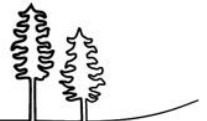
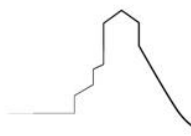


# **APPENDIX 5.0A**

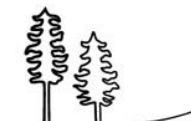
## **Closure Objectives**



**Table 5.0A1: Site-Wide Closure Objectives and Criteria**

Closure Objectives	Closure Criteria	Monitoring/Maintenance and Inspection
SW1. Air quality is maintained at concentrations protective of human health and the environment	<ul style="list-style-type: none"> <li>• <b>SW1-1</b> Air quality standards outlined in the Dust Management and Monitoring Plan and associated Air Quality Monitoring Program are met.</li> </ul>	<p><i>Active Remediation Phase and Adaptive Management:</i></p> <ul style="list-style-type: none"> <li>• Dust Management and Monitoring Plan</li> <li>• Qualitative and quantitative monitoring per Air Quality Monitoring Program(s)</li> </ul> <p><i>Post Closure Phase:</i></p> <ul style="list-style-type: none"> <li>• Qualitative and quantitative monitoring per Air Quality Monitoring Program(s)</li> </ul>
SW2. Site-wide loading of contaminants to the environment is reduced to the extent practicable	<ul style="list-style-type: none"> <li>• <b>SW2-1</b> Approved effluent quality criteria are met</li> <li>• <b>SW2-2</b> Approved surface runoff quality criteria are met, as per the approved Water Management and Monitoring Plan</li> <li>• <b>SW2-3</b> Water quality objectives in the receiving environment are met (see Objective WTP 2)</li> <li>• <b>SW2-4</b> Concentrations of metals in tissue of small-bodied, resident fish and benthos tissue in Baker Creek decrease over time</li> </ul> <p><i>Criteria in Development related to Passive and Semi-Passive Treatment Technology Reclamation Research Plan</i></p> <ul style="list-style-type: none"> <li>• <b>SW2-5</b> Reclamation research plan to review if additional treatment methods such as wetlands can further reduce site-wide loading of contaminants</li> </ul>	<p><i>Active Remediation Phase, Adaptive Management and Post Closure Phase:</i></p> <ul style="list-style-type: none"> <li>• Surveillance Network Program: Water quality monitoring in surface water, runoff water, treated effluent</li> <li>• Water Management and Monitoring Plan: Operational Monitoring Plan: sump water quality</li> <li>• Aquatic Effects Monitoring Program: Water, toxicity, fish and benthos, sediment quality monitoring in Baker Creek</li> </ul>
SW3. Remaining operational engineered structures/controls meet appropriate design levels required for long-term care	<ul style="list-style-type: none"> <li>• <b>SW3 -1</b> Elements are designed to meet regulations as described in tables of Chapter 5 and below, and design specifications are met.</li> <li>• <b>SW3-2</b> Minimise perpetual care requirements including the following:               <ul style="list-style-type: none"> <li>• Lower in maintenance</li> <li>• Lower long-term costs</li> <li>• Remaining operational controls</li> <li>• Low probability of failure of engineering controls</li> <li>• Demonstrated design redundancy</li> </ul> </li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>• As-built design report signed and sealed by Qualified Professional Engineer and submitted to MVLWB.</li> </ul> <p><i>Active Remediation, Adaptive Management and Post Closure Phases:</i></p> <ul style="list-style-type: none"> <li>• WSCC Mines Inspector and Qualified Professional Engineer inspection confirms Building Codes met.</li> <li>• Perpetual Care Plan</li> </ul>
SW4. Residual risks are identified, and local residents have been, and continue to be, informed of residual hazards (post-remediation)	<ul style="list-style-type: none"> <li>• <b>SW4-1</b> Public communication initiatives as outlined in the Perpetual Care Plan / Engagement Plan are undertaken</li> <li>• <b>SW4-2</b> A land map with residual risks identified and available at Land Titles and project websites</li> <li>• <b>SW4-3</b> Perimeter barriers are installed near risk areas to reduce inadvertent access and are visually displeasing to communicate that residual risk is present (e.g., large grey boulders, earth embankments)</li> <li>• <b>SW4-4</b> Landowners are provided with necessary information for Land title caveats, zoning (administrative controls)</li> </ul>	<p><i>Active Remediation:</i></p> <ul style="list-style-type: none"> <li>* Perpetual Care Plan / Engagement Plan - Further engagement required on standard communication like newsletters, site visits, maps, websites, local radio and television alerts. Alternative forms of communication (e.g., mural, signs in various languages) will be discussed with affected parties</li> </ul> <p><i>Active Remediation, Adaptive Management and Post Closure Phases:</i></p> <ul style="list-style-type: none"> <li>• Engagement plan requirements met and reported to MVLWB</li> <li>• Perpetual Care Plan</li> </ul>
SW5: Remediated areas are stabilized and protected from erosion in final configuration	<ul style="list-style-type: none"> <li>• <b>SW5-1</b> Elements are designed to meet regulations as described in tables of Chapter 5 and below, and design specifications are met.</li> <li>• <b>SW5-2</b> Approved effluent quality criteria are met</li> <li>• <b>SW5-3</b> Approved surface runoff quality criteria are met, as per the approved Water Management and Monitoring Plan</li> <li>• <b>SW5-4</b> Water Quality Objectives in the receiving environment are met</li> <li>• <b>SW5-5</b> Remediated areas are designed to resist erosion including armouring and targeted revegetation with native species</li> </ul>	<p><i>Active Remediation Phase, Adaptive Management and Post Closure Phase:</i></p> <ul style="list-style-type: none"> <li>• <i>Fisheries Act</i> Authorization – vegetation requirements and monitoring (awaiting further consultation)</li> <li>• Water Management and Monitoring Plan/Surveillance Network Program - Water quality monitoring in surface water and runoff water.</li> <li>• Erosion and Sediment Control Plan(s) (Active Remediation Only)</li> <li>• Operational Monitoring Plan: structural erosion monitoring; visual inspection for slumping, mass wasting, cracking</li> </ul>
SW6. Incorporate traditional and local knowledge and affected party input into closure design and implementation, where appropriate and available	<ul style="list-style-type: none"> <li>• <b>SW6-1</b> Collect and utilize traditional and local knowledge for Site in environmental assessment process to inform remediation decisions where parties are interested, and information is available</li> <li>• <b>SW6-2</b> Collect updated traditional and local knowledge for Site with relevant affected parties, where parties are interested and available</li> <li>• <b>SW6-3</b> Document for relevant design elements and monitoring programs that traditional knowledge was reviewed and incorporated, to the extent practical</li> </ul>	<p><i>Active Remediation Phase, Adaptive Management and Post Closure Phase:</i></p> <ul style="list-style-type: none"> <li>• Engagement Plan- document plans to gather traditional knowledge</li> <li>• Quantitative Risk Assessment – document residual risk including local and traditional knowledge</li> <li>• <i>Fisheries Act</i> Authorization – use of traditional knowledge in design and monitoring of Baker Creek re-alignment and habitat replacement and monitoring</li> <li>• Input and involvement in Archaeological study and monitoring</li> <li>• Aquatic Effects Monitoring Program, Wildlife and Wildlife Habitat Management and Monitoring Plan – gathering and use of traditional knowledge to design monitoring and implement monitoring and interpret results</li> </ul>

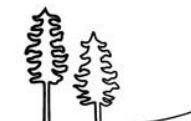
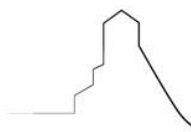
Note: Site-wide objectives and criteria are linked to numerous remediation activities and as such specific activities are not listed in this table. SW = site-wide; WTP = water treatment plant; GNWT = Government of the Northwest Territories; MVLWB = Mackenzie Valley Land and Water Board; \* Number has been rounded to the nearest metre



