



Giant Mine Remediation Project



Canada

The 2015-16 Annual Report of the Giant Mine Remediation Project

REMEDIATING GIANT MINE

DATE: October 2016



Indigenous and
Northern Affairs Canada

Affaires autochtones
et du Nord Canada





About this Report

Welcome to *Remediating Giant Mine* - the first annual report of the Giant Mine Remediation Project (GMRP). The report provides an overview of the Project's key activities and performance for the 2015-16 reporting year¹, with a particular focus on environmental management, health and safety, and community involvement. The goal is to ensure that the GMRP meets the requirements of the Environmental Agreement and that interested stakeholders, members of nearby communities and the broader public have accurate and timely information on the GMRP should the report be shared beyond the Giant Mine Oversight Board (GMOB).

The content of this report was largely shaped by the Environmental Agreement, signed in June 2015, and by the GMOB, the independent oversight body that was established through the Environmental Agreement (additional information is provided below: Environmental Agreement – Report Alignment). The content was also influenced by input collected from Project Team members. The report aligns with existing GMRP reporting obligations.

For additional information on the Giant Mine Remediation Project, please visit: <http://www.aadnc-inac.gc.ca/eng/1100100027364/1100100027365>.

A list of acronyms is provided in Appendix A.

Environmental Agreement – Report Alignment

A significant driver for the development of the GMRP Annual Report is the Environmental Agreement (“the Agreement”), which is a mandatory requirement per Measure 7 of the Report of Environmental Assessment. The Agreement establishes an independent oversight body for the Project and was signed in June 2015 by Indigenous and Northern Affairs Canada (INAC), the Government of Northwest Territories (GNWT), the City of Yellowknife, the Yellowknives Dene First Nation (YKDFN), Alternatives North, and the North Slave Métis Alliance.

Article 5 of the Agreement stipulates that “the Co-Proponents shall prepare, provide to the Oversight Body, and make available to the public an annual report on the Project each year,” with the first report submitted to the GMOB no later than October 1 2016.

The Environmental Agreement specifies the content that must be included in each annual report. The table below outlines each requirement and where the content can be found in this 2015-16 report.

¹ April 1, 2015 – March 31, 2016



Environmental Agreement Requirement	Section of Report	Comments
A summary of the Project's key operational activities and associated expenditures	Year in Review: Operational Summary (p. 14)	
A summary of any other significant developments relating to the Project	Environment (p. 20) Health and Safety (p. 32) Community (p. 36)	
A summary of the results or findings of all monitoring done for the Environmental Programs and Plans and a description of actions taken or planned to implement Adaptive Management	Environment (p. 20) Health and Safety (p. 32)	
An assessment of the effectiveness of actions already taken to address the results or findings of all monitoring done for the Environmental Programs and Plans	Environment: Air (p. 21)	
A summary of any environmental or engineering studies conducted by the Co-Proponents in relation to the Project	Year in Review: Operational Summary (p. 14) Environment: Water (p. 23); Land (p. 26); Biodiversity (p. 28)	
A summary of any changes to, or plans for changes to, the Environmental Program and Plans	Not applicable for this reporting year	Given the current stage of the GMRP, this is not explicitly reported on in the current version of the report; Environmental Programs and Plans will be developed when and to the extent that those matters may be applicable to the Project
A summary of the environmental audits of the Project, and the Co-proponents' response to the audit	Not applicable for this reporting year	Not applicable; an audit was conducted in June 2016 and results will be reflected in the 2016-17 report
A summary of any reportable spills, accidents or significant malfunctions, and a summary of the Co-Proponents' responses	Year in Review: Operational Summary (p. 14) Environment: Air (p. 21)	
A listing of regulatory inspections, reports or directions, and a summary of the Co-Proponents' response to any issues arising therefrom	Year in Review: Operational Summary (p. 14)	
An analysis of trends in environmental effects data over time	Not applicable for this reporting year	Not applicable to this report, as it is the first annual report; trend information will be provided in subsequent reports
A summary of significant public engagement activities, or matters raised as public concerns, and the Co-Proponents' responses	Community: Engagement (p. 36)	The Engagement section provides a summary of engagement activities, but does not specify public concerns and the Co-Proponents' responses; this information will be included in subsequent reports



Environmental Agreement Requirement	Section of Report	Comments
A summary of the Project's planned key operational activities for the coming year and associated planned expenditures, subject to the need to protect commercially sensitive financial information	In Closing (p. 43)	Planned expenditures are currently not included in this version of the report; additional information is required to address plans for 2016-17
A summary of the progress of the Project, including with respect to the MVRMA Measures, MVEIRB Suggestions, and Co-Proponents' Commitments	Year in Review: Progress on Commitments (p.18) Appendix D (p. 75)	
References to all sources relied on by the Co-Proponents in coming to conclusions in the annual report	References (p. 45)	
A plain language summary of the annual report	Report Summary (p. 8)	



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Message from the INAC Project Leader – ADM, Northern Affairs Organization

On behalf of the entire Giant Mine Remediation Project Team, I am pleased to present the first Annual Progress Report to the Giant Mine Oversight Board. This report is aimed at strengthening the partnership that Indigenous and Northern Affairs Canada is building, on behalf of the Government of Canada and alongside the Government of the Northwest Territories, with First Nations, Indigenous communities, and stakeholders who are most affected by the outcome of the Giant Mine Remediation Project.

Together, and with the guidance of the Oversight Board, the Project Team will continue to document our progress and our setbacks, promote transparency and accountability related to the management of the project and the public funds being used to carry it out, and share lessons learned in order to continually improve our decision-making.

The Environmental Assessment sparked a higher than expected level of engagement and participation from various stakeholders and interested parties, demonstrated through 172 Information Requests through four rounds, two technical sessions, one chaired by the Board, the other Project Lead, public hearings and ongoing engagement. To build on the momentum following acceptance of the Report of Environmental Assessment by Responsible Ministers in August 2014 (Indigenous and Northern Affairs, Environment and Climate Change Canada, Fisheries and Oceans, and the Government of the Northwest Territories), the team has been working and will continue to work diligently with stakeholders to address the measures in a meaningful way.

The Environmental Assessment process was a critical milestone in the life of the project, the outcome of which has defined the scope and provided greater public understanding of the project. This is a major achievement for the Project to proceed with the licensing process, permitting and advance the remediation plan and engineering designs.

The first example of this was the negotiation and signing of the Environmental Agreement within the timeframe established, which led to the creation of the independent Giant Mine Oversight Board in 2015. The delivery of this first annual Progress Report fulfils a direct commitment made within the Environmental Agreement.

The Government of Canada and the Government of the Northwest Territories welcomes this opportunity to communicate our results, improve our reporting, and receive feedback on our planning and management of the Giant Mine Remediation Project.

I look forward to participating in the annual reporting cycle and working with the Oversight Board, and learning from this process so that each subsequent report may be improved and further advance the Giant Mine Remediation Project.



Stephen M. Van Dine, Assistant Deputy Minister, Northern Affairs Organization



Report Summary

Remediating Giant Mine is the first annual report of the Giant Mine Remediation Project (GMRP). This report describes the Project Team's key activities and performance for the 2015-16 reporting year (April 1, 2015 – March 31, 2016), with a particular focus on environment, health and safety, and community information. It also describes the Project's progress on commitments to address the measures and suggestions from *The Report of Environmental Assessment and Reasons for Decision* (MVEIRB, 2013), as accepted by the Responsible Ministers on August 15, 2014. This **Report Summary** provides the highlights from the year – please refer to the full report for more information.

Key Operations

In 2015-16, the Project Team continued to advance immediate risk mitigation work by completing the Site Stabilization Plan (including the Roaster Complex deconstruction and, stabilizing the underground), stabilizing the C1 Pit Wall, and completing the C-Shaft Complex Deconstruction. Care and maintenance (C&M) activities were ongoing throughout the year. The below table describes the key operations.

Activity	Progress	Comments
Roaster Complex Deconstruction	Completed: removed remaining hazards and waste, stored all waste bags in shipping containers in the Material Storage Area (MSA), and covered exposed soil.	No incidents
Underground Stabilization Project	Underway: filled eight stopes with cemented tailings paste.	High urinalysis results (described under the Health and Safety summary below and in Section 4.1)
Arsenic Contaminated Waste Repackaging	Completed: all deteriorating barrels were recontainerized in either steel drums or in plastic overbags and stored safely on site until disposal is possible	Work was halted in 2014-15 due to weather; completed in 2015-16
C1 Pit Wall Stabilization	Completed: constructed support structure to reduce the risk of water from Baker Creek entering the mine through C1 Pit.	No incidents
C-Shaft Complex Deconstruction	Completed: dismantled C-Shaft Complex to reduce associated risks.	No incidents
Care and Maintenance	Ongoing: prepared for spring freshet, suppressed dust, treated and discharged effluent, and continued upgrades to power system.	Ten minor health and safety incidents (Section 4.1); one halocarbon release (Section 3.1); one Action Level exceedance from visible dust (Section 3.1)

Studies

The below table lists environmental or engineering studies conducted in 2015-16 by the Co-Proponents or their contractors in relation to the Project. Additional details on these studies can be found throughout the report.

Theme	Study / Report
Design	<ul style="list-style-type: none"> Baker Creek Options Assessment Freeze Optimization Study – Design Basis Report Mine Water Characterization
Air	<ul style="list-style-type: none"> Dust Mitigation Options Analysis
Water	<ul style="list-style-type: none"> Porewater and Sediment Study at the Baker Creek Outlet



Theme	Study / Report
	<ul style="list-style-type: none">• Surface Runoff Arsenic Loading Study
Land	<ul style="list-style-type: none">• Contaminated Soils Characterization Sampling• Land Cover Classification Study

Inspections

The below table summarizes regulatory inspections conducted in 2015-16, including examples of the types of issues identified during inspections. The Project is committed to addressing non-compliances and has assigned responsibility and timelines for addressing issues identified.

Inspection Type	Inspections Performed (#)	Non-Compliances (#)	Types of Issues Identified (Examples)
Workers' Safety Compensation Commission site inspections (general, mechanical, electrical)	11	69	<ul style="list-style-type: none">• Installation of additional safety measures on equipment (e.g., emergency stop cord on tailings conveyor; fire extinguisher and seat belt on bulldozer)• Ensure proper personal protective equipment and hygiene standards at pour sites• Establish maintenance procedure and post warning signs on electrical substations• Electrical upgrades (surface and underground)
INAC Lands inspections (compliance with land use permit)	3	0	<ul style="list-style-type: none">• No issues identified

Progress on Commitments

The below table summarizes the progress made in FY 2015-16 towards achieving the Measures from [The Report of Environmental Assessment and Reasons for Decision](#). This table highlights those Measures on which progress was made in 2015-16. For a complete list of Measures, see Appendix D.

Measures	Status	Comments
3, 4, 7 & 8	Complete	The Environmental Agreement came into effect in June 2015; the Giant Mine Oversight Board formed in 2015.
9	Underway	Health Effects Monitoring Program initiated.
10	Underway	Contracting process for the Human Health Risk Assessment initiated.
11 & 12	Underway	Baker Creek is a component in the Surface Design Engagement discussions; site-specific water quality objectives under development to inform options analysis.
18	Underway	Freeze Design Basis Report finalized and the Giant Mine Working Group engaged.

Environment

The below table summarizes the activities/progress, outcomes and mitigations /actions related to environmental management in FY 2015-16, organized by Air, Water, Land and Biodiversity. Beyond the



one release of halocarbons, as described in this report and reported to Environment Canada in accordance with the Federal Halocarbons Regulations, there were no other reportable spills, accidents, or significant malfunctions at the GMRP in 2015-16.

Component	Activities / Progress	Outcomes	Mitigations / Actions
Air	Air quality monitoring was conducted by the project as per the established program (see details in Section 3.1). Results were posted to GNWT website for public access. A community monitoring station was installed in the Niven Lake Community, which is anticipated to be operational in 2016-17.	No exceedances in air quality measurements, but one incidence of visible dust blowing off tailings and stockpiles that triggered an Action Level.	Made changes to reduce likelihood of dust exceedance (e.g. storage of larger stockpile of dust-control product on site). Initiated an options analysis study looking into effective solutions to suppress fugitive dust onsite.
	Equipment for Freeze Optimization Study (FOS) taken out of service as scheduled.	One halocarbon released (16kg) from the Freeze Optimization Study (FOS) equipment.	Release reported to Environment Canada; source identified; all halocarbons are now removed from the FOS equipment.
Water	Continued operation of the Effluent Treatment Plant (ETP) and improvements to the ETP and associated facilities.	Discharge of 232,943 m ³ of treated water.	Replaced three steel reaction tanks and dredged the settling pond to provide an additional 10 years of storage capacity.
	Surveillance Network Program and Operational Monitoring Program (OMP) continued to monitor water quality at the ETP daily and at six other sites on- and off-lease on a weekly or monthly basis throughout the operating season (May-June) and throughout the year at one sampling location.	No exceedances; treated effluent discharged to the environment from the polishing pond met the water quality limits as set forth in the former Water Licence and the federal MMER.	Monitoring programs to continue.
	Results from the winter 2015 study of Baker Creek outlet were reviewed and assessed.	Elevated arsenic concentrations confirmed in surface sediments; possible existing negative effects on aquatic life; sediments below 1m depth are near background concentrations.	If Baker Creek Outlet is left in place, further work is required to assess the risk posed to greater Yellowknife Bay.
	Sampling continued on-site and upstream for the surface water runoff arsenic loading study and findings were assessed.	Concentrations of metals in surface runoff water consistently exceed applicable guidelines for aquatic life in both on-lease and off-lease sampling locations	Supplemental hydrology work to be undertaken and models updated to allow for comparison of three remedial options.
Land	Site stabilization activities as	See above (e.g. Roaster	N/A



Component	Activities / Progress	Outcomes	Mitigations / Actions
	described under Key Operations.	Complex deconstruction).	
	Waste management involved appropriate handling and care of arsenic-contaminated wastes from the Roaster Complex and C-Shaft Head decontamination and deconstruction.	Some hazardous and non-hazardous wastes stored safely on site; some transported off-site and disposed of appropriately.	Waste stored on site to be safely managed until it can appropriately disposed or full remediation commences.
	Contaminated soils characterization sampling continued.	Soil sampling undertaken to characterize disturbed and undisturbed areas of the site.	Decisions related to future land use and provide baseline information for the Human Health and Ecological Risk Assessment (HHERA).
	Land cover classification study was completed.	Total area of 15.3 km ² was classified.	Additional studies will be undertaken to assess vegetation and soils in support of the HHERA and to provide input to design decisions.
Biodiversity	Annual Bird Survey conducted.	Recommendations to reduce the risk of contributing to the incidental take of migratory birds, their young, eggs and/or nests.	Recommendations to be considered by project team and mitigations / actions determined.
	Winter Wildlife Monitoring through track counts, remote motion-activated camera footage (six cameras) and site surveillance surveys.	Evidence of eleven wildlife species, or groups, with highest frequency of observation around the Akaitcho Shaft.	Information to be used to guide closure planning to reduce risks and hazards to wildlife.
	Environmental Effects Monitoring (EEM) via effluent characterization and surface water quality sampling during the discharge period between July and September, 2015.	Treated mine water meets discharge requirements.	EEM information will be used to inform the Human Health and Ecological Risk Assessment (HHERA).
	Aquatic Effects Monitoring not yet underway.	N/A	Project Team to develop an Aquatic Effects Monitoring Plan (AEMP) based on the results of previous baseline aquatic assessments to confirm that the discharge from a relocated ETP discharge does not have an adverse effect on the receiving environment.



Health and Safety

The below table summarizes the activities, progress and outcomes related to health and safety management in FY 2015-16.

Component	Activities / Progress	Outcomes	Mitigations / Actions
Occupational Health and Safety	Health and Safety training for all employees and contractors. Urinalysis samples taken from on-site workers.	10 minor incidents and 85 near misses reported. 4% of urinalysis samples exceeded Action Level of >35 micrograms of arsenic per litre of urine.	Retrained and adopted more rigorous personal protective equipment procedures for certain employees; contractor relieved one employee of duties due to continued poor alignment with safety procedures.
Public Health and Safety	Health Effects Monitoring Program draft proposal. External engagement on the development of scope of work for contracting process for the Human Health Risk Assessment initiated.	No outcomes to report; activity ongoing.	N/A

Community

The below table summarizes the activities, progress and outcomes related to engagement, procurement, employment and training in FY 2015-16.

Component	Activities / Progress	Outcomes	Plans for 2016-17
Engagement and Consultation	Giant Mine Oversight Board established; held 103 public engagements, including Surface Design Engagement sessions and the annual Public Forum.	1669 people engaged through 103 events.	Update Engagement Strategy and continue to engage through working groups and Surface Design Engagements.
Community Monitoring Program (CMP)	Continued to measure water quality at locations of significance to YKDFN to provide baseline data for LTEMP.	Confirmation that water and sediment adjacent to Ndilo have been affected by mining pollution.	Information from the CMP to inform the Human Health and Ecological Risk Assessment (HHERA).
Procurement and Employment	Continued with Procurement Strategy and implementing contracting requirements to increase Aboriginal benefits.	Employees are 28% Northern and 11% Aboriginal Suppliers are 68% Northern and 28% Aboriginal.	Main Construction Manager contract RFP and SSP - C509 Stope drilling contract RFP to be posted.
Training	Contractors provided workforce training (e.g. on-site orientation).	224 people trained; 2353 hours of training.	Workforce training to continue.

1.0 Project Overview

The Giant Mine Remediation Project addresses the long-term containment and management of the arsenic trioxide waste, the demolition and removal of all surplus buildings on the surface, and the remediation or risk management of all impacted surface areas, such as soils and tailings ponds. It also includes water management and treatment. The overall objectives of the Giant Mine Remediation Project are to:

- Minimize risks to human health and safety;
- Minimize impacts to the environment; and,
- Reduce Canada's liability associated with the site.

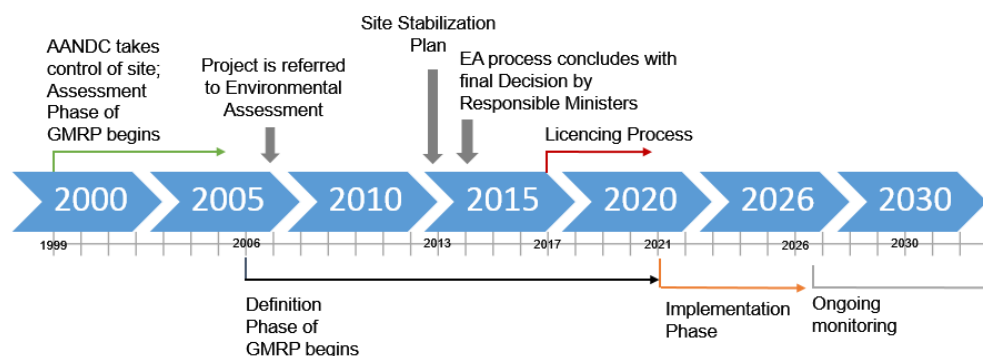
The successful remediation of the Giant Mine will yield the following outcomes:

- Safeguard the health and safety of Northerners;
- Protection of water, soils, flora and fauna at the Giant Mine Site;
- Reduction of the federal liability associated with the site by using industry best practices for remediation in a cost-effective manner;
- Improved relationships with the local aboriginal groups;
- Demonstrated federal commitment, which illustrates how economic development can be carried out without adversely affecting the environment; and,
- Demonstrated federal leadership in complying with all applicable environmental Acts, Regulations and standards.

Phases of the Giant Mine Remediation Project

Figure 1 illustrates the past, current and planned activities of the Giant Mine Remediation Project. Appendix B provides more information on the phases of the project.

Figure 1: GMRP Activities and Timeline



Appendix B provides more information on the Project, including the Mine's legacy and the Project's background, phases, management structure, integrated management system, and risk management approach.



2.0 The Year in Review: 2015/16 Operational Summary and Progress on Commitments

2.1 Operational Summary

The GMRP Project Team – which includes INAC, Public Services and Procurement Canada (PSPC), and GNWT personnel – and independent contractors focused their activities in four main areas over the 2015-16 year (April 1, 2015 – March 31, 2016):

1. Continuing the implementation of the Site Stabilization Plan (SSP), including underground stabilization and C-Shaft deconstruction;
2. Ensuring ongoing care and maintenance of the site;
3. Conducting studies and assessing surface design options; and
4. Undertaking environmental monitoring and studies / baseline assessments (described in Section 3).

In addition, the Project Team maintained an active risk identification and management program (described in Appendix B).

Project Expenditures

Expenditures for the project include personnel and operations and maintenance (care and maintenance, risk mitigation activities and design). Actual expenditures in 2015-16 were \$57,747,855.

