Giant Mine Remediation Project

Government of Northwest Territories

Canada

The 2016-17 Annual Report of the Giant Mine Remediation Project

REMEDIATING GIANT MINE

DATE: October 2017

Indigenous and Northern Affairs Canada

Affaires autochtones et du Nord Canada

Government of Northwest Territories / Gouvernement des Territoires du Nord-Ouest

About this Report

Welcome to *Remediating Giant Mine* – the second annual report of the Giant Mine Remediation Project (GMRP). The report provides an overview of the Project's key activities and performance for the 2016-17 reporting year[1], with a particular focus on environmental management, health and safety, and community involvement. The goal is to ensure that the Project Team achieves the objectives that have been set for the project, meets the requirements of the Environmental Agreement (the 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 Agreement, signed in June 2015, and by feedback on the 2015-16 report from the GMOB, the independent oversight body that was established through the Agreement (additional information is provided below: see 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: www.giant.gc.ca.

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 Agreement, which is a mandatory requirement per Measure 7 of *The Report of Environmental Assessment and Reasons for Decision* (MVRB, 2013). The Agreement establishes an independent oversight body (i.e., GMOB) 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 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 2016-17 report.

[1] April 1, 2016 – March 31, 2017

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. 22)	
A summary of any other significant developments relating to the Project	Environment (p. 33) Health and Safety (p. 45) Community (p. 52)	
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. 32) Health and Safety (p. 45)	
An assessment of the effectiveness of actions already taken to address the results or findings of all monitoring completed for the Environmental Programs and Plans	Environment: Air (p. 33) Environment: Water (p. 36)	
A summary of any environmental or engineering studies conducted by the Co-Proponents in relation to the Project	Year in Review: Operational Summary (p. 22) Environment: Water (p. 36); Land (p. 39) Health and Safety: Public Health and Safety (p. 48) Community: Procurement and Employment (p. 55)	
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	Year in Review: Operational Summary (p. 22)	
A summary of any reportable spills, accidents or significant malfunctions, and a summary of the Co-Proponents' responses	Year in Review: Operational Summary (p. 22) Environment (p. 32)	
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. 22)	
An analysis of trends in environmental effects data over time	Environment (p. 32) Health and Safety (p. 45) Community (p. 52)	As this is the second annual report, performance for 2016-17 is compared to the previous year (2015-16), but trends cannot be determined based on only two years of data; trend analysis will be provided in subsequent reports
A summary of significant public engagement	Community: Engagement	The Engagement section provides

Environmental Agreement Requirement	Section of Report	Comments
activities, or matters raised as public concerns, and the Co-Proponents' responses	(p. 52)	a summary of engagement activities, but does not specify public concerns and the Co-Proponents' responses; this information will be included in subsequent reports
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. 63)	Planned expenditures are currently not included in this version of the report; additional information is required to address plans for 2017-18
A summary of the progress of the Project, including with respect to the Mackenzie Valley Resource Management Act (MVRMA) Measures, MacKenzie Valley Environmental Impact Review Board (MVEIRB) Suggestions, and Co-Proponents' Commitments	Year in Review: Progress on Commitments (p.22) Appendix D (p. 93)	
References to all sources relied on by the Co-Proponents in coming to conclusions in the annual report	References (p. 65)	
A plain language summary of the annual report	Under separate cover	

Addressing GMOB Recommendations

A key influence in the preparation of this report was the feedback from the GMOB on last year's report. We have done our best to address the GMOB's recommendations. For many of the recommendations, improvements are a multi-year process: though steps have been taken to begin to address the recommendation, work is still ongoing in order to fully address the recommendation in future reports.

In some cases, the current C&M contracting mechanism is a limitation to collecting and analyzing the data requested by the GMOB. The Project Team anticipates that this limitation will be addressed with the new Main Construction Manager (MCM), as provisions regarding the collection and reporting of various performance data have been incorporated into the contract requirements. We look forward to being able to provide this information in the coming years.

The GMRP will continue to work toward addressing the outstanding recommendations, as well as any further feedback on this year's report, and to continuously improve stewardship and transparency of our actions at the GMRP.

The following table provides an overview of how this report addresses the recommendations provided by the GMOB in February 2017.

#	Subject	GMOB Recommendation	How the Recommendation is Addressed in this Report
1	**Plain Language Summary**	The GMRP should either revise the language of the Report Summary next year so that it is more accessible to readers at all levels of technical knowledge and/or that it provide a standalone plain language summary document. The latter document could be produced independently from the Annual Report and be made available for wider public distribution.	The GMRP will provide a short, plain language summary of the annual report as a stand-alone document for wider circulation. Additionally, interested members of the public can access plain language descriptions of work conducted in 2016-17 at any time via the newsletters available on www.giant.gc.ca .
2	**Reporting Cycle**	GMOB would like discuss with the Project Team how best to maximize the utility of the Annual Report. For example, one way to address the reporting cycle issue might be through the presentation of a preliminary project report in May of each year so that feedback from GMOB and the community could be applied adequately to the following year's planning cycle.	Since receipt of the GMOB's recommendation, the Project Team has worked with the GMOB to ensure that the GMOB's members are kept informed and have timely opportunities to provide input and feedback throughout the reporting and planning cycle. For example: • The GMOB attends monthly Working Group meetings with the Project Team. • The Project Team provides frequent project updates to the GMOB. • At the Project Team's invitation, GMOB members have attended workshops where the GMRP is addressing specific components of the project. The Project Team has also met with the GMOB to discuss the "Establishment Report" received in May 2017 and has provided updates to the GMOB on the work plan, offering opportunities for the GMOB to provide recommendations prior to the field season.
3	**Annual Project**	An Annual Project Plan be included in the Annual Report.	The Detailed Work Plan is included as Appendix E to this report.

#	Subject	GMOB Recommendation	How the Recommendation is Addressed in this Report
	Plan		
4	**Performance Measures**	Quantifiable performance measures should be further developed and included in the Annual Report. In the meantime, specific in-year performance targets will continue to be monitored (i.e. project team performance in meeting the goals established in the annual Detailed Work Plan.	The GMRP will include performance against targets in future annual reports. The Project Team is currently in the process of reviewing and updating its existing set of performance measures and targets, to align with evolving performance measurement and reporting requirements in the Government of Canada, and will share these measures and targets with GMOB for discussion.
5	**Expenditures**	A further breakdown of the project expenditure figures as well as a multi-year trend analysis of the total cost estimate of spending versus budget would be helpful to include in future annual reports. The latter item should include a justification for any significant variances. The cost vs. budget trend analysis would help us to understand if and where there may be issues with scope creep, schedule slippage, etc.	Although the level of financial detail provided in the annual report remains the same as in the previous year, the GMRP offers the following information regarding scope creep and scheduled slippage: Overall, the GMRP achieved most of its planned activities for 2016/17 and did so within the planned budget. Where activities have been deferred, the decision was made consciously in response to requests from stakeholders. Given recent progress on the project, the process to apply for a water licence is proceeding ahead of schedule.
6	**Trends**	We recommend that the Project Team consult with the Parties to the Agreement as to what datasets should be analyzed for trend reporting in the Annual Report.	No engagement has yet occurred regarding analysis of trends. However, the GMRP has made an effort to begin to provide trends analysis. In this report, wherever quantitative performance data are reported, 2016-17 performance is compared to 2015-16 performance. However, these comparisons should be interpreted with caution, as they have not been adjusted for the level of effort and activity on site in each year. As discussed in row 4 above, the Project Team is in the process of revising its performance measures. The Project Team is giving particular attention to developing appropriate normalized indicators that will allow for robust trends assessment in future years, taking into account changes in activity levels or the relative risk associated with the activities undertaken in a given year.
7	**Air**	The Air Quality Monitoring Plan should be referenced in the Annual Report and a link to the plan provided.	Information on the air quality monitoring program can be found via http://www.enr.gov.nt.ca/en/services/giant-mine-remediation-project/giant-mine-ambient-air-monitoring-program . The GMRP is currently assessing options for creation of a public, web-based library to enable stakeholders' access to documents of interest. Once the library is established, the Air Quality Monitoring Plan will be added there and a link to that library will be provided through regular GMRP communications, including future annual reports. Although the Air Quality Monitoring Plan (2013) is not currently posted publicly, it is available upon request to the Project Team.
8	**Water**	It would be helpful if the Annual Report could provide a roadmap and timeline as to how the outfall design, the re-routing of Baker	Information on the outfall design, Baker Creek realignment, updates to the ETP, and development of SSWQO is provided within this annual report

#	Subject	GMOB Recommendation	How the Recommendation is Addressed in this Report
		Creek, the ETP design and the development of SSWQO relate to each other and how the Project team plans to sequence work on these items.	and the relationships among these initiatives and sequencing of them have been described in meetings of the Working Group. Records of discussions and minutes are available.
		The GMRP should work with the Parties to develop a way of sharing key water monitoring data as is done for air quality.	As described in row 7 above, the GMRP is currently assessing options for creation of a public, web-based library to enable stakeholders' access to documents of interest. Once this library is established, key water quality monitoring results can be made available there.
		All operational details, such as the dredge removal, should be followed through in future Annual Reports.	The Project Team took care in this annual report to provide information on all "Next Steps" items from last year's report and in future years' reports, the Project Team will continue to follow up on and provide updates related to any unconcluded work items.
9	**Biodiversity**	As written, it is not clear what the objective of monitoring wildlife/birds is or what mitigations or plans this monitoring will inform. It would be helpful if there was a more systematic way to link the results of monitoring to corrective actions or to design planning.	Effort has been made in the biodiversity section of this report to link specific studies to corrective actions taken this year. With respect to how biodiversity studies and monitoring undertaken in recent years are informing the remediation design, results will be shared with stakeholders via future reports, public fora, and working group meetings. When the remediation design is shared, the Project Team will describe how the results of biodiversity-related studies have influenced the overall remediation planning and execution.
10	**Land**	No specific recommendation.	
11	**Health**	The Annual Report should include a section on the effectiveness of the measures used to address the exceedances of urinalysis tests for present onsite workers.	The Project Team has begun to address this recommendation in this report. Section 4.1.2 includes additional description of the actions taken in response to high urinalysis test results. Additionally, regular monitoring helps identify workers who are near the Action Level and intervene to prevent exceedances. Although there is no analysis specifically on the effectiveness of actions taken in response to Action Level exceedances, workers with high test results are retested to ensure they return to acceptable levels. Section 4.1.2 also includes data on the proportion of samples that exceed the Action Level in 2016/17 and compares this to the same figure for 2015/16. Although there are several factors that can influence this number – such as the type of work undertaken each year – it is at least partially reflective of the effectiveness of actions taken to prevent exceedances. In future years, the Project Team will endeavour to provide additional analysis of the effectiveness of actions undertaken to address elevated arsenic in workers' urine. As described in rows 4 and 6, the Project Team is working to develop appropriate indicators to allow for year-over-year comparisons.