**Table 5.0A-2: Underground Mine Workings Closure Objectives, Activities and Criteria**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>UG1. Access to underground workings from surface openings is restricted for the safety of humans and wildlife</p>	<ul style="list-style-type: none"> <li>Seal vertical openings to surface with either a cast-in-place engineered concrete cap, or a pre-cast cap placed over the opening.</li> <li>Seal horizontal openings to surface using waste rock, concrete, polyurethane foam, or combinations thereof.</li> <li>Close openings to surface present within the open pits in a manner that supports pit closure criteria (see Section 5.3).</li> </ul>	<ul style="list-style-type: none"> <li><b>UG1-1</b> All openings to underground are secured in a manner that meets the NWT <i>Mine Health and Safety Act</i>.</li> <li><b>UG1-2</b> Access to unsecured openings to underground areas is restricted.</li> <li><b>UG1-3</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met, such that access to the underground is restricted.</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Inspection by Mines Inspector as per the NWT <i>Mine Health and Safety Act</i>.</li> <li>Operational Monitoring Plan: Physical inspection(s) of closed openings to surface.</li> </ul>
<p>UG2. Minewater elevation will be managed to maintain mine physical stability and chemical stability</p>	<ul style="list-style-type: none"> <li>Construct the new deep well station in the C Shaft area to pump water from the mine pool to the new WTP (refer to Objective WTP2)</li> <li>Maintain the minewater elevation such that it forms a groundwater sink (see Water Management and Monitoring Plan for details on pumping).</li> </ul>	<p><i>Criterion in Development pending Planned Minewater Level Raise Reclamation and Research Plan</i></p> <ul style="list-style-type: none"> <li><b>UG2-1</b> Maintain minewater level at or below approximately the 750 L which is equivalent to -77 m * above mean sea level (amsl) ± seasonal fluctuation (refer Water Management and Monitoring Plan)</li> </ul> <p><i>Criterion in Development pending engineering works / Planned Minewater Level Raise Reclamation and Research Plan</i></p> <ul style="list-style-type: none"> <li><b>UG2-2</b> Minewater drawdown will not be faster than an amount that could destabilize the mine (estimated as 0.1 m/day, to be confirmed)</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional</li> <li>Water Management and Monitoring Plan and Surveillance Network Program; monitoring of minewater pool chemistry and of minewater level at mine water intake.</li> <li>Planned Minewater Level Raise Reclamation Research Plan</li> </ul> <p><i>Adaptive Management and Post-Closure Phase:</i></p> <ul style="list-style-type: none"> <li>Water Management and Monitoring Plan and Surveillance Network Program; <ul style="list-style-type: none"> <li>Monitoring of minewater pool chemistry and of minewater level at mine water intake.</li> <li>Monitoring of groundwater chemistry and levels to verify mine is a groundwater sink and confirm chemical stability.</li> </ul> </li> <li>Operational Monitoring Plan: Monitoring to verify stabilizing backfill stays in place from surface via boreholes cameras.</li> </ul>
<p>UG3. Structures, controls, and adaptive management approaches used for the remediation of the arsenic trioxide meet appropriate design levels required for long-term care</p>	<ul style="list-style-type: none"> <li>Plug underground openings connected to arsenic stopes and chambers and backfill all voids on top of arsenic stopes and chambers to provide thermal continuity to the frozen shell.</li> <li>Backfill voids on top of arsenic stopes and chambers and near-surface non-arsenic stopes and boundary pillars as necessary</li> <li>Establish new long-term underground mine access location within the Core Industrial Area.</li> </ul>	<ul style="list-style-type: none"> <li><b>UG3-1</b> Meets the NWT <i>Mine Health and Safety Act</i>.</li> <li><b>UG3-2</b> Satisfactory final inspection is performed by a Qualified Professional and the Mines Inspector.</li> <li><b>UG3-3</b> Stabilizing backfill stays in place.</li> <li><b>UG3-4</b> Potentially unstable crown pillar voids are backfilled such that subsidence does not cause damage to critical infrastructure.</li> <li><b>UG3-5</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met.</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional</li> <li>Operational Monitoring Plan: Monitoring to verify stabilizing backfill stays in place and surface subsidence.</li> </ul>
<p>UG4. Underground is stabilized (geotechnically and physically) to reduce risks for public, workers, and wildlife safety</p>	<ul style="list-style-type: none"> <li>Stabilize voids under surface crown pillars and under pits with paste tailings or other suitable materials as required based on stability assessments.</li> <li>Backfill drifts connected to arsenic stopes and chambers to protect bulkheads in the event of unexpected mine flood or thawing of arsenic in chambers.</li> </ul>	<ul style="list-style-type: none"> <li><b>UG4-1</b> Drifts connected to arsenic stopes will be filled to the extent of the frozen shell</li> <li><b>UG4-2</b> Paste backfill meets minimum 100 kPa specification; to prevent liquefaction during seismic event</li> <li><b>UG4-3</b> Stabilizing backfill stays in place as documented by cameras/inspections</li> <li><b>UG4-4</b> Design engineering drawings for underground backfill are signed and sealed by a Qualified Professional and the specifications outlined therein are met</li> </ul> <p><i>Criteria in Development pending engineering work</i></p> <ul style="list-style-type: none"> <li><b>UG4-5</b> Voids under potentially unstable crown pillars will be filled to the extent practical (dependant on void geometry and access) such that no more than 1 m subsidence would occur at ground surface.</li> <li><b>UG4-6</b> Voids under pits will be filled to the extent practical (depending on void geometry and access) to prevent no more than 1 m subsidence of the fill in the pits, and damage to pit covers, where installed.</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional</li> </ul> <p>Operational Monitoring Plan:</p> <ul style="list-style-type: none"> <li>Monitoring of position of stabilizing backfill in arsenic and non-arsenic stope voids from surface via boreholes cameras.</li> <li>Monitoring of stope backfill settlement under pits.</li> <li>Monitoring of settlement of fill in pits (see Objective P2)</li> </ul>

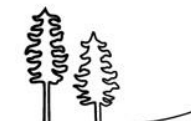
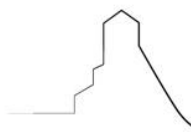
NWT = Northwest Territories; MVLWB = Mackenzie Valley Land and Water Board; WTP = water treatment plant; L = level; \* Number has been rounded to the nearest metre