2.1.1 Site Stabilization Plan

Roaster Deconstruction

The Roaster Complex was a group of structures where ore was roasted at extremely high temperatures to extract gold. The Roaster closed in 1999 and by 2013 the building had deteriorated to a point where it was assessed as posing an unacceptable risk to on-site workers, neighbouring communities and the environment. A plan was put in place to address these risks. Over two work seasons (2013 and 2014), all 10 structures that made up the Roaster Complex were safely decontaminated and deconstructed.

The decontamination and deconstruction of the Roaster Complex produced a significant amount of waste, which has been safely packaged until it can be disposed of once the Remediation Plan is implemented. The wastes are stored in lined Transportation of Dangerous Goods (TDG) bags, held in shipping containers with the area secured by a chain-link fence. Runoff water from the storage area is collected and treated in the mine's water treatment plant.

The work that was done in 2015-16 to complete the project included:

- Scraping the surface soil and raking debris into the waste bags
- Cleaning foundations and removing protruding metal reinforcement bars and bolts
- Backfilling sumps
- Moving waste bags into shipping containers in the temporary storage area on the Central Tailings Pond
- Covering the exposed soil in the immediate area of the former Roaster Complex with crushed rock to suppress dust



Underground Stabilization Project

As part of the GMRP's ongoing risk management process, the Project Team identified underground areas that required immediate action to reduce risks to staff, the public and the environment.

Underground stabilization work started in 2013 and continued in 2014 and 2015. To address the risks of rock collapse or underground flooding, stopes (large, empty underground spaces) were filled with a paste made from mine tailings from the South Pond, water, and cement. The paste hardens, helping to stabilize the underground mine structure.

Key activities in 2015-16 included:

- Filling eight stopes in total – four non-arsenic stopes and four arsenic stopes.

The remainder of stope drilling is to continue in 2016-17 in order to design the final backfilling of stopes required for final remediation, in addition to a detailed analysis, conceptual mitigation plan development, and tendering for the filling of Stope C509 (the last remaining high-risk stope to be filled).

2.1.2 Immediate Risk Mitigation

Arsenic Contaminated Waste Repackaging

Approximately 1,600 barrels of arsenic contaminated waste from historic activities were contained in the Hazardous Materials Storage Area located in the Northwest Tailings Pond. As a result of evidence of decay in the barrels, action was required to ensure continued containment until a final disposal solution is developed and implemented. The work was initiated in 2014-15, suspended due to weather constraints, and completed in 2015-16.

Key activities in 2015-16 included:

- The deteriorating barrels were recontainerized in either steel drums or in plastic overpacks. It is currently intended for this waste to be disposed of in the same manner as the arsenic-impacted waste from the Roaster. Disposal options are currently being evaluated.

C1 Pit Wall Stabilization

The Project Team continued previous work to address risks associated with the stability of the C1 Pit. Though the western wall of this pit has always been a concern, a drilling program determined that a failure of the wall is possible under certain conditions. If that pit wall were to collapse, water from Baker Creek could enter the mine and potentially cause a flood.

Key activities in 2015-16 included:

- Construction of an engineered buttress, a support structure made of rock fill, which greatly reduces the risk of water from Baker Creek entering the mine through C1 Pit.

C-Shaft Complex Deconstruction

For over 50 years, Giant Mine's C-Shaft is a narrow, vertical shaft, which was historically used to bring miners to and from work – as far down as 640 metres below the surface. The C-Shaft head – the iconic symbol of Giant Mine – was surrounded by four other structures that were part of the C-Shaft Complex: the screen house, the conveyor galleries, the crusher house, and the trestle. These structures were over 60 years old and site assessments confirmed they had deteriorated to an unsafe state. The head frame



itself posed unacceptable on-site risks including the risk of injury to site personnel, potential power loss to the Freeze Optimization Study or to underground workings, and potential loss of communication from the surface to the underground workings. Deconstruction was undertaken to eliminate these risks.

Key activities in 2015-16 included:

- Dismantling the C-Shaft head and the four other structures in the C-Shaft Complex: the screen house, the conveyor galleries, the crusher house, and the trestle.
- Capping the C-Shaft to protect infrastructure and act as a safety measure, while continuing to allow air flow through the mine.

2.1.3 Care and Maintenance

Ongoing care and maintenance at Giant Mine is critical to ensuring that the current hazards at the site are managed to prevent harm to staff, to surrounding communities and to the environment. The Project Team and the C&M Contractor ensure the site is kept safe, secure, and in compliance with regulations by maintaining facilities, controlling and inspecting contaminated waste storage areas, managing mine water, and treating water effluent on site.

Key activities in 2015-16 included:

- Preparation for spring freshet; the 2015 spring freshet occurred without incident.
- Ongoing dust suppression activities; application of calcium chloride on roads and Soil Sement (a dust-control product) on tailings.
- Discharge of treated effluent: 232,943 m³ of treated mine water safely released into the environment.
- Improvements to the effluent treatment plant (ETP), including replacement of three steel reaction tanks.
- Continued upgrades of the site-wide power system.
- Production of borrow material for activities around the site, such as armouring the splitter dyke at the Effluent Treatment Plant. A significant cost savings was realized by producing the material at site rather than trucking it in.

2.1.4 Summary of Fiscal Year 2015-2016 Operational Activities, Incidents, and Expenditures

Table 1 below summarizes the main operational activities from April 1, 2015 to March 31, 2016, including whether there were incidents or issues (e.g. schedule delay) and the associated expenditures.

Table 1: Summary of 2015-16 Operational Activities

Activity	Progress	Issues/Incidents	Expenditures
Site Stabilization Plan			
Roaster Deconstruction	Completed	No incidents and on schedule	\$1.71M
Underground Stabilization Project	Underway	High arsenic urinalysis results for some workers; on schedule	\$20.96M
Immediate Risk Mitigation			
Arsenic Contaminated	Completed	Work was halted in 2014-15 due to weather; completed in 2015-	\$0.73M



Activity	Progress	Issues/Incidents	Expenditures
Waste Repackaging		16	
C1 Pit Wall Stabilization	Completed	No incidents and on schedule	\$1.99M
C-Shaft Complex Deconstruction	Completed	No incidents, schedule moderately delayed to address YKDFN elders' concerns related to bird activity and high winds	\$2.11M
Care and Maintenance			
Care and Maintenance	Ongoing	10 minor health and safety incidents and 85 near misses (Section 4.1); one halocarbon release (Section 3.1); one Action Level exceedance from visible dust (Section 3.1)	\$10.68M

2.1.5 Inspections in 2015-16

Fourteen inspections were undertaken by two regulatory bodies in 2015-16 (the Workers' Safety Compensation Commission and INAC Lands). Through these inspections, 69 non-compliances were identified (see examples provided in Table 2). The Project is committed to addressing non-compliances and has assigned responsibility and timelines for addressing issues identified. In addition to the inspections performed by regulatory bodies, internal inspections are regularly performed to ensure safe operation at the site. These internal inspections include daily site inspections by care and maintenance staff and regular engineering inspections of major structures (e.g. dams, arsenic chamber bulkheads) and equipment. Non-conformances identified during internal inspections in 2015-16 were minor and promptly corrected.

Table 2: Regulatory inspections performed, including types of issues identified

Inspection Type	Inspections Performed (#)	Non-Compliances (#)	Types of Issues Identified (Examples)
Workers' Safety Compensation Commission site inspections (general, mechanical, electrical)	11	69	<ul style="list-style-type: none"> Installation of additional safety measures on equipment (e.g., emergency stop cord on tailings conveyor; fire extinguisher and seat belt on bulldozer) Ensure proper personal protective equipment and hygiene standards at pour sites Establish maintenance procedure and post warning signs on electrical substations Electrical upgrades (surface and underground)
INAC Lands inspections (compliance with land use permit)	3	0	<ul style="list-style-type: none"> No issues identified



2.2 Progress on Commitments

The *Report of Environmental Assessment and Reasons for Decision* (MVRB, 2013) listed 26 Measures that must be addressed, as well as 16 suggestions that may be implemented at the Project Team's discretion. The Project Team's immediate focus is to address the Measures with set timelines, and those with the biggest impact on the project scope. A summary below provides a highlight of the progress made in 2015-16, and Appendix D provides the full summary of progress and plans for the 2016-17 year.

Environmental Agreement and Giant Mine Oversight Board (Measures 3, 4, 7 & 8)

- The Environmental Agreement came into effect June 2015, which formalized requirements to meet Measures 3, 4, 7 and 8.
 - Measures 3 and 4: The Project will fund the Giant Mine Oversight Board (GMOB) to manage a research program. Initial funding will flow for these Measures in 2016-17 and will be ongoing.
 - Measures 7 and 8: The Environmental Agreement provided for the creation of the GMOB, which formed in the fall of 2015, and funding to fulfill the obligations outlined under Measure 8.

"Environmental Agreement – Report Alignment", Section 5.1 and Appendix B provide more information about the Environmental Agreement and GMOB.

Human Health Monitoring (Measure 9)

- In 2015, the Project Team selected Dr. Laurie Chan from the University of Ottawa to lead the development and implementation of the Health Effects Monitoring Program. Next steps will involve the creation of an Advisory Committee and a communications plan, as well as the determination of the study scope through engagement with stakeholders downstream of the mine.

Section 4.2 provides more information about the Health Study.


Human Health Risk Assessment (HHRA) (Measure 10)

- In 2015 the project engaged on the scope of the Human Health Risk Assessment (HHRA) through the Giant Mine Working Group and the Giant Mine Advisory Committee (GMAC). The contracting process for the HHRA was initiated in 2015-16 to develop the scope of work through various engagement sessions, by Mark Richardson with Stantec. Contract award for the Request for Proposals is scheduled for 2016-17, with the HHRA work following.
- In 2015, the Project Team began developing a statement of work for a stress assessment component of the HHRA. The Project Team engaged Dr. Ketan Shankardass, an expert in epidemiology and health effects of stress, who was introduced to stakeholders in January 2016.

Section 4.2 provides more information about the HHRA and Stress Assessment.

Investigating Options for Baker Creek (Measure 11) and Developing Site-Specific Water Quality Objectives (Measures 12)

- Baker Creek was a component in the Surface Design Engagement discussions. Further discussions are planned with the GMOB.

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- Predictive modeling and development of site specific water quality objectives were initiated in 2015-16 and will continue in 2016-17 in order to support evaluation of expected water quality in Baker Creek under various realignment options. The results of this work will be used to support a detailed options analysis that will influence decisions regarding the remediation and alignment of Baker Creek.
 - The evaluation of options for Baker Creek will continue, supported by assessments, predictive modeling, and detailed design work. The Giant Mine team expects to select the preferred option for final alignment of Baker Creek in 2016-17.

Section 5.1 provides more information about Surface Design Engagement and Appendix C provides more information about the options analysis.

Freeze Design Options (Measure 18)

- Environmental Agreement Measure 18 directed the Project Team to conduct “a comprehensive quantitative risk assessment evaluating both wet and dry methods for the initial freezing design.” As per this measure, the Project Team, along with SRK Consulting and a technical review by the Independent Peer Review Panel, compared the two methods for freezing through a Freeze Optimization Study (FOS). This assessment, as part of the Design Basis Report, concluded that the dry method worked just as well as the wet at reaching the target freeze temperature to ensure that the arsenic trioxide remains encapsulated in frozen rock, preventing contact with water flowing through the mine. In addition, if future technologies provide a better option for managing the arsenic trioxide dust, a dry freeze is easier to reverse than a wet one. This information was provided to the Project Team in the freeze design basis report. Engagement with the Giant Mine Working Group followed in early 2016.



3.0 Environment

Spills, Accidents, and Significant Malfunctions

Beyond the one release of halocarbons, as described in this report and reported to Environment Canada in accordance with the Federal Halocarbons Regulations, there were no other reportable spills, accidents, or significant malfunctions at the GMRP in 2015-16.

Care and Maintenance Environmental Management

The current Care and Maintenance Contractor, Deton'cho Nuna, has in place an Environmental Management Plan, which includes Environmental Protection Plans (EPPs) for major components of the Mine Site, including:

- Materials and Equipment Handling (e.g. Halocarbon management)
- Non-Hazardous and Hazardous Waste Management
- Traffic Management
- Erosion and Sediment Control
- Water Management
- Ecological Management
- Heritage Protection

These EPPs guide the management of each of the above components. For example, the EPP for water management includes details of how water is treated at the mine's Effluent Treatment Plan as well as a description and requirements of the different water monitoring and sampling programs.


The below information, organized into four main sub-sections of **Air, Water, Land** and **Biodiversity**, describes the key activities and results of these ongoing management programs, in addition to other assessments and monitoring as described in the Long-Term Environmental Monitoring Program (LTEMP) summary below.

Long-term Environmental Monitoring Program (LTEMP)

The LTEMP is a combination of all monitoring components that are currently ongoing or will be required at Giant Mine. The program is used to determine baseline conditions, monitor existing performance, and to inform the design process for remediation activities. The components of the LTEMP include regulatory and due diligence monitoring, including:

- Surveillance Network Program (SNP) – water licence requirement
- Metal Mining Effluent Regulations (MMER) including Environmental Effects Monitoring (EEM)
- Aquatic Effects Monitoring Program (AEMP) – water licence requirement
- Wildlife Management Program (WMP) – water licence requirement
- Air quality – fence-line & community
- Due diligence – terrestrial & aquatic ecosystems, including cumulative effects
- Freeze Program (to be determined)
- Cumulative effects

LTEMP is structured in three phases: pre-remediation, remediation, and post-remediation. The intent is for the LTEMP to be operational for the lifetime of the project (100 years). Section 3 provides additional information on the individual components of the monitoring program.



Appendix C provides additional information regarding the Project's environmental management approach.

3.1 Air

To monitor and minimize air quality impacts, the Giant Mine Project Team has established an air quality monitoring program, including ongoing air quality monitoring on-site and in nearby communities, and actively manages air quality through dust suppression (e.g. application of calcium chloride on roads or dust suppressor on tailings).

3.1.1 Air Quality Monitoring and Dust Suppression

The Giant Mine project conducts real-time air quality monitoring of particulate matter (PM₁₀ and PM_{2.5}) and analysis of arsenic, asbestos, iron, lead and other contaminants in airborne dust at three levels: near any activity taking place on the site, such as deconstruction or drilling; at the "fence-line" (site perimeter); and in the local community. This data helps the Giant Mine Remediation Project Team to:

- Monitor concentrations of airborne contaminants,
- Assess potential effects on the local air,
- Establish whether these contaminants are the result of activities at the Giant Mine Site, and
- Determine whether mitigation measures are required if air quality results exceed established Action Levels and criteria (summarized in Appendix B of this report).

Activity-specific monitoring is established to monitor potential impacts to air quality in the vicinity of workers and to identify potential effects to the fence-line monitoring. In 2015, task specific monitoring was conducted in the vicinity of: the paste plant, delivery borehole drilling sites and the paste backfill areas for the underground stabilization program; the arsenic contaminated waste repackaging; the roaster area capping; the C1 Pit wall stabilization (buttress construction); and the deconstruction of the C-Shaft headframe.

Six monitors located around the perimeter of the site ("fence-line") help the team monitor and minimize the spread of contaminants off-site. Operation of these stations continued in 2015-16 as it had in previous years.

A fourth community monitoring station was installed in the Niven Lake Community in 2015 as part of Measure 25. This will form part of the community air quality monitoring network, along with the existing three stations in Ndilo, downtown Yellowknife (NAPS station)², and at the Yellowknife Cruising Club (see image). The Niven Lake community station is anticipated to be operational in 2016-17. These stations measure and assess air quality in the community to confirm that air quality in the community is not being negatively affected.

² The NAPS station in downtown Yellowknife has been and will continue to be operated by the GNWT, whereas the other stations are operated by INAC and PWGSC or their contractors..



Additional details on the Giant Mine air quality monitoring program, including the locations of the fence-line and community monitoring stations, are available here:

<http://www.enr.gov.nt.ca/node/3283>. Air quality monitoring results are published weekly on the GNWT Air Quality Monitoring website (<http://aqm.enr.gov.nt.ca/>). Historical data are available.

Results

Throughout 2015-16, there were no occasions in which air quality readings at the fence-line or community monitoring stations exceeded the regulated criteria (provided in Appendix B). However, there was one incident of visible dust on May 15th, 2015 which caused the Action Level to be triggered at one of the fence-line air quality monitors. Dry conditions and high winds led to visible dust blowing off tailing ponds and stockpiles at the Mine Site. Water trucks successfully wetted down the tailings after a delay due to mechanical issues. Dust levels in the community did not exceed the 24-hour criteria, and laboratory analytical results collected at the community stations were all below criteria. As a follow-up, the Project Team met with the YKDFN Giant Mine Advisory Committee to discuss the findings and generate ideas to prevent similar incidents in the future.

Key Actions

In response to the concerns generated by the May 2015 dust incident, the Project Team committed to implementing changes to reduce the likelihood of a dust exceedance ahead of the 2016 spring thaw. The following activities were completed in 2015-2016:


- Stored a larger stockpile of dust suppressor on site.
- Communicated daily wind forecasting to the Project Team each morning.
- Conducted 24-hour dust monitoring at the fence-line air quality monitoring stations throughout the spring thaw until the dust suppressor sealant could be applied.
- Ensured more water trucks were available to wet drying areas that could generate dust.
- Commenced an options analysis to identify and assess means of mitigating fugitive dust emanating from the tailings impoundments.

Next Steps

The air quality monitoring program will continue, including ongoing community monitoring, fence-line monitoring, and activity-specific monitoring wherever work is being undertaken. In addition, the Project Team re-evaluated the location of the existing station in Ndilo based on feedback from the Yellowknives Dene First Nation (YKDFN) community. Traditional knowledge on wind patterns has identified that the current location might not be ideal and dust coming from the site might not be detected. After evaluation of several options, the YKDFN chose a location near the original station but requested a higher deck to raise the equipment intakes and vegetation management to improve airflow to the station. The Ndilo station will also be upgraded in 2016 to a purpose-built structure that is more efficient to operate.

3.1.2 Dust Mitigation Options Analysis

Despite measures being actively implemented at site by the care and maintenance contractor to mitigate dust generation, dust continues to be generated from the site and is of concern to neighbouring communities and Parties to the Working Group. An assessment of the options available to



effectively mitigate dust generation from the tailings impoundments was completed as a first step to address this issue.

The options assessment was initiated in 2015-16. It comprised a desktop study, completed by an independent expert in wind erosion and wind-blown dust mitigation; a review of the available options with key stakeholders (the Working Group of Parties and the Giant Mine Advisory Committee); the creation of an evaluation matrix that systematically addressed the comments resulting from the internal and external reviews and that quantitatively evaluated each option against the GMRP Team's requirements; and the selection of the highest ranked solution.

Results / Key Actions

- The study is underway; no results are yet available and no key actions were taken.

Next Steps

- The study will continue in 2016-17 and the Project Team will evaluate the results.
- Implementation of the selected solution is anticipated to start in the spring of 2017.

3.1.3 Halocarbon Release

The Project Team completed the removal of halocarbons from the Freeze Optimization Study (FOS) Plant on December 18, 2015. There was a discrepancy of 16.78 kg between the final weight of the halocarbons removed and the weight of the original load placed in the tanks the previous year. PWGSC reported the release to Environment Canada in accordance with the Federal Halocarbons Regulations, with a copy of the information to the Co-Proponents. The leaky valve was identified and the condition recorded in the equipment logbook. The system is now empty so no further action was required.

3.2 Water

To monitor and minimize water quality impacts, the GMRP and has ongoing water quality monitoring on-site and in nearby communities.

3.2.1 Effluent Treatment and Water Quality Monitoring

The Project Team undertakes water quality monitoring in and around the Giant Mine site via different programs in order to report on surface water, mine water, underground locations, and underwater sediments. These programs track measures such as the volume of water discharged, water quality, and the performance of the effluent treatment plant. These programs are used to monitor existing performance and to inform the design process for remediation activities.

To protect the health and safety of workers, the public, and the environment, all water from the Giant Mine Site is treated at the on-site Effluent Treatment Plant (ETP) before being discharged to the environment. The ETP system consists of various components including reaction tanks, a settling pond, and a polishing pond that are used – in this order – to treat the mine water. Discharged water must meet standards set by the Metal Mining Effluent Regulations (MMER) under the *Fisheries Act* and the Project has also committed to meeting the standards outlined in its former Water Licence. Part of the water quality monitoring program includes testing of effluent chemistry. If the level of arsenic in the



water is near the allowable limit, the project team stops the release of water to Baker Creek and recycles it back through the treatment plant.

Contaminated water is generated throughout the year and stored on-site in the Northwest pond. Treatment of this water typically occurs in June of each year, with discharge to the environment occurring between July and September, once the Arctic Grayling have left Baker Creek.