#	Subject	GMOB Recommendation	How the Recommendation is Addressed in this Report
12	**Community and Engagement**	This section of the Annual Report could to be strengthened by, for example, including an analysis of concerns identified during engagement and how those concerns are being addressed.	The Project Team acknowledges this recommendation and will provide additional information on stakeholder concerns in future annual reports. As described in Section 5.1, the Project Team is working to design and develop a system to systematically track stakeholder concerns and how concerns were addressed. This system was not yet operational in 2016/17, but is expected to be operational by the end of 2017/18. Although the nature of concerns are not presently logged in a central location, the Project Team takes care to consider and address feedback from stakeholders and interested parties. For example: • In 2016-17, stakeholders and Indigenous groups indicated concern over the amount of engagement that was occurring. In response to these concerns, the Project team delayed certain activities (such as the Stress Assessment) to spread out engagements and reduced the number of different topics in any given YKDFN GMAC meeting. This is discussed in the Community and Engagement section of the 2016-17 report. • The timing of the deconstruction work was scheduled based on input from YKDFN Elders. Additionally, the Project Team frequently reviews and revises its approach to the public forum, website, newsletters, and pamphlets to update them to make them easier to read and more accessible, in response to feedback from stakeholders.
13	**Employment**	The Annual Report should provide more detailed information on employment, contractors and value of contracts as well as any other information linked to direct socio-economic activity. The Project team should consult with GMOB and the Parties about exactly what kinds of information would be most useful to report on.	Section 5.3 of this report include information on employment and contractors, including a breakdown of employees and expenditures by socio-economic groups of interest, as well as the value of key contracts. Similarly, Section 5.4 provides information on training provided, including a breakdown of training received by socio-economic group. This year's report also includes an overview of the labour resource study conducted in 2016/17 and updates to the socio-economic strategy. The Project Team is working toward being able to provide more detailed employment and training information in future reports. There are provisions within the future Main Construction Manager (MCM) contract that are intended to improve the quality of data collected on employment, health and safety, and socio-economic aspects of the project. These provisions were included in the MCM procurement documents in response to input from the GMOB. The Project Team will encourage the MCM to work with the GMOB on approaches to collecting socio-economic data.
14	**Training**	The Project team should consider including a section in the report that describes the overall socio-economics of the Project including, for example, comprehensive and measurable local training and employment initiatives as well as secondary economic effects of the project.	
15	**Traditional Knowledge**	A specific section reporting on consultation and incorporation of traditional knowledge should be included in the Annual Report.	A specific section regarding consultation and incorporation of traditional knowledge (TK) will be added to future reports. For this year's report,

#	Subject	GMOB Recommendation	How the Recommendation is Addressed in this Report
			incorporation of TK is summarized in this table and is mentioned in relevant sections of the report. • In 2016-17, the Project Team's scheduling of the deconstruction work reflected traditional knowledge (TK) from YKDFN Elders, who indicated that high wind conditions in May and June increased the risk of fugitive dust. This is discussed in Section 2.1.2 of this report. • The Project Team is also committed to incorporating TK in the remediation design as it is developed. For example, the Project Team is currently working on redrawing the lines of the site and is considering YKDFN TK to inform that decision. • The GNWT has agreed to support YKDFN undertaking a TK Land Use Study focused on Giant. The outcomes will be presented in upcoming reports. These will inform final Closure Plan decisions.
16	**Off-Site Considerations**	The Annual Report should describe how the Project Team is working with applicable authorities to ensure the effective and consistent management of both off and on site contamination.	The GMRP is responsible for C&M and remediation activities within the site boundaries. Management of off-site contamination is beyond the scope of the GMRP and is therefore not addressed in this report. However, the INAC NWT Regional Office and the GNWT are working together to discuss an agreed to approach for addressing legacy contamination (off-site) in the Yellowknife Area. These discussions are taking place separate from the GMRP.
17	**Emergency Measures**	The Annual Report should provide the criteria and rationale used to categorize on-site activities that are deemed to be of an emergency measure and …	Additional description has been added to Section 2.1.2 to provide information on the process used to identify urgent works / emergency measures.
		… describe or provide a link to an Emergency Preparedness Plan.	An Emergency Preparedness and Response Plan (EPRP) has been created and is maintained by the C&M contractor (DCNJV). As described in row 7 above, the GMRP is currently assessing options for creation of a public, web-based library to enable stakeholders' access to documents of interest. Once the library is established, the EPRP will be added there. Until then, it is available to any interested person upon request to the Project Team.
18	**Plans to Incorporate New Remediation Technologies in the Future**	The Annual Report should outline the process and actions taken to address any potential changes in remediation technologies, techniques, or processes that may be recommended as a result of the research program currently undertaken by GMOB.	The Project Team regularly engages with the GMOB (as described in Row 2 of this table) to ensure that the GMOB has opportunities to provide input into annual work planning and design decisions. The GMRP will consider the GMOB's recommendations in the remediation design. At this time, the GMOB's research program is not yet complete; there are no resulting changes to the remediation technology to discuss in this report. The remediation design process is proceeding based on the proposal submitted in the Environmental Assessment. All design packages for the final remediation project will be peer reviewed to ensure they

#	Subject	GMOB Recommendation	How the Recommendation is Addressed in this Report
			represent robust approaches.

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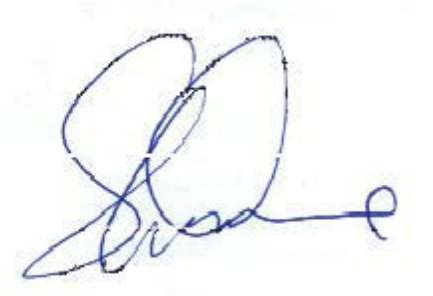
Message from the INAC Project Leader – ADM, Northern Affairs Organization

On behalf of the entire Giant Mine Remediation Project Team, I am pleased to present the second Annual Progress Report to the Giant Mine Oversight Board. This report provides our stakeholders and the public with a transparent, comprehensive record of our progress over the last year as we work towards advancing the Giant Mine Remediation Project. We are committed to following the mandate given to us by the Government of Canada to use public investment to spur economic growth, job creation, and to improve economic opportunity for Northerners and Indigenous Peoples. We will also use this opportunity to support the effort towards reconciliation and the renewed relationship between Canada and Indigenous Peoples based on recognition, rights, respect, co-operation, and partnership.

This sophomore report builds on our first effort, with the benefit of input and advice from the Giant Mine Oversight Board and our other stakeholders. We will continue to communicate our progress, improve our engagement with, and reporting to, the public, and welcome feedback on our planning and management of the Giant Mine Remediation Project. Our goal is to achieve an outcome we can all be proud of that addresses the legacy left behind by Giant Mine, and benefits our Indigenous peoples, Northerners, and all Canadians through collaboration, sincere dialogue, and learning from each other to continually improve.

The Giant Mine Remediation Project Team looks forward to engaging with others throughout the project life cycle, seeking a collaborative approach that is inclusive and forward-looking. We hope our work, and the lessons we take from, it will inform the management of other complex remediation projects and will allow the Government of Canada to adapt and improve both its management practices and decision-making processes related to resource extraction and land use in the North.



Stephen M. Van Dine,

Assistant Deputy Minister, Northern Affairs Organization

Report Summary

Remediating Giant Mine is the second annual report of the Giant Mine Remediation Project (GMRP). This report describes the Project Team's key activities and performance for the 2016-17 reporting year (April 1, 2016 – March 31, 2017), 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* (MVRB, 2013), as accepted by the Responsible Minsters 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 2016-17, the Project Team continued to advance immediate risk mitigation by continuing the work on the Site Stabilization Plan (SSP) and the deteriorating infrastructure action plan. This risk mitigation work included deconstruction of the A-shaft Head Frame and Hoist Room, Assay Lab, and Curling Club, as well as continued work to stabilize the underground), surface and underground electrical upgrades (including substation repairs), and communications equipment upgrades. Care and Maintenance (C&M) activities were ongoing throughout the year. The below table describes the key operations.

Activity	Progress	Comments
Deconstruction of A-shaft Head Frame and Hoist Room, Assay Lab, and Curling Club	**Completed**: Dismantled structures to reduce associated risks to environment, on-site workers, and the public. Removed and disposed or stored remaining hazards and waste. Installed a permanent steel cap over A-Shaft.	No incidents. Additional details in Section 2.1.
Communications Upgrades	**Underway –** Completion expected Fall 2017.	An assessment of the underground communication system determined it was in poor condition and required upgrades to ensure its safe and reliable continued operation. Slight delay in the work as pre-cut fiber cables were too short upon arrival at site. This caused schedule delays waiting for additional cabling.
B3 Substation Repairs	**Completed:** Replaced transformers and switchgear at the B3 substation and supercrest locations.	The equipment repairs were necessary due to failing infrastructure and unsafe conditions. Additional details in Sections 2.1 and 3.2.
Underground Electrical Upgrades	**Completed:** Replaced transformers, switchgear, panels and electrical components for various areas in the underground mine.	These repairs were required due to failing infrastructure and safety concerns. Workers' Safety and Compensation Committee (WSCC) expressed concerns with some of the existing infrastructure being used. Additional details in Section 2.1.
Borrow Development for C&M	**Completed:** 7500 tons of 3/4" minus material and 7500 tons of 6" minus material delivered to site for use in Care and Maintenance Activities.	No incidents. Additional details in Section 2.1.
Underground Stabilization Project	**Completed:** Remainder of stope drilling and void surveys completed to provide information regarding underground	The findings from the drilling program and void surveys will be used to fill the gaps with the underground stope backfilling that will

Activity	Progress	Comments
	structures in inaccessible parts of the mine. **Underway:** Only one high-risk stope complex (C5-09) remains to be backfilled. Conceptual design and mitigation strategies for this stope complex started in 2016/17; backfilling of this complex will be completed in 2017.	occur as part of the remediation. The remaining stopes on 1st and 2nd level will be backfilled but do not pose an immediate risk to public safety or the integrity of the underground.
Care and Maintenance (C&M)	**Ongoing:** Prepared for spring freshet, managed dust, treated and discharged effluent, and continued upgrades to power system. Completed monitoring to meet requirements of former Surveillance Network Program and the current Metal Mining Effluent Regulations. Completed annual site-wide bird survey prior to open-water activities.	Two minor health and safety incidents (Section 4.1); one Action Level exceedance due to fugitive dust generated on site (Section 3.1).

Studies

The below table lists environmental or engineering studies conducted in 2016-17 by the Project Team or their contractors in relation to the Project. It includes studies that were completed, as well as several that are still underway. Additional details on these studies can be found throughout the report.

Theme	Study / Report
Design	• Supplemental Borrow Source Identification • Underground Disposal Options for Arsenic Waste • Tailings Geotechnical and Geochemical Investigation • Tailings Relocation Options • Tailings Cover Design Options • Surface Design Engagement Options Evaluation
Air	• Air quality monitoring
Water	• Surveillance Network Program (SNP) • Annual MMER/EEM Effluent and Water Quality Monitoring • ETP Systems Upgrade Study • Present-Day Arsenic Loading to Baker Creek and Yellowknife Bay • Baker Creek Re-Alignment Alternative Evaluation • Baker Creek Site-specific Water Quality Objectives (initiated in 2016)
Land	• Assessment of Radiation Hazard Potential of Granodiorite (Pink granite) • Arsenic Characterization (Disturbed and Undisturbed Areas)
Biodiversity	• Phase 5 EEM Program – Investigation of Cause Study

Health & Safety	• Health Effects Monitoring Program (Health Study)
	• Human Health and Ecological Risk Assessment (HHERA), including:
	  o Dietary Survey
	  o Voluntary Sampling Program for Country Foods
	• Human Health Risk Assessment for Workers Exposed to Disturbed Soils at the Giant Mine

Community	• Labour Resource Study

Audits and Inspections

Two audits were undertaken in 2016-17 by the Project Team contractors in relation to the GMRP, as described in the table below. Additional details are provided in Section 2.1 of this report.

Theme	Audit
Occupational Health and Safety (OHS)	• Industrial hygiene audit on the effectiveness of the medical monitoring and hygiene program to manage workers' exposure to arsenic trioxide
Environment, Health and Safety (EHS)	• EHS and site security audit to confirm compliance with applicable regulatory and other requirements

Inspections

In 2016-17, inspections conducted by three regulatory bodies collectively identified 6 non-compliance incidents. In addition to the inspections performed by regulatory bodies, internal inspections are regularly performed to ensure safe operation at the site. Non-conformances identified during internal inspections in 2016-17 were minor and promptly corrected.