**Table 5.0A-3: Freeze Program Closure Objectives, Activities and Criteria**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>F1. Arsenic trioxide dust and arsenic-impacted waste disposal areas are not, and will not become, a source of contamination to the environment</p>	<ul style="list-style-type: none"> <li>Prepare and install supporting site infrastructure for the freeze program:               <ul style="list-style-type: none"> <li>Civil works including access roads, backfilling, and pads.</li> <li>Underground mine works (refer to Objectives UG3 and UG4).</li> <li>Electrical works, instrumentation, and monitoring equipment.</li> </ul> </li> <li>Freeze the bedrock or fill around each arsenic containing chamber, stope, drift or pit fill using thermosyphons to develop the frozen shell.</li> </ul>	<ul style="list-style-type: none"> <li><b>F1-1</b> The dust will be considered contained when a 5 m wide frozen shell at -5°C or colder exists in the bedrock or fill around each arsenic containing chamber, stope, drift or fill in pit.</li> <li><b>F1-2</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met, to contain the arsenic trioxide dust.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional</li> </ul> <p><i>Active Remediation Phase, Adaptive Management and Post-Closure Phase:</i> Arsenic Trioxide Frozen Shell Management and Monitoring Plan</p> <ul style="list-style-type: none"> <li>Monitoring of frozen shell temperatures to show evidence that they remain at, or colder than -5°C within 5 m of an arsenic containing chamber, stope, drift or fill in pits. Any warming trends will be evaluated and if necessary, mitigation efforts to protect the frozen shell will be undertaken.</li> <li>Post-closure monitoring will be used to evaluate climate change impacts on the frozen shell with action being taken to satisfy the containment criteria</li> <li>Results of thermal modelling will predict performance, and instrumentation monitoring demonstrates the performance of the system; the alignment between modelling and monitoring shows the system will remain effective under a wide range of climate change and operational scenarios.</li> <li>Review and regular calibration of thermal models to confirm frozen shell performance.</li> <li>Inspection of thermosyphons, electrical, instrumentation, and monitoring equipment.</li> </ul>
<p>F2. Reversibility for future technology developments in remediation has been maintained</p>	<ul style="list-style-type: none"> <li>Freeze the bedrock or fill around each arsenic containing chamber, stope, drift or pit fill using thermosyphons to develop the frozen shell.</li> <li>Plug drifts connected to arsenic stopes and chambers with a fine-grained cemented material that can be excavated later if access through the long-term portal to the arsenic dust is required in the future (refer to Objective UG3).</li> </ul>	<ul style="list-style-type: none"> <li><b>F2-1</b> Reversibility is maintained as each arsenic containing chamber, stope, drift or pit fill with arsenic trioxide dust and arsenic-impacted waste are contained within the frozen shell.</li> <li><b>F2-2</b> Backfill at minimum 100 kPa strength can be excavated to access chambers. Refer to UG4-2.</li> <li><b>F2-3</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met, such that reversibility for future access is maintained.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional</li> </ul> <p><i>Active Remediation Phase, Adaptive Management and Post-Closure Phase:</i> Arsenic Trioxide Frozen Shell Management and Monitoring Plan</p> <ul style="list-style-type: none"> <li>Monitoring of frozen shell temperatures to show evidence they remain at, or colder than -5°C within 5 m of an arsenic containing chamber, stope, drift or fill in pits. Any warming trends will be evaluated and if necessary, mitigation efforts to protect the frozen shell will be undertaken.</li> <li>Review and regularly calibrate thermal models to confirm freeze performance to confirm frozen shell performance.</li> <li>Inspection of thermosyphons, electrical, instrumentation, and monitoring equipment.</li> <li>Independent review conducted every 20 years to evaluate effectiveness, and consider research results.</li> </ul>

MVLWB = Mackenzie Valley Land and Water Board



**Table 5.0A-4: Open Pits Mine Workings Closure Objectives and Criteria**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>P1. Potential for flooding the underground by way of the pits is reduced</p>	<ul style="list-style-type: none"> <li>Re-align Baker Creek such that potential for pit flooding is reduced (refer to Objective BC1).</li> <li>Install water diversions/berms, when needed to protect underground water quantity (refer to Objective UG1)</li> <li>Install scour protection between water courses and the pits that protect berms, diversions and vulnerable topography*</li> <li>Install engineered cover over pit when needed to protect underground water quantity or quality (refer to Objective UG1)</li> </ul>	<ul style="list-style-type: none"> <li><b>P1-1</b> Berms/Diversions are built to an elevation of Baker Creek PMF.</li> <li><b>P1-2</b> Diversions/berms include low flux features to limit water entering the underground to achieve UG1 criteria of maintaining the minewater level.</li> <li><i>Refer to Objective BC1</i> for criteria related to the re-alignment of Baker Creek</li> <li><b>P1-3</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met, such that potential flooding for the underground through the pits is reduced.</li> </ul> <p><i>Criteria in Development through engineering works</i></p> <ul style="list-style-type: none"> <li><b>P1-4</b> Fill in pits or pit cover settlement is confirmed not to exceed damage criteria (to be developed); refer to Objective UG4 for voids under pits</li> <li><b>P1-5</b> Where berms or diversions are predicted to be in contact with the PMF, the minimum size of scour protection will be calculated based on water flow velocity and depth during PMF.</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional</li> <li>Operational Monitoring Plan: Scour-resistant water diversions/berms monitored for erosion annually and after each major flood event and inspections of pit fill and pit cover, where installed.</li> <li>Water Management and Monitoring Plan: Minewater monitoring for elevation changes (refer to Objective UG2).</li> </ul>
<p>P2. Public, worker, and wildlife safety risks associated with pits are reduced</p>	<ul style="list-style-type: none"> <li>Backfill underground voids connected to pits as required (refer to Objective UG4)</li> <li>Fully or partially fill pits and re-contour the smaller B4 Pit.</li> <li>Recontour remnant high walls above A1 and A2 pits.</li> <li>Cap each pit with clean, coarse material of large size to discourage public and animal use</li> </ul>	<ul style="list-style-type: none"> <li><b>P2-1</b> Pits will not permanently retain ponded water</li> <li><b>P2-2</b> Design engineering drawings for fill placement into pits are signed and sealed by a Qualified Professional and the specifications outlined therein are met</li> </ul> <p><i>Criteria in Development related to further engineering works:</i></p> <ul style="list-style-type: none"> <li><b>P2-3</b> Recontour high walls to appropriate slope (pending further engineering work)</li> <li><b>P2-4</b> Settlement and erosion of fill in pit/cap occurs within standard parameters (appropriate numbers to be determined differential settlement of 1% of fill height pending further engineering work)</li> <li><b>P2-5</b> Pit cover criterion (to be determined pending further engineering work)</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection of grade and shape of fill in pits.</li> <li>Operational Monitoring Plan: Monitoring of fill in pits             <ul style="list-style-type: none"> <li>Monitor for settlement and erosion annually and after each major flood event.</li> <li>Monitor for wildlife presence in pit area.</li> <li>Survey of fill of pits as required.</li> </ul> </li> <li>Water Management and Monitoring Plan, Operational Monitoring Plan             <ul style="list-style-type: none"> <li>Inspections for ponded water in pits.</li> </ul> </li> <li>Waste Management and Monitoring Plan – volumes of waste</li> <li>Surveillance Network Program - water inflow through pit covers does not exceed expected values required to support mine water elevation management requirements</li> <li>Wildlife and Wildlife Habitat Management and Monitoring Plan – monitoring of wildlife presence near pits</li> </ul>
<p>P3. Pit fill material will not become a source of contamination to the environment</p>	<ul style="list-style-type: none"> <li>Fill pits with a combination of borrow and contaminated granular fill from the Site.</li> <li>Cap each pit with clean, coarse material of large size to reduce potential for dust.</li> <li>Install engineered cover over pit when needed to protect underground water quality (refer to Objective WTP2)</li> </ul>	<ul style="list-style-type: none"> <li><b>P3-1</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met, such that fill in the pits will not become a source of contamination.</li> <li><b>P3-2</b> Runoff off pits (caps or covers) meets surface runoff quality criteria, as per the approved Water Management and Monitoring Plan</li> <li><i>Refer to Objective SW1 for Air Quality standards are met</i></li> <li><i>Refer to Objective UG2 and WTP2, EQC are achieved</i></li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional</li> <li>Surveillance Network Program, - Water quality monitoring of mine water quality, treated effluent quality</li> <li>Air Quality Monitoring Plan</li> </ul>

MVLWB = Mackenzie Valley Land and Water Board; \* Vulnerable topography = landforms or infrastructure that are susceptible to flooding either because they are in a flow path, are easily erodible or have high value aesthetically or for the community and require protection from flooding.