Results

In 2015, a total of 232,943 m³ of water was released into the environment and 478,914 m³ of water was pumped to the NW Pond; however, the maximum amount that was stored in the pond at any given time was 238,609 m³.

Key Actions

The site is actively monitored to ensure operational equipment is functioning as it should and actions are taken to treat risks. In 2015, the Project Team:

- Replaced three steel reaction tanks, where additives (ferric sulphate, lime, and a very small amount of polymer) are added to the untreated mine water to form sludge, which settles to the bottom of the settling pond.
- Built a berm in the settling pond to make more room for water and sludge (since the sludge continues to build-up over time).
- Made repairs to the existing splitter dyke that separates the settling and polishing ponds.

Next Steps

- Effluent treatment and water quality monitoring will continue, to ensure that the Giant Mine Site does not negatively impact water quality downstream of the mine.
- In 2016-17, a desktop study will be conducted to validate recommendations for ETP system upgrades to maximize treatment efficiency with the existing infrastructure in case discharge criteria are changed or to be able to react to a situation in which there is limited storage capacity and the treatment and discharge of water needs to happen immediately.

3.2.1.1 Surveillance Network Program and Operational Monitoring Program

Although the Water License expired in 2005, the Project has committed to continue site monitoring as outlined in the Surveillance Network Program (SNP), which involves daily water quality analyses of the discharge from the ETP during the treatment season (June to September) and weekly or monthly analysis at six other sites (four on-lease and two off-lease). In addition to the regulated SNP for the Site, voluntary operational monitoring (OMP) has also occurred at various surface water, groundwater, mine water and underground locations, the results of which inform and confirm operational practices at the ETP and ensure that discharge from the ETP meets the requirements of the SNP. Additional details on the SNP and OMP are included in Appendix C.

Results

- SNP and OMP daily analyses show that all water discharged to the environment during the 2015 treatment season met the water quality limits as set forth in the former Water Licence and the federal MMER. No exceedances were reported for the treated effluent discharged to the environment (SNP 43-1).



3.2.1.2 Study of Baker Creek Outlet

Results of the winter 2015 study on sediment and pore water of the Baker Creek Outlet became available in FY 2015-16. The objective of the study was to examine sediment chemistry in winter, under ice conditions.

Results

Appendix C provides more information. Study highlights include:

- Sediments from below 1m depth are at or near background concentrations for the Yellowknife region.
- Dredging of the sediments is not expected to pose a risk to aquatic life; for those metals with established Canadian Council of Ministers of the Environment (CCME) Probable Effects Level (PEL), the concentrations measured are at or below the defined level.
- The elevated arsenic concentrations in surface sediment layers, identified in the winter study and previous summer studies, indicate existing negative effects on aquatic organisms in the Baker Creek Outlet.

Next Steps

- If Baker Creek Outlet sediments are left in place, further work is required to assess the risk posed to greater Yellowknife Bay.

3.2.1.3 Surface Runoff Arsenic Loading Study

Data collection was undertaken to determine baseline arsenic loading information in surface water runoff for the site and upstream sources. This information can be used to inform the remediation design for multiple work packages by illustrating the estimated effect of different design options on arsenic loading into Yellowknife Bay. Work was initiated in 2014 and sampling continued in 2015 to fill data gaps. Field sampling in 2015 was conducted at 64 sampling locations grouped into nine sampling areas; sampling was conducted at times of elevated flows: freshet (Spring) and after a rainfall/storm (Summer). Samples were analyzed for total metals, routine chemistry parameters and Arsenic speciation.

Results

- On-lease surface water runoff (from ponded and flowing sources) contained elevated concentrations of metals, ions and nutrients, similar to mine water and treated effluent.
- Concentrations of metals consistently exceeded applicable guidelines for aquatic life in both on-lease and off-lease sampling locations.
- Nutrient and ion concentrations exceeded applicable aquatic life guidelines / criteria in some on-lease sampling locations, but not in off-lease locations.
- Summer runoff samples generally contained higher concentrations of metals and ions than did spring freshet samples.

Next Steps

- Supplemental hydrology work will be undertaken to update the hydrology completed at the Giant Mine Site with current volumes and seasonal flow information. The updated hydrology information will then be used to compare the surface water volumes and flow rates in three remedial options scenarios.



3.3 Land

The Project Team undertook several activities to monitor and minimize impacts to land and to protect the health and safety of the public and on-site workers. These activities included stabilizing site structures, managing and disposing of hazardous materials and wastes, assessing soil contamination, and classifying land cover.

3.3.1 Site Stabilization/Risk Mitigation

In 2015-16, the GMRP reduced risks to the site by deconstructing the C-Shaft Headframe and supporting structures, stabilizing the C1 Pit Wall, and filling stopes with paste. Section 2.1 provides additional details on the site stabilization activities.

3.3.2 Waste Management

In 2015-16, the Project Team and contractors managed existing waste and carefully disposed of new waste created during the year.

In 2014, the decontamination and deconstruction of the Roaster Complex as part of the Site Stabilization Plan produced hazardous waste, primarily arsenic- and asbestos-containing materials. The wastes were safely packaged in lined Transportation of Dangerous Goods (TDG) bags and stored on site, held in shipping containers within an area secured by a chain-link fence. Runoff water from the storage area is collected and treated in the Project's effluent treatment plant (ETP). Until the material can be appropriately disposed, the safest place to store it is on an already contaminated site, away from water and people. The materials have therefore remained on-site and appropriately cared for during 2015-16.

Additional hazardous waste was created as a result of activities in 2015-16. Many of the C-Shaft Complex structures were covered with or contained asbestos. The Project Team developed standard operating procedures to safely manage this material. The hazardous waste materials containing asbestos were safely packaged, transported, and disposed outside the NWT in accordance with all applicable regulations. Non-hazardous waste materials, as well as some lead-painted items, were safely stored on site and within the project work area. This waste will be managed until full remediation can begin.

Results

Hazardous and non-hazardous wastes were safely stored and managed on-site, and some were transported off-site and appropriately disposed of.

Key Actions

- Developed standard operating procedures (SOPs) to safely managed contaminated material from C-Shaft Complex deconstruction and decontamination.
- Safely packaged and transported hazardous waste materials containing asbestos and disposed of the materials at appropriate facilities outside the NWT in accordance with all applicable regulations.
- Non-hazardous waste materials, as well as some lead-painted items, were safely stored on site and within the project work area.
- Collected and treated run-off water from the hazardous waste storage area.



Next Steps

- Hazardous waste safely packaged and stored on-site will remain so until it can be appropriately disposed, which may take several years.
- Waste material stored on-site will be safely managed until full remediation can begin.

3.3.3 Contaminated Soils

A soil sampling program was initiated in 2014 and a supplementary soil sampling program was completed in 2015-16 to further characterize both undisturbed and disturbed areas of the site (addressing data gaps from the 2014 sampling program).

The scope for the *undisturbed* sampling involved the collection of 10 shallow soil samples to a maximum depth of 10 cm. Sample stations were selected to allow for adequate geographical coverage and included distribution between bedrock outcrops, forested areas and wetlands.

The scope for the *disturbed* sampling involved the collection of soil samples in the tailings containment areas (North, Central, South and Northwest Tailings Ponds) and the former Mill Area. Shallow soil samples were collected from five locations in each of the tailings containment areas to a maximum depth of 0.30 metres below ground surface (m bgs) and six test pits were advanced in the Mill Area to a maximum depth of 2.0 m bgs.

Results

- Undisturbed Sampling: The 2015 results were similar to the 2014 program and confirmed the presence of elevated concentrations of arsenic in shallow soil within the undisturbed areas of the site, including the presence of arsenic trioxide, roaster oxides and arsenopyrite.
- Disturbed Sampling: The results suggested that total arsenic concentrations in the tailings containment and the Mill areas exceed the applicable guideline of 340 mg/kg and that there is a correlation between these elevated concentrations and the elevated concentrations and percentage of bioaccessible arsenic in the tailings containment areas. While some of the highest concentrations of total arsenic were reported in the Mill Area, the concentrations and percentage of bioaccessible arsenic are generally lower than the tailings samples.

Next Steps

- This work will inform decisions related to future land use and provide baseline information for the HHERA.

3.3.4 Land Cover Classification

A land cover classification study was conducted in 2015-16 to provide a broad-level description of land cover³ surrounding the Site.

³ I.e. disturbed, disturbed with secondary growth, exposed bedrock, forest, Great Slave Lake, other open water, peat bog, shoreline vegetation, tailings pond.



Results

The total area classified covered 15.3 km² and centered on the Giant Mine Site. The combined surface area of each land cover class is summarized in the table below.

Table 3: Area Summary of Land Cover Classes within the Mapped Study Area

Class Name	Area (ha)	Percent Coverage ^(a)
Disturbance	256.38	19.33
Disturbance with secondary growth	40.94	3.09
Exposed bedrock	354.37	26.72
Forest	425.41	32.08
Great Slave Lake	204.40	N/A
Open water	95.29	7.19
Peat bog	80.28	6.05
Shoreline vegetation	50.29	3.79
Tailings pond	23.15	1.75
Total	1,530.51	100.0

^(a) Excluding Great Slave Lake

Next Steps:

- The land classification information will be used to inform future land-use discussions, contaminated soils mapping exercises and a Site Wildlife Management Plan.
- Additional studies will be undertaken to assess vegetation and soils in support of the Human Health and Ecological Risk Assessment (HHERA) and to provide input to design decisions.

3.4 Biodiversity

The Giant Mine project team undertook several activities to monitor and minimize impacts to biodiversity. These activities have included establishing and undertaking studies on animals, plants, and habitat, as described below.

3.4.1 Bird Survey

The annual bird survey was conducted in 2015-16 to:

- Document bird use of infrastructure and habitat at the site where work is planned or ongoing;
- Document bird use of contaminated areas;
- Identify risks of industrial activities to birds, their eggs and nests; and
- Recommend appropriate mitigations.

The following seven risk factor categories were considered for birds on site:



1. Presence/operation of above-ground facilities, machinery and vehicles;
2. Removal of habitat (human-made and natural);
3. Presence of contaminated media;
4. Creation of artificial habitats, traps and nest structures;
5. Interaction with above-ground power lines;
6. Presence of artificial lights; and
7. Presence of noise.

Results

Recommendations to reduce the risk of contributing to the incidental take of migratory birds, their young, eggs and/or nests included:

- Remediation or demolition work should be undertaken before or after the nesting season, especially buildings around the C-Dry and Mill areas where most perching and nesting was observed.
- If work occurs during the nesting season, affected areas should be surveyed for evidence of bird nesting behaviour or other indicators of the presence of active nests before any demolition or remediation work starts. Machinery and vehicles should also be inspected for nests before starting work.
- If active nests (containing eggs or young) are discovered, work should be delayed in the area until nesting is complete (after the young have left the nest and the immediate area).

Appendix C provides a full summary of the observed bird activities by site component (e.g. C-Dry and Mill Area; Baker Creek), the associated risks, and the full list of recommendations.

Key Actions

- Recommendations will be considered by the Project Team.

Next Steps

- Annual bird monitoring will continue in 2016-17.

3.4.2 Winter Wildlife Monitoring

In January 2016, a winter wildlife monitoring project was completed to document current wildlife use of the site and surrounding area. This was accomplished through winter track counts, remote, motion-activated camera footage (six cameras) and site surveillance surveys. The information collected from these three programs is intended to provide direct feedback to site operations regarding the effectiveness of waste management and wildlife mitigation practices while the site is being decommissioned and to guide closure planning to reduce risks and hazards to wildlife.

Results

- Winter Track Counts: Tracks from eleven wildlife species, or groups, were observed during the track counts. The most common wildlife tracks observed were coyote, red fox, snowshoe hare, red squirrel, ptarmigan (willow ptarmigan and rock ptarmigan) and small mammal species (including mice, voles and shrews). Wildlife incidentally observed during the counts included ptarmigan and raven.



- **Remote Camera Monitoring:** Cameras recorded a total of 140 images of wildlife. The most common animal photographed on the remote cameras was red fox. The species captured on film during this program were: red fox, snowshoe hare, ptarmigan, and lynx.
- **Weekly Site Surveillance:** Surveys focused on targeted site facilities (A-Shaft, Akaitcho Shaft, B1 Pit, B2 Pit, B4 Pit, C-Dry and the garbage dump). Observations of wildlife and wildlife sign during the surveys were variable among site locations. The area with the highest frequency of wildlife observed was the Akaitcho Shaft where 80% of surveys recorded wildlife. Observations of wildlife were relatively rare at all other locations.

Key Actions / Next Steps

- Results will be considered in remediation design and planning.

3.4.3 Environmental Effects Monitoring

The *Metal Mining Effluent Regulations* (MMER) under the *Fisheries Act* require metal mines to conduct Environmental Effects Monitoring (EEM). This includes biological monitoring studies and chemical / toxicological analyses to identify any effects that may be caused by mine effluents. The objectives are to protect fish and fish habitat in order to ensure the safe use and consumption of fish by people. These EEM results provide additional supporting information to the observed effects downstream of the effluent discharge, as the results of the yearly EEM is used to help interpret the effects observed in the fish and benthic invertebrates from Baker Creek (the results from the biological program that is completed every three years).

The Project Team completed effluent characterization and surface water quality sampling during the discharge period between July and September, 2015. Samples of treated effluent and surface water were analyzed for the eight deleterious substances and pH as outlined in Schedules 3 and 4 of the MMER, as well as the required parameters outlined in Schedule 5 and applicable site-specific parameters recommended by Environment Canada (2012). In addition, treated effluent was tested for acute and sub-lethal toxicity as required by the MMER (Government of Canada, 2012).

In 2015, effluent characterization and surface water quality monitoring for Giant Mine were performed on three occasions: July 21, August 25, and September 29. Surface water quality in the exposure and reference areas was tested as required under Schedule 4 and 5 of the MMER (Government of Canada 2012).

Results

- Effluent characterization results were consistent with previous years in that treated water was found not to be acutely toxic, but that sub-lethal effects were observed.
- Treated effluent was determined to be not acutely toxic⁴ to rainbow trout and *Daphnia magna* (water flea). Toxic effects related to survival were not observed⁵. However, sub-lethal toxic effects related to reproduction of a water flea (*Ceriodaphnia dubia*) and common duckweed (*Lemna minor*), and growth in microalgae (*P. subcapitata* and *P. promelas*) were observed in the August 25, 2015 treated effluent sample. No sub-lethal effects were observed in Fathead

⁴ MMER definition of “acutely lethal effluent”: an effluent at 100% concentration that kills more than 50% of the rainbow trout subjected to it over a 96-hour period when tested in accordance with the acute lethality test.

⁵ As applicable to the test organisms under the bounds of the program.



Minnow. Given the results of the effluent characterization, the effects previously observed in fish and benthic invertebrate communities downstream of the effluent discharge are considered to be mine-related and are attributable to the effluent.

- In surface water tested, all parameters were below applicable MMER requirements for the 2015 July, August, and September samples. Current results were consistent with results from previous years.

Next Steps

- EEM will continue in 2016-17.

3.4.4 Aquatic Effects Monitoring

The Project Team is currently considering options for a new effluent discharge location. The sampling at the proposed location of the outfall will be necessary to establish baseline environmental conditions prior to construction, which will be communicated in a report.

Given that the outfall will likely be situated along the western shore of Yellowknife Bay, where there are elevated concentrations of metals in the sediments, a sediment coring study has been recommended. Further sampling of small organisms, such as phytoplankton and zooplankton, and bottom-dwellers, is also recommended to ensure an adequate characterization of these communities in order to evaluate potential effects from the proposed outfall.

Next Steps

- Once the design and location of the new effluent outfall is confirmed, additional baseline sampling will be carried out in the new exposure area.
- The Project Team will develop an Aquatic Effects Monitoring Plan (AEMP) based on the results of previous baseline aquatic assessments to confirm that the discharge does not have an adverse effect on the receiving environment.
- An 'investigation of cause' study is planned to assess other potential factors in addition to the discharged effluent, such as historical sediment contamination. The main objective of the study is to determine the likely primary causal factor, which will be informed by EEM results and additional monitoring results.



4.0 Health and Safety

This section provides an overview of the relevant management and performance information that applies to health and safety at Giant Mine.

4.1 Occupational Health and Safety

4.1.1 Health and Safety Incidents

GMRP tracks the number of major incidents, moderate incidents, minor incidents and near misses on a monthly basis, and reports the incidents to the Project Director and Project Team.

Results

Below is a summary of the incidents and near misses from the 2015-16 reporting year including examples of the types of incidents and near misses.

Table 4: Health and Safety Incidents and Near Misses in 2015-16

Incidents and Near Misses	2015-16 Total	Examples
Major Incident: An incident resulting from activities performed at the Project Site that results in a severe and irreversible disability, impairment, injury, illness or fatality to an individual or individuals.	0	
Moderate Incident: An incident resulting from activities performed at the Project Site that results in a reversible disability, impairment, injury or illness that temporarily alters the lives of an individual or individuals.	0	
Minor Incident: An incident resulting from activities performed at the Project Site that results in injury or illness that inconveniences an individual or individuals.	10	<ul style="list-style-type: none">• A truck driver sprained his ankle when he stepped out of his truck onto uneven ground. The worker did not miss work but was on light duty for a few days.
Near Misses: An unplanned incident resulting from activities performed at the Project Site, which did not result in any disability, impairment, injury, illness or fatality, but had the potential to do so.	85	<ul style="list-style-type: none">• A security officer skidded off the road while conducting a patrol. No injuries were sustained.• A security guard backed into a boulder while turning their light vehicle around, causing minor damage to the vehicle.

Key Actions

- Incidents and near misses are discussed at daily safety meetings to review lessons learned, root causes and corrective measures.



Next Steps

- The Project Team will also continue to track and report health and safety incidents.

4.1.2 Monitoring of Arsenic Levels in Workers

In the 2015-16 reporting year, the Project Team monitored arsenic levels in the workers who spend time on-site by taking regular urinalysis samples (weekly samples if on-site full-time). Samples were compared against the Action Level of 35 micrograms of arsenic per litre of blood (µg/L) adopted by the Workers Safety and Compensation Committee (WSCC).

Results

Table 5 below shows the total number of samples and the number of samples above the Action Level of 35 micrograms of arsenic per litre of blood.

Table 5: Total number of urinalysis samples and number and percentage of samples above the Action Level of 35 micrograms of arsenic per litre of blood

Total samples	Sample >35 micrograms per litre	Percentage of samples above the Action Level
306*	13	4.2%

*This value includes 76 baseline samples, and does not include invalid test results (10 samples)

Key Actions

- For any urinalysis sample above the Action Level, the contractor notified WSCC and Public Services and Procurement Canada (PSPC) and investigated the root cause (e.g., diet, poor hygiene practices, inadequate procedures). The contractor then took immediate actions to reduce exposure to workers, such as improvement of dust control measures, adoption of more rigorous personal protective equipment procedures, or reassignment of personnel to other duties (in the rare case of continued high levels of arsenic). In 2015-16, one individual working for a contractor was removed from the Project after repeated high levels from improper work procedures.

Personal Protective Equipment (PPE)

PPE is a vital component to keeping workers safe at Giant Mine. Health and safety procedures outline the PPE requirements for various parts of the mine site and for different operations. Depending upon their designated tasks, workers also wear personal air monitoring devices to ensure the PPE they wear are appropriate for their surroundings.

Next Steps

- The Project Team will continue to provide oversight and manage the health and safety of its employees and contractors through the established management system and associated health and safety procedures, including urinalysis for on-site workers.



4.1.3 Training

The C&M Contractor's occupational health and safety manager ensures that employees and sub-contractors receive relevant health and safety training, including first aid, wildlife safety, water safety, fire response, etc. In 2015-16, workers involved in the underground stabilization project were trained on the hazards of arsenic and silica, the required personal protective equipment (PPE), and decontamination and work procedures.

Results

PSPC and INAC track the number of person hours that employees and sub-contractors receive in training, as shown in Table 6.

Table 6: Total hours of health and safety training received by employees and contractors on-site

Health and Safety Training	2014-15 Total Hours
HAZWOPER (Hazardous Waste Operations and Emergency Response)	16
WHMIS (Workplace Hazardous Materials Information System)	302
First Aid	238
Wildlife Safety	94
Water Safety	-
Fire Response	91
Other	1000
Total Training Hours	1740

Next Steps

- The Project Team will continue to track the type and amount of training received by employees and contractors.

4.2 Public Health and Safety

4.2.1 Health Effects Monitoring Program (Health Study)

The health effects monitoring program in Ndilo, Dettah and Yellowknife focuses on arsenic and any other contaminants in people that might result from the Project. The monitoring will include studies of baseline health effects of these contaminants and ongoing periodic monitoring, in accordance with Measure 9 of the Report of Environmental Assessment.