Regulatory Body	Inspection Date	Inspection Type	#of Non-Compliances	Findings / Recommendations
INAC Lands and Economic Development	27-May-16	Inspection-MSA and Baker Cr.	0	• No concerns
	26-Jul-16	Inspection-Drill Sites and SNP 43-1	0	• No concerns
	19-Aug-16	Inspection of the UBC Bridge stabilization project in response to NT/NU Spill # 16-299	2	• Spill 16-299[2] - Non-compliant release to environment
Environment and Climate Change Canada	3-Aug-16	Inspection-Site & SNP43-1	3	• Halocarbon leak not reported on semi-annual report • Four C-Dry air conditioners do not have log books • Env. Emergency Plan testing may not be adequate
GNWT Environment and Natural Resources	Various	Beaver Dam inspections-over course of summer	1	• Dam modified without previous consent
		Bear Trap inspections-over course of summer	0	• No concerns

[2] See additional details in Section 3.1

Progress on EA Measures

The below table summarizes the progress made in FY 2016-17 towards achieving the Measures from *The Report of Environmental Assessment and Reasons for Decision* (MVEIRB 2013). This table highlights the Measures on which progress was made in 2016-17. 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.
6	**Underway**	Draft report describing considerations for long-term funding has been provided to the public for input via the Giant Mine Working Group.
9	**Underway**	Health Effects Monitoring Program initiated.
10	**Underway**	Human Health and Ecological Risk Assessment (HHERA) initiated. Completion expected in 2017-18.
11 & 12	**Underway**	Significant engagement efforts over the past two years regarding investigation of options for Baker Creek.
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 2016-17, organized by Air, Water, Land and Biodiversity. Beyond the one spill of drilling water, as described in this report and reported to the NT/NU Spill Line, there were no other reportable spills, accidents, or significant malfunctions at the GMRP in 2016-17.

Component	Activities / Progress	Outcomes	Mitigations / Actions
Air	**Air quality monitoring** was conducted by the project as per the established program. Results were posted to GNWT website for public access and weekly summary reports were shared via the GMRP distribution list.	One exceedance in air quality measurements as a result of fugitive dust at site. On June 15th, PM_{10} concentrations were measured to be above the Risk Based Action Level (RBAL) at two fence-line monitoring stations.	The Project Team deployed a water truck in the areas where the elevated concentrations were observed by instrumentation.
	A community monitoring station was fully installed in the Niven Lake Community, which is anticipated to be operational in 2017. The Ndilo station was upgraded to a purpose-built structure.		
	The Project Team evaluated and selected a new product for dust suppression.	The Project Team will use SoilTac for dust suppression.	Dust suppression activities continue on site.
Water	Continued operation of the **Effluent Treatment Plant (ETP)** (July and August 2016)	Discharge of 183,564 m^3 of treated water.	B3 substation electrical upgrades to provide safe and reliable power to the ETP and other areas of the mine.
	Annual MMER/EEM effluent	Treated mine water meets	MMER/EEM information will

Component	Activities / Progress	Outcomes	Mitigations / Actions
	and water quality monitoring (July 1 – Aug 19 2016)	discharge requirements.	be used to inform the Human Health and Ecological Risk Assessment (HHERA).
	Surveillance Network Program (SNP) continued to monitor water quality at the ETP daily and at six other sites on a weekly or monthly basis throughout the open water season (May-October) and throughout the year at one sampling location.	No exceedances; treated effluent discharged to the environment from the Polishing Pond met the effluent quality limits as set forth in the former Water Licence and the federal Metal Mining Effluent Regulations (MMER).	Monitoring programs to continue.
	Identified new outfall location for the new ETP based on input received during engagement sessions.	The Project Team chose a general area in the vicinity of Baker Creek outlet for the new outfall. Additional work to identify the specific location was planned for 2017-18	
	Continued work on draft of comprehensive evaluation of re-alignment alternatives for Baker Creek.	Development of a draft recommendation report is underway, to be submitted to the Working Group.	
	Completed a study of the present-day (2011-2014) arsenic loading to Baker Creek and Yellowknife Bay, using a water quality model.	The total arsenic loads estimated by the water quality model are similar to measured loads previously reported. The largest sources of total arsenic to Baker Creek at SNP 43-5 were the Upper Baker Creek watershed and the Lower Baker Creek watershed downstream of the Old Mill Area.	
Land	**Site stabilization activities** as described under Key Operations.	See above (e.g. A-frame deconstruction).	N/A
	Waste management involved appropriate care of hazardous and non-hazardous wastes on site.	Some wastes (hazardous and non-hazardous) are stored on site; some are transported off-site for disposal. All waste, whether stored on site or transported off site, is handled in accordance with applicable regulations and guidelines.	Hazardous waste stored on site will be monitored and managed safely until it can appropriately disposed or until full remediation commences.
	Assessed **radiation hazard** potential of granodiorite (pink granite).	The radioactive hazard potential from gamma and radon is low in its current state and applicable guidelines for Naturally Occurring Radioactive	

Component	Activities / Progress	Outcomes	Mitigations / Actions
		Materials (NORM) are unlikely to be exceeded.	
	Characterized arsenic at disturbed and undisturbed areas of the site.	For disturbed sites, there is a correlation between elevated concentrations of total arsenic and percentage of bioaccessible arsenic in the tailings containment areas. For undisturbed sites, no strong overall correlation exists between arsenic speciation results and bioaccessibility data.	Information will be further assessed through additional work in 2017-18.
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.
	Phase 5 Environmental Effects Monitoring (EEM) Program – Investigation of Cause Study	Assessing cause of confirmed effects in fish and benthos.	EEM information will be used to inform the Human Health and Ecological Risk Assessment (HHERA). EEM will be incorporated into future AEMP design.
	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 point 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 2016-17. Further details are available in Section 4 of this report.

Component	Activities / Progress	Outcomes	Mitigations / Actions
Occupational Health and Safety	**Health and Safety training** for all employees and contractors.	2 minor incidents and 179 near misses reported.	Retrained and adopted more rigorous personal protective equipment procedures for certain employees; new mine manager is working to improve safety culture, resulting in greater reporting of near misses and corrective actions taken in response.
	Urinalysis samples taken from	3% of urinalysis samples	Workers whose urinalysis

Component	Activities / Progress	Outcomes	Mitigations / Actions
	on-site workers to monitor arsenic exposure.	exceeded Action Level of >35 micrograms of arsenic per litre of urine.	samples exceeded limits were temporarily placed on restricted duty to reduce their exposure.
	Industrial hygiene audit* **EHS and site security audit*** **Described in Section 2.1 of this report*	Recommendations provided for improvements to reduce potential for workers' exposure to arsenic.	N/A
Public Health and Safety	**Health Effects Monitoring Program** initiated.	No outcomes to report; activity ongoing. Sampling for health effects monitoring program to occur in 2017-18.	N/A
	Human Health and Ecological Risk Assessment (HHERA) undertaken, including dietary survey and voluntary country food sampling program (laboratory analysis of contaminant concentrations in country foods).	Report on results of HHERA expected in fall 2017-18.	N/A
	Stress Assessment deferred; likely to occur in 2018-19. Communications and engagement is ongoing.	Working group approved approach	N/A

Community

The below table summarizes the activities, progress and outcomes related to engagement, procurement, employment and training in FY 2016-17. Further details are available in Section 5 of this report.

Component	Activities / Progress	Outcomes	Plans for 2017-18
Engagement	**External stakeholders** continue to meet regularly. Held 50 **engagement events**, 25 media interactions, and distributed 7 e-newsletters.	1907* attendees engaged through 50 events. *Some individuals attended multiple engagement events. The total number of unique individuals engaged is less than 1907.	Continue to engage through working groups, public forums, established channels, and activity-specific engagement events
Procurement and Employment	Continued **with Procurement Strategy** and implementing contracting requirements to increase Indigenous benefits.	Employees and contractors are 23% Northern and 4% Indigenous – down slightly from the previous year. Suppliers are 64% Northern (comparable to 2015-16) and 45% Indigenous (nearly double last year).	Continue with procurement strategy.
	Labour Resource Study undertaken.	Results of labour resource study informed the development of Main	Additional interviews to be conducted and the Labour Resource Study report

Component	Activities / Progress	Outcomes	Plans for 2017-18
		Construction Manager RFP documents and processes.	expanded to address specific training and capacity building opportunities and recommendations.
	Socio-Economic Strategy finalized.	Creation of a new position for a NWT-based resource dedicated to leading the implementation of the socio-economic strategy.	Implement socio-economic strategy.
	Main Construction Manager (MCM) RFP posted, tendering process included engagement and site visit with interested bidders.	MCM proposals received and currently being evaluated.	Issue contract to MCM and bring them on board. Have MCM issue new contracts for C&M and environmental monitoring.
Training	Contractors provided workforce training (e.g. on-site orientation).	230 people trained (comparable to 2015-16); 7760 hours of training (more than three times the training provided in 2015-16).	Workforce training to continue.

1.0 Project Overview

The GMRP 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 GMRP are to:

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

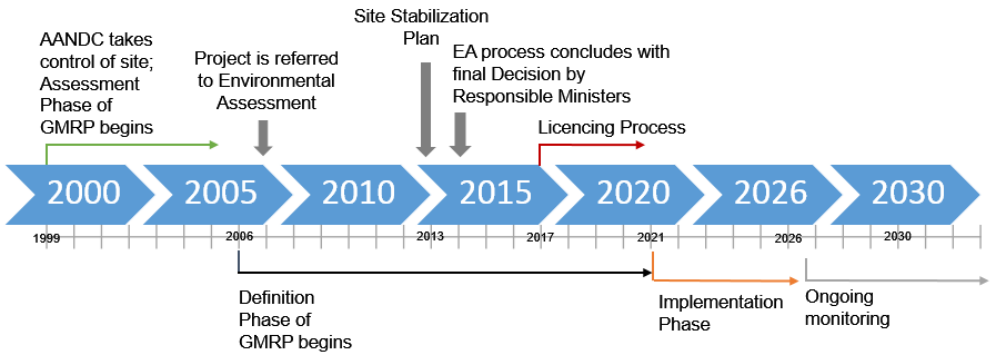
The successful remediation of the Giant Mine will yield the following outcomes:

- 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 Indigenous 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 GMRP

Figure 1 illustrates the past, current and planned activities of the GMRP. Appendix B provides more information on the GMRP, including the Mine's legacy and the GMRP's background, phases, management structure, integrated management system, and risk management approach.

Figure 1: GMRP Activities and Timeline



2.0 The Year in Review: 2016-17 Operational Summary and Progress on EA Measures

2.1 Operational Summary

The GMRP Project Team – which includes INAC, Public Services and Procurement Canada (PSPC), and GNWT personnel – focused their activities in five main areas over the 2016-17 year (April 1, 2016 – March 31, 2017):

1. Continuing the implementation of the Site Stabilization Plan (SSP), including power upgrades and underground stabilization work;
2. Undertaking immediate risk mitigation activities (urgent works) as and when a need is identified;
3. Ensuring ongoing care and maintenance of the site;
4. Conducting studies and assessing surface design options (described in Sections 3, 4, and 5); and
5. Undertaking environmental and health monitoring and studies / baseline assessments (described in Sections 3 and 4).

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 2016-17 were $40,305,969. Further details on key expenditures are shown in section 2.1.4, Table 1.

2.1.1 Site Stabilization Plan

Underground Stabilization Project
An important element of the Giant Mine closure includes stabilizing stopes and other voids, which are areas that were hollowed out underground during mining operations. 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, 2015, and 2016. To address the risks of rock collapse or underground flooding, stopes were filled with a paste made from mine tailings, water, binder (cement), fly-ash, and in some cases inert rock material. The paste cures, helping to stabilize the underground mine structure.

Work to stabilize the underground is informed by a near-surface drilling program. Historical mine records and other documentation about near-surface underground mine workings did not provide enough information about the remaining underground stopes to inform a robust design for the final Closure and Reclamation Plan. As a result, a geotechnical drilling program was needed. The findings from the drilling program will be used to inform the design of final near-surface underground stope backfilling that will occur as part of the remediation. This program has been carried out over recent years, with the drilling completed in summer 2016.

A void monitoring survey was also conducted for each identified stope. Using specialized scanning equipment, the survey helps to determine the volume of each stope, which helps determine which stopes require backfilling and how much backfill material will be needed to fill the voids. This informs

both the filling of high risk stopes as part of the urgent works and also the longer term remediation design for the remaining lower risk stopes.

Key activities in 2016-17 included:

- Completing the remainder of stope drilling for geotechnical assessment and observation;
- Conducting a cavity monitoring survey for each identified stope;
- Using a remotely controlled drone equipped with cameras and specialized stabilizers to investigate areas of C5-09 that are otherwise inaccessible.