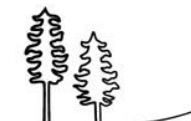
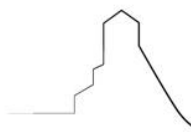


Table 5.0A-5: Contaminated Soils and Sediment

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>CS1. Contaminated materials (i.e., soil, sediment, granular fill, and tailings) are remediated or risk managed to reduce risk to humans and to aquatic and terrestrial ecosystems</p>	<ul style="list-style-type: none"> <li>Remove and dispose of heavily contaminated granular fill from the mill/roaster area in the frozen portion of B1 Pit or within another suitable frozen zone.</li> <li>Remove and dispose of contaminated granular fill in A1 and B1 Pits and TCAs.</li> <li>Remove and dispose of contaminated fine-grained soil in TCAs.</li> <li>Remove and dispose of PHC contaminated soil in TCAs.</li> <li>Excavate tailings-impacted fine-grained soil downgradient of Dam 3 and place within the TCAs.</li> <li>Excavate Baker Pond contaminated sediment and Jo-Jo Lake tailings and dispose of in the TCAs.</li> <li>Remove contaminated sediment from Baker Creek and dispose of in the TCAs.</li> <li>Backfill excavated areas with new quarried rock.</li> <li>Construct engineered soil covers in areas where contaminated materials remain at a depth significantly greater than 2 m (e.g., Mill Pond, former Calcine Pond, and Area 4).</li> <li>Partially excavate and/or cover nearshore sediments with clean backfill material.</li> <li>Construct fence in the core area of site, surrounding area of primary roaster stack deposition.</li> </ul>	<ul style="list-style-type: none"> <li><b>CS1-1:</b> Industrial soil quality standard of 340 mg/kg for total arsenic is met in Developed Areas.</li> <li><b>CS1-2:</b> Residential soil quality standard of 160 mg/kg for total arsenic is met in the Townsite, Shoreline Lands, and Marina area.</li> <li><b>CS1-3:</b> Runoff from engineered soil covers meets surface runoff quality criteria as per the approved Water Management and Monitoring Plan.</li> <li><b>CS1-4:</b> Fence installed to encompass area most impacted by roaster emissions fallout.</li> <li><i>Refer to Objective SW4;</i> Administrative controls in place; such as signs.</li> <li><b>CS1-5:</b> Contaminated sediment in Baker Creek removed down to bedrock or underlying native soil.</li> <li><b>CS1-6</b> Final backfill grading will not permanently retain ponded water.</li> <li><b>CS1-7</b> Design engineering drawings for soil covers are signed and sealed by a Qualified Professional and the specifications outlined therein are met.</li> </ul> <p><i>Criterion in Development with Contamination Downgradient of Dam 3 Reclamation Research Plan</i></p> <ul style="list-style-type: none"> <li><b>CS1-8:</b> Tailings-impacted area downgradient of Dam 3 TBD</li> </ul> <p><i>Criteria in Development related to Fisheries Act Authorization</i></p> <ul style="list-style-type: none"> <li><b>CS1-9</b> Shoreline lands sediment cover TBD</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB</li> <li>Satisfactory final inspection by a Qualified Professional</li> <li>Soil sampling: <ul style="list-style-type: none"> <li>In Developed Areas, confirmatory soil samples obtained from the limits of excavations to verify GNWT ENR guidelines for industrial land use are met.</li> <li>In the tailings-impacted area downgradient of Dam 3, confirmatory soils samples obtained from the limits of excavations to verify appropriate criterion is met.</li> <li>In the Townsite, Shoreline Lands, and Marina area, confirmatory soil samples obtained from the limits of excavations to verify GNWT ENR guidelines for residential land use are met.</li> </ul> </li> <li>Sediment inspection in Baker Creek confirms contaminated sediment was removed</li> </ul> <p><i>Adaptive Management and Post-Closure Phase:</i></p> <ul style="list-style-type: none"> <li>Aquatic Effects Monitoring Program - sediment and water sampling in Baker Creek and Yellowknife Bay</li> <li>Operational Monitoring Plan - Soil/sediment cover monitoring for settlement and erosion by a Qualified Professional</li> </ul>

PHCs = petroleum hydrocarbons; TCA = Tailings Containment Area; MVLWB = Mackenzie Valley Land and Water Board; GNWT = Government of the Northwest Territories; ENR = Environment and Natural Resources; TBD = to be determined

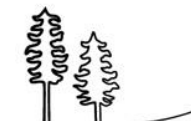
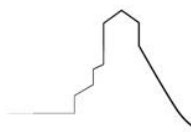
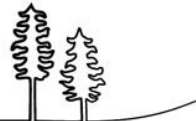
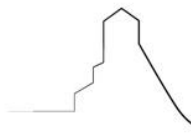


Table 5.0A-6: Baker Creek and Surface Water

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>BC1. Baker Creek is prevented from entering the underground workings and the arsenic chambers</p>	<ul style="list-style-type: none"> <li>Build a geomorphic channel and flood plain that accommodates the probable maximum flood (PMF).</li> <li>Realign reaches to avoid openings to the underground and pits and to provide adequate channel and flood plain dimensions and straighter flow path.</li> <li>Install surface water diversions where required in large sub watersheds to convey runoff around pits to Baker Creek (refer to Objective P1).</li> <li>Seal openings to surface from underground (refer to Objective UG1).</li> </ul>	<ul style="list-style-type: none"> <li><b>BC1-1</b> Design engineering drawings for Baker Creek are signed and sealed by a Qualified Professional and the specifications outlined therein are met, including accommodation of a geomorphic channel and flood plain that allows passage of the probable maximum flood (PMF).</li> <li><b>BC1-2</b> Geomorphic low flow channel designed to convey frequent flood events.</li> <li><b>BC1-3</b> No sinkholes or openings to underground are observed below PMF elevation in annual inspections.</li> </ul> <p><i>Criteria in Development with engineering works</i></p> <ul style="list-style-type: none"> <li>Refer to P1-5 - scour protection criterion.</li> <li>Slopes of berms and diversions will be designed with a minimum static geotechnical factor of safety of 1.3</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by a Qualified Professional.</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Annual pre- and post-freshet inspections of Baker Creek channel by a Qualified Professional to identify and document changes from as-built conditions (e.g., erosion, sinkhole formation).</li> </ul>
<p>BC2. Baker Creek is physically stabilized and capable of providing adequate flood conveyance throughout the site without long-term active care/maintenance</p>	<ul style="list-style-type: none"> <li>Construct a flood plain in various reaches of Baker Creek to convey extreme flood (PMF), with mitigation for channel ice deposits.</li> <li>Construct channel bed foundation such that it mitigates potential subsurface instabilities due to changes in thermal regime.</li> <li>Construct erosion resistant channel to be dynamically stable during PMF events.</li> </ul>	<ul style="list-style-type: none"> <li><b>BC2-1</b> Design engineering drawings for Baker Creek are signed and sealed by a Qualified Professional and the specifications outlined therein are met, including accommodation for the PMF.</li> <li><b>BC2-2</b> Flood plain design geometry provides capacity for ice storage.</li> <li><b>BC2-3</b> Low flow channel lateral migration does not impinge on vulnerable topography*</li> <li>Refer to BC1-3 - No sinkholes or openings to underground are observed below PMF elevation in annual inspections.</li> </ul> <p><i>Criteria in Development with engineering works</i></p> <ul style="list-style-type: none"> <li><b>BC2-4</b> Permeable channel substrates; granular channel bed material provides for interstitial seepage as mitigation for channel ice deposits</li> <li><b>BC2-5</b> Design includes geotechnical and permafrost evaluation for alignment selection, design considers appropriate mitigations for vulnerable topography*</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional.</li> <li>Satisfactory final inspection by a Qualified Professional</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Inspections by a Qualified Professional;</li> <li>Operational Monitoring Plan <ul style="list-style-type: none"> <li>Annual pre- and post-freshet inspections of Baker Creek channel.</li> <li>Hydrometric monitoring of Baker Creek and Trapper Creek, and updates to flood models as required.</li> <li>Monitoring and inspection for build up of channel ice.</li> </ul> </li> </ul>
<p>BC3. Surface natural drainage patterns are re-established to the extent practicable and to provide conveyance of site runoff, while managing flood risk to closure infrastructure</p>	<ul style="list-style-type: none"> <li>Restore pre-development drainage patterns, to the extent practicable.</li> <li>Design conveyance channels, ponds, and wetlands with appropriate erosion resistance to mitigate surface runoff flood risk to closure infrastructure.</li> <li>Eliminate permanent surface storage of minewater and runoff (refer to Objective WTP1).</li> </ul>	<ul style="list-style-type: none"> <li><b>BC3-1</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met, such that natural drainage patterns are reinstated, and surface water is conveyed.</li> <li><b>BC3-2</b> Baker Creek inflow locations in the final configuration are similar to pre-development based on natural topography and sub-watersheds.</li> <li><b>BC3-3</b> Surface runoff is conveyed by natural watercourses to the extent practicable.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional.</li> <li>Satisfactory final inspection by a Qualified Professional</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Inspections by Qualified Professional.</li> <li>Water Management and Monitoring Plan, Operational Monitoring Plan <ul style="list-style-type: none"> <li>Annual pre- and post-freshet inspections.</li> </ul> </li> </ul>
<p>BC4. Water quality and sediment quality in Baker Creek are improved to reduce exposure of aquatic and terrestrial organisms to contaminants</p>	<ul style="list-style-type: none"> <li>Stop effluent discharge into Baker Creek from the existing ETP and install and operate new WTP with outfall to Yellowknife Bay (refer to Objectives WTP1 and WTP2).</li> <li>Remove sediments in Baker Creek and backfill the area with uncontaminated material.</li> <li>Dispose camp water and sewage off site.</li> <li>Implement site remediation activities to reduce loadings to surface water in Baker Creek (cover TCAs and pits, decommission settling and polishing ponds, excavate contaminated soil areas and backfill).</li> <li>Collect runoff from engineered structures and convey to the minewater pool until it meets Surface runoff quality criteria, as per the approved Water Management and Monitoring Plan</li> </ul>	<ul style="list-style-type: none"> <li><b>BC4-1</b> Meet approved effluent quality criteria (refer to Objective WTP2).</li> <li><b>BC4-2</b> Site-specific water quality objectives are met in Yellowknife Bay, in the vicinity of the outlet of Baker Creek.</li> <li><b>BC4-3</b> Approved surface runoff quality criteria are met, as per the approved Water Management and Monitoring Plan.</li> <li>Refer to CS1 for sediment excavation.</li> <li><b>BC4-4</b> Concentrations of total arsenic in Baker Creek are reduced in comparison to pre-remediation conditions.</li> </ul> <p><i>Passive and Semi-Passive Treatment Technology Reclamation Research Plan</i></p> <ul style="list-style-type: none"> <li>Refer to SW2-5.</li> <li><b>BC4-5:</b> Water quality in lower Baker Creek is similar to upstream concentrations after remediation activities are complete.</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Surveillance Network Program: Water quality monitoring of treated effluent, Baker Creek, and runoff water.</li> <li>Aquatic Effects Monitoring Program - Sediment quality monitoring of Baker Creek post-construction and intermittently as required.</li> <li>Aquatic Effects Monitoring Program and/or Fisheries Act Authorization Monitoring: Small-bodied, resident fish tissue monitoring post-construction and intermittently as required.</li> </ul>