In 2015, Dr. Laurie Chan from the University of Ottawa was selected to lead the implementation of the Health Effects Monitoring Program. Dr. Chan was selected based on his experience carrying out a number of health studies in the North and working closely with northern and Aboriginal communities. He currently sits on the Independent Peer Review Panel (IPRP) for the Giant Mine Remediation Project and is familiar with the issues surrounding Giant Mine.

Next Steps

The implementation schedule for the Health Study is as follows:



- **2016:** Establish Advisory Committee (representatives from Health Canada, GNWT Health and Social Services, the Yellowknife medical community, the Yellowknives Dene First Nation and other potentially affected communities) and engage with stakeholders; Develop communication strategy (considerations for plain language component); Develop methods; Finalize sampling plan; Obtain research license and ethics approval.
- **2017:** Implement sampling program; Sample and data analysis.
- **2018 and onward:** Communicate results; Collect and analyze feedback; Publish results in scientific journals; Develop long-term program.

The contract for the implementation of the HHRA and the contract for the implementation of the stress assessment will be posted in 2016, and the work is expected to be completed by 2017.

4.2.2 Human Health Risk Assessment

As discussed in Section 2.2 above, the GMRP initiated a human health risk assessment (HHRA) in 2015-16 per Measure 10 of the Report of Environmental Assessment. The HHRA is anticipated to provide an estimate of the current and predicted future exposures to contaminants associated with Giant Mine.

4.2.3 Stress Assessment

In late 2015, the project engaged Dr. Ketan Shankardass, an expert in epidemiology and health effects of stress from Wilfred Laurier University, to support the development of a scope of work for a stress assessment. Dr. Shankardass met with stakeholders, including the Working Group, in January 2016, and planned to visit Yellowknife in the spring 2016 to conduct more detailed consultations with stakeholders.

The scope of this study is still under development, but it is anticipated that it will include consultation with affected community members (focus groups) and surveys to measure and analyze the effects of stress.

5.0 Community

This section provides an overview of the relevant management and performance information that applies to the community and socio-economic elements of Giant Mine.

5.1 Engagement and Consultation

The GMRP recognizes the importance of engaging with the stakeholders on the key issues in a meaningful way, while providing consistent, reliable engagement opportunities for all stakeholders. The GMRP Team also know the importance of showing how stakeholder input has been gathered and incorporated into decision-making.

The GMRP has established several regular engagement meetings to provide general updates and progress and to cover key topics of interest, described in Table 7.

Table 7: Types of Engagements and Frequency of Meetings

External Oversight Bodies	Frequency
Giant Mine Advisory Committee (GMAC) (Yellowknives Dene First Nation membership through designates) <ul style="list-style-type: none"> The GMAC is a forum for engagement and Crown Consultation with the Yellowknives Dene First Nation. 	Monthly
Giant Mine Working Group (Environmental Assessment Interveners and Chair of the GMAC) <ul style="list-style-type: none"> The Giant Mine Working Group is a multi-party committee that consists of the Expert Support Departments, Aboriginal groups, and other stakeholders. The mandate is to provide a forum for interested parties to discuss and make recommendations on technical, operational and project activities regarding the remediation of Giant Mine; it reviews risk assessments and remediation plans. 	Monthly
Giant Mine Community Alliance <ul style="list-style-type: none"> The mandate of the Giant Mine Community Alliance is to act as an independent body to assist key stakeholders and the people of Ndilo, Dettah and Yellowknife in providing input and feedback into decisions about the underground arsenic trioxide, closure and remediation, surface clean up and future use of the Site. 	Monthly
Giant Mine Oversight Board Society <ul style="list-style-type: none"> The Oversight Board was established to provide advice and to promote public awareness of the project, as well as offer independent advice to the federal project team and conduct research into better solutions for the arsenic trioxide problem at the mine. The Oversight Board is guided by the legally binding Environmental Agreement. Each party to the Environmental Agreement is entitled to appoint a director of the Oversight Board Society. The six Directors include: <ul style="list-style-type: none"> Ginger Stones (appointed by the Government of Canada) Ken Hall (appointed by the Government of NWT) David Livingstone (appointed by Alternatives North) Tony Brown (appointed by the City of Yellowknife) Dr. Stephan Gabos (appointed by the North Slave Métis Alliance) Dr. Kathy Racher (appointed by the Yellowknives Dene First Nation) 	Two semi-annual meetings with the Parties, and one annual meeting with the public
Meetings	Frequency
GNWT Legislative Assembly	Yearly



Yellowknife Dene First Nation Chief and Council	Yearly
Tlicho Government	Yearly
Yellowknife Dene First Nation Land & Environment	Monthly
Yellowknife City Staff	Monthly
Yellowknife City Council Updates	Quarterly
North Slave Métis Alliance	As required
Mackenzie Valley Land and Water Board	As required
Site tours	As required
Public Meetings	As required
Individual group meetings	As required

5.1.1 Communications and Events

The GMRP Team provides updates on GMRP activities and progress through multiple communication techniques, including:

- E-newsletter: sent monthly to close to 200 email addresses and posted on the GMRP website
- Website (<https://www.aadnc-aandc.gc.ca/eng/1100100027364/1100100027365>)
- Twitter account ([@GiantMine](#))
- Media briefings and responses to media requests
 - There were 37 media interactions, including interviews and requests for information, in 2015-16.
- Responses to unforeseen events
- Topic-specific public service announcements, as required
- School presentations

The GMRP Team assesses the effectiveness of its communications through various means, such as gathering feedback from the public and keeping a media log to track inquiries and topics. The Team also tracks the number and type of engagement activities planned and achieved.

- 103 consultations and community engagements were held in 2015-16.


Engagement and event highlights from the 2015-16 reporting year include an Annual Public Forum, a Giant Mine Healing the Land Ceremony, Industry Days, and the Surface Design Engagement Process activities.

5.1.1.1 Annual Public Forum

On March 3, 2016, the Project Team held its annual public forum in Yellowknife. This forum was a two-way exchange of information – a chance for the Project Team to share information about the Project and a chance for community members to ask questions or raise concerns. The Project Team provided updates on the status of the remediation, the full range of activities on site, future plans (including as they relate to the regulatory process) and progress on EA measures.

5.1.1.2 Giant Mine Healing the Land Ceremony

On June 21, 2015, the Yellowknives Dene First Nation and the Giant Mine Remediation Project Team held a historic joint Feeding the Fire / Healing the Land Ceremony at the Weledah Site. This Ceremony



was held to promote healing the land and people who have been impacted by the mine to strengthen the relationship between both parties, as well as to celebrate the Environmental Agreement signed by all parties.

5.1.1.3 Industry Days

In early December 2015, engagement sessions were held with First Nations and Métis groups to discuss contracting associated with the Giant Mine Remediation Project. The session provided a high level overview of project status, a brief description of the remediation activities required, and the proposed contracting approach being considered.

On February 25, 2016, the Project Team held an engagement session for industry. This event resulted in approximately 70 members of the business community coming out to learn about the proposed procurement approach for the remediation phase of the Project and to hear about the anticipated work needed during the remediation of the Giant Mine Site. Industry Day also provided a networking opportunity for members from various Aboriginal, local and southern companies.

5.1.1.4 Surface Design Engagement Process

Throughout 2015 and into 2016 the Giant Mine Remediation Project Team worked with stakeholders in a surface design engagement process to support surface design decisions. Surface design engagement does not replace other engagement processes, but instead offers an opportunity for stakeholders to voice concerns, identify their objectives and provide direct input to the planning of the Giant Mine surface remediation and significant input into a number of the Report of Environmental Assessment Measures – such as “What will the future of Giant Mine look like?” and “How will future generations use this area?”. It provides one of the best ways for the public to weigh in with their preferences, giving the Project Team a wider variety of options that will be considered going forward.

The engagement process was developed in early 2015 with extensive input from the Giant Mine Working Group and Yellowknives Dene First Nation Advisory Committee and shared with the public in May of 2015. Participants attended several multi-day SDE workshops that occurred between May 2015 and February 2016. For example:

- **June 2015:** A two-day Options Definition Workshop was held as a follow-up to initial sessions held in May. This workshop allowed the participants to share their ideas, discuss their visions for the Site, and identify a range of options for the mine’s surface. Almost 100 people attended.
- **December 2015:** A Risk Review Meeting (3 days) was held for representatives from stakeholder groups to review the plans for each surface option and use a risk assessment method in order to tell the project engineers how to improve the options.
- **February 2016:** A five-day Options Evaluation Workshop was held in Dettah to evaluate each of the site-wide options.
- **August 2016:** A final report on the Surface Design Engagement project is expected in August 2016. The Project Team will then analyze the results of Surface Design Engagement options and potential impacts on the project and will incorporate the selected options into the final Giant Mine surface remediation plan and Closure and Reclamation plan. In 2016-17, the Project Team will share remediation plans through its regular engagement channels (the



Giant Mine Advisory Committee, Giant Mine Working Group, Giant Mine Community Alliance and Giant Mine Oversight Board) as well as through public reporting (e.g. Giant Mine online newsletter).

Note to GMOB

In FY 2015-16, the GMRP Project Team did not consistently track in one location the key stakeholder concerns and how concerns were addressed, as per the Environmental Agreement. Concerns are held within minutes, emails and other correspondence. The Project Team will begin to systematically track this information in 2016-17.

Next Steps

The GMRP Project Team will share remediation plans through the Giant Mine Advisory Committee, Giant Mine Working Group, Giant Mine Community Alliance and Giant Mine Oversight Board as well as through public reporting. Engagement in 2016-17 will also focus on engaging on ongoing Site Stabilization work (public forums and monthly reporting), continuing the engagement related to the Human Health Risk Assessment, Health Effects Monitoring Program and Stress Assessment.


5.2 Study/Partnership Program

The Giant Mine team provided funding to support additional sampling to be included in work Environment Canada, with partial funding via the Cumulative Impact Monitoring Program (CIMP-GNWT), carried out in partnership with the Yellowknives Dene First Nation (YKDFN). The Study objective was to measure metal concentrations (particularly arsenic) in sediments and surface waters at locations adjacent to the communities of Dettah and Ndilo. The selection of the locations was informed by the YKDFN, based on their use for recreation, including swimming and fishing.

In 2015, a total of 16 locations were sampled: 4 water and 6 sediment in Ndilo, and 3 water and 3 sediment in Dettah (include map). This complements the water, sediment and sediment core samples collected from nearby locations the previous year. The CMP report is not yet available to the public, but is expected to be finalized and released in September, 2016.

The results of the 2014 and 2015 CMP show that water and sediment concentrations of arsenic adjacent to Ndilo have been impacted by mining pollution while similar measurements adjacent to Dettah were comparatively lower in arsenic, reflecting Ndilo's closer proximity to Giant Mine. For example, a new sediment site sampled in 2015 at Dettah confirmed the low arsenic concentrations (<10 mg/kg), while sampling at two new sites in Ndilo in 2015 confirmed elevated arsenic concentrations (173-310 mg/kg) in the top 10 cm layer of sediment (offshore, and adjacent to the community). Similarly, the amount of arsenic that is bioavailable (i.e. in a form that can cross a cell membrane and accumulate) varies largely within Yellowknife Bay. The lowest concentrations are found in surface water at Dettah (<0.1 µg/L) and the highest concentrations in deep sediment at Ndilo (>100 µg/L).

Two beach areas at Ndilo were also studied for potential water arsenic concentrations encountered by swimmers. Researchers disturbed the bottom sediments to mimic swimming in shallow water, which increased total arsenic from 3 µg/L to 7 µg/L at one beach and 15 µg/L at the other . Dissolved **arsenic**



and arsenite (As³⁺) (more biologically available than total arsenic) did not increase in water at either site.

The environmental information from the CMP will support future updates to Human Health and Ecological Risk Assessment work currently underway at the Giant Mine site.

Results

- The preliminary results of the 2014 and 2015 CMP show that water and sediment concentrations of arsenic adjacent to Ndilo have been affected by mining pollution, while similar measurements adjacent to Dettah were comparatively lower in arsenic, reflecting Ndilo's closer proximity to Giant Mine.

Next Steps

- The environmental information from the CMP will support future updates to Human Health and Ecological Risk Assessment (HHERA) work currently underway at the Giant Mine Site.

5.3 Procurement and Employment

Through the Environmental Assessment process, the residents of Yellowknife and other stakeholders and local community members expressed strong interest in socio-economic issues. The Giant Mine Remediation Project Team is committed to providing opportunities for local economic development through local employment and procurement.

5.3.1 Procurement Strategy

The GMRP has developed a Procurement Strategy that outlines how the GMRP's procurement activities are being planned for the design and implementation phases of the Project. It is informed by the INAC Contaminated Sites Procurement Strategy Procedure, which guides projects in developing and implementing procurement strategies that are in-line with Canada's procurement legislation, policies and trade agreements, as well as with land claim agreements, historic treaties and constitutional requirements.

Two contracting mechanisms that are used, when applicable, to increase Aboriginal benefits are outlined below.

- **Aboriginal Opportunity Considerations (AOC):** AOCs are a contracting mechanism implemented to meet obligations within a land claims area to support and provide opportunities to the local Aboriginal communities under federal government contracts. All contracts for the GMRP include an AOC unless otherwise approved by INAC.
- **Procurement Strategy for Aboriginal Business (PSAB):** The Procurement Strategy for Aboriginal Business supports Aboriginal business capacity development on behalf of the federal government of Canada. Through mandatory set asides, voluntary set asides, joint ventures and partnerships, the Strategy aims to assist Aboriginal businesses to compete for and win federal



contracting opportunities. Procurement under the PSAB, limits competition to those Canadian businesses meeting the definition of 'Aboriginal Business'⁶.

The GMRP engages Aboriginal groups, the business community, other interested parties and the community at large in several ways, including holding ongoing meetings with Aboriginal governments to advise them on upcoming procurement activities, holding Industry Days (led by PSPC), and posting 'Request for Interest' on MERX to provide early notification of work.

The GMRP tracks the total employment and employment by certain categories, namely Northern, Aboriginal, Aboriginal Opportunity Considerations, and Women. Table 8 shows the employment statistics for 2015-16.

Table 8: Total number of persons and total person-hours for 2015-16, by category

Employee type	Total # persons (incl. contractors)	Total person-hours	Persons as % of all employees
Northern employees	190	66,426	28%
Aboriginal employees	71	34,163	11%
AOC employees	65	31,906	10%
Female employees	209	20,679	31%
TOTAL	667	149,925	100%

Since 2004, the care and maintenance contractor for GMRP has been Det'on Cho Nuna, which is a joint-venture between Det'on Cho Corporation and Nuna Logistics Limited. Nuna is 51 percent Inuit-owned. Det'on Cho is the economic development organization of the Yellowknives Dene First Nation.

In April 2015, the on-site interim construction manager, Parsons Canada Limited, awarded a contract to RTL Construction – a Yellowknife based firm – to stabilize the C1 Pit wall. PSPC awarded a contract in May, 2015, to Det'on Cho Nahanni Construction Ltd. to complete a diamond core drilling program that investigated the geotechnical stability of two stopes. The work occurred in June, 2015.

The GMRP also tracks the total number of suppliers, the total value of contracts and the number of suppliers and value of contracts by three categories: Northern, Aboriginal and Aboriginal Opportunity Considerations. Table 9 includes the supplier statistics for 2015-16. The GMRP also tracks purchase of goods and services by supplier category, namely Northern, Aboriginal, and Aboriginal Opportunity Considerations.

Table 9: Total number of suppliers and total value of contracts for 2015-16, by category

Supplier type	# suppliers	\$ spent	% of total \$ spent
Northern suppliers	240	\$29,899,837	68%
Aboriginal suppliers	41	\$12,320,066	28%
AOC suppliers	29	\$12,260,267	28%
TOTAL	436	\$44,190,575	100%

⁶ PSAB applies for those contracts over \$5,000 with Aboriginal populations as the main recipients of the goods or services.



Next Steps

The GMRP will continue to develop and adapt its Procurement Strategy and practices in 2016-17. Planned activities include the update to the GMRP Procurement Strategy, the development of contract provisions for the Main Construction Manager (for the implementation phase of the Project), as well as research related to local employment capacity and capacity-building programs relevant to the GMRP.

5.4 Training and Capacity Building

In addition to the occupational health and safety training, GMRP contractors are required to ensure that employees are properly trained to perform their responsibilities. Contractors deliver workforce training, including site orientations. The inclusion of AOC in contracts ensures Aboriginal employment and capacity building is considered and implemented where possible by all GMRP contractors.

The GMRP tracks its workforce training by number of people who have participated in training exercises, as well as the number of person hours. Table 10 below highlights the training statistics for 2015-16, organized by category of Northern, Aboriginal, Women and Total.⁷

Table 10: Total number of people trained and total person hours of training in 2015-16, by category

Workforce training	Total # persons	Total person-hours
Northern employees	129	1485
Aboriginal employees	63	845
AOC employees	58	830
Female employees	19	272
TOTAL	224	2353

Next Steps

Training is delivered by contractors on an as and when needed basis.

⁷ The total does not reflect the sum of the other categories because there is overlap between the categories and the total includes all workforce training (e.g., non-Northern).

6.0 In Closing

The 2015-16 fiscal year was another busy year for the GMRP – the focus was on the continuation of the implementation of the Site Stabilization Plan, ensuring ongoing care and maintenance of the Site, analyzing remedial design options, and undertaking environmental monitoring and baseline assessments. The focus for the 2016-17 fiscal year will be as follows:

Component		Plans for 2016-17
Operations	Care and Maintenance	Repair of the damaged UBC bridge at Site.
	Underground	Remainder of Slope mitigation drilling to support the final backfill design in the remediation phase of the project, conceptual mitigation plan development, and tendering of the last remaining underground slope to stabilize as part of the Site Stabilization Plan (Slope C5-09).
	Immediate Risk Mitigation	Demolition of A-head frame, curling rink, and assay lab; electrical systems improvements; communications system improvements.
Commitments	Measures	Health effects monitoring; human health risk assessment; Baker Creek relocation options and site-specific water quality objectives.
Environment	Air	Continue air quality monitoring program and operationalize the improvements to the monitoring station in the Niven Lake Community.
	Water	Continue effluent treatment and water quality monitoring; conduct study of ETP system upgrades; further study on Baker Creek outlet; update hydrology.
	Land	Additional studies to assess vegetation and soils in support of the Human Health and Ecological Risk Assessment (HHERA) and to provide input to design decisions.
	Biodiversity	Continue baseline monitoring (LTEMP); develop an Aquatic Effects Monitoring Plan; additional baseline monitoring at new effluent discharge location; investigation of cause study.
Community	Health and Safety	Oversee and manage occupational health and safety through tracking of training and incidents. Advance Health Study (establish Advisory Committee; engage with stakeholders; develop methods; finalize and implement sampling program). Post contracts for the Human Health Risk Assessment and Stress Assessment
	Engagement	Complete the Surface Design Engagement process, engage on health related studies (Health Study, HHRA and Stress Assessment) and other existing engagement mechanisms.



Component		Plans for 2016-17
	Procurement	Post contract for the Main Construction Manager.

Following this initial report, the GMRP will prepare annual reports that describe the progress and performance of the GMRP. We welcome your comments on this report and how it can be improved in the future.

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Appendices

Appendix A – List of Acronyms

Appendix B – Project Overview and Risk Tables

Appendix C – Additional Information on Project Activities and Commitments to Manage Environmental Impacts, Health and Safety, and Community Issues

Appendix D – Progress on Commitments



Appendix A – List of Acronyms

AOC	Aboriginal Opportunity Considerations
ADM	Associate Deputy Minister
AEMP	Aquatic Effects Monitoring Program
AQMP	Air Quality Monitoring Program
CCME	Canadian Council of Ministers of the Environment
C&M	Care and Maintenance
DG	Director General
DM	Deputy Minister
EA	Environmental Agreement
EEM	Environmental Effects Monitoring
EHSC	Environment, Health, Safety and Community
ETP	Effluent Treatment Plant
FTE	Full-time Equivalent
GMAC	Giant Mine Advisory Committee
GMRP	Giant Mine Remediation Project
GNWT	Government of Northwest Territories
HHRA	Human Health Risk Assessment
INAC	Indigenous and Northern Affairs Canada
LTEMP	Long-term Environmental Monitoring Program
MMER	Metal Mining Effluent Regulations
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
MVRB	Mackenzie Valley Review Board
NAO	Northern Affairs Organization
NCSB	Northern Contaminated Sites Branch
PPE	Personal Protective Equipment
PSAB	Procurement Strategy for Aboriginal Business
PSPC	Public Services and Procurement Canada
RBAL	Risk Based Activity Levels
RD	Regional Director
RDG	Regional Director General
SNP	Surveillance Network Program
SSP	Site Stabilization Plan
TDG	Transportation of Dangerous Goods
WMP	Wildlife Management Program
WSCC	Workers' Safety and Compensation Committee
YKDFN	Yellowknives Dene First Nation



Appendix B – Project Overview

Giant Mine Legacy

The Giant Mine is located close to Yellowknife's city centre (about five kilometres from the north end) and within the asserted traditional territory of the Akaitcho Territory Dene First Nations, within the extended Monfwi (Môwhì Gogha Dè Nîṭâàèè) boundary as defined in the Tlicho Land Claim and Self Government Agreement, and adjacent to, or on the boundary of, the Interim Measures Agreement Area of the Northwest Territory Métis Nation.