As of the conclusion of the 2016/17 fiscal year, all but one of the stope complexes identified as high risk have been backfilled. The outstanding stope complex (C5-09) is anticipated to be filled in the summer of 2018, once the final backfill conceptual mitigation approach is designed, and a contract is procured to complete the work. Due to the size of C5-09, the complexity of the stope geometry, and the fact that arsenic chamber 9 is situated above it, the backfill material and construction methodology is being carefully considered. The other remaining stopes that have not been backfilled do not pose an immediate risk to public safety or the integrity of the underground and will therefore be addressed through final remediation activities.

2.1.2 Immediate Risk Mitigation

Deconstruction of A-shaft Head Frame and Hoist Room, Assay Lab, and Curling Club

As part of C&M activities, the Project Team regularly engages a qualified, third-party engineer to assess the site using a set of risk-based criteria to identify any elements that require immediate action to ensure the safety of the environment, on-site workers, and the public. This year, the assessment found that several structures had deteriorated and that the A-Shaft head frame and hoist room, assay lab, and curling club posed unacceptable risks, including the risk of injury to site personnel and potentially to the public. The Project Team commissioned the immediate deconstruction of these structures.

The A-shaft – a narrow, vertical shaft hundreds of metres deep – was historically used to bring miners to and from the underground areas of the mine. Constructed in 1945, it was the first such shaft at the Giant Mine. The head frame stood 24 metres above ground, near the current main entrance to the site.

Many of the structures contained asbestos and other hazardous construction materials. The assay lab also contained hazardous chemicals left over from its days as a working lab.

Key activities in 2016-17 included:

- Tendering and awarding the contract
- Developing standard operating procedures (SOPs) to safely manage the hazardous construction materials during this deconstruction
- Dismantling the structures
- Safely packaging, transporting, and disposing of hazardous waste materials outside the NWT in accordance with all applicable regulations
- Storing non-hazardous waste materials, as well as some lead-painted items, safely on site in areas that are not publicly accessible; this waste will be managed until full remediation can begin

- Installing a permanent steel cap over the A-shaft to protect infrastructure and as a safety measure, while continuing to allow air circulation through the mine

The timing of the work was informed by advice of YKDFN Elders, who provided traditional knowledge on weather conditions. They indicated that August was cooler, wetter, and less windy, thus reducing the risk of dust blowing. Dust mitigation was a priority and site specific air quality monitoring was conducted to ensure the protection of people on and off the site. The timing of the work to take down the curling club was also coordinated with the Great Slave Sailing Club to limit the effects on its operations.

An associated building, the A-shaft powerhouse, remains standing as it is structurally sound. The Akaitcho Head Frame is the only head frame still standing at the Giant Mine site. Unless this structure is assessed as an unacceptable safety risk, it will be dealt with as part of the remediation plan.

B3 Substation Repairs

In 2016, the Project Team contracted DT Electric Ltd to replace transformers and electrical equipment for the B3 Electrical Substation. The equipment repairs were necessary due to failing infrastructure and unsafe conditions.

The equipment replacement simplifies the existing electrical system and provides safe and reliable power to the affected areas of the mine, such as the Effluent Treatment Plant (ETP) and various water pumps.

Key activities in 2016-17 included:

- Replacing the transformers and switchgear at the B3 substation and supercrest locations

2.1.3 Care and Maintenance

Ongoing care and maintenance (C&M) 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 2016-17 included:

- Preparation for spring freshet; the 2016 spring freshet occurred without incident.
- Ongoing dust management activities; application of calcium chloride on roads and a dust-control product (Soil Sement) on tailings, and pilot testing a new dust-control product (SoilTac).
- Discharge of treated effluent: 183,564 m^3 of treated mine water safely released into the environment.
- Continued upgrades of the electrical systems, including upgrades to the B3 substation and the underground power system.
- Production and off-site sourcing of borrow material for activities around the site, such as armouring the splitter dyke at the Effluent Treatment Plant. Stockpiling of borrow material at strategic locations around the site for use on work such as road building, winter sanding, emergency stockpiles for dam repairs, drill pad construction, and others.
- Completion of monitoring to meet the SNP outlined in the former Water Licence and current Metal Mining Effluent Regulations.

Underground Electrical Upgrades

During a routine inspection, the Worker Safety Compensation Commission (WSCC) expressed concerns with some of the electrical equipment being used in the underground areas. Upgrades to underground electrical systems were required to address failing infrastructure and safety concerns, including providing reliable power to the underground area for refuge stations, communications, lighting, and high test arsenic sump pumps. The upgrades were undertaken in 2016-17 as part of the C&M contract.

Key activities in 2016-17 included:

- Replacing transformers, switchgear, panels, and electrical components for various areas in the underground mine works.

2.1.4 Summary of Fiscal Year 2016-2017 Operational Activities, Incidents, and Expenditures

Table 1 below summarizes the main operational activities from April 1, 2016 to March 31, 2017, including whether there were incidents or issues (e.g. schedule delay) and the associated expenditures.

Table 1: Summary of 2016-17 Operational Activities

Activity	Progress	Issues/Incidents	Expenditures
Site Stabilization Plan			
Underground Stabilization Project	Underway	The conceptual mitigation approach and design for stope complex C5-09 is challenging and required further investigations and UG drilling to understand the base of the void and whether or not it could support backfill material. Much of this investigation and design work was completed in 16/17, however impacted the tendering and construction schedule.	$1,681,000
Remainder of Stope Drilling	Completed	No issues or incidents were encountered on this activity.	$4,663,000
Immediate Risk Mitigation			
Deconstruction of the A-shaft Head Frame and Hoist Room, Assay Lab, and Curling Club	Completed October 2016	Late WSCC review resulted in a change to original design to increase safety. This added schedule delays and slight cost increase.	$2,013,000
B3 Substation Upgrades	Construction completed October 2016.	When new equipment was turned on there were issues with tying into old system because of "antiquated temporary fixes". A new panel was needed to resolve the issues.	$1,202,000
Care and Maintenance			
Care and Maintenance	Ongoing	2 minor incidents and 179 near misses reported. 3% of urinalysis samples exceeded Action Level of >35 micrograms of arsenic per	$10,614,000

Activity	Progress	Issues/Incidents	Expenditures
		litre of urine.	
Underground Power Upgrades	Ongoing	No issues or incidents were encountered on this activity.	$486,000
Communications Upgrades	On schedule to be completed summer of 2017	Pre-cut fiber cables were too short when arrival at site. This caused schedule delays waiting for additional cabling.	$387,000
Borrow to support C&M	Completed November 2016	None to report.	$444,000
Interim Construction Manager (ICM) Contract Extension	Current contract end date Dec 2017 with possible extension pending MCM contract.	None to report.	$1,042,000

2.1.5 Audits and Inspections in 2016-17

Occupational Health and Safety (OHS) Audit -- Underground

The ICM for the GMRP, Parsons Inc. (Parsons), conducted an audit and review of the DCNJV industrial hygiene program in place at the Giant Mine. The audit consisted of document review, on-site evaluation, interviews and observations of practices at the Giant Mine, and a report of findings and recommendations. The focus of the audit was to evaluate the effectiveness of the Medical Monitoring and Hygiene Program for arsenic trioxide along with a general evaluation of industrial hygiene practices in place at the site. The purpose of the evaluation was to review and evaluate the effectiveness and efficiency of DCNJV's policies and procedures, as well as measuring their state of compliance.

As part of the audit, Parsons conducted observations of site activities with a focus on underground operations and above ground tasks that have potential for exposure to arsenic containing soil or debris.

The audit identified several improvements to reduce the potential for exposure, including:

- Regular wet cleaning of refuge stations by personnel using high-risk PPE;
- Installation of wood pallets and boot washes leading into the refuge stations to reduce the potential for the spread of contamination;
- Improvement and clarification of hazard zones within the mine and increased and consistent PPE;
- Increased focus on decontamination and hygiene.

Environment, Health and Safety (EHS) Audit – Aboveground

Stratos Inc. (Stratos) conducted an EHS and site security audit of the Giant Mine site to confirm compliance of DCNJV (the current C&M contractor) with applicable EHS and site security requirements (regulatory and other). The audit was conducted on-site in June 2016 with a team of two auditors and was limited to aboveground facilities and activities.

The findings were characterized by a priority ranking system. The audit found two major regulatory violations that required immediate action to prevent an emergency or threat to human health and safety or the environment (priority level 1):

1. **Hazardous Chemical and Waste Storage Room**. The storage room located behind the Mobile Equipment Garage is a plywood structure that does not meet the requirements for safe storage of chemicals. For example, hazardous materials were found stored in improper containers, batteries were stored in a manner that could cause a short circuit and lead to a fire, and lights were non-serviceable.

2. **Environmental Emergency Plan**. The three 100,000 Litre fuel tanks require Environmental Emergency Plans [EEP]. The entry in the Emergency Response Plan (ERP) for the propane tank emergency response does not cover all requirements of the regulation. It is deemed that waiting for a response from Superior Propane (per the ERP) to deal with a major leak especially during quiet hours is not a timely response, especially since they are not listed on the DCNJV Emergency Response Flow Plan.

The EHS audit identified a further 74 findings across the lower priority categories (13 priority level 2 findings, 35 priority level 3 findings, 17 priority level 4 findings, and 9 priority level 5 findings) for a total of 76 findings.

Table 2: Summary of EHS Audit Findings by Priority Level

Priority	Description	Number of Findings
P1	Major regulatory violation requiring immediate action to prevent an emergency or threat to human health and safety or the environment.	2
P2	Regulatory violation that could result in legal action requiring action as soon as possible to prevent environmental, health and safety impact.	15
P3	Minor regulatory/policy breach requiring a remedy as soon as funding and time permits to prevent environmental, health and safety impacts.	27
P4	Not a regulatory breach but has significant benefit/savings or can demonstrate a proactive approach to the EHS management.	16
P5	Has the potential to maintain EHS compliance, demonstrate EHS compliance and a proactive approach to pollution prevention and process improvement.	8
Kudos	An expression of approval and praise for a noteworthy innovative process, above average performance, or for an issue that is described, managed, and implemented very well.	22

The audit also identified 22 kudos – expressions of approval and praise for a noteworthy innovative process, above average performance, or for an issue that is described, managed, and implemented very well.

The 2 P1 findings were dealt with immediately after the audit, and the remaining issues identified in the EHS audit will be addressed during the 2017-18 field season.

Inspections

In 2016-17, a total of 183 inspections were conducted, which identified 185 non-compliance incidents. A small subset of these were inspections conducted by external regulatory bodies, including three by INAC Lands and Economic Development, one by Environment and Climate Change Canada, and several by

GNWT Department of Environment and Natural Resources. The inspection effort is similar to 2015-16, when 14 regulatory inspections were conducted.

The 2016-17 regulatory inspections collectively identified 6 non-compliance incidents. The GMRP is committed to addressing non-compliances and has assigned responsibility and timelines for addressing issues identified.

Table 3: Summary of Inspections Performed

Regulatory Body	Inspection Date	Inspection Type	#of Non-Compliances	Findings / Recommendations
INAC Lands and Economic Development	27-May-16	Inspection-MSA and Baker Cr.	0	• No concerns
	26-Jul-16	Inspection-Drill Sites and SNP 43-1	0	• No concerns
	19-Aug-16	Inspection of the UBC Bridge stabilization project in response to NT/NU Spill # 16-299	2	• Spill 16-299[3] - Non-compliant release to environment
Environment and Climate Change Canada	3-Aug-16	Inspection-Site & SNP43-1	3	• Halocarbon leak not reported on semi-annual report (related to Freeze plant) • Four C-Dry air conditioners do not have log books • Env. Emergency Plan testing may not be adequate
GNWT Environment and Natural Resources	Various	Beaver Dam inspections-over course of summer	1	• Dam modified without previous consent
		Bear Trap inspections-over course of summer	0	• No concerns

The remainder of the 183 inspections were internal, conducted by the C&M contractor on a regular basis to ensure safe operation at the site. These internal inspections include daily site inspections by C&M staff and regular engineering inspections of major structures (e.g. dams, arsenic chamber bulkheads) and equipment. Non-conformances identified during internal inspections in 2016-17 were minor and promptly corrected.