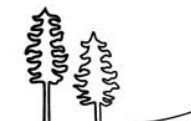
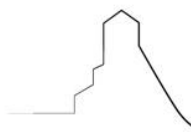


**Table 5.0A-6: Baker Creek and Surface Water**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>BC5. Once realigned, Baker Creek is restored to a state that encourages natural rehabilitation</p>	<ul style="list-style-type: none"> <li>• Perform grading according to overall site surface drainage plan.</li> <li>• Provide physical habitat modifications to the channel to provide appropriate habitat and re-colonization for a range of aquatic species at relevant life stages; as per <i>Fisheries Act</i> Authorization requirements; including the removal of culvert in Reach 2.</li> <li>• Revegetate shoreline with native species to reduce erosion and increase fish habitat features.</li> <li>• Restore natural drainage patterns, where possible.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>BC5-1</b> Design and build the physical habitat modifications as per the requirements of <i>Fisheries Act</i> Authorisation.</li> </ul> <p><i>Criteria in Development</i> through the outcomes of <i>Fisheries Act</i> Authorisation</p> <ul style="list-style-type: none"> <li>• <b>BC5-2</b> Fish and benthos are present after Baker Creek realignment and sediment replacement</li> <li>• <b>BC5-3</b> Aquatic monitoring confirms spring spawning in Baker Creek by Longnose Sucker and Arctic Grayling including presence of adults, eggs, and young of year that out migrate out of creek in late spring.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>• Satisfactory final inspection is carried out by a Qualified Professional.</li> <li>• As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB and Fisheries and Oceans Canada.</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>• <i>Fisheries Act</i> Authorization monitoring of fish and benthos in frequency defined by Fisheries and Oceans Canada.</li> </ul>

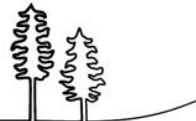
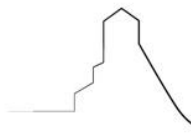
PMF = Probable Maximum Flood; MVLWB = Mackenzie Valley Land and Water Board; ETP = effluent treatment plant; TCA = Tailings Containment Area; WTP = water treatment plant; TBD = to be determined; \* Vulnerable topography = landforms or infrastructure that are susceptible to flooding either because they are in a flow path, are easily erodible or have high value aesthetically or for the community and require protection from flooding





**Table 5.0A-7: Tailings Containment Areas and Dams Closure Objectives**

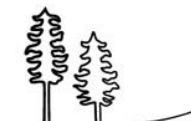
Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
T1. Arsenic loading from the tailings containment area to the environment is reduced	<ul style="list-style-type: none"> <li>Reduce overall footprint of tailings (see Objective T5).</li> <li>Grade tailings to promote positive drainage of precipitation off the TCAs and avoid ponding.</li> <li>Cover tailings in the TCAs with a low permeability geosynthetic cover to minimize the possibility that precipitation will come in contact with or seep through tailings.</li> <li>Protect the geosynthetic material with a 1 m layer of fine and coarse material, promoting its long-term integrity.</li> <li>Construct spillway channels to route surface water to receiving environment (see Objective BC3), once surface runoff quality criteria are met.</li> </ul>	<ul style="list-style-type: none"> <li><b>T1-1</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met, such that arsenic loading to the environment is reduced.</li> <li><b>T1-2</b> Runoff water quality from North Pond, Central Pond, and Northwest Pond meets or is lower than applicable surface runoff quality criteria as per the approved Water Management and Monitoring Plan.</li> <li><b>T1-3</b> Runoff water quality from former South Pond area meets or is lower than applicable surface runoff quality criteria for direct discharge to Yellowknife Bay, as per the approved Water Management and Monitoring Plan.</li> <li>Refer to SW1, meeting air quality standards</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by inspector.</li> <li>Follow Tailings Management and Monitoring Plan once closure activities are complete</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Water Management and Monitoring Plan, Operational Monitoring Plan - water quality monitoring of surface, groundwater and sumps.</li> <li>Surveillance Network Program - water quality monitoring of surface, groundwater and sumps.</li> </ul>
T2. Risk of tailings erosion and human contact with tailings in the foreshore area is reduced	<ul style="list-style-type: none"> <li>Design and place cover on tailings in the foreshore tailings area.</li> <li>Administrative controls, refer Objective SW4.</li> </ul>	<ul style="list-style-type: none"> <li><b>T2-1</b> Design engineering drawings for the foreshore tailings cover are signed and sealed by a Qualified Professional and the specifications outlined therein are met.</li> </ul> <p><i>Criteria in Development with further engineering work and development of the Fisheries Act Authorization</i></p> <ul style="list-style-type: none"> <li><b>T2-2</b> Inspection confirms limited erosion within design allowance (criterion to be determined).</li> <li><b>T2-3</b> Cover depth is X m, and extent is X m preventing wave and ice scour (criterion to be determined).</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by inspector.</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Operational Monitoring Plan <ul style="list-style-type: none"> <li>Periodic inspections/surveys of foreshore tailings area to verify that tailings remain covered.</li> </ul> </li> </ul>
T3. Dam stability is maintained	<ul style="list-style-type: none"> <li>Evaluate stability of dams in their closure configuration. Where necessary, undertake stabilization works such as buttressing or reconstruction to confirm that all permanent dams meet stability criteria.</li> <li>Re-evaluate dam stability following construction to confirm compliance with CDA criteria.</li> </ul>	<ul style="list-style-type: none"> <li><b>T3-1</b> Dams meet applicable CDA stability criteria.</li> <li><b>T3-2</b> Design engineering drawings for dam reinforcement works are signed and sealed by a Qualified Professional and the specifications outlined therein are met.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by inspector.</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Tailings Management and Monitoring Plan and Dam monitoring including: <ul style="list-style-type: none"> <li>Monitoring of slopes (slope indicators), phreatic surface (piezometers) and settlement at select locations, as designated by the Engineer of Record.</li> <li>Annual dam inspections by qualified engineer.</li> <li>Dam Safety review in accordance with CDA Guidance.</li> </ul> </li> </ul>
T4. Avoid surface water ponding on Tailings Containment Areas	<ul style="list-style-type: none"> <li>Contour tailings and cover tailings to stable grades, the grade should promote drainage to avoid surface water ponding.</li> </ul>	<ul style="list-style-type: none"> <li><b>T4-1</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met.</li> <li><b>T4-2</b> Cover meets minimum 0.5% grade for site drainage.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by inspector.</li> </ul> <p><i>Adaptive Management and Post-Closure Phase:</i></p> <ul style="list-style-type: none"> <li>Tailings Management and Monitoring Plan <ul style="list-style-type: none"> <li>Visual inspection and periodic surveys of the TCA to verify that grades are maintained and that areas of significant ponding do not develop.</li> <li>Visual inspection of covers for evidence of erosion and exposure of geosynthetic barrier.</li> </ul> </li> </ul>
T5. Footprint of tailings is reduced	<ul style="list-style-type: none"> <li>Relocate South Pond to within the remaining TCAs to provide a reduction in the total area covered by tailings.</li> <li>Relocate Jo-Jo tailings and Dam 3 tailings-impacted soils to remaining TCAs (see Objective CS1).</li> </ul>	<ul style="list-style-type: none"> <li><b>T5-1</b> The total tailings impoundment footprint is reduced by approximately 90,000 m<sup>2</sup>.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Volume of material moved is recorded in Design and Construction Plans and as-built drawings</li> <li>Satisfactory final inspection by inspector.</li> </ul>