Between 1948 and 2004 when the Giant Mine was operational, it produced over 220,000 kilograms (7 million ounces) of gold. To release the gold, arsenopyrite ore had to be roasted at extremely high temperatures, which also released arsenic rich gas, a highly toxic by-product. During the mine's first several years of operation (1948-1950), arsenic was released directly into the air, resulting in human health impacts, including a death, and the contamination of local soil and produce. The introduction of pollution control equipment in the 1950's reduced arsenic air emissions dramatically, but resulted in the by-product of arsenic trioxide dust (which is approximately 60% arsenic). The collection and storage of this dust has amounted to approximately 237,000 tonnes and is stored on-site in underground stopes⁸ and chambers.

Arsenic trioxide dissolves in water and is dangerous to both people and the environment. If left unmanaged, the dust stored at Giant Mine could gradually dissolve and arsenic concentrations in groundwater would increase substantially. The contaminated groundwater would make its way into local water bodies downstream of the Site, particularly Great Slave Lake.

In addition to the significant risk posed by the storage of arsenic trioxide waste, there are other legacy concerns at the Site. The recovery of gold produced approximately 14 million tonnes of tailings⁹ that contain arsenic. During the first few years of operations, tailings (flotation tailings) were discharged uncontrolled into a valley leading to Yellowknife Bay. Commonly referred to as the "historic tailings area", residual tailings are still present at the Site. Arsenic-contaminated soils exist across the Site, and there are more than 100 buildings on-site, many of which are contaminated with arsenic and asbestos. Eight open pits and 35 openings to the underground mine also represent safety hazards.


⁸ Large underground spaces created during the mining process.

⁹ Ground rock and process effluents that are generated as a waste slurry in the mining process.



In 1999, the Government of Canada took over responsibility for Giant Mine after the mine's last owner went bankrupt. After the Government took over responsibility, the biggest concern was the arsenic trioxide dust stored underground. The Site became the subject of several studies, workshops, community consultation sessions and the work of experts to find a solution for the dust. From a possible 56 different management alternatives for dealing with the arsenic trioxide waste, the list was narrowed down to the 12 most viable options. Following this extensive community consultation period, the 12 options were further refined to two options: one which would keep the arsenic trioxide waste in the ground while limiting its movement ("leave in") and another that would involve removing it and storing it above ground ("take it out"). These two options were presented to the public by the Giant Mine Remediation Project Office at several community meetings and public information workshops. Based on feedback from public workshops, and the recommendations of the Technical Advisor and the Independent Peer Review Panel, the "leave-in" option was selected and the frozen block method¹⁰ of immobilizing the arsenic trioxide was incorporated into the Remediation Plan for Giant Mine.

¹⁰ An explanation of the frozen block method is available online. For more information, see <https://www.aadnc-aandc.gc.ca/eng/1100100027422/1100100027423> and <https://www.aadnc-aandc.gc.ca/eng/1100100023281/1100100023292>



Environmental Assessment processes involve very thorough public and technical reviews. For the GMRP, the assessment took seven years to complete and included a Developers Assessment Report¹¹, the Freeze Optimization Study, five days of technical sessions, five days of public hearings, over 400 information requests and hundreds of meetings and discussions with stakeholder groups, the Yellowknives Dene and the public.

On August 14, 2014, the Responsible Ministers issued their Decision of Environmental Assessment, and stipulated 26 legally binding Measures, many of which must be completed before a Water Licence for the Project will be issued, which would allow the Project to proceed to remediation. These 26 Measures will help focus the Project Team's work for the next phase of engagement, design and decision-making. Section 3 includes additional information on the status of each Measure.

Throughout the Environmental Assessment process and until remediation can begin, the Giant Mine Project Team monitors the Site and ensures it is kept safe and secure through 24-hour-a-day care and maintenance work. This work involves ensuring that the mine remains in compliance with relevant environmental regulations, ensuring site security and public safety, maintaining facilities, suppressing dust, and managing mine water and effluent. The Team also conducts risk mitigation activities and studies related to the remediation program (see Section 4.3 of this report for more detailed information on risk and studies).

Freeze Optimization Study


Since 2011, the Project Team has conducted a Freeze Optimization Study, or "FOS", to gather information about the freeze option, such as power requirements and rates of freezing. The FOS showed that a passive freezing system (using thermosyphons) can be used to achieve the same results as a fully active system (where a mechanical pump is used to circulate fluid). The FOS also showed that the chambers and stopes will remain safely frozen when cooled to a temperature of minus-five degrees Celsius, and it demonstrated how the efficiency of the design could be improved by freezing multiple stopes as one block. This information is incorporated into the updated remediation plan to freeze the remaining stopes and chambers.

Major Phases of the GMRP

The overall approach to the GMRP is divided into four major phases. The first phase was **project assessment**, which included initiating care and maintenance, understanding all of the risks and complexities of the Site and identifying remediation options. This phase began in 1999 and ended in 2006.

The second and current phase is referred to as **project definition**. As a result of the measures coming out of the Environmental Assessment, this phase is now projected to last until 2021. It is during this phase that the Environmental Assessment was completed, the detailed remediation plan is being

¹¹ The Developer's Assessment Report was developed based on the direction provided in the Review Board's Terms of Reference for the Environmental Assessment; the report identifies and assesses any likely adverse environmental effects that might be caused during the implementation of the Remediation Project, the selected mitigation measures and a monitoring framework.



developed and all permits and licences will be obtained. This phase has also involved addressing urgent health and safety risks and several remediation elements that were intended to be completed in the third phase of the project, such as the deconstruction of the Roaster Complex (structures where ore was roasted at high temperatures to extract gold) (see Section 2.3 for more detailed information).

The third major phase is referred to as **project implementation** and is when the majority of the remediation work will be completed. This includes a variety of activities including the containment of approximately 237,000 tonnes of arsenic trioxide dust by freezing 15 underground chambers, capping 95 hectares of tailings, demolishing over 100 mine buildings and infrastructure, as well as constructing and operating a waste water treatment facility to treat arsenic contaminated mine water, to name a few. This phase is currently projected to take place between 2021 and 2030, and represents the majority of activity and costs associated with the remediation project.

The final phase of the project is **monitoring and maintenance**. This is the longest phase as it is projected to begin in 2030 and to last in perpetuity. This phase has the lowest level of activity, but will include elements such as post-remediation adaptation, water treatment, long-term monitoring and infrastructure renewal as required.

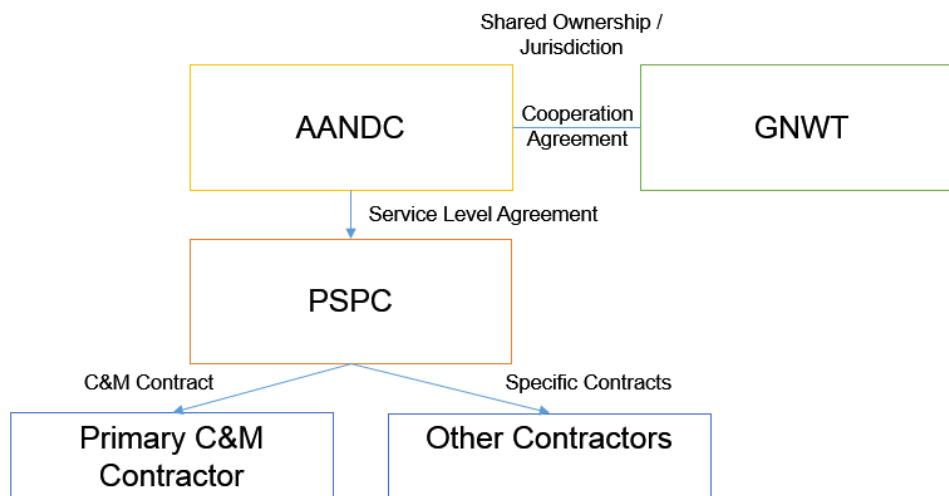
Management of the GMRP

Project Team

INAC and the GNWT share jurisdiction for the Site and jointly oversee the remediation through a Cooperation Agreement. INAC currently has care and control of the Site and has retained the support of PSPC for the management of the Site through the care and maintenance (C&M) contractor and management of the implementation of the Giant Mine Remediation Program.

Figure 3 shows the management structure for the GMRP.

Figure 3: Management Structure for the GMRP



The key members of the Project Team are:

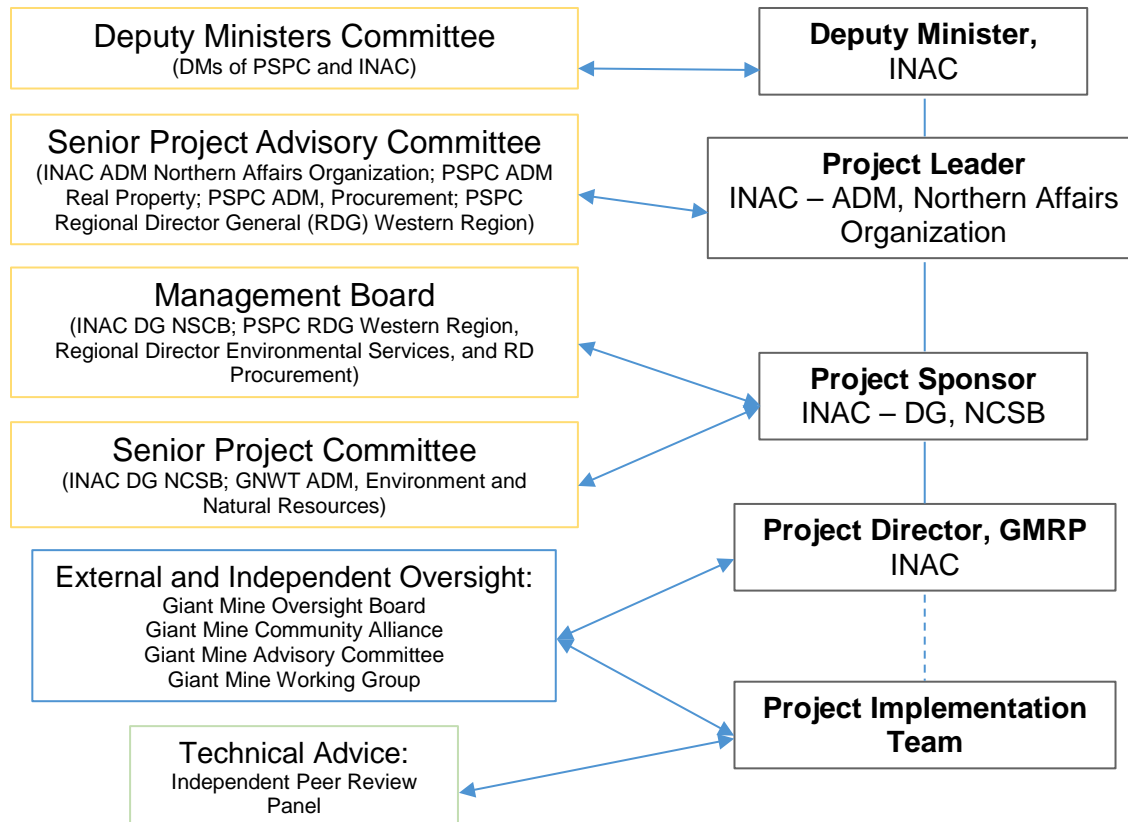
- a. Project Leader: Assistant Deputy Minister, Northern Affairs Organization (ADM NAO);
- b. Project Sponsor: Director General, Northern Contaminated Sites Branch (DG, NCSB);
- c. INAC Project Director
- d. Project Implementation Team, including the INAC Senior Project Leads and Project Leads and the PSPC Senior Project Managers, Project Managers and GNWT Manager

The Assistant Deputy Minister (ADM) of the Northern Affairs Organization of INAC is the **Project Leader** and is accountable to the INAC Deputy Minister for the overall delivery of the project. The Project Leader is also accountable for the project liability and the use of funds. The **Project Sponsor's** role is to ensure that project objectives are established early in the project and maintained throughout to project completion. The Project Director reports to the Project Sponsor, and is supported by the **Project Implementation Team** – a combination of INAC, PSPC, and GNWT personnel.

Project Governance

A joint INAC - PSPC project governance structure has been established to provide oversight, direction and advisory services to the Project Team. The governance and management of the GMRP is also supported by external, independent and technical reviews, provided by multiple groups, such as the Giant Mine Oversight Board, which was formed in 2015, the Giant Mine Community Alliance, and the Independent Peer Review Panel. Figure 4 shows the governance structure of the GMRP.

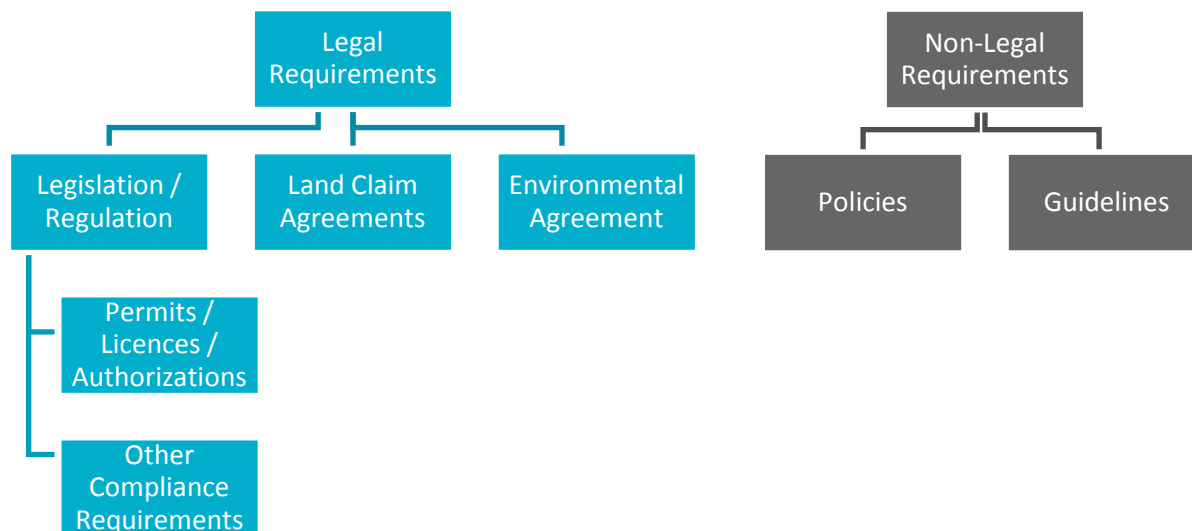
Figure 4: Governance Structure of the GMRP



Obligations of the GMRP

The activities and operations of Giant Mine are regulated through various pieces of legislation and guided by other non-legal requirements, as demonstrated in the below figure (**Figure 5: Obligations of the GMRP**)

Figure 5: Obligations of the GMRP



The GMRP occurs in an area covered by the *Tlicho Land Claims and Self Government Agreement* and INAC meets its specific obligations by providing Aboriginal employment and Aboriginal business opportunities (see Section 5.2 for more information). As of 2014-15, the Akaithcho First Nation was in negotiations with the GNWT for a comprehensive land agreement; they signed an Interim Measures Agreement in 2001. Should the land claim be settled in the Akaithcho territory during the project's lifecycle, the GMRP will work within the provisions set out in the agreement to meet its obligations.

A significant legal instrument for the GMRP is the Environmental Agreement, which established an independent oversight body (Giant Mine Oversight Board). The Environmental Agreement was signed in June of 2015. Signatories included INAC, the GNWT, the City of Yellowknife, the Yellowknives Dene First Nation, Alternatives North and the North Slave Métis Alliance.

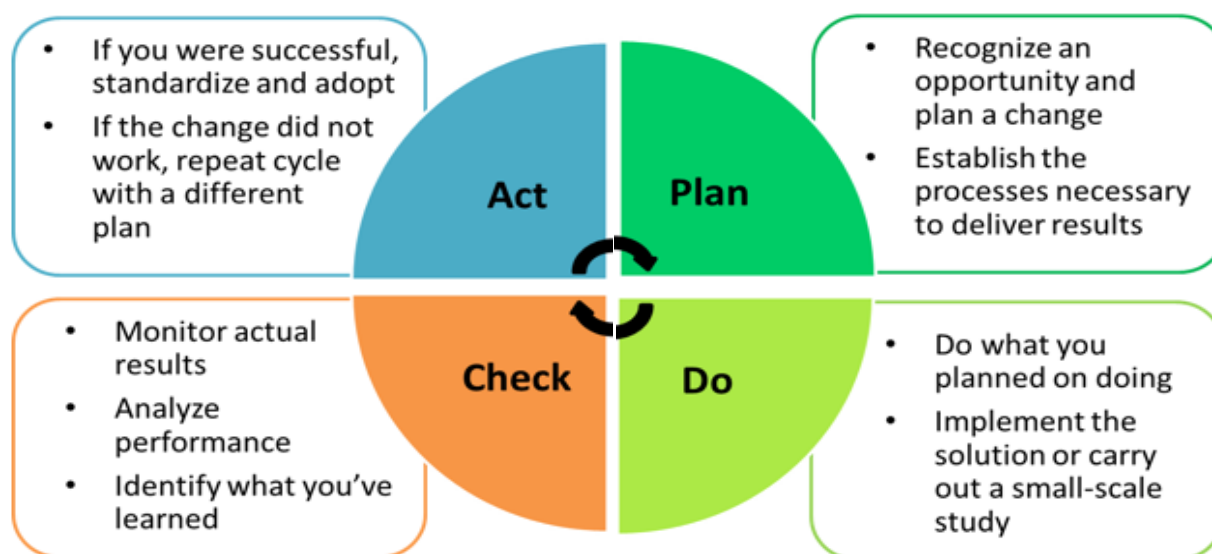
A key regulatory instrument for environmental management is a Type A Water License, issued by the MVLWB under the *Mackenzie Valley Resource Management Act*, *Northwest Territories Waters Act* and *NWT Water Regulations*. INAC will apply for a Type A Water License for the implementation phase of the project. Currently, INAC voluntarily manages water on the Site consistent with the standards specified in a historical Type A Water License (expiry 2005), issued to a former operator of the Site. In March 2013, the Project received a Type B Water License from the MVLWB for the Site Stabilization Plan (the Roaster Demolition and Underground Stabilization work are under this license).

Integrated Management System

GMRP has an integrated Environment, Health & Safety, and Community (EHSC) Management System¹², which improves the management of key environment, health, safety and social issues at the Site. A management system is a process of systemizing how things are done – it is a series of processes and procedures for ensuring activities are performed correctly, consistently and effectively to meet objectives and to drive continual improvement. The EHSC Management System provides the foundation for the GMRP to:

- Identify and manage risks;
- Track performance; and
- Ensure continual improvement through a “plan-do-check-act” approach.

Figure 6: EHSC Management System



Key parts of the GMRP EHSC Management System include a **Policy**¹³, which provides direction and sets commitments for the management of environment, health, safety and community for the GMRP, as well as a **Manual** that acts as a roadmap for the whole system by describing roles and responsibilities, procedures and requirements. The Management System also includes specific procedures and requirements within Environmental Management Plans and Health and Safety Standard Operating Procedures.

¹² The GMRP EHSC Management System is in alignment with internationally recognized standards in order to enable a single integrated approach (specifically, the ISO 14001:2004 Environmental Management Systems standard and the OHSAS 18001: 2007 Occupational Health and Safety Management Systems standard).

¹³ Giant Mine Remediation Project: Environment, Health, Safety and Community Policy: <https://www.aadnc-inac.gc.ca/eng/1340835251072/1340835309566>



Project Risks and Mitigation

Risk management has been an important and ongoing management activity for the GMRP since 2002-03. Risk is about uncertainties, or unknowns, and how these could impact the objectives of the project, such as the objective to minimize impacts to the environment. Risk management involves identifying and understanding risks, ranking them (which ones are low or high), and taking steps to prevent risk events from happening or to reduce their impact if they do happen. Organizations with strong risk management processes are better prepared to anticipate, avoid or reduce the impact and/or likelihood of risk events, should they occur.

The GMRP has a risk management procedure and process¹⁴ which it uses to reduce risks to acceptable levels (e.g., legacy risks; see text box) and to manage risks which may increase with increased project activity (e.g., project activity risks; see text box).