In future years, internal and external inspections will be tracked separately.

2.2 Progress on EA Measures

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

[3] See additional details in Section 3.1

with the biggest impact on the project scope. Measures completed to date deal with the negotiation of an Environmental Agreement ("the Agreement") and the creation of the Giant Mine Oversight Board (GMOB) (Measures 3, 4, 7 & 8), as well as investigating and engaging stakeholders and the public in discussions of long-term funding options (Measure 6). A summary below provides a highlight of the progress made in 2016-17, 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 Agreement came into effect June 2015, which formalized requirements to meet Measures 3, 4, 7 and 8.
    - Measures 3 and 4: The GMRP will fund the 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.

Long-Term Funding Options (Measure 6)

- In Summer 2017 the GMRP plans to provide a draft report describing considerations for long-term funding to the public for input via the Giant Mine Working Group. Per the Measure, the public will be given the opportunity to provide input into and discuss the report before it is finalized prior to the submission of the Water License process. Once this report is finalized, this measure will be considered complete.

Health Effects Monitoring Program (Measure 9)

- In 2016, the Project Team worked with the GNWT, the Giant Mine Working Group, and the YKDFN Giant Mine Advisory Committee (GMAC) to identify people to be part of an advisory committee for the Health Effects Monitoring Program. The committee – made up of health experts, government officials (Territorial and Federal) and community members – held its first meeting in September 2016 in Yellowknife.
- The monitoring program is expected to begin in mid-2017. The program will involve biological sampling, which will include collecting nail clippings, buccal swabs and urine from community residents who volunteer to participate.
- A communications plan was developed in 2016. Communications will be ongoing to ensure community members are well-informed.

Section 4.2 provides more information about the Health Study.

Human Health and Ecological Risk Assessment (HHERA) (Measure 10)

- In 2016, PSPC contracted Canada North Environmental Services (CanNorth) to complete the Human Health and Ecological Risk Assessment (HHERA). Over the summer, CanNorth met twice with representatives of the Giant Mine Working Group and the YKDFN GMAC to discuss the best approach to implement the study.

- Starting in July 2016, the consultants conducted a voluntary country foods sampling program to test contaminant concentrations in locally-harvested fish, meat, berries, and medicinal plants.
- In January 2017, CanNorth conducted a dietary survey with YKDFN and NSMA. When combined with the laboratory results, this will help assess the degree of risk that consumption of traditional foods may pose.
- The draft HHERA report is anticipated to be completed in mid-2017 and results will be shared with stakeholders. A public meeting to discuss the results of the entire HHERA will be held in October 2017.

- Measure 10 of the EA requires the Project Team to also evaluate the indirect effects of potential exposures to arsenic on wellness, including stress. The Project Team engaged Dr. Ketan Shankardass – an expert in epidemiology and health effects of stress – to begin developing a statement of work for the stress assessment.
    - Based on engagements with stakeholders in early 2016 on the stress assessment and other topics, the Project Team decided not to pursue the stress assessment in 2016-17. This decision allowed the Project Team to focus on the HHERA and the Health Effects Monitoring Program and to avoid overwhelming stakeholders.
    - Planning for the stress assessment will continue in 2017-18 with implementation potentially in 2018-19.

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

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

- Baker Creek was a key component in the Surface Design Engagement (SDE) discussions and options evaluation, with significant engagement effort over the past two years.
    - The report on the SDE process, which was finalized in 2016-17, demonstrated general stakeholder support for onsite alignment. The GMRP will also fill pits to address flood risk and remove contaminated sediments to minimize exposure to fish in Baker Creek.
    - Additional input was received in October 2016 from Federal Contaminated Sites Action Plan (FCSAP) Expert support and the GMOB.
    - A draft options report was completed in 2016/17 and will be shared with stakeholders, including the GMOB, in 2017-18 for discussion at a Working Group meeting. The report will be finalized in 2017-18 and the selection of the final alignment of Baker Creek will be made.
- Predictive modeling and development of site specific water quality objectives were initiated in 2015-16 and continued 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 GMRP expects to engage stakeholders on the site specific water quality objectives in 2017-18 and finalize the objectives by early 2018-19.

Appendix C provides more information about the Surface Design Engagement and 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, which was finalized in 2016-17. Engagement with the Giant Mine Working Group followed.

- A Freeze Plain Language Report was underway in 2016. It will be distributed to the Giant Mine Working Group and YKDFN GMAC once it is finalized.

3.0 Environment

3.1 C&M Environmental Management

The current C&M contractor, DCNJV, 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
- 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 ETP as well as a description and requirements of the different water monitoring and sampling programs.

The following report sub-sections (**Air**, **Water**, **Land** and **Biodiversity**) describe the key activities and results of these ongoing management programs, in addition to other assessments and monitoring as described in the Long-term Monitoring Program (LTMP) summary below.

Long-term Monitoring Program (LTMP)
The LTMP is a combination of all monitoring components that are currently ongoing or will be required at Giant Mine. The Program includes both environmental components as well as structural monitoring that are required on site. The LTMP is used to determine baseline conditions, monitor existing performance, and inform the design process for remediation activities.

The components of the LTMP include regulatory and due diligence monitoring, including:

Environmental	Structural
• Surveillance Network Program (SNP)* • Metal Mining Effluent Regulations (MMER) including Environmental Effects Monitoring (EEM) Program • Aquatic Effects Monitoring Program (AEMP)* • Wildlife and Wildlife Habitat Management Program (WWHMP)* • Air quality – fence-line & community • Operational Monitoring Program (ETP, underground, annual site-wide bird survey) • Noise • Cumulative effects ** water licence requirement*	• Freeze • Dams and seeps • Landfill • Pit stability • Tailings covers • Underground Structures • Baker Creek (icing)

LTMP is structured in three phases: pre-remediation, remediation, and post-remediation. The intent is for the LTMP 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 GMRP's environmental management approach.

Spills, Accidents, and Significant Malfunctions
Beyond the one release of drilling water – described in this report and reported to the NT/NU Spill Line – there were no other reportable spills, accidents, or significant malfunctions at the GMRP in 2016-17.

3.2 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).

2016-17 Highlights

- Activity-specific air quality monitoring occurred at site related to the Stope Borehole Drilling Program and A-shaft deconstruction
- Two additional fence-line samplers were added to the network
- A community air quality monitoring station installed at Niven Lake, to replace Station at Sir John Franklin High School
- The Ndilo air quality monitoring station was upgraded to a purpose-built structure that is more efficient to operate
- The Project Team piloted a new product for dust suppression (SoilTac), as a result of the options assessment initiated in 2015, for purchase and use in 2017.

3.2.1 Air Quality Monitoring

The Project Team conducts real-time air quality monitoring of particulate matter (PM_{10} 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 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).

In 2016, the Giant Mine Project Team conducted air quality monitoring specific to the stope borehole drilling program and the A-shaft deconstruction. Monitoring occurred at locations within the vicinity of these activities.

The fence-line program measures dust around the perimeter of the site to ensure dust and contaminants are not being released from the GMRP. Stations are positioned in fixed locations to ensure consistent coverage of various wind directions. The stations run 24-hours a day throughout the work season (May – November). Two additional fence-line samplers were added to the network and began collecting data in May, 2016; this brings the total number of fence-line stations to eight (six DustTrak instruments and two e-samplers).

Upon further engagement with local residents, the community air quality monitoring station installed in Moyle Park in the Niven Lake sub-division of Yellowknife was moved to a new location within the park. The station became operational in 2017, and will join the existing network of community and fence-line monitoring stations. Two other air quality monitoring stations are currently part of the community network[4]: at the Great Slave Sailing Club, and in Ndilo. The Project Team completed the replacement of the temporary monitoring station in Ndilo. The station is now a purpose-built structure that is more efficient to operate. Its new permanent location was chosen in collaboration with the YKDFN.

More details on the air monitoring program, including real-time data and weekly reports are available on the NWT Air Quality Monitoring Network. You can also receive the weekly reports via email by requesting to be added to the distribution list by writing to giantmine@aandc-aadnc.gc.ca.

Results

In 2016, there were several occasions in which air quality readings at the fence-line or community monitoring stations exceeded the regulated criteria. Only one of these occasions appeared to be the result of fugitive dust generated on site. On June 15th, PM_{10} concentrations were measured to be above the Risk Based Action Level (RBAL) at two fence-line monitoring stations (RBAL is 159 µg/m^3; concentrations were measured between 184 µg/m^3 and 204 µg/m^3). The City of Yellowknife was downwind of the site during periods of elevated measurements. The Project Team deployed a water truck in the areas where the elevated concentrations were observed by instrumentation.

Additional occasions in which air quality readings exceeded the regulated criteria were investigated and found to likely be the result of regional fires or increased traffic. These instances include:

- One 15-minute average PM10 concentration above the RBAL was measured on July 1st at the fence-line monitoring station F-Marina (203 µg/m3), likely the result of increased traffic into and out of the marina for the Canada Day holiday.
- 24 hour average concentrations of PM2.5 and PM10 were measured above the referenced standards at two community stations on July 4th, 2016, likely the result of smoke from regional forest fires and localized vehicle traffic.
- Seven 15-min average PM10 concentrations equal to or above established RBAL of 159 µg/m3 were measured on July 14 and 15 (159 µg/m3 to 179 µg/m3) – likely caused by smoke from regional forest fires. 24 hour average concentrations of PM2.5 were measured above the referenced standard (28 µg/m3) at NDL, YCC and NAPS community stations on July 15 (31-35 µg/m3) – likely affected by smoke from regional forest fires because higher concentrations coincided with periods of heavy smoke observed throughout the area.
- One 15-minute average PM10 concentration above the established fence-line RBAL of 159 µg/m3 was measured on July 17, 2016 (168 µg/m3). This was likely caused by smoke from regional forest fires.

[4] The station located in downtown Yellowknife next to Sir John Franklin High School is operated by the GNWT.

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.
- Open houses to introduce the community to the air stations in Niven and Ndilo will be conducted to give the community an idea of what is taking place at the stations.
- Equipment for the fenceline air monitoring program will be updated from Dust Trak monitors to E-Samplers.
- The Project Team is assessing ways to create a public library for stakeholders to access monitoring reports and the Air Quality Monitoring Plan.

3.2.2 Dust Suppression

Dust suppression activities continue to take place at the Giant Mine site. Dust can be caused by many sources, particularly in dry climates such as Yellowknife. Dust detected at the site doesn't necessarily contain arsenic trioxide or other mining by-products. Real-time monitors that make up the Air Quality Monitoring Program use conservative criteria to ensure residents are not being exposed to unacceptable levels of contaminants from the activities occurring at the Giant Mine site.

The Project Team takes active measures to reduce dust from the site's tailings ponds and roads. These measures include communicating daily wind forecasts to Project Team members each morning, applying a dust control product to the tailings ponds, and wetting both the tailings ponds and the tailings stockpiles.

Results

In 2016 the Project Team evaluated a new product for dust suppression. Procurement was undertaken in winter 2017 to purchase an environmentally-safe polymer that bonds to the material it is applied to and produces highly-effective dust control. The new product is similar to the SoilSement that has been at site in the past but is expected to perform better in cold conditions and last longer (less frequent applications required). Calcium Chloride ($CaCl_2$) is also applied to roads to suppress dust.

Next Steps

The Project Team will continue to ensure there is a sufficient stockpile of dust suppressor is on site, and that water trucks are available to wet drying areas that could generate dust.

3.3 Water

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

2016-17 Highlights

- Effluent treatment and water quality monitoring was ongoing.
- A water quality model was finalized to estimate present-day (2011-2014) arsenic loading to Baker Creek and Yellowknife Bay Study.
- Electrical equipment was replaced to provide safe and reliable power to the affected areas of the mine, such as the ETP and water pumps.
- New general outfall location was determined; additional work is on-going for specific location.