**Table 5.0A-7: Tailings Containment Areas and Dams Closure Objectives**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>T6. Access to tailings cover areas is discouraged</p>	<ul style="list-style-type: none"> <li>• Tailings covers are rough / coarse gradation / rock cover.</li> <li>• Boulders placed in access areas.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>T6-1</b> Cover is constructed in accordance with design specification including a rough surface on TCA's and coarse gradation of material</li> <li>• <b>T6-2</b> Site inspections verify area access is limited; confirm no damage to the cover by ATV' or other vehicles</li> <li>• <i>Refer to SI3-2 - Security log records a reduction in number of trespasser sightings in restricted areas</i></li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>• As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>• Satisfactory final inspection by inspector.</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <p>Tailings Management and Monitoring Plan</p> <ul style="list-style-type: none"> <li>• Visual inspection and periodic surveys of the TCA to verify that rough surface remains</li> </ul> <p>Operational Monitoring Plan</p> <ul style="list-style-type: none"> <li>• Inspection and logs of site access</li> </ul>

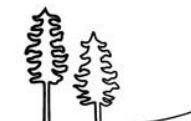
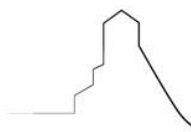
TCA = Tailings Containment Area; EQC = effluent quality criteria; TBD = to be determined; MVLWB = Mackenzie Valley Land and Water Board; CDA = Canadian Dam Association



**Table 5.0A-8: Closure Objectives and Criteria for Borrow Pits and Quarries**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>Q1. New disturbance due to borrow/quarry areas is minimized, to the extent practicable</p>	<ul style="list-style-type: none"> <li>Preferentially use materials from Closure project by-products. Design each borrow area in accordance with clearly defined project needs, factoring in material volumes generated by other site activities and using opportunities to minimize project borrow needs:               <ul style="list-style-type: none"> <li>recontouring slopes for safety reasons</li> <li>spillway for Northwest Pond</li> </ul> </li> <li>Use stockpiles of fine- and coarse-grained material for site closure activities such that new borrow volumes are reduced.</li> </ul>	<ul style="list-style-type: none"> <li><b>Q1-1</b> Borrow development is completed as defined in the approved Borrow Materials and Explosives Management and Monitoring Plan:               <ul style="list-style-type: none"> <li>Borrow areas are limited to areas identified in design. Preferentially use materials from Closure project by-products.</li> <li>Design to consider aesthetic impact (visibility to public) of borrow areas.</li> <li>Excavations are limited to the extent practical; without compromising the material properties, topography, and final borrow reclamation plan.</li> <li>Archaeological or heritage sites encountered are documented and avoided.</li> </ul> </li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by Land Use inspector.</li> <li>Borrow and Explosive Management Plan including QAQC checks on borrow limits during construction.</li> </ul>
<p>Q2. Borrow and quarry materials/areas are not a source of environmental contamination and do not pose a safety risk</p>	<ul style="list-style-type: none"> <li>Conduct investigations of potential quarry areas to confirm that materials are geochemically suitable.</li> <li>Meet site water management program objectives and manage residuals from blasting.</li> <li>Excavate to rock at fine grained borrow sources, to the extent practical to meet project objectives.</li> <li>Revegetate areas of exposed fine-grained soils that remain after the exploitation of borrow areas to reduce potential for erosion (refer to SW5)</li> <li>Manage blasting, excavation, site access, and coordinate traffic from haul trucks for worker and public safety.</li> <li>Complete areas with final slopes that do not present hazards significantly greater than the surrounding natural environment.</li> </ul>	<ul style="list-style-type: none"> <li><b>Q2-1</b> Use geochemically suitable borrow sources as defined in the Borrow Materials and Explosives Management and Monitoring Plan.</li> <li><b>Q2-2</b> NWT Quarrying Regulations and Pits and Quarries Northern Land Use Guidelines are met</li> </ul> <p><i>Criteria in Development with engineering works</i></p> <ul style="list-style-type: none"> <li><b>Q2-3</b> Slope grades in remediated borrow areas are completed such that final slopes do not present hazards significantly greater than the surrounding natural environment.</li> <li><b>Q2-4</b> Water quality and sediment load of surface runoff from borrow areas meets applicable surface runoff quality criteria from approved Water Management and Monitoring Plan</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>Air Quality Monitoring Plan – dust monitoring</li> <li>Sediment and Erosion Control Plan</li> <li>Water Management and Monitoring Plan -Water quality monitoring</li> <li>Borrow Materials and Explosives Management and Monitoring Plan</li> <li>Dust Management and Monitoring Plan</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Satisfactory final inspection by Qualified Professional.</li> <li>Water Management and Monitoring Plan -Water quality monitoring</li> </ul>
<p>Q3: New borrow and quarry areas are reclaimed at the end of their production</p>	<ul style="list-style-type: none"> <li>Revegetate with native vegetation, areas of exposed fine-grained soils that remain after the exploitation of borrow areas, where risk of erosion exists</li> <li>Grade/contour to match existing landform.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to Q2-2 NWT Quarrying Regulations and Pits and Quarries Northern Land Use Guidelines for reclamation are met</li> <li>Refer to Objective SW 5 - Establishment of native vegetation on fine-grained soils</li> </ul> <p><i>Criteria in Development with engineering works</i></p> <ul style="list-style-type: none"> <li><b>Q3-1</b> Slope grades in remediated borrow areas are completed such that final slopes will be equivalent to current natural conditions of the surrounding environment.</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>Erosion and Sediment Management and Monitoring Plan - monitoring for erosion in fine-grained borrow areas</li> </ul> <p>Borrow Materials and Explosives Management Plan</p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> </ul> <p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Satisfactory final inspection by Qualified Professional.</li> </ul>

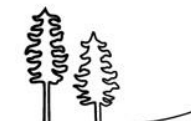
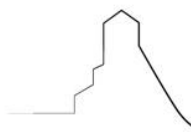
MVLWB = Mackenzie Valley Land and Water Board; INAC = Indigenous and Northern Affairs Canada; NWT = Northwest Territories