Examples of GMRP Risks

1. **Legacy Risks:** risks related to the infrastructure (e.g., dams) and environmental conditions (e.g., underground chambers) left by the former mining operation that could have human health and environmental impacts. Examples include: the release of arsenic trioxide from the underground chambers, or the injury or death of a trespasser from falling into a mine opening.
2. **Activity Risks:** risks related to the remediation project and the activities involved in reducing the legacy risks. These risks include risks to scope, budget, schedule, health and safety of workers and the surrounding environment. Examples include: delays in advancing work (and associated cost impacts), health and safety impacts to workers while conducting remediation activities (e.g., moving earth), and air pollution due to dust from remediation work.

There are many examples of how risk management has informed project decision-making. When the risk management process was first implemented in 2002-03, the identification of various public access risks led to a range of site security measures to prevent people from entering the Site. More recently, the identification of significant risks related to the Roaster Complex, Baker Creek, and underground chamber instability led to the development of a Site Stabilization Plan (SSP) – a set of remediation measures (including the demolition of the Roaster Complex) that were approved and implemented ahead of schedule to minimize impacts to human health and safety and the environment. An overview of current legacy and activity risks for the GMRP, and associated risk treatment activities, is presented below.

In the response to the Environmental Assessment, the GMRP initiated a human health risk assessment (HHRA) in 2015-16 to assess human health risks associated with the measures of the Environmental Assessment that the Minister has agreed to implement. The HHRA will provide an estimate of the current and predicted future exposures to contaminants associated with Giant Mine. It will inform community members about the possible ways that contaminants can affect them, for example through

¹⁴ GMRP's risk management procedure and process aligns with best practice and the international risk management standard CAN/CSA-ISO 31000-10 (R2015).



fish consumption or soil intake. It is anticipated that the proposed remediation will cause contaminant levels and risks to decrease over time.

In 2015, the Project Team engaged Stantec to support the development of a statement of work for the HHRA. Stantec and the Project Team met with the Giant Mine Working Group and the YKDFN Giant Mine Advisory Committee (GMAC) in 2015 and 2016 to gain input.



Risk Tables

Table 11 lists the key risks associated with the major elements of the former Mine Site, ongoing and recently completed actions to treat these risks, and future risk treatment priorities to further manage these risks. During the care and maintenance phase of the Project, the risk management process informs short and medium term actions required to maintain environmental compliance, worker safety, and public safety. In addition to the ongoing and planned risk treatment activities described below, the Project conducts a range of monitoring activities including daily site inspections by care and maintenance staff, regular engineering inspections of major structures (e.g. dams, arsenic chamber bulkheads) and equipment, and continuous monitoring of air quality on and off site (as discussed in Section 3).

Table 11: Overview of Key Legacy Risks and Risk Treatment

Key Risks	Current / Recently Completed Risk Treatment	Future Risk Treatment Priorities
Buildings: <i>This category includes risks associated with all buildings on-site, including large industrial buildings formerly used for mine processing, storage and administrative buildings, former town site buildings.</i>		
<ul style="list-style-type: none">Fatality or serious injury due to fire, unauthorized public access, building collapse	<ul style="list-style-type: none">Site security, signage and barriersDeconstruction and decontamination of buildings, including Roaster Complex and C-Shaft Headframe and associated structures	<ul style="list-style-type: none">Additional measures are being considered based on 2014 Structural Evaluation conducted by AECOM
Infrastructure: <i>This category includes risks associated with the electrical distribution and power systems, waste storage areas, central heating systems, and underground services.</i>		
<ul style="list-style-type: none">Unauthorized public access to waste areas leads to injuryFailure of underground services, of steam distribution system, or of pumping systems (due to power outage)	<ul style="list-style-type: none">Regular maintenance and upgrades to electrical, heating, and other systemsRepackaging of arsenic contaminated waste in hazardous waste storage areaRemoval of exposed friable asbestos from waste areas	<ul style="list-style-type: none">Upgrades / modifications to pumping systems to ensure reliability / redundancyUpgrades / modifications to underground servicesReplacement of B3 electrical substation



Key Risks	Current / Recently Completed Risk Treatment	Future Risk Treatment Priorities
Water Treatment: <i>This category includes risks associated with the water treatment plant and associated infrastructure (main treated and untreated water lines, ponds).</i>		
<ul style="list-style-type: none"> Failure of effluent treatment plant (ETP) 	<ul style="list-style-type: none"> Regular maintenance Replacement of previously decommissioned tanks to increase treatment capacity / redundancy 	<ul style="list-style-type: none"> Ongoing implementation of maintenance and recapitalization plan to maintain ETP operation over next 10 or more years (e.g. settling and polishing pond improvements)
Underground: <i>This category includes all risks associated with underground areas including all mined areas below surface, mine openings at surface, and arsenic chambers.</i>		
<ul style="list-style-type: none"> Conventional risks associated with underground work Failure of an arsenic chamber bulkhead or pillar near chamber leads to arsenic trioxide to the underground Failure of a crown pillar leads to injury or fatality; or to mine flooding and increased remediation costs 	<ul style="list-style-type: none"> Backfilling of selected underground areas as part of the Site Stabilization Plan (SSP) Restricted access for workers to subsurface and surface areas of potential instability. 	<ul style="list-style-type: none"> Completion of underground stabilization work (backfilling underground areas to prevent collapse or limit its impacts)
Dams: <i>This category includes risks associated with all dams, including seepage (water passing through dams) and dam failure. Overall, the dams are stable and many are currently not water-retaining structures.</i>		
<ul style="list-style-type: none"> Dam failure and seepage Overall, dams are very stable. Exceptions include dams 1, dam 7, and B2 pit dam. 	<ul style="list-style-type: none"> Ongoing surface water management program to minimize the height of water behind dams Management of seepage water (pumping water back behind dam) 	<ul style="list-style-type: none"> Re-evaluate stability for 10+ year service life Modify monitoring program and inspection as appropriate
Diversions: <i>This category includes risks associated with Baker creek and diversions/ditches that channel water within and off the Site.</i>		
<ul style="list-style-type: none"> Failure of Baker Creek Diversion (particularly at C1 pit) leads to flooding of the pit and the mine 	<ul style="list-style-type: none"> Recent completion of buttress to reinforce the C1 pit wall 	



Key Risks	Current / Recently Completed Risk Treatment	Future Risk Treatment Priorities
	<ul style="list-style-type: none"> Berm heights raised and key dykes augmented to reduce possibility of loss of channel integrity Pumps, piping, and equipment on stand-by at site during high-flow periods 	
Tailing and Sediments: <i>This category includes risks associated with tailings containment areas and shoreline and submerged tailings at Back Bay.</i>		
<ul style="list-style-type: none"> Windblown tailings lead to air contamination Erosion of the tailings beach at Back Bay lead to environmental impacts 	<ul style="list-style-type: none"> Ongoing dust suppression program for exposed tailings in ponds Contractor protocols for dust management Capping of selected tailings areas Studies completed to assess impacts of Back Bay tailings and remedial options 	<ul style="list-style-type: none"> Follow up on recommendations of Back Bay tailings studies as needed
Open Pits: <i>This category includes risks associated with all open pits.</i>		
<ul style="list-style-type: none"> Unauthorized public access leads to injury or fatality Work in pits lead to worker injury or fatality 	<ul style="list-style-type: none"> Site security, signage, and fencing in selected areas Access restrictions and health and safety procedures for pit work 	<ul style="list-style-type: none"> Conduct an assessment with final solution for the B1 sinkhole issue Additional fencing in selected areas

The GMRP Team has identified a range of risks to the achievement of project objectives. These risks are associated with governance, funding, human resources, planning and controls, engagement, and procurement. Table 12 provides an overview of key activity risks and the current risk treatments.

Table 12: Overview of Key Activity Risks and Risk Treatment

Key Risks	Current Risk Treatment
<ul style="list-style-type: none"> Inability to effectively plan and control execution of remediation work leads to unanticipated changes (scope, scheduling, quality, cost) and cost overruns and/or incident causing public concern. 	<p>To address activity risks, the Project has revised or newly developed the following project structures and processes:</p> <ul style="list-style-type: none"> governance structures



Key Risks	Current Risk Treatment
<ul style="list-style-type: none">• Multiple and inconsistent requirements across regulatory regimes (municipal, territorial, federal) lead to project delays.• Challenges in maintaining key positions in Yellowknife leads to decreased ability to deliver on project requirements (e.g. delays in engagement and regulatory process activities).	<ul style="list-style-type: none">• project planning and controls processes• long-term funding strategy• human resources plan• Environment Health Safety and Community Management System (EHSC MS)



Appendix C – Additional Information on Project Activities and Commitments to Manage Environmental Impacts, Health and Safety, and Community Issues

This appendix provides supplemental details about studies and activities summarized in the Environment, Health and Safety, and Community sections of the report.

Environment

Air

Activities undertaken at the Giant Mine Site have the potential to release contaminants from the Site into the air. Of primary interest are particulates carrying arsenic, asbestos, iron, lead, or dust. If these contaminants become airborne, they may be transported off-site and deposited elsewhere.

Some activities on-site also create noise and vibration (e.g. from driving vehicles or the work being undertaken to demolish site structures), which can be perceived by residents of nearby communities and the City of Yellowknife, and by local wildlife. Increased traffic and power generation related to the Giant Mine also have the potential to emit greenhouse gases and other criteria air contaminants (e.g. sulfur dioxide, nitrogen oxides).

The Giant Mine team is undertaking activities to manage risks related to air quality. The team is committed to using best practices to monitor air quality and to minimize effects on air quality from activities on-site. This commitment continues to three years after remediation is complete (GMRP air quality monitoring website: <http://www.enr.gov.nt.ca/node/3283>).

Through the Giant Mine air quality monitoring program (AQMP), the team has set “protective” limits on air quality, meaning that they make efforts to keep air quality at a level that is not dangerous to people or the environment. If any monitoring station detects measurements above these limits, an alarm is triggered, prompting the team to investigate and, if necessary, take actions to modify any on-site activity causing the increase so as to reduce the levels to normal. The Giant Mine Team is committed to maintaining air quality parameters below the protective thresholds listed below.

Fence-line Action Level

The Giant Mine Team initiates additional procedures if the following levels of particulates are detected by monitoring stations positioned along the Site fence:

- 159 µg / m³ of particulate matter (PM₁₀)
- 333 µg / m³ of total suspended particulates (TSP).

Community criteria

The Giant Mine aims to avoid contributing to exceedances of the following thresholds for various air quality indicators, as measured by air quality monitoring stations within the community:



Parameter	Averaging Time Period	Source ¹⁵	Criterion ($\mu\text{g} / \text{m}^3$ unless otherwise specified)
Antimony (Sb)	24 hr	[1]	25
Arsenic (As)	Annual	[2]	0.011
	24 hr	[1]	0.3
Asbestos as fibre > 5 μm in length	24 hr	[1]	0.04 fibres/cm ³
Iron (Fe)	24 hr	[1]	4
Lead (Pb)	24 hr	[1]	0.5
Nickel (Ni) in TSP	24 hr	[1]	0.2
	Annual	[1]	0.04
Nickel (Ni) in PM ₁₀	24 hr	[1]	0.1
	Annual	[1]	0.02
Particular matter less than 10 μm (PM ₁₀)	24 hr	[1]	50
Particular matter less than 2.5 μm (PM _{2.5})	24 hr	[3]	30
Total suspended particulates (TSP)	24 hr	[3]	120
	Annual	[3]	60

Activity-specific guidelines

Activity-specific monitoring and guidelines are established as needed for specific activities on-site, to monitor potential impacts to air quality in the vicinity of workers. For example, in 2015, fixed and mobile monitors were placed near the drilling sites and near the deconstruction of the C-Shaft headframe.

Water Overview

The Giant Mine is located near several bodies of water, including Yellowknife Bay of Great Slave Lake and Baker Creek, which are important to the people and ecosystems of the area. These water bodies have already been affected by mining activities. The course of Baker Creek has been physically altered to accommodate mining, ore processing, and highway construction and contaminants from the Site have been found in the water and underlying sediment.

There is potential for contaminants from the Giant Mine Site to further affect water. In particular, arsenic trioxide dust is soluble and will dissolve in water. Arsenic could then be transported to nearby

¹⁵ SOURCES: [1] Ontario Ambient Air Quality Criteria (April, 2012), [2] Health Canada Toxicological Reference Values (2004), [3] Guideline for Ambient Air Quality Standards in the Northwest Territories (January, 2011)



water bodies. Spring melt is a particular risk, due to the high volume of water moving through the Site at this time. Activities associated with care and maintenance, emergency work, and remediation also have the potential to affect water, for example if a spill or release occurs.

The SNP monitors water bodies and discharges, both natural and mine-related, in and around the Giant Mine Site. The SNP is comprised of seven active sampling locations, five of which are located within the lease area. One location is sampled weekly on a year-round basis, the other six are sampled during open water (May-October).

ACTIVE MONITORING STATIONS 2015		
STATION	LOCATION	FREQUENCY
SNP 43-1	Treated effluent discharge pipe - autosampler	Daily during discharge from ETP (June – Sept)
SNP 43-5	Baker Creek, prior to entering Yellowknife Bay	Weekly during open water (May-Oct)
SNP 43-11	Baker Creek, upstream of SNP 43-1	Monthly during open water (May-Oct)
SNP 43-12	End of the breakwater at the outlet to Baker Creek	Weekly during open water (May-Oct)
SNP 43-15	Outflow of Trapper Creek from Trapper Lake	Monthly during open water (May-Oct)
SNP 43-21	Akaitcho pumping system shake	Weekly, throughout the year
SNP 43-22	Pocket Lake	Monthly during open water (May-Oct)

The SNP stations are sampled on a daily, weekly or monthly basis. Parameters to be tested at all stations include temperature, pH, physical tests, total metals, dissolved metals and ammonia. There are also specific station requirements for other tests such as cyanide, oil and grease and radium-226. Natural water bodies include Trapper Creek, Baker Creek, Pocket Lake, and the Back Bay area, near the Baker Creek breakwater. Mine-related discharges include the effluent-release point as well as underground mine water-release points, prior to their entry into the Northwest Pond tailings-containment area (TCA).

The SNP calls for the analysis of specific parameters as per the terms and conditions of the former Water Licence N1L2-0043. Water quality parameters and criteria required under the federal MMER (Metal Mining Effluent Regulations) and the former Water Licence are followed and in cases where the federal requirements are more stringent than those in the former Water Licence, the more stringent water quality limit is followed.

Commitments

A key component of the Giant Mine care and maintenance program and the remediation project is to mitigate the risk from arsenic toxicity in water. The Giant Mine team is undertaking activities to manage water-related risks on-site and to minimize effects on surrounding water bodies.

Two of the five objectives of the Remediation Plan relate to water. The Giant Mine team has objectives to:

- Minimize the release of contaminants from the Site to the surrounding environment; and
- Restore Baker Creek to a condition that is as productive as possible.

A key component of the Giant Mine care and maintenance program and the remediation project is to mitigate the risk from arsenic toxicity in water.



Meeting these objectives includes examining options for the diversion of Baker Creek around the Site to avoid contamination and flooding, treating all water on-site so that it meets drinking water standards before being discharged, and changing the plan for how treated water is released into Great Slave Lake.

Additionally, INAC has agreed to continue monitoring and reporting on water quality from specified locations in and around the Site, as outlined in the SNP (a condition of the now-expired Water License N1L2-0043). The GMRP will apply for a new Type A Water Licence for the implementation phase of the project; the licencing process is anticipated to occur between 2017 and 2021. The water licencing process requires the Project Team to gather significant local stakeholder and public input into these plans. Section 7.1 provides more information on the extensive engagement required for this process.

Section 3 summarizes the water-related commitments that address the Measures in the *Report of Environmental Assessment and Reasons for Decision* (MVRB, 2013). Measures relate to the water quality at the outlet of Baker Creek channel and the outfall of the water treatment plant.

Additional Details on the 2014-2016 Ecological Assessment and Comparative Hydrodynamic Modelling of the Baker Creek Outlet

The Giant Mine Remediation Team is investigating the feasibility of a potential northern diversion option for Baker Creek, which would involve re-routing the creek channel upstream of Baker Pond and diverting flow north, around the Giant Mine Site, through constructed channels and existing lakes, into Yellowknife Bay on Great Slave Lake. The potential diversion of Baker Creek would remove fish habitat in the existing channel below the diversion (between Reach 10 and upper Reach 1), with the exception of fish habitats in the creek outlet area. The Baker Creek Outlet (BCO) is comprised of lower Reach 1 and all of Reach 0 and includes the main channel and wetland areas behind the constructed breakwater in Yellowknife Bay.

To assess the potential ecological effects of the proposed north diversion of Baker Creek on the BCO, comparative hydrodynamic modelling on six different options was undertaken, as well as an assessment of the ecological importance of the BCO to the productivity of Yellowknife Bay.

The six BCO constructed channel scenarios modelled across seasonal flow regimes included:

- Scenario 1: Existing natural flow (with elimination of effluent discharge) and existing bathymetry conditions, with and without flood flows.
- Scenario 2: Existing natural flow (with elimination of effluent discharge), with dredging of the main channel of Reach 0 (remediation), with and without flood flows.
- Scenario 3: Existing natural flow (with elimination of effluent discharge), with dredging of the main channel and adjacent wetlands of Reach 0 (remediation), with and without flood flows.
- Scenario 4: Diversion of Baker Creek with existing bathymetry conditions.
- Scenario 5: Diversion of Baker Creek with dredging of the main channel at Reach 0 (remediation).
- Scenario 6: Diversion of Baker Creek with dredging of the main channel and adjacent wetlands at Reach 0 (remediation).

A qualitative analysis of the strengths, weaknesses, opportunities and threats (SWOT) for each of the six scenarios was developed to provide a comprehensive review of each of the future scenarios. Each



scenario is outlined with options to mitigate potential weaknesses or threats, and opportunities to enhance local habitat and fish productivity.

Additional Details on the Sediment and Porewater Study of the Baker Creek Outlet

A porewater and sediment study at the Baker Creek Outlet (BCO) was initiated in January 2015 to address data gaps that limit the understanding of arsenic cycling and mobility, and ultimately whether sediments of the BCO are contributing impacts to components of the aquatic environment. As some open-water (summer) data was previously collected, the main objective of the study was to examine sediment chemistry in winter, under ice conditions. The study was carried out in February and March 2015.

Solid-phase concentrations of arsenic and other metals were higher in wetland sediments than in main channel sediments. Sediments from below 1m depth are at or near background concentrations for the Yellowknife region. If dredged, the newly exposed sediment surface is not expected to pose a risk to aquatic life as most metal concentrations are at or below the Canadian Council of Ministers of the Environment) CCME Probable Effects Level (PEL).

Geochemical cycling of arsenic in the surface layer of sediment (1-2cm) appears to vary seasonally, and is influenced by sulphide and/or organic matter during winter (anoxic, reducing conditions) and by iron and manganese-oxides during open-water months (oxic, oxidizing conditions). This seasonal shift in redox conditions implies there are periods of instability for these arsenic minerals and that, seasonally, arsenic is likely desorbed and released to sediment pore waters before being re-precipitated to the solid phase.

The predominant dissolved arsenic species (the bioavailable forms) identified during winter (arsenic-5 and Dimethyl-arsenide) are less toxic than arsenic-3, but are known to induce toxic effects in fish and rats at concentrations higher than measured in the BCO in February/March 2015. The elevated Arsenic concentrations identified in current winter and previous summer studies indicate existing adverse effects on aquatic biota in the BCO. These include:

- Accumulation of arsenic and other elements in resident slimy sculpin and depositional benthic invertebrates, indicating bioavailability of these elements.
- Toxicity of sediments of the BCO in laboratory tests using aquatic biota. These include reduced survival and growth, and increased arsenic accumulation in tissue of larvae of a common midge, and eggs and larvae of Fathead Minnow.
- Accumulation of arsenic in horsetail (a common wetland plant) in the above-ground tissue and the iron-based root plaque, which could have implications for transfer of arsenic in the aquatic and terrestrial food chains (would require further study of arsenic speciation and bioavailability in horsetail and other plant species).

If BCO sediments are left in place, further work is required to assess and quantify the risk posed to greater Yellowknife Bay, as sediments will continue to be a sink and a source for arsenic and other elements, and will continue to pose risks to terrestrial and aquatic biota. Also, additional work would be



needed to estimate mass loading from the BCO to Yellowknife, which would also require additional information on the flow/exchange of water between the BCO and Yellowknife Bay.

Additional Details on the Surface Water Management Arsenic Loading Study

The purpose of the Surface Water Management arsenic Loading Study work is to develop baseline arsenic loading information for the Site (and upstream sources). This information can be used to inform the remediation design for multiple work packages by illustrating the estimated effect of different design options on arsenic loading into Yellowknife Bay.