3.3.1 Effluent Treatment and Water Quality Monitoring

The Project Team undertakes effluent and water quality monitoring in and around the Giant Mine site via different programs in order to report on surface water and underground mine water. These programs track measures such as the volume of water discharged, water quality, and the performance of the ETP. 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 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 GMRP 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 maximum 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 begins in June of each year, with discharge to the environment occurring between July and September, once the Arctic Grayling have left Baker Creek.

Surveillance Network Program (SNP)
Although the Water License expired in 2005, the Project Team has committed to continue site monitoring as outlined in the 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). Additional details on the SNP are included in Appendix C.

Metal Mining Effluent Regulations/Environmental Effects Monitoring Effluent and Water Quality Monitoring
During the period of active discharge, monitoring is completed at the point of discharge (SNP43-1), an upstream location in Baker Creek (SNP43-11) and a station downstream of the point of discharge (Baker

Creek Exposure Point). This monitoring is completed to meet the requirements of the MMER and associated EEM program for annual effluent and water quality monitoring.

ETP System Upgrades Study

In 2016-17, a desktop study was initiated to validate recommendations for ETP system upgrades. The upgrades would 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.

Results

- In 2016, a total of 183,564 m^3 of treated water was released into the environment.
- SNP daily analyses show that all water discharged to the environment during the 2016 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).

Next Steps

- Monitoring of the treated effluent will continue to ensure that the existing maximum discharge limits defined in the former Water Licence and MMER are met prior to discharge to the receiving environment.
- Existing water quality monitoring (SNP, MMER/EEM) will continue to characterize the conditions on site and downstream of the site, which will enable these results to be used to assess potential site-related effects in the biota.
- In addition to the regulated SNP for the Site, the Project Team will restart the voluntary Operational Monitoring Program (OMP) in 2017. The OMP will be at various surface water and underground water monitoring sites, the results of which will inform and confirm operational practices at the ETP and ensure that discharge from the ETP meets the requirements of the SNP.
- The GMRP will apply for a new Type A Water Licence for the implementation phase of the project; the submission of the water licence application is anticipated in January 2019. The water licencing process requires the Project Team to gather significant local stakeholder and public input into these plans. In the interim, INAC has agreed to continue monitoring and reporting on effluent and water quality from specified locations in and around the Site, as outlined in the SNP (a condition of the now-expired Water Licence N1L2-0043). A proposed expanded SNP program will be submitted as part of the water licence application.
- The Project Team is assessing ways to create a public library for stakeholders to access monitoring reports. It is anticipated that the SNP data files will be posted to the MVLWB in FY 2017/18. Until then, any document – including SNP data – is available by request to the Project Team.

3.3.2 Arsenic Loading to Baker Creek and Yellowknife Bay

The Project Team contracted Golder Associates Ltd. (Golder) to provide support for the Baker Creek post-environmental assessment investigations. Golder completed a Surface Water Management Arsenic Loading Study. The purpose of the study was to compile and calculate present-day (2011 to 2014) arsenic loading to Baker Creek and Yellowknife Bay from various point and non-point source locations

on a sub-watershed scale. Golder developed and used a water quantity and quality model (GoldSim) and used it to estimate the arsenic loadings to Baker Creek and Yellowknife Bay.

Results

- The model was able to reproduce the seasonal trends in concentrations of total arsenic at SNP 43-15, SNP 43-16, and the Baker Creek Exposure Point, and SNP 43-5. On average, the model over-estimated total arsenic concentrations at SNP 43-15, SNP 43-16, and SNP 43-5 and under-estimated total arsenic concentrations at the Baker Creek Exposure Point.
- The annual total arsenic load to Baker Creek near former "A" Boiler House, prior to entering Yellowknife Bay (i.e. SNP 43-5) ranged from a minimum of 804 kg/year to a maximum of 1,375 kg/year. These loads are similar to measured total arsenic loads reported by SRK for 2001 (i.e. 1,800 kg/yr), 2002 (i.e. 1,100 kg/yr), and 2003 (i.e. 730 kg/yr) and are similar to total arsenic loads estimated from the SRK model (i.e. 800 kg/yr) in 2005. The largest sources of total arsenic to Baker Creek at SNP 43-5 between 2011 and 2014 were the Upper Baker Creek watershed (i.e. Lower Martin Lake and Reaches 7 to 11 of Baker Creek) and the Lower Baker Creek watershed downstream of the Old Mill Area (i.e. Reaches 1 to 3 of Baker Creek).

Next Steps

- This site model is being updated and will be used as part of the modelling to develop site-specific water quality objectives for Baker Creek. This model is also incorporated into the modelling to develop effluent quality criteria for the new outfall and the site-specific water quality objectives for the associated mixing zone.

3.3.3 Electrical Upgrades

In 2016, the Project Team contracted DT Electric Ltd to replace transformers and electrical equipment for the B3 Electrical Substation. The equipment replacement simplifies the existing electrical system and provides safe and reliable power to the affected areas of the mine, such as the ETP and various water pumps.

3.3.4 Outfall Location

The construction of a new ETP will be part of the final Closure and Reclamation Plan for Giant Mine. The first stage of this work was to select a location for the new outfall where the treated water will be released into Great Slave Lake. The process to determine the outfall location included engagements with the Giant Mine Working Group and the YKDFN GMAC and broader YKDFN community.

Results

The Project Team assessed three potential locations for consideration for the outfall location. Based on input from the engagement sessions, the Project Team included a fourth location, which was in the vicinity of Baker Creek as this area was already being used and impacted. The Project Team agreed that this location was the preferred choice. However, further work is required to identify the exact location of the outfall; this should be completed by December 2017.

Next Steps

The Project Team will identify the exact location of the new outfall, in collaboration with the Giant Mine Working Group and the YKDFN GMAC.

3.3.1 Spill to Baker Creek

On August 19 2016, during drilling for the UBC Bridge stabilization project, one of the members of the Major Drilling crew noticed a release from under the bank of Baker Creek. The crew immediately ceased drilling and the Project Team monitored the plume. As Baker Creek flow rate was very low at this point in the summer, the plume did not spread downstream but remained in the immediate vicinity of the bridge. Site staff noted that the sediment plume had settled to the bottom of the creek within an hour of the release.

The drilling program used water from the Polishing Pond as per condition Part C #1 of the licence was used to drill the hole. No other chemicals or additives were used in the drilling process. The crew estimated that approximately 25 gallons of Polishing Pond water was released before the drill rig was shut down.

Site staff reported the incident to the NT/NU Spill Line, which sent an Inspector to follow up on the incident. The Inspector concluded that the impact to Baker Creek and the surrounding environment was very minor, due to the flow rate of Baker Creek, the low estimated quantity of released drill water, and the fact that this borehole was not associated with the arsenic stopes.

3.4 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, and managing and disposing of hazardous materials and wastes.

2016-17 Highlights

- Deconstruction of A-Shaft, assay lab, and former curling club structures to reduce risks on site.
- Continued monitoring and management of arsenic impacted waste on site.
- Conducted an assessment of radiation potential of pink granite, in response to questions and concerns raised during public meetings.
- Supplemental soil sampling programs to characterize arsenic in disturbed and undisturbed areas of the site.

3.4.1 Site Stabilization/Risk Mitigation

In 2016, the GMRP reduced risks to the site by deconstructing the A-Shaft, assay lab, and former curling club structures. Section 2.1 provides additional details on the site stabilization activities.

3.4.2 Waste Management

In 2016-17, 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 GMRP's 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 2016-17.

Additional hazardous waste was created in 2016-17 as a result of the A-shaft deconstruction.

Results

- Hazardous material produced as a result of the A-shaft deconstruction was transported off-site.
- Non-hazardous wastes were safety stored on site, within designated areas.
- There was continued monitoring and management of hazardous wastes produced by the deconstruction of the Roaster Complex.
- Run-off water from the hazardous waste storage area was collected and treated.

Next Steps

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

3.4.3 Assessment of Radiation Hazard Potential of Granodiorite (Pink granite)

In response to questions and concerns raised by stakeholders in public meetings, the Project Team retained Golder to complete an assessment of the radiation hazard potential of "pink granite" bedrock outcrops near the mine site. Golder completed a field surface survey for gamma radiation and a laboratory study for radon to assess the radiation hazard potential. Field work was completed in October 2016. Golder surveyed a total of 14 locations for Naturally Occurring Radioactive Materials (NORM) concentrations and collected three samples for radon emanation testing.

Results

- Based on the results of the field surveying and laboratory testing, the radioactive hazard potential from gamma and radon for the "pink granite" is low in its current state, and applicable guidelines[5] for NORM materials are unlikely to be exceeded.
- Appendix C provides additional information on this study.

Next Steps

- The Project Team will consider conducting a risk assessment for radon generating potential should the bedrock be blasted, excavated, and used as a fill material, either as run-of-quarry rock-fill or crushed.

[5] Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM) (2013)

3.4.4 Arsenic Characterization (Disturbed and Undisturbed Areas)

The Project Team retained AECOM Canada Ltd. (AECOM) and Golder to complete a supplemental soil sampling program in the disturbed and undisturbed areas of the site (two separate studies and resulting reports). The purpose of the field studies was to collect soil quality data in disturbed and undisturbed areas to support both the Occupational Health and Safety (OHS) Human Health Risk Assessment (HHRA) and the regional HHRA. The sampling program occurred from October 27 to 29, 2015.

For the disturbed areas study, the field program involved the collection of shallow soil samples from the four Tailings Ponds, and the formal Mill Area. For the undisturbed areas study, the field program involved the collection of ten shallow soil samples (6 outcrop, 2 wetland, and 2 forest). Samples were submitted for bulk chemical analysis, arsenic bioaccessibility, and grain size.

Results: Disturbed Areas

- Concentrations of total arsenic in all 60 samples collected from the tailings containment areas exceeded the applicable guideline of 340 mg/kg[6]. Concentrations range from 1,350 mg/kg to 4,800 mg/kg, with the Northwest Tailings Pond containing the highest average arsenic concentrations (3,430 mg/kg).
- Concentrations of bioaccessible arsenic in the 27 samples collected from the tailings containment areas ranged from 665 mg/kg to 2,848 mg/kg, with the Northwest Tailings Pond containing the highest average bioaccessible arsenic concentrations (1,672 mg/kg).
- The results suggest that there is a correlation between these elevated concentrations of total arsenic and percentage of bioaccessible arsenic in the tailings containment areas. In general, the tailings are fine-grained, which also correlated to the elevated concentrations and percentage of bioaccessible arsenic, and the percentage of bioaccessible arsenic in the tailings containment areas.
- Concentrations of total arsenic exceeded the applicable guideline of 340 mg/kg in 16 of the 22 samples collected from the Mill Area. Concentrations ranged from 8 mg/kg to 5,400 mg/kg.
- Concentrations of bioaccessible arsenic in the 11 samples collected from the Mill Area ranged from 2 mg/kg to 391 mg/kg, with an average bioaccessible arsenic concentration of 263 mg/kg.
- The results suggest that in general total arsenic concentrations in the Mill Area exceed the applicable guideline (340 mg/kg) within the upper 1.0 m of soil and decrease with depth. The concentrations and percentage of bioaccessible arsenic are generally lower compared to the tailings samples. The samples from the Mill Area or coarse-grained, which also correlates to the lower concentrations and percentage of bioaccessible arsenic in the Mill Area.

Results: Undisturbed Areas

- No strong overall correlation exists between arsenic speciation results and bioaccessibility data. The results suggest that 20% to 65% of the total arsenic present is likely to be bioaccessible, and that this result is independent of arsenic speciation and grain size results.
- The data set was small (10 soil samples). Additional data collection should be considered to confirm that no correlation exists between arsenic speciation and bioaccessiblity.

[6] Environmental Guideline for Contaminated Site Remediation (ENR Guidelines) (2003)

3.5 Biodiversity

The 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.

The results of these and other biodiversity-related studies from recent years are being considered in the HHERA and remediation design to better understand current impacts on wildlife and to consider wildlife uses of the site when planning the design, schedule, and nature of activities in remediation. Additional details on how wildlife has been considered in the remediation design will be provided in future, once the remediation design is further advanced.