**Table 5.0A-9: Closure Objectives for the Water Treatment Plant**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>WTP1. Treated minewater to Yellowknife Bay is discharged at a designated near-shore outfall. The outfall location is selected such that site-specific water quality objectives are met in the receiving environment</p>	<ul style="list-style-type: none"> <li>Commission and operate the new WTP to treat minewater and discharge treated water year-round at the near shore outfall pipe.</li> <li>Construct engineering controls at the outfall pipe location to prevent sediment scour and remobilization.</li> <li>Decommission, demolish, and dispose of existing ETP, associated surface/settling ponds (see Section 5.6), and related infrastructure (see Sections 5.9).</li> </ul>	<ul style="list-style-type: none"> <li><b>WTP1-1</b> Treated water discharge to Baker Creek ceases and effluent is discharged to Yellowknife Bay</li> <li><b>WTP1-2</b> Site-specific water quality objectives are met in Yellowknife Bay, in the vicinity of the outlet of Baker Creek (edge of the mixing zone).</li> <li><b>WTP1-3</b> – Install outfall at minimum water depth of 6m</li> <li>Refer Objective S11 for removal of ETP.</li> <li>Refer to Objective WTP2 for details on meeting effluent quality criteria at the end of pipe</li> </ul>	<p><i>Active Remediation Phase:</i></p> <ul style="list-style-type: none"> <li>As-built engineering drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Aquatic Effects Monitoring Program – sediment monitoring</li> <li>Surveillance Network Program – Water quality monitoring at edge of mixing zone.</li> </ul> <p><i>Adaptive Management and Post-Closure Phase:</i></p> <ul style="list-style-type: none"> <li>Surveillance Network Program – Water quality monitoring at edge of mixing zone.</li> </ul>
<p>WTP2. Water treatment plant discharge meets approved effluent quality criteria, derived such that site-specific water quality objectives are met in the receiving environment</p>	<ul style="list-style-type: none"> <li>Commission and operate the new WTP to treat minewater using a treatment train with ion exchange</li> <li>Operate the WTP to meet the effluent quality criteria / design specifications (see EQC Report for details)</li> </ul>	<ul style="list-style-type: none"> <li><b>WTP2-1</b> Treated effluent is not acutely toxic, i.e., no acute lethality to <i>Daphnia</i> or rainbow trout from exposure to WTP discharge</li> <li><b>WTP2-2</b> Average arsenic concentrations in WTP discharge are at or below 10 µg/L.</li> <li><b>WTP2-3</b> Approved effluent quality criteria for parameters of potential concern, as prescribed by the Water Licence, are met.</li> <li><b>WTP2-4</b> Site-specific water quality objectives are met in Yellowknife Bay, in the vicinity of the outlet of Baker Creek (edge of the mixing zone)</li> <li><b>WTP2-5</b> Outfall does not scour or re-suspend arsenic from sediments during operation.</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Operational Monitoring Plan               <ul style="list-style-type: none"> <li>Quality control program for the treated water</li> </ul> </li> <li>Surveillance Network Program at end-of-pipe and edge of mixing zone               <ul style="list-style-type: none"> <li>Water and sediment quality</li> <li>Toxicity</li> </ul> </li> <li>Aquatic Effect Monitoring Program – water quality monitoring related to site specific water quality objectives and effluent plume</li> </ul>
<p>WTP3. Water treatment plant waste is disposed of in a controlled manner, so it is not, and will not become, a source of contamination to the environment</p>	<ul style="list-style-type: none"> <li>Dispose spent ion exchange media, sludge, and other process residuals in the on-site landfill in a separate engineered cell (see Objectives L1 and L2).</li> <li>Test materials to go into the on-site landfill according to the Toxicity characteristic leaching procedure (TCLP)</li> </ul>	<ul style="list-style-type: none"> <li><b>WTP3-1</b> Spent ion exchange media, sludge, and other process residuals comply with the non-hazardous classification of spent media per the EPA's SW-846 Test Method 1311: Toxicity Characteristic Leaching Procedure prior to disposal in landfill cell, meeting total arsenic of 2.5 mg/L prior to landfill disposal</li> <li>Refer to Objectives L1 and L2 related to runoff from landfill</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Operational Monitoring Plan - Spent ion exchange media, sludge, and other process residuals testing</li> <li>See objectives L1 and L2, Surveillance Network Program Surface and groundwater quality sampling</li> </ul>

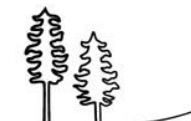
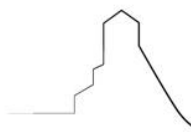
WTP = water treatment plant; ETP = effluent treatment plant; MVLWB = Mackenzie Valley Land and Water Board; EQC = effluent quality criteria; L = level; EPA = United States Environmental Protection Agency



**Table 5.0A-10: Site Infrastructure Closure Objectives and Criteria**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>SI1. Site infrastructure with no future use has been removed and contaminated portions have been remediated so they are not, and will not become, a safety hazard or a source of contamination to the environment</p>	<ul style="list-style-type: none"> <li>Decommission and demolish site infrastructure with no future use, consisting of approximately 101 structures, 25 debris stockpiles, up to 30 km of road network, utilities, and fencing.</li> <li>Submittal of a demolition plan in accordance with WSCC and Mine Manager as per <i>Mines Health and Safety Act</i>.</li> <li>Remove hazardous waste and arsenic hazardous waste from site infrastructure using appropriate decontamination methods.</li> <li>Prior to deconstruction, remove and dispose of any documented heavily-impacted arsenic wastes within a frozen shell (see Section 5.2), dispose of hazardous waste in an approved off-site hazardous waste facility and place non-hazardous waste in the landfill (see Section 5.10).</li> <li>Contour and grade surfaces to match existing/natural topography leaving limited visual evidence of previous site infrastructure presence, e.g., areas of decommissioned site infrastructure (transport routes, buildings) are scarified and contoured to match the natural topography.</li> </ul>	<ul style="list-style-type: none"> <li><b>SI1- 1</b> Wastes are appropriately handled, containerized, and disposed of and results from confirmation testing are within WSCC/GNWT industrial hygiene standards*</li> <li><b>SI1- 2</b> Surface drainage is not interrupted as evidenced by no ponding of water</li> <li><b>SI1- 3</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met; Building decontamination and demolition plans to be prepared and signed and sealed by a Qualified Professional.</li> </ul>	<p><i>Active Remediation</i></p> <ul style="list-style-type: none"> <li>As-built engineering record drawings signed and sealed by Qualified Professional and submitted to MVLWB.</li> <li>Satisfactory final inspection by Land Use inspector.</li> <li>Operational monitoring/inspection of surface drainage and demolition</li> <li>Water Management and Monitoring Plan - Surface water sampling of sumps, seeps, runoff (per Objective BC3).</li> <li>Waste Management and Monitoring Plan – waste types, recycling</li> <li>Industrial Hygiene Air Quality Monitoring</li> <li>Manifests for waste disposal – off site hazardous materials</li> </ul> <p><i>Adaptive Management and Post-Closure Phases</i></p> <ul style="list-style-type: none"> <li>Air Quality Monitoring Plan (refer to Objective SW1).</li> <li>Operational monitoring/inspection of surface drainage and demolition</li> <li>Water Management and Monitoring Plan - Surface water sampling of sumps, seeps, runoff (per Objective BC3).</li> </ul>
<p>SI2. Site infrastructure that remains during the long-term operation and maintenance phase is not, and will not become, a safety hazard, or a source of contamination to the environment</p>	<ul style="list-style-type: none"> <li>Construct, or maintain, the road network (bridges, roads, culverts) confirming physical stability</li> <li>Construct or maintain, the power supply to support long term operations and monitoring</li> <li>Construct security measures, including core infrastructure area fence,</li> <li>Remove and dispose of any remaining hazardous materials (asbestos, PCBs, lead, mercury, ODS) from any remaining infrastructure.</li> <li>Construct any new infrastructure to meet the design intent as described in each of the sections of Chapter 5.</li> <li>Remove hazards to humans/wildlife</li> </ul>	<ul style="list-style-type: none"> <li><b>SI2-1</b> New facilities designed to meet requirements of National Building Code, National Fire Code, National Plumbing Code,</li> <li><b>SI2-2</b> Permanent buildings, such as the WTP, are founded on bedrock</li> <li><b>SI2-3</b> WSCC Mines Inspector and Qualified Professional Engineer inspection confirms Building Codes met.</li> <li><b>SI2-4</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met for the remaining infrastructure (roads, WTP, culverts, etc.)</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>As-built engineering record drawings signed and sealed by Qualified Professional and submitted to the MVLWB.</li> <li>Satisfactory final inspection by Land Use inspector.</li> <li>Operational Monitoring and Inspection: risk thaw settlement, slope failure, erosion, slumping, or collapse</li> <li>Operational Monitoring Program: <ul style="list-style-type: none"> <li>Periodic inspections of buildings and infrastructure to confirm compliance with codes</li> <li>Monitoring to confirm no significant adverse impacts to existing permafrost</li> </ul> </li> <li>Emergency Response Plan and Spill Contingency Plan for reagents and fuel for final site infrastructure</li> </ul>
<p>SI3. Post-closure access to remaining Site infrastructure has been designed for the safety of humans and wildlife</p>	<ul style="list-style-type: none"> <li>Fence the Core Industrial Area as per Objective CS1, which also restricts access to key infrastructure.</li> <li>Site presence and on-site security used to discourage unauthorized entry to restricted areas.</li> <li>Implement administrative controls to communicate residual hazards such as by installing signs (see Objective SW4).</li> <li>Engineering controls are in place to manage residual risks. Restrict access to operational transport and utility routes using fences and barricades.</li> </ul>	<ul style="list-style-type: none"> <li><b>SI3-1</b> Engineered controls are in place, and are maintained / monitored, to manage residual risks (e.g., signs and physical barriers along the shoreline near the outfall pipe are in place) (refer to Objective SW4).</li> <li><i>Refer to CS1 for fence criterion</i></li> </ul> <p><i>Criteria in Development with engineering works and Perpetual Care Plan</i></p> <ul style="list-style-type: none"> <li><b>SI3-2</b> Security log records a reduction in number of trespasser sightings in restricted areas</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>As-built engineering record drawings signed and sealed by Qualified Professional and submitted to the MVLWB.</li> <li>Wildlife and Wildlife Habitat Management and Monitoring Plan – monitoring of wildlife presence near infrastructure (roads, bridges, water treatment plant).</li> <li>Operational Monitoring Program and Perpetual Care Plan. <ul style="list-style-type: none"> <li>Periodic inspections of access control, e.g., fences and signage</li> </ul> </li> </ul>