This scope includes two major work items. The first is the arsenic Loading Study, which will use the surface water information collected to date to calculate/model the arsenic loading in surface water on the Giant Mine Site at present day. The second is supplemental hydrology, which will update the hydrology completed at the Giant Mine Site using updated volumes and seasonal flow information. The updated hydrology will then be used to compare the surface water volumes and flow rates in three remedial options scenarios.

Field sampling in 2015 was conducted at 64 sampling locations grouped into nine sampling areas:

- Off Lease Lakes;
- Baker Creek Upstream of the Mine;
- Baker Creek at the Mine;
- Trapper Creek Upstream of Baker Creek;
- Mill Area;
- North of the Mill Area;
- West of the Mill Area;
- South of the Mill Area; and
- Tailings Areas.

Sampling was conducted at times of elevated flows: freshet (Spring) and after a rainfall/storm (Summer). Samples were analyzed for total metals, routine chemistry parameters and Arsenic speciation. Surface water at the Site and in the surrounding areas may be characterized as follows:

- On-lease surface water runoff (from ponded and flowing sources) contains elevated concentrations of metals, ions and nutrients, similar to mine water and treated effluent in terms of the presence of chlorides, metals and nitrate.
- The highest concentrations of metals and ions were measured near the mill.
- On-lease and off-lease sampling locations consistently exhibit metals exceeding applicable guidelines for aquatic life, including arsenic, antimony, copper, lead, nickel and zinc.
- Nutrients and ions that exceeded applicable aquatic life guidelines/criteria on-lease but not off-lease include chloride, nitrate and nitrite.
- Elevated sulphate and chloride concentrations in most on-lease samples.
- ~98% of inorganic arsenic in runoff consists of As (V); consequently, runoff contains very low concentrations of As (III).
- Summer runoff generally contained higher concentrations of metals and ions than Spring freshet.



Land Overview

The historical operation of the Giant Mine affected the structure and characteristics of the land. Waste rock is piled on-site and soil has been contaminated. The underground workings of the mine have affected the stability of the overlying ground. These, as well as the various open pits, quarries, and mine entrances pose a potential safety hazard for workers and the public.

The current care and maintenance activities and proposed remediation activities also have effects on land at the Site, including improvements to site structure and stability; movement of sediment and materials to, from, or within the Site; and changes to the surface of the Site, including infill, grading, reestablishment of plants, and paving.

There are over 100 buildings on the Site, many of which are contaminated with arsenic and asbestos and are proposed to be removed. Contaminated materials and waste must be managed appropriately to ensure no further negative effects on the land surrounding the Giant Mine.

Commitments

Three of the five objectives of the Remediation Plan relate to land. These objectives are to:

- Manage the underground arsenic trioxide dust in a manner that will minimize the release of arsenic to the surrounding environment, minimize public and worker health and safety risks during implementation, and be cost effective and robust over the long-term;
- Remediate the surface of the Site to the industrial use guidelines under the *NWT Environmental Protection Act*, recognizing that portions of the Site will be suitable for other land uses with appropriate restrictions; and
- Minimize public and worker health and safety risks associated with buildings, mine openings and other physical hazards at the Site.

Additionally, minimizing impacts on permafrost and terrestrial habitat loss remains one of the goals of the Giant Mine Remediation Project.

Biodiversity Overview

Land-based habitat at and near the Giant Mine has been degraded by past industrial impacts from the mine and other developments, as well as by the proximity to urban development. However, some wildlife habitat is still available around the Mine Site, and non-resident species use this land as travel corridors to more favourable environments. Species of interest found around the Site include the Peregrine falcon, black bear, moose and other mammals.

The aquatic habitat around the Giant Mine Site is dominated by Baker Creek, which runs through the Giant Mine lease area before entering Great Slave Lake on the western shoreline of Yellowknife Bay. The creek has been adversely affected by historic mining operations and currently has elevated concentrations of arsenic in the water and sediments, as well as low diversity of bottom-dwelling



species. Nonetheless, the creek currently serves as habitat for a variety of fish species, muskrats and aquatic birds.

There are ongoing risks to land-based wildlife from the Giant Mine Site. Contact with contaminated soils and tailings or ingestion of contaminated plants may cause health risks. Contact or ingestion of contaminated surface water also pose a risk. The many openings into the underground workings from the surface can present physical hazards to wildlife through inadvertent or deliberate access.

For aquatic life, contamination of water and sediment remains an ongoing concern. Although water treatment on-site is expected to improve water quality, there remains a risk that a flood at the Site could significantly contaminate nearby waterbodies by mobilizing the underground arsenic trioxide dust.

Impacts on wildlife and aquatic life have the potential to subsequently affect people who hunt and fish in the area and consume contaminated plants or animals.

Commitments

The Giant Mine Team is undertaking activities to actively manage risks related to land-based wildlife and to aquatic life. Objectives of the Remediation Plan previously cited under water and land have a direct link to biodiversity because they relate to minimizing the release of contaminants to the surrounding environment to avoid negative impacts on wildlife and aquatic life, remediating the land, as well as restoring Baker Creek to a more productive condition. Similarly, commitments to address the Measures of the Report of Environmental Assessment relate to minimizing the release of contaminants to avoid negative impacts on wildlife and aquatic life.

Additional Details on the 2015-2016 Bird Survey

The primary risks to birds at the Giant Mine Site as a result of site activities are associated with the potential for the inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs (referred to as *incidental take*) through existing above-ground infrastructure, the operation of machinery and vehicles, and the removal of habitat. No authorizations or permits allow for the incidental take of migratory birds or their nests and eggs. A secondary risk to birds on-site is the presence of contaminants, particularly at tailings ponds and water treatment facilities. The purposes of this study were to:

- Document bird use of infrastructure and habitat at the site where work is planned or ongoing;
- Document bird use of contaminated areas;
- Identify risks of industrial activities to birds, their eggs and nests; and
- Recommend appropriate mitigations.

Results of the 2015-2016 Bird Survey

Project activities and infrastructure were examined and compared with known risk factors for birds as identified in scientific literature and from previous experience at the Giant Mine and other similar industrial project sites. The following seven risk factor categories were considered for birds on Site:

- Presence/operation of above-ground facilities, machinery and vehicles;
- Removal of habitat (human-made and natural);
- Presence of contaminated media;
- Creation of artificial habitats, traps and nest structures;



- Interaction with above-ground power lines;
- Presence of artificial lights; and
- Presence of noise.

The following recommendations were provided and incorporated into Site activities wherever possible to reduce the risk of contributing to the incidental take of migratory birds, their young, eggs and/or nests during the breeding season:

- Remediation and demolition work should be undertaken either before or after the nesting season (May 8 through August 11), especially buildings around the C-Dry and Mill areas where most perching and nesting was observed.
- If remediation or demolition work occurs during the nesting season, affected areas should be surveyed for evidence of bird nesting behaviour or other indicators of the presence of active nests before any demolition or remediation work starts. Machinery and vehicles should also be inspected for nests before starting work.
- If active nests (containing eggs or young) are discovered, work should be delayed in the area until nesting is complete (after the young have left the nest and the immediate area).
- Avoid expanding the Site footprint to undisturbed areas, and avoid existing undisturbed areas within the Site footprint, during the nesting season. Consider nesting surveys in vegetated areas prior to activities (such as drilling) within 30m in adjacent areas.
- Man-made cliffs in the open pits and other areas may require nesting surveys prior to any activity in the vicinity. These perches are likely used throughout the year. If nesting is anticipated, nest deterrent actions can be discussed with the GNWT and Environment Canada prior to the nesting season.
- Be on the lookout for suspected nests or nesting activity. Particular diligence is required in the spring, and on infrastructure where demolition or other activities are planned.
- Report all nests found to either the GNWT or Environment Canada, as required by the relevant legislation for that species.
- Continued use of audio deterrents where nesting in hazardous areas is likely.

Additional Details of the 2016 Winter Wildlife Monitoring Program

Information on wildlife and wildlife use of the Site will assist the closure and remediation processes for the Project. In January 2016, a winter wildlife monitoring project was undertaken to document current wildlife use of the Site and surrounding area. This was accomplished through winter track counts, remote, motion-activated camera footage and Site surveillance surveys. The winter track counts and remote cameras documented wildlife within the Site and surrounding areas. Site surveillance surveys identified wildlife use of the Site that may impede closure activities or cause a risk to wildlife, such as instances of wildlife denning, nesting or scavenging. The information collected from these three programs is intended to provide direct feedback to Site operations regarding the effectiveness of waste management and wildlife mitigation practices while the Site is being decommissioned and to guide closure planning to reduce risks and hazards to wildlife.

Results of the 2016 Winter Wildlife Monitoring



Winter Track Counts: Tracks from eleven wildlife species, or groups, were observed during the track counts. The most common wildlife tracks observed were coyote, red fox, snowshoe hare, red squirrel, ptarmigan (willow ptarmigan and rock ptarmigan) and small mammal species (including mice, voles and shrews). Wildlife incidentally observed during the counts included ptarmigan and raven. These species represent potential valued ecological components for an Environmental Risk Assessment (ERA).

Remote Camera Monitoring: A total of six cameras were deployed to record photos from January 27 to March 1, 2016. Two were positioned in disturbed areas on-site, two in undisturbed areas on-site and two in undisturbed areas off-site. Cameras recorded a total of 140 images of wildlife. The most common animal photographed on the remote cameras was red fox (five different locations in all three disturbance categories). The species captured on film during this program were: red fox, snowshoe hare, ptarmigan, and lynx.

Site Surveillance: Site surveillance surveys were completed weekly from January 22 to February 24, 2016. Surveys focused on targeted Site facilities (A-Shaft, Akaitcho Shaft, B1 Pit, B2 Pit, B4 Pit, C-Dry and the garbage dump). The polishing pond and settling pond locations were originally included but were discontinued after the first survey on the advice of the mine manager. Observations of wildlife and wildlife sign during the surveys were variable among Site locations. The area with the highest frequency of wildlife observed was the Akaitcho Shaft where 80% of surveys recorded wildlife. Observations of wildlife were relatively rare at all other locations. Wildlife observed included ptarmigan at C-Dry and the polishing pond, and raven at the settling pond, garbage dump, A-Shaft, Akaitcho Shaft and B1 Pit. Wildlife sign was common during the surveys (at least 80% of surveys in all locations). Wildlife sign observations included red fox, coyote, wolf, small mammal, snowshoe hare, raven and ptarmigan tracks, as well as a raven next at the Akaitcho Shaft. On one occasion, raven remains were found near C-Dry. Raven, red fox and wolf track were observed at the garbage dump. Continued monitoring, especially in areas frequently visited by staff or scheduled for remediation, is recommended, as is seasonal monitoring. Information about wildlife use in these areas of the Site will inform adaptive management in areas of concern to prevent wildlife-human interaction or harm to wildlife throughout the Site closure phase.

Health and Safety

Occupational Health and Safety

INAC provides oversight for occupational health and safety, while PSPC provides oversight and manages contractors to ensure that they have in place a health and safety plan, health and safety procedures, and emergency response plans, and that contractors follow the procedures and report any health and safety incidents.

The current care and maintenance contractor maintains overall health and safety responsibility as the prime contractor at the Giant Mine. The care and maintenance contractor has in place a Giant Mine Site Specific Safety Plan, which includes recommended procedures for working with arsenic, asbestos, tailings, tailings ponds, and for working in confined spaces, to mention a few. To ensure that the on-site safety plan is implemented, there is a designated occupational health and safety manager who organizes ongoing training and occupational health and safety support for managers, supervisors and other employees.



As described in Appendix B, the EHSC Management System provides the foundation for the GMRP to identify and manage risks, track performance and ensure continual improvement through a “plan-do-check-act” approach. The EHSC Policy commits to the following:

The GMRP will achieve excellence in health and safety performance through a zero harm target for employees, contractors and the public.

This EHSC Policy applies to Federal and Territorial employees and contractors of the GMRP, as well as visitors to the GMRP's operations. All GMRP personnel and contractors are accountable for bringing occupational health and safety concerns to the attention of higher levels without fear of reprisal.

Public Health and Safety

Since the Government of Canada took over responsibility for the Mine Site in 1999, the Giant Mine Project Team has monitored the Site and ensured it is kept safe and secure through 24-hour-a-day care and maintenance work. This work involves ensuring public safety through site security, suppressing dust, and managing mine water and effluent.

In response to Measure 9 of the Report of Environmental Assessment, the GMRP commits to working with other federal and territorial departments to design and implement a broad health effects monitoring program. In response to Measure 10 of the EA, the GMRP commits to evaluating the direct and indirect effects of potential exposures to arsenic on wellness, including stress, through a Human Health Risk Assessment and a Stress Assessment.

Community

Engagement and Consultation

The Project Team recognizes that communications and engagement are critical to the overall success of the GMRP. Between 1999 and 2013, communications and engagement activities were focused on assessing the scope of the remediation challenge and the remediation options, and proceeding through the regulatory process. With the conclusion of the Environmental Assessment process, the Project has shifted to discussions related to project permitting and detailed design. The focus for communications and engagement approaches have shifted with it.

The GMRP has in place a Communications and Engagement Strategy for 2013-18, which sets-out the vision, goals and objectives for GMRP communication and engagement. The vision is as follows:

As a result of the GMRP communications and engagement program, the majority of stakeholders and residents of Yellowknife, Ndilo and Dettah are well-informed about the project, support the approach being taken to remediation, are confident that the project is being well managed by the Government of Canada and are optimistic about the future of the Site.

The strategy also describes a high-level plan for five years of communications and engagement. To realize the vision, goals and objectives and to expand on the five-year plan, the GMRP Team developed an Engagement Work Plan for 2014-15. The work plan details the planned communications and engagement activities that are ongoing or new.

Community Monitoring Program



Additional Details on the Community Monitoring Program

The objectives of the program are to:

- Investigate impacts of Giant Mine to the aquatic environment at locations utilized by the YKDFN in Yellowknife Bay
- Measure metal concentrations (particularly arsenic) in sediments and surface water

The study was designed by the Giant Mine Project Team in cooperation with the YKDFN. The work was carried out by Dr. John Chetelat, who is a Research Scientist with Environment Canada and is very experienced in carrying out similar activities in the Yellowknife area. The purpose was to provide information that would contribute to baseline information requirements for the Long-Term Environmental Monitoring Program (LTEMP), as well as for the Human Health and Ecological Risk Assessment. It also provides an opportunity for community members to develop training in environmental sampling.

A total of 16 locations were sampled in 2015 (4 water and 6 sediment in Ndilo, and 3 water and 3 sediment in Dettah).

Procurement and Employment Overview

Procurement and employment at Giant Mine are important issues for residents of Yellowknife and for other stakeholders and local community members. There was strong interest expressed in socio-economic issues during the Environmental Assessment process, and there are substantial opportunities to maximize Northern and Aboriginal employment / procurement during the implementation phase of the Project. A recently completed socio-economic analysis estimates that GMRP will require an average of 186 full-time equivalent workers (FTEs) over the 20 year life of the Project (not including long-term monitoring and care and maintenance), peaking at 195 FTEs during the active remediation phase, with 75% of workers projected to be Northern or Aboriginal. The total expenditure for the Project is projected to be \$836 million, with a cumulative impact of \$739 million on the gross domestic product (GDP) of the Northwest Territories, including direct, indirect and induced economic impacts.

Shifting Economic Development in the NWT

In the NWT, mining, especially diamond mining, has driven economic growth. After a peak of mining outputs in 2007, the NWT's GDP has remained stable or been falling. Two of the largest diamond mines (Diavik and Ekati) are set to scale down or close in the early 2020's, and upcoming planned mining and infrastructure projects are not likely to replace the decreased employment demand. The GMRP could potentially play an important role in easing some of the impacts of impending mine closures. The remediation project will require hundreds of workers, as well as local suppliers and services. Many of the skilled workers in the mining sector have skills that will be transferable to the GMRP. Products and services in the mining sector will also be transferable.

Commitments



The Government of Canada – Government of Northwest Territories Cooperation Agreement includes the following commitment:

Both parties agree to maximize northern economic development opportunities in carrying out the Giant Mine Remediation Project.

The Giant Mine Environment, Health and Safety, and Community Policy describes that:

The Giant Mine Remediation Project will implement strategies to maximize the economic opportunities for Northerners and local Aboriginal people through employment and procurement.

Training and Capacity Building Overview

In addition to the occupational health and safety training delivered at the Giant Mine Site, contractors also deliver workforce training, such as site orientations, Aboriginal electrical apprenticeship training and overhead crane operation training. The inclusion of AOC in contracts ensures Aboriginal employment and capacity building is considered and implemented where possible by all GMRP contractors.

Commitments

Through PSPC's contracting mechanisms, there are requirements for contractors to ensure that employees are properly trained to perform their responsibilities and receive training as needed.



Appendix D: Progress on Commitments – Detailed Tables

This appendix provides supplemental details about progress toward achieving the Measures stipulated via the Report of EA and plans for 2016-17.

Table 13: Giant Mine EA Measures Tracking Table (as of June, 2016)

#	Measure	Status	Progress in 2015-16	Plans for 2016-17
1	To prevent the significant adverse impacts on environment and the significant public concern from the proposed perpetual timeframe, the Project will proceed only as an interim solution, for a maximum of 100 years.	No Action Required		
2	<p>Every 20 years after the beginning of Project implementation, the Developer will commission an independent review of the Project to evaluate its effectiveness to date, and to decide if a better approach can be identified. This will:</p> <ol style="list-style-type: none"> 1. Consider results of the ongoing research; 2. Be participatory in nature; and 3. Follow the requirements of procedural fairness and be transparent in nature. <p>If the periodic review identifies a better approach that is feasible and cost-effective, the Developer will further study it, and make the study and its results of the study public.</p>	Future action required	Article 8 of the June 9, 2015 Environmental Agreement further formalized the process through which the future Independent Project Review will be conducted.	No action required in 2016-17
3	<p>To facilitate active research in emerging technologies towards finding a permanent solution for dealing with arsenic at the Giant Mine Site, the Developer will fund research activity as advised by stakeholders and potentially affected Parties through the Oversight Board. The ongoing funding for this research activity, and additional resources required to manage its coordination, will be negotiated and included as part of the Environmental Agreement specified in Measure 7 and will make best use of existing research institutions and programs. The Oversight Board will ensure through the research activity that, on a periodic basis:</p> <ol style="list-style-type: none"> 1. Reports on relevant emerging technologies are produced; 2. Research priorities are identified; 3. Research funding is administered; 4. Results of research are made public; and 5. Results of each cycle are applied to the next cycle of these steps. 	Complete	Articles 7 & 11 of the June 9, 2015 Environmental Agreement provide a commitment of funding for the Oversight Board (which will be known publicly as the Giant Mine Oversight Board, or GMOB) to manage a research program as required by Measure 3. Initial funding will flow for this Measure in 2016-17 and will be ongoing.	Funding in the amount of \$175,000 (2015 dollars) will be provided to GMOB to commence development of research priorities.
4	The Oversight Board will provide the results of the research funded by the Developer to the periodic reviews of the Project described in Measure 2. If better technological options	Complete	Article 8 of the Environmental Agreement	No action required until closer to the 20



#	Measure	Status	Progress in 2015-16	Plans for 2016-17
	are identified through the funded research in-between these periodic 20-year reviews, these will be reported publicly by the Oversight Board to the Parties, the Developer and the Canadian public. The Developer will consider these technologies and make decisions regarding their feasibility. The Developer will make any such decisions public.		further formalized this obligation for the Oversight Board (GMOB).	year review date.
5	<p>In order to mitigate significant adverse impacts that are otherwise likely, the Developer will commission an independent quantitative risk assessment to be completed before the Project receives regulatory approvals. This will include:</p> <ol style="list-style-type: none"> 1. Explicit acceptability thresholds, determined in consultation with potentially affected communities. 2. An examination of risks from a holistic perspective, integrating the combined environmental, social, health and financial consequences. 3. Possible events of a worst-case/ low frequency high consequence nature. 4. Additional considerations specified in Appendix D of the Report of EA. <p>From this, the Developer will identify any appropriate Project improvements and identify management responses to avoid or reduce the severity of predicted unacceptable risks.</p>	Future action required	None anticipated beyond discussion in project planning	Engagement on scope of Measure with stakeholders (WG, GMAC)
6	<p>The Developer will:</p> <ul style="list-style-type: none"> • Investigate long-term funding options for the ongoing maintenance of this Project and for contingencies, including a trust fund with multi-year up front funding; • Involve stakeholders and the public in discussions on funding options; and, • Make public a detailed report within three years that describes its consideration of funding options, providing stakeholders with the opportunity to comment on the report. 	Future action required	The requirement to have long-term funding in place has been included in the overall project schedule for planning purposes.	Options for long term source of funds are being developed for the short term (i.e. to the end of active remediation) and long term (i.e. – post closure monitoring and maintenance)
7	The Developer will negotiate a legally-binding Environmental Agreement with, at a minimum, the members of the Oversight Working Group, and other appropriate representative organizations, to create an independent Oversight Board for the Giant Mine Remediation Project. These negotiations will build on the existing discussion paper and draft Environmental Agreement of the Giant Oversight Working group. This Oversight Board will exist for the life of the Project unless otherwise agreed by the Parties to the Environmental Agreement. Every effort will be made to have the Oversight Board in place as early as possible. The negotiations will make significant progress within six months of the Ministers' Environmental Assessment decision or proceed to mediation. The Developer will cover any mediation costs. The Environmental Agreement will include a dispute resolution mechanism to ensure compliance with the agreement and a stable funding mechanism for the Oversight Board.	Complete	The Environmental Agreement came into effect on June 9, 2015	None