2016-17 Highlights

- Results of site-wide bird survey and MMER/EEM were similar to previous year.
- Results of biodiversity studies and monitoring are being considered in the remediation design and the HHERA.

3.5.1 Site-wide Bird Survey

The annual bird survey was conducted in spring of 2016-17 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 to minimize detrimental impacts on birds.

The methods, risk factor categories considered, and recommendations were consistent with those from the previous year (spring 2015). Details are provided in Appendix C.

Results

Recommendations were provided to reduce the risk of contributing to the incidental take of migratory birds, their young, eggs and/or nests. Appendix C provides the full list of recommendations.

These recommendations were considered when determining when and how activities were carried out on site. For example, deconstruction work was scheduled outside the nesting season for birds.

Next Steps

- The Project Team will consider the recommendations.
- Annual site-wide bird monitoring will continue in 2017-18.

3.5.2 Winter Wildlife Monitoring

No winter wildlife monitoring took place in 2016-17. However, wildlife interactions are logged by DCNJV and reported, as required. Development of a Wildlife and Wildlife Habitat Management Program (WWHMP) is scheduled to begin in 2017-18 and will be submitted as part of the overall water licence application.

3.5.3 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 maintain 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 MMER/EEM effluent and water quality data are used to help interpret the effects observed in the fish and benthic invertebrates from Baker Creek (i.e., 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 1 and August 19, 2016. 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 (EEM) of the MMER 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 2016, effluent characterization and surface water quality monitoring for the GMRP were performed twice: on July 4 and on August 8. 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). The samples from both days were tested for acute toxicity, while sub lethal toxicity was only assessed for the August 8 samples.

The Phase 5 EEM Investigation of Cause Study was completed to meet the requirements for the biological monitoring program. This study was designed to assess the causes of the confirmed effects observed in previous phases of the EEM biological program.

Results

This study was on-going with a final completion date for submission to Environment and Climate Change Canada on June 6, 2017. Draft results are provided below.

- 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. All concentrations in the effluent were below applicable MMER limits.
- Treated effluent was determined to be not acutely toxic[7] to rainbow trout (*Oncorhynchus mykiss)* and water flea (*Daphnia magna*). Toxic effects related to survival were not observed in most species[8]. However, adverse effects on survival (*Ceriodaphnia dubia)* and sub-lethal toxic effects related to growth and/or reproduction were observed for water flea (*C. dubia*), common duckweed (*Lemna minor*), and microalgae (*Pseudokirchneriella subcapitata).* No toxic effects were observed in the growth or survival of fathead minnow *(Pimphales romelas)*. Overall, results for the 8 August 2016 treated effluent sub-lethal toxicity sample are consistent with results from previous years with the exception of adverse effects on common duckweed *(L. minor)* growth (biomass). Given the results of the effluent characterization, the effects previously observed in

[7] 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.
[8] As applicable to the test organisms under the bounds of the program.

fish and benthic invertebrate communities downstream of the effluent discharge are considered to be mine-related and are attributable to the effluent.

- Current water quality results at the reference and exposure stations were consistent with results from previous years, with the exception of the August 2016, SNP Station 43-11 (reference station) iron concentration, which was higher than in July 2016 and previous years. This result was attributed to reducing conditions in the water at the time of testing, possibly as a consequence of the low flow regime experienced in Baker Creek in 2016.

Next Steps

- Annual effluent and surface water quality monitoring for the MMER/EEM will continue in 2017-18.

3.5.4 Aquatic Effects Monitoring

The Project Team is currently considering options for a new outfall location where treated water will be discharged year round into Yellowknife Bay. The water will be discharged from a new water treatment plant along the shore near Giant Mine. 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.

Once a more precise location for the new outfall is decided, additional baseline work will be completed. This will include assessment of the fish habitat in the area of the proposed outfall as well as baseline data collection for other components including water quality, sediment quality, and lower trophic organisms. The results of these data will be used to assess potential effects related to the new outfall and Baker Creek.

As the precise outfall location has not been finalized, this sampling was not conducted in 2016/17.

Results

- No results to report for 2016/17.

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 monitoring results and baseline work to confirm that the discharge does not have an adverse effect on the receiving environment.
- The results of the Phase 5 EEM Investigation of Cause Study will be used to inform the design of the AEMP.

4.0 Health and Safety

4.1 Occupational Health and Safety

2016-17 Highlights

- There were no major or moderate H&S incidents and only 2 minor incidents.
- The number of reported near misses increased from 85 in 2015-16 to 179 in 2016-17, which reflects a change in safety culture at the site to be more engaged and proactive.
- 2.6% of urinalysis samples were above the action level.
- The number of hours spent in training in 2016-17 are comparable to those spent in 2015-16.

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.

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 2016-17 reporting year including examples of the types of incidents and near misses.

There were no major or moderate incidents in 2016-17, nor in 2015-16. The number of minor incidents in 2016-17 is lower than the previous year (11 in 2015-16). The number of reported near misses increased from 85 in 2015-16 to 179 in 2016-17, which reflects a change in safety culture at the site to be more engaged and proactive. All near misses are reviewed and appropriate corrective actions are implemented to reduce the risk of an incident occurring.

The Project Team works with the C&M contractor to continually improve safety standards and training on site and with the contractors.

Table 4: Health and Safety Incidents and Near Misses in 2016-17

Incidents and Near Misses	2016-17 Total
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	2

Incidents and Near Misses	2016-17 Total
that results in injury or illness that inconveniences an individual or individuals.	
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.	179

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 2016-17 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 urine (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. The percentage of samples above the action level is lower than it was in the previous year (2.6% in 2016-17 versus 4.2% in 2017-18). This may reflect the increased emphasis from the Project Team and the C&M contractor on prevention, but should be interpreted with caution as it may also be influenced by the nature of work undertaken in 2016/17 and in 2015/16 (i.e. how much arsenic-impacted material workers were exposed to in each year).

Table 5: Summary of Urinalysis Sampling and Results in 2016-17

Total samples	Number of samples above the Action Level (35 µg/L)	Percentage of samples above the Action Level (35 µg/L)
686*	20**	2.6%

*This value includes 125 baseline samples, and does not include invalid test results (90 samples)

** This value includes one baseline sample that exceeded the 35 µg/L action level.

Key Actions

- For any urinalysis sample above the Action Level, the contractor notified WSCC and 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, re-training of staff on proper procedures, placing affected workers on limited duty to limit exposure to higher risk activities, or reassigning personnel to other duties (in the rare case of continued / recurring high levels of arsenic).

- Tracking of results that are below but nearing the Action Level also allows for identification of those workers who could benefit from preventive interventions, to avoid reaching the Action Level.

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, and fire response, as required by applicable regulations. Each year, all new employees are assessed to ensure they have the required training to complete their jobs safely and effectively. Workers involved in the underground stabilization project are 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.

The number of hours spent in training in 2016-17 are comparable to those spent in 2015-16 for most types of training, though significantly more "Other" (non-health and safety) training was provided, including job-specific training, such as for confined spaces or loader operator training.

Table 6: Total Hours of H&S Training Received by Employees and Contractors On-site

Health and Safety Training	2016-17 Total Hours
HAZWOPER (Hazardous Waste Operations and Emergency Response)	16
WHMIS (Workplace Hazardous Materials Information System)	153
First Aid	292
Wildlife Safety	71
Water Safety	21
Fire Response	53
Other (non-H&S)	4580
Total Training Hours	5733

Key Actions

- None to report.

Next Steps

- The Project Team will continue to track the type and amount of training received by employees and contractors to ensure that all employees receive the required training. The Project Team also shares this information with interested parties and stakeholders – such as the GMOB and the community – to assure them that on-site personnel are appropriately

trained to do their job safely and effectively, and are getting some training that is potentially transferable to other employment.

4.2 Public Health and Safety

2016-17 Highlights

- A Health Effects Monitoring Program Advisory Committee (HEMPAC) was established.
- The Human Health and Ecological Risk Assessment (HHERA) was underway, including country food sampling and a dietary survey.
- The Stress Assessment was deferred based on feedback from community members about engagement fatigue and potential confusion among the various health-related studies.

4.2.1 Health Effects Monitoring Program (Health Study)

The health effects monitoring program in Ndilo, Dettah and Yellowknife focuses on effects in people related to arsenic and other contaminants[9] that might result from the GMRP. The monitoring will include studies of baseline health and ongoing periodic monitoring, in accordance with Measure 9 of *The Report of Environmental Assessment and Reasons for Decision* (MVRB, 2013). The purpose of this baseline and ongoing monitoring is to ensure that the implementation of the Closure and Reclamation Plan activities do not cause negative health impacts on the people of Yellowknife, Ndilo and Dettah and to adjust activities as necessary if adverse effects are discovered.

Results

No results yet to report.

Key Actions

During 2015-16, the Project Team selected, Dr. Laurie Chan from the University of Ottawa 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 Indigenous communities. His research interests include toxicology, environmental health, nutrition and the environment of indigenous peoples; effects of contaminants in the ecosystem; and risk assessment. He currently sits on the Independent Peer Review Panel (IPRP) for the GMRP and is familiar with the issues surrounding Giant Mine.

A Health Effects Monitoring Program Advisory Committee (HEMPAC) was established in September 2016 to provide advice and support to Dr. Chan and his research team in the development of the study design. Members include representatives from the Federal and Territorial governments, Yellowknives Dene First Nation (YKDFN), the North Slave Metis Alliance (NSMA), the City of Yellowknife, and the Giant Mine Oversight Board. The Institute of Circumpolar Health Research (ICHR) is providing additional support and acting as a liaison between the research team and the Yellowknife Health Authority.

[9] Including antimony, cadmium, lead, manganese, and vanadium, which are being measured because other research and studies have shown that they are present at the Giant Mine site.

Some residents who had participated in historical health studies in the 1960s and 1970s expressed concerns about having never received their results from those studies. The research team is investigating gathering that data. To date, several results have been located, which will be provided to any participants who request them. Interpretation will be included with both past and current results.

Next Steps

The monitoring program is expected to begin in the fall of 2017. The program will involve biological sampling, which will include collecting nail clippings and urine from community residents who are randomly selected and those who volunteer to participate. A total of 2000 participants are targeted for sampling. All YKDFN members living in Dettah and Ndilo will be invited to voluntarily participate, as will all NSMA members.

The implementation schedule for the Health Study is as follows:

- **2017/2018 Fall:** Implement sampling program. The first wave of sampling (approximately 1000 residents) will take place September to December 2017, and the second wave September to December 2018. It will include a lifestyle questionnaire, biological samples of toenails, urine and saliva, a food frequency questionnaire, medical records review, a medical questionnaire and a brief medical exam with a nurse practitioner (for YKDFN participants only). Sample and data analysis.
- **2018/2019 Later Winter:** Communicate individual participants results; 2019/2020 overall community baseline results reported
- **Follow-ups:** The Program will also carry out follow up sampling five years later for participants younger than 18 years of age, and within 10 years for adult participants.

Communications will be ongoing to ensure community members are well-informed. Monitoring results will be shared regularly, with plain-language explanations of the findings. For privacy and confidentiality reasons, results shared publicly will only report population-level findings.

For additional details on the Health Effects Monitoring Program, please refer to the Frequently Asked Questions (FAQs) on the program's public-facing website: http://www.ykhemp.ca/faqs.php .

4.2.2 Human Health and Ecological Risk Assessment (HHERA)

Since 2000, several human health risk assessments (HHRAs) have been completed to determine the health risks from arsenic contamination associated with Giant Mine. *The Report of Environmental Assessment and Reasons for Decision* (MVRB, 2013) concluded that there were continued public concerns around health due to the remediation of Giant Mine. A new human health and ecological risk assessment (HHERA, previously referred to as an HHRA) is now underway to address these concerns and provide an estimate of current and predicted future exposures to contaminants associated with the Giant Mine. It will provide information about the possible sources and pathways of exposure, such as whether fish, meat, and berry consumption or soil intake could lead to potential contaminant exposure related to the GMRP. The end result will be a set of benchmarks against which the GMRP is measured to avoid and reduce the severity of any predicted unacceptable health risks during and after remediation.