GNWT = Government of the Northwest Territories; MVLWB = Mackenzie Valley Land and Water Board; NWT = Northwest Territories; WTP = water treatment plant; \*standards such as guideline for Hazardous Waste Management (GNWT, 2017) Guideline for the Management of Waste Asbestos (GNWT, 2004); Asbestos Abatement, Northwest Territories and Nunavut Codes of Practice, WSCC (Sept 2018)



**Table 5.0A-11: Closure Objectives and Criteria for the Landfill**

Closure Objectives	Closure Activity	Closure Criteria	Monitoring/Maintenance and Inspection
<p>L1. Inadvertent access to landfill by humans and wildlife has been prevented</p>	<ul style="list-style-type: none"> <li>Fence the Core Industrial Area to restrict access to the landfill.</li> <li>Site presence and on-site security will discourage unauthorized entry to restricted areas.</li> <li>Close and contain the non-hazardous waste cell with perimeter berms.</li> <li>Cover the surface of this cell with a granular layer including a low permeability cover, graded to promote surface runoff.</li> <li>Contain the WTP process residual cell with perimeter berms. During operation, use a temporary cover over the active portion of the cell to cover the wastes.</li> <li>Close the cell by covering with a granular surface layer that includes a low permeability cover, graded to promote surface runoff. Progress the permanent cover as sections of the cell can be closed.</li> </ul>	<ul style="list-style-type: none"> <li><b>L1-1.</b> Landfill is installed within the fence perimeter area (see SI3) to prevent inadvertent access.</li> </ul> <p><i>Refer to CS1 for fence criterion</i></p> <ul style="list-style-type: none"> <li><b>L1-2.</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications outlined therein are met</li> </ul> <p><i>Refer to criterion in development SI-3 Security log records reduction in number of trespasser sightings in restricted areas (including the landfill)</i></p> <p><i>Criteria in Development with engineering work</i></p> <ul style="list-style-type: none"> <li><b>L1-3:</b> Cover is installed over landfill to mitigate mammal or bird access; Specification for design of the cover to mitigate small mammal burrows TBD</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Waste Management and Monitoring Plan used to monitor, and report volume of waste disposed, and cover soil used.</li> <li>As-built engineering record drawings signed and sealed by Qualified Professional and submitted to the MVLWB.</li> <li>Operational Monitoring Program               <ul style="list-style-type: none"> <li>Annual Inspections of cell caps and containment berms for erosion and stability, evidence of wildlife or human activity</li> <li>Fence inspections, e.g., evidence of wildlife or human activity</li> <li>Periodic inspections of access control</li> <li>Ongoing site security</li> </ul> </li> <li>Wildlife and Wildlife Habitat Management and Monitoring Plan – wildlife observations</li> </ul>
<p>L2. Landfill is not, and will not become, a source of contamination to the environment</p>	<ul style="list-style-type: none"> <li>Dispose only non-hazardous waste in the landfill.</li> <li>Non-hazardous wastes are contained within berms.</li> <li>Install internal sump within each cell to collect contact water for treatment</li> <li>Grade the base of the landfill cells to promote water drainage within the cells to an internal collection sump during landfill operations</li> <li>Close the cells with low permeability cover and grade the cover to minimize surface water infiltration.</li> <li>Grade surface water to external sumps, collect and treat water from external sumps, as required, until surface runoff quality criteria are met, and water can be released to the environment.</li> </ul>	<ul style="list-style-type: none"> <li><b>L2-1</b> Follow the applicable guidelines for waste management*</li> <li><b>L2-2</b> Perimeter berm slopes designed to achieve a minimum Factor of Safety of 1.3.</li> <li><b>L2-3</b> Design base of cell to minimum 0.75% grade to facilitate contact water collection during operations.</li> <li><b>L2-4</b> Design of landfill cover to minimum 1% grade to shed surface water from the cover.</li> <li><b>L2-5</b> Low permeability landfill cover to achieve a hydraulic conductivity equivalent to 10<sup>-7</sup>m/s.</li> <li><b>L2-6</b> Design engineering drawings are signed and sealed by a Qualified Professional and the specifications have been met</li> <li><b>L2-7</b> Surface water quality from landfill cover meets surface runoff criteria as per the approved Water Management and Monitoring Plan</li> </ul>	<p><i>Active Remediation, Adaptive Management and Post-Closure Phases:</i></p> <ul style="list-style-type: none"> <li>Waste Management and Monitoring Plan used to monitor, and report volume of waste disposed, and cover soil used.</li> <li>As-built engineering record drawings signed and sealed by Qualified Professional and submitted to the MVLWB.</li> <li>Operational Monitoring Program with repairs as required               <ul style="list-style-type: none"> <li>Annual Inspections of cover and containment berms for erosion and stability</li> <li>Surface and groundwater quality</li> </ul> </li> <li>Surveillance Network Program: water quality monitoring</li> </ul>

WTP = water treatment plant; NWT = Northwest Territories; GMRP = Giant Mine Remediation Project; TBD = to be developed; \* Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories (Government of Northwest Territories, 2003); Solid Waste Management for Northern and Remote Communities – Planning and Technical Guidance Document (Environment and Climate Change Canada, 2017); Guideline for Hazardous Waste Management (GNWT, 2017)