#	Measure	Status	Progress in 2015-16	Plans for 2016-17
8	<p>The activities of the oversight body will include:</p> <ul style="list-style-type: none"> Keeping track of monitoring activities by the Developer and the results of those activities, including water quality and aquatic effects monitoring, health monitoring and other monitoring; Considering the adequacy of funding for the Project and ongoing research; Providing advice to the Developer, regulators and government on ongoing improvements in monitoring and Project management to prevent risks and mitigate any potential impacts; Sharing the oversight body's conclusions with the general public and potentially affected communities in a culturally appropriate manner 	Complete	The Environmental Agreement provides for the creation of the Oversight Board (GMOB) and funding to fulfill these obligations going forward.	None.
9	<p>The Developer will work with other federal and territorial departments as necessary to design and implement a broad health effects monitoring program in Ndilo, Dettah and Yellowknife focusing on arsenic and any other contaminants in people which might result from this Project. This will include studies of baseline health effects of these contaminants and ongoing periodic monitoring. This will be designed with input from:</p> <ul style="list-style-type: none"> Health Canada, GNWT Health and Social Services and the Yellowknife medical community; and The Yellowknives Dene and other potentially affected communities. <p>The organization conducting the monitoring will provide regular plain language explanations of the monitoring results in terms that are understandable to lay people, and communicate this to potentially affected communities in a culturally appropriate manner.</p>	Underway	Approval received from Senior Management to have Dr. Laurie Chan proceed with preparing a proposal to address Measure 9.	Establish an advisory committee, develop a communications plan. Develop scope for the health study with engagement from stakeholders (WG, GMAC)
10	<p>The Developer will commission a comprehensive quantitative human health risk assessment by an independent, qualified human health risk assessor selected in collaboration with Health Canada, the Yellowknives Dene, the City of Yellowknife, and the Developer. This human health risk assessment will be completed before the Project receives regulatory approvals. It will:</p> <ul style="list-style-type: none"> Include a critical review of the 2006 Tier II human health risk assessment and the previous screening reports; Consider additional exposures and thresholds (as specified in Appendix F of the Report of Environmental Assessment); Decide whether a Tier III risk assessment is appropriate; Provide a plain language explanation of the results in terms that are understandable to the general public, and communicate this to potentially affected communities in a culturally appropriate manner; 	Underway	The Project Team worked with Stantec Environmental to develop a Statement of Work for the HHRA with input from members of the Giant Mine Working Group. Specifications and evaluation criteria were developed for contracting purposes. Contracting process was initiated prior to year-end. The Project Team began	Award of the contract is expected in June 2016, and the contractor to begin conducting HHRA work thereafter. Ongoing engagement with stakeholders (WG, GMAC)



#	Measure	Status	Progress in 2015-16	Plans for 2016-17
	<ul style="list-style-type: none"> Provide interpretation of results and related guidance; and Inform the broad health effects monitoring program (described in Measure 9 above). <p>The Developer may conduct the human health risk assessment concurrently with the quantitative risk assessment described in Measure 5. Based on the results of this human health risk assessment, and on any existing results of the health effects monitoring program (described in Measure 9 above), the Developer will, if necessary in response to this information, identify, design and implement appropriate design improvements and identify appropriate management responses to avoid or reduce the severity of any predicted unacceptable health risks.</p> <p>Also, footnote #133 in the Report of Environmental Assessment (Appendix D) is revised to read, in its entirety, "Including inference of causality and pathologies deducted from any available health studies."</p>		developing an SOW for stress assessment with Dr. Shankardass.	
11	<p>The Developer, with meaningful participation from the Oversight Board and other parties, will thoroughly assess options for, and the environmental impacts of, diversion of Baker Creek to a north diversion route previously considered by the Developer or another route that avoids the Mine Site and is determined appropriate by the Developer. Within one year of the project receiving its water license, a report outlining a comparison of options including the current on-site realignment will be provided to the appropriate regulatory authorities, the Oversight Board and the public.</p> <p>Once informed by the advice of the Oversight Board and regulatory authorities, the Developer will determine and implement the preferred option. In doing so, the Developer will consider the advice of the Oversight Board, regulatory authorities, and the public, and will ensure that the primary considerations in selecting an option are to:</p> <ol style="list-style-type: none"> Minimize the likelihood of Baker Creek flooding and entering the arsenic chambers, stopes and underground workings, and Minimize the exposure of fish in Baker Creek to arsenic from existing contaminated sediments on the Mine Site, surface drainage from the Mine Site or tailings runoff. If off-site diversion is selected, the Developer will seek required regulatory approvals to implement the diversion within five years of receiving its water license. 	Underway	<p>Baker Creek was a component in the Surface Design Engagement discussions. Further discussions will need to be had with GMOB as to how their participation will be integrated.</p>	<p>Evaluating input from the Surface Design Engagement work. Expert support working group (DFO, EC, HC) to be reinstated. A draft options report is anticipated in February 2017. GMOB is expected to be integrated into the expert support working group, or should provide input to the Project Team on how they will meet the requirement of meaningfully participating.</p>
12	To prevent significant adverse impacts on Great Slave Lake from contaminated surface waters in the existing or former channel of Baker Creek, should it be re-routed to avoid the	Underway	Worked on site specific water quality objectives to	Ongoing work to solidify the Site



#	Measure	Status	Progress in 2015-16	Plans for 2016-17
	Mine Site, the Developer will ensure that water quality at the outlet of Baker Creek channel will meet site-specific water quality objectives based on the CCME <i>Guidance on the Site-Specific Application of Water Quality Guidelines in Canada</i> .		feed into the SDE process and future expert support working group discussions.	specific water quality objectives
13	<p>The Developer will design and, with the applicable regulators, manage the Project to ensure that, with respect to arsenic and any other contaminants of potential concern, the following water quality objectives are achieved in the vicinity of the outlet of the existing or former channel of Baker Creek, should it be re-routed to avoid the mine, excluding Reach 0:</p> <ul style="list-style-type: none"> a) Water quality changes due to discharge from the former channel of Baker Creek will not reduce benthic invertebrate and plankton abundance or diversity; b) Water quality changes due to discharge from the former channel of Baker Creek will not harm fish health, abundance or diversity; c) Water quality changes due to discharge from the former channel of Baker Creek will not adversely affect areas used as drinking water sources, d) Water quality changes due to discharge from the former channel of Baker Creek will not adversely affect any traditional or recreational users; and, e) There is no increase in arsenic levels in Great Slave Lake due to discharge from the former channel of Baker Creek beyond the parameters described in Measure 12. 	Future Action Required	See measures 11&12	See measures 11&12
14	The Developer will add an ion exchange process to its proposed water treatment process to produce water treatment plant effluent that at least meets Health Canada drinking water standards (containing no more than 10µg/L of arsenic), to be released using a near shore outfall immediately offshore of the Giant Mine Site instead of through the proposed diffuser. The Developer will achieve this concentration without adding lake water to dilute effluent in the treatment plant.	Future Action Required	None	To be actioned during design and implementation.
15	<p>The Developer and regulators will design and manage the Project so that, with respect to arsenic and any other contaminants of potential concern:</p> <ul style="list-style-type: none"> 1. Water quality at the outfall will meet the Health Canada Guidelines for Canadian Drinking Water Quality; and, 2. The following water quality objectives in the receiving environment are met: <ul style="list-style-type: none"> a) Water quality changes due to effluent discharge will not reduce benthic invertebrate and plankton abundance or diversity at 200 metres from the outfall; b) Water quality changes due to effluent discharge will not harm fish health, 	Future Action Required	None	Outfall location to be finalized through detailed design discussions and engagement.



#	Measure	Status	Progress in 2015-16	Plans for 2016-17
	<p>abundance or diversity;</p> <p>c) Water quality changes due to effluent discharge will not adversely affect areas used as drinking water sources; and,</p> <p>d) There is no increase in arsenic levels in Yellowknife Bay water at 200 metres from the outfall: and,</p> <p>e) There is no increase in arsenic levels in Yellowknife Bay sediments at 500 metres from the outfall</p>			
16	Before construction, the Developer will model re-suspension of arsenic from sediments and resulting bioavailability in the vicinity of the outfall. If the modeling results indicate that the outfall may re-suspend arsenic from sediments, the Developer will modify the outfall design until operation does not cause resuspension of arsenic from sediment.	Future Action Required	None	None anticipated
17	<p>Before operating the outfall, the Developer will design and implement a comprehensive aquatic effects monitoring program that is sufficient to determine if the water quality objectives listed in Measure 15 are being met. This program will:</p> <ol style="list-style-type: none"> 1. At a minimum, be able to identify any accumulation of arsenic over time in the water, sediment or fish in the receiving environment; 2. Include appropriate monitoring locations near Ndilo, in Back Bay and in Yellowknife Bay, with a focus on areas in the vicinity of the outfall and areas used by people; 3. Include the establishment of a baseline for aquatic effects in Back Bay before beginning Project construction and installation of the outfall; 4. Be developed according to AANDC <i>Guidelines for Designing and Implementing Aquatic Effects Monitoring Programs for Development Projects in the Northwest Territories, June 2009</i>, with corresponding Action Levels and management response framework. 	Future Action Required	None	Work planned to develop conceptual design of the study including identifying parameters, potential water quality based effluent quality criteria. Timing of the AEMP will be determined.
18	Prior to preparing chambers and stopes for freezing, the Developer will conduct a comprehensive quantitative risk assessment evaluating both wet and dry methods for the initial freezing design, with respect to current risks and implications for future removal. This will include an evaluation of potential effects of the proposed freezing and wetting method on the thawing or frozen excavations, and potential impacts of ongoing design changes prior to implementing the Project. The Developer will release a plain language report to the public describing its considerations and the resulting design.	Underway	Freeze design basis report was finalized and engagement occurred with the Working Group.	Plain language report to be developed and released to the public.
19	Considering the results of the risk assessment described in Measure 18, the Developer will not adopt any method of freezing that significantly reduces opportunities for future	Future Action	None	None



#	Measure	Status	Progress in 2015-16	Plans for 2016-17
	arsenic removal or other remediation by future technologies.	Required		
20	The Developer will conduct all major demolition and construction activities with the potential to release large amounts of dust or contaminants into the air when wind directions will minimize the chances of dust and contaminants blowing into the City of Yellowknife, Dettah and Ndilo.	Future Action Required	None	None anticipated
21	The Developer will collect dust and contaminant level data from soil and vegetation in the vicinity of major reclamation activities before and after major demolition or construction activities to serve as a baseline for any related adaptive management activities that may follow.	Future Action Required	None	None anticipated
22	The Developer will conduct a study to determine appropriate depth of the tailings cap and B1 pit cover, in consultation with Environment Canada and responsible regulators, to verify that the depth proposed will ensure the tailings cap and B1 pit cover are not compromised by vegetation growth. The Developer will provide a report of this study to the Mackenzie Valley Land and Water Board before it issues a water license for the Project.	Future Action Required	Tailings remediation options were discussed as part of the SDE process.	Confirm requirements and objectives of tailings cover.
23	The Developer will work cooperatively with responsible regulatory authorities and interested Parties in the development and submission of a Tailings Monitoring and Management Plan prior to receiving regulatory approvals. This plan will not only identify potential issues for the management of tailings but will also identify mitigation measures to prevent problems related to the tailings cap failure, and will include consideration of the B1 pit cover as applicable.	Future Action Required	None	Further definition of the plan for the remediation of the tailings will need to be advanced before a monitoring and management plan can be developed.
24	The Developer will physically prevent all-terrain vehicle access to the tailings cap and B1 pit cover to prevent the surface from being eroded or otherwise compromised. The Developer will monitor the effectiveness of this prevention, and will take any additional management measures as necessary to prevent all-terrain vehicle access.	Future Action Required	None	None anticipated



#	Measure	Status	Progress in 2015-16	Plans for 2016-17
25	The Developer will work cooperatively with responsible regulatory authorities and interested Parties in the development and submission of an Air Quality Management Plan which incorporates an ongoing air quality monitoring program. This ongoing monitoring program will include all previously identified on-site air quality monitoring stations and one off-site air quality monitoring station near Niven Lake. At a minimum, ambient concentrations of NO2 and PM2.5 will be monitored at the Niven lake site. Total suspended particulate and metal concentrations will be monitoring at the on-site locations. This air quality monitoring program will identify Action Levels and trigger additional management and mitigation activities, if required.	Future Action Required	Air Quality program is underway, and the Niven Station was put in place, however additional engagement on the exact location is ongoing with nearby homeowners.	The final location for the Niven Air station will be determined and the station is expected to be fully functional by Fall of 2016. An Air Quality Management Plan will be submitted as part of the Water License Package.
26	In conjunction with Measure 10 above, the Developer will consider the results of the comprehensive human health risk assessment, and consult with the YKDFN and City of Yellowknife when determining suitable end uses of the Site, to ensure that those proposed uses do not pose a health risk to people, including toddlers.	Future Action Required	HHRA work was put out for tender. Consultation was ongoing through regular meetings with GMAC, Working group, City of Yellowknife, and through the Surface Design Engagement Process.	The HHRA to be contracted and conducted. Ongoing engagement.

Table 14: Giant Mine EA Suggestions Tracking Table (as of June, 2016)

#	Suggestion	Status	Progress in 2015-16	Plans for 2016-17
1	The Developer should consult with surrounding communities, including Dettah, Ndilo and the City of Yellowknife, prior to finalizing its Project design, so that design improvements may be incorporated to address any remaining concerns.	Underway	Ongoing consultation efforts through regular meetings with the Giant Mine Working Group and the YKDFN GMAC. Surface Design Engagement Process (SDE) initiated in June with first stakeholder workshop. SDE draft	Ongoing engagement activities with GMAC, Working Group and the City of Yellowknife. Detailed design consultation as appropriate. Ongoing follow-up



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			report submitted by March 31 2016, Ongoing meetings with City of Yellowknife staff to provide updates on the project.	from SDE report and workshops.
2	The Developer should create a monument as a memorial to the impacts of past contamination from Giant Mine on Aboriginal communities and the environment.	Future Action Required	None	Continued interaction with the Communicating with Future Generations Working Group. Ongoing consultation.
3	To encourage widespread learning from and remembering of the experiences of the Giant Mine, the Developer, in conjunction with the GNWT Department of Education, Culture and Employment, should: <ol style="list-style-type: none"> 1. Develop an education resource unit on the impacts of Giant Mine on the land and on people, including impacts on Aboriginal peoples, and 2. Distribute this resource unit for use within the school curriculum across Canada. 	Future Action Required	GNWT-ENR has approached ECE to discuss the suggestion. The Toxic Legacy's Project has worked with ECE focusing on an insert for the Grade 10 Northern Studies curriculum. Giant Mine is addressed in a student-led inquiry chapter of a larger unit about resource development.	To be determined.
4	The Federal Contaminated Sites Action Program should develop a policy framework and guidance for the perpetual care and management of remediated contaminated sites.	Not a Project responsibility	Project Team contacted FCSAP to make them aware of the suggestion	FCSAP is set to end in 2020. This suggestion will be part of any discussion on a future Federal program or funding source for the GMRP



#	Suggestion	Status	Progress in 2015-16	Plans for 2016-17
5	To ensure long-term funding throughout the life of the Project, the Developer should create an independently managed self-sustaining trust fund with multi-year up-front funding for the ongoing maintenance of this Project and for contingencies. A third-party expert should independently manage this trust fund. Annual reports on the condition of the fund should be provided to stakeholders and the public.	Outside of the Project scope	Linked to Measure 6.	Linked to Measure 6
6	To reduce public concern about the multiple roles of AANDC in this Project and to increase public confidence, AANDC should produce guidelines to clarify reporting structures to ensure that Project inspectors, advisors and managers employed by the federal government can perform their duties objectively and without undue pressure from within the federal government. These should be made available to the public within six months of Ministerial acceptance of this Report of Environmental Assessment.	Outside of the Project scope	The existing Treasury Board Values and Ethics Code for the Public Sector which came into force April 2012 provides this clarity and is available to the public at http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=25049	None
7	Based on the results of the health risk assessment described in Measure 10, the appropriate government authorities should remediate garden and playground soils where arsenic concentrations exceed current guidelines for urban soils in Canada.	Outside of the Project scope	None	None
8	The Developer should consider the Trail Human and Environmental Health Committee as a model for the development of the health program.	Future Action Required	Links to Measure 9 The Project Team ensured that the proposal for work on Measure 9 included consideration of the Trail work.	The Project Team will ensure future work on Measure 9 includes consideration of the Trail model.
9	During its review of the diversion of Baker Creek, the Department of Fisheries and Oceans should consider the habitat loss of the existing Baker Creek and decide on any habitat design requirements for the diversion to the extent it deems appropriate. Any resulting habitat compensation requirements should be applied on the new diversion.	Future Action Required	None	The Project will involve DFO in the analysis of moving Baker Creek off-site.
10	The Developer should investigate the potential advantages and disadvantages of adding an engineered wetland to the Project to reduce arsenic in surface drainage. This investigation should include possible locations in the channel that formerly contained Baker Creek and in the Baker Creek diversion. On completion, the Developer should make a public report of the results of this investigation and of any resulting changes to Project design. This should be completed before a water license is issued for the Project.	Future Action Required	None	All relevant options will be considered in the overall analysis of remedial strategies for the Site



#	Suggestion	Status	Progress in 2015-16	Plans for 2016-17
11	<p>To manage the risks of airborne exposure of contaminated dust from deconstruction of buildings or other structures on-site, the Developer should:</p> <ul style="list-style-type: none"> • Prepare a dispersion model of dust plume given typical wind direction and speed. • Define the meteorological window of opportunity to describe acceptable wind conditions to eliminate the potential for a dust cloud release and transport of surrounding communities. • Consult a meteorologist to develop a sound model of weather conditions, to indicate when winds are steady and not gusting, blowing to the north. • Stop if winds change or any dust controlling equipment fails. 	Underway	The GMRP Site Wide Air Quality Management and Monitoring Plan (AQMMP) is an existing and ongoing program that was designed to adapt to changing activities on-site, and will incorporate all suitable measures and activities to mitigate the risks of exposure to contaminated dust throughout the life of the project.	The Project will continue to evaluate the type of work being completed on a regular basis based on weather, wind direction, and as a result will employ further dust suppression or stop work until weather and wind conditions are more favorable.
12	To prevent impacts on people from potentially harmful contaminant releases from deconstruction of buildings or other structures on-site at the Giant Mine Site, the Land and Water Board should specify allowable wind directions and wind speeds in degrees, to ensure that contaminated structures are not demolished during blustery multi-directional winds at ground level.	Outside the Project Scope	None	The Project will consider any direction from the Land and Water Board with respect to project activities.
13	The Developer should investigate options for filling in the pits, in consultation with the City of Yellowknife and YKDFN.	Underway	The SDE process included evaluating the filling of pits in the options for site remediation.	Ongoing work to review results from the SDE process and begin development of the revised Remedial Action Plan.
14	The Developer should consider the baseline conditions for existing fish habitat in Back Bay (including a fish habitat assessment in the area of the foreshore tailings and the aquatic effects baseline required in Measure 17) and develop a foreshore tailings cover design and foreshore tailings monitoring and mitigation plan for review by the Department of Fisheries and Oceans pursuant to habitat provisions of the <i>Fisheries Act</i> .	Future Action Required	None	Included in Project scope.
15	The Developer should consult with the City of Yellowknife in the design of any landfill on the Giant Mine Site.	Future Action Required	None	Included in Project scope.



#	Suggestion	Status	Progress in 2015-16	Plans for 2016-17
16	The Developer should consult with Aboriginal groups with respect to reduced traditional use cumulatively resulting from the proposed Project in combination with contamination from Giant Mine. This should occur prior to finalizing Project design, so that design improvements may be used to address any remaining concerns.	Underway	Ongoing consultation with the YKDFN through the GMAC group. YKDFN was a key participant in the SDE process.	Ongoing consultation and engagement as detailed design is developed.