Implementation of the HHERA commenced in summer 2016. Representatives of Canada North Environmental Services (CanNorth) – the firm contracted to complete the study – were in Yellowknife twice over the summer to meet with the YKDFN GMAC and the Giant Mine Working Group to discuss the best approach to implement the study, to identify data gaps, and other issues.

Starting in July 2016, the consultants conducted a voluntary country food sampling program. Volunteer community residents provided small amounts of country food harvested from the land (including game animals, fish, and edible or medicinal plants) to be tested and noted the general area from which each sample was harvested. Contaminant analysis of all country food samples was conducted by an accredited laboratory.

In fall 2016, additional samples of small mammals, vegetation, berries and soil were collected and analyzed for total metal concentrations. These data were used to augment the existing dataset for the HHERA.

In January 2017, representatives of CanNorth engaged the YKDFN and NSMA in a survey to understand what country foods people eat, how often, and in what quantities. The survey also collected information on where participants hunt, trap, and gather country foods. This information, when combined with the contaminant analysis, will help to understand exposure levels through consumption of traditional foods, and what degree of risk that consumption may pose. The survey was organized by the GMRP in partnership with the YKDFN GMAC. A similar dietary survey was conducted in Yellowknife in 1998, but there was a need to update the information because eating habits have changed over the last 18 years. The results of the dietary survey were shared with stakeholders in early 2017.

The Project Team and consultants have worked closely with stakeholders throughout the HHERA process to date, including in the design of the study, and will continue to do so as the study concludes.

Results

- No results to report. Results are expected to be available in fall 2017.

Key Actions

- None to report.

Next Steps

- The draft HHERA report is anticipated to be completed in mid-2017 and results will be shared with stakeholders.
- Public meetings to discuss the results of the entire HHERA will be held in October 2017.

4.2.3 Stress Assessment

The direct effects of arsenic exposure are being evaluated through the HHERA as outlined above; however, Measure 10 of the EA requires the Project Team to also evaluate the indirect effects of potential exposures to arsenic on wellness, including stress.

In 2015-16, the GMRP 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. In January 2016, Dr. Shankardass met with stakeholders, including the Working Group, to help inform his development of an approach to the stress assessment.

During 2016-17, the approach proposed by Dr. Shankardass was presented and discussed with the Giant Mine Working Group and there was support to engage with various focus groups to receive input in the development of a survey that would essentially act as the scope of work to collect information on stress moving forward with the remediation project. The structure of the focus group meetings was designed

and approved, as was the list of potential participants in order to represent a comprehensive representation of the Yellowknife, and YKDFN communities.

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

Results

- No results to report.

Key Actions

- The original schedule to implement the stress effects in the fall of 2017 was adjusted to winter 2017 in response to stakeholder comments noting potential capacity issues around engagement activities on the currently underway HHERA and the Health Effects Monitoring Program.

Next Steps

- It is the intent of the GMRP to carry out the focus group sessions and continue with the scoping of the study during the winter of 2017-18.

5.0 Community

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

5.1 Engagement

2016-17 Highlights

- The Project Team undertook or participated in 50 engagement activities and events, including engagements related to surface design, outfall location, the HHERA, and information sessions regarding procurement processes for the MCM.
- Key decisions made based on input from SDE, including the alignment of Baker Creek onsite, filling the pits, remediating the near shore sediments in the townsite, and a rock cover for the tailings. Outstanding decisions include what material to fill the pits with and how to remediate soils.
- Regular communications continued (e.g. newsletter, website, Twitter account, public service announcements, media briefings and responses to inquiries, school presentations).
- Scheduling of certain work packages – such as the deconstruction urgent works and the stress assessment – was altered in response to input from community members.

Engagement has always been a significant part of the GMRP, from the initial examination of options, to the Environmental Assessment (EA) process and Site Stabilization work, to the more recent Surface Design Engagement and health-related studies.

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 Project Team also appreciates the importance of showing how stakeholder input has been gathered and incorporated into decision-making.

In the two years since the Decision of EA, the engagement process has matured and become more streamlined. Sessions such as the Surface Design Engagement activities conducted in 2015/16 and 2016/17 helped establish momentum and trust with some stakeholder groups and the Project Team gained important lessons that have allowed the planning and execution of engagement sessions and public events to become easier and more effective. Furthermore, the process for various standing meetings has become well established. A list of stakeholders that meet regularly to receive updates on the GMRP, discuss key topics of interest, and provide input to the GMRP is included in Appendix C.

5.1.1 Engagement and Events

The Project 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.

In 2016-17, the Project team undertook or participated in 50 engagement activities and events, aligned with and in support of Project or related activities. This is down from 103 engagement events in 2015-

16, largely due to the conclusion of the surface design engagement process and due to the cancellation of several GMAC meetings.

Key GMRP engagement activities in 2016-17 included:

- The two-year Surface Design Engagement Process was completed in February 2017
- The YKDFN and Giant Mine Working Group participated in the selection of the location of the outfall for the future ETP
- The HHERA was underway, including community participation via voluntary contributions of country foods for laboratory analysis and participation in a dietary survey
- The Health Effects Monitoring Program Advisory Committee was established and became operational, and details of the program were developed
- Several engagement activities supported procurement (e.g. information session and site tour for interested bidders for the Main Construction Manager contract; YKDFN career fair
- Engagement began with relevant GNWT Departments on the socio-economic strategy and their role in the GMRP
- The Project Team met with the GMOB four times for Semi-Annual Meetings with the parties and for the Annual Public Meeting
- The Project Team conducted outreach to local schools, including hands-on science experiences
- A preferred location was chosen for the new air quality monitoring station in Ndilo through engagement with the YKDFN GMAC
- The new Niven air quality monitoring station became operational
- Annual community forums were held in both Dettah and Yellowknife
- Regular communications continued (e.g. newsletter, website, Twitter account, public service announcements, media briefings and responses to inquiries, school presentations)
- Participation in the Yellowknife Chamber of Commerce Spring Trade Show and the Yellowknife Geoscience Forum
- Pre-engagement and regulatory engagement regarding stabilization of the C5-09 stope

Additionally, the Project Team participated in community events hosted by other organizations, including the YKDFN Healing the Land and Feeding the Fire ceremony and a Communicating with Future Generations workshop hosted by Memorial University, Lakehead University, the Goyatiko Language Society (a Yellowknives Dene First Nation non-profit), and Alternatives North (a Yellowknife environmental and social justice coalition).

Summaries in Appendix C provide additional details on the following key engagement activities:

- Giant Mine Annual Public Forum
- Giant Mine Healing the Land Ceremony (YKDFN)
- Outfall location and Conceptual Design
- The HHERA
- Surface Design Engagement

The Project Team is engaged in continual learning and improvement in all aspects of its operation, including is it relates to communications and engagement. In 2016-17, the team identified and worked to respond to variety of challenges. Of note:

- Changes in the scheduling of certain work package activities or regulatory timelines have influenced engagement timelines and priorities. The Project Team has also adjusted engagement timelines in response to requests from stakeholders and interested parties.
- While the GMAC has greatly improved the relationship between the GMRP and the YKDFN, the Project Team continues to work toward better engagement with the First Nation's leadership, senior management, and members.
- Incorporating traditional knowledge into planning and work on site is a requirement for obtaining the Water License. While some traditional knowledge has been incorporated in GMRP activities to date (e.g. to help determine the best time of year to deconstruct buildings), the Project Team acknowledges that there is a need for continual improvement. This year the GMRP incorporated traditional knowledge, as advised by the YKDFN, by extending the voluntary food sampling program for a full year to capture all of the harvesting seasons.

Note to GMOB

In FY 2016-17, 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 is working to design and develop a system to systematically track this information.

Next Steps

- In 2017-18, significant engagement is expected on the health related studies (HHERA, Health Effects Monitoring Program, Stress Assessment), the Quantitative Risk Assessment (QRA), and the beginning of the Closure and Reclamation plan and objectives. Engagement on these pieces can continue the momentum built up through the Surface Design Engagement process.
- The GMRP will continue to host community forums for YKDFN and Yellowknife, to engage with the external advisory bodies, and to communicate in a frequent and transparent manner via the established channels (e.g. newsletter, website, Twitter, radio, school outreach).
- The Project Team will continue to work toward incorporating traditional knowledge into planning.

5.2 Study/Partnership Program

2016-17 Highlights

- The GMRP is not currently engaged in any community-based monitoring initiatives.
- The results from previous years' sampling supported the Human Health and Ecological Risk Assessment (HHERA) work currently underway.

In the past, the GMRP has provided funding to support two additional sampling programs by community members and government partners:

- A study on metal concentrations in sediments and surface waters adjacent to Ndilo and Dettah in Yellowknife Bay, carried out by Environment Canada, with partial funding via the Cumulative Impact Monitoring Program (CIMP-GNWT), in partnership with the Yellowknives Dene First Nation (YKDFN). This study is complete and no activities were undertaken in 2016-17.
- A community-based water quality monitoring program (CBM) carried out by community members, staff from the GNWT Environment and Natural Resources' (ENR) Water Resources Division, and other water partners.

The CBM includes monitoring of a site on Yellowknife River, which was established in 2013 based on input from the YKDFN, as well as two additional sites added in 2015: one in Back Bay, close to Ndilo, to specifically address potential impacts from Giant Mine; and one close to Dettah to address the concerns related to overall water quality and fish health. In 2015-16, GNWT ENR-Environment Division (as Co-proponent to the Giant Mine Remediation Project) partnered with the Water Resources Division to support monitoring at the Ndilo Site.

The CBM continued in 2016-17, but the GMRP did not contribute funding assistance. Information about sample results can be obtained by contacting the GNWT Waters Division (Environment and Natural Resources).

The results from previous years' sampling supported the Human Health and Ecological Risk Assessment (HHERA) work currently underway for the GMRP.

5.3 Procurement and Employment

2016-17 Highlights

- In 2016-17, the proportions of Northern employees and female employees were comparable to 2015-16, but the proportions of Indigenous and AOC employees was lower (4 and 2 % down from 11 and 10%).
- The proportion of expenditures with Northern suppliers was comparable in 2016-17 (64%) and in 2015-16 (68%). Similarly, the proportion spent with AOC suppliers was comparable (28% in 2015-16 and 31% in 2016-17). Contracts with Indigenous suppliers increased as a proportion of total spending on the GMRP (from 28% in 2015-16 to 45% in 2016-17).
- The GMRP issued the tender for a MCM and held information sessions to help ensure a transparent bidding process. Bids have been received and are being evaluated.
- Labour resource study underway to identify existing local capacities, available training programs, and needs in order to realize potential socio-economic benefits.
- Socio-economic strategy finalized.

Through the Environmental Assessment process, the residents of Yellowknife and other stakeholders and local community members expressed strong interest in socio-economic issues. The 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 GMRP. 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. This strategy was developed in 2014-15, and the GMRP is in the process of implementing it. This includes the development of the Request for Proposals and all documents related to the Main Construction Manager (MCM), as described in section 5.3.1.1.

The following two contracting mechanisms are used, when applicable, to increase Indigenous benefits:

- **Indigenous 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 Indigenous communities under federal government contracts. All contracts for the GMRP include an AOC unless otherwise approved by INAC.
- **Procurement Strategy for Indigenous Business** (PSAB): The Procurement Strategy for Indigenous Business supports Indigenous 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 Indigenous businesses to compete for and win federal contracting opportunities. Procurement under the PSAB, limits competition to those Canadian businesses meeting the definition of 'Indigenous Business'[10].

The GMRP engages Indigenous groups, the business community, other interested parties and the community at large in several ways, including holding ongoing meetings with Indigenous 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, Indigenous, Indigenous Opportunity Considerations, and Women. Table 8 shows the employment statistics for 2016-17.

In 2016-17, the proportions of Northern employees and female employees were comparable to 2015-16, but the proportions of Indigenous and AOC employees was lower (4 and 2 % down from 11 and 10%). It is possible that this reduction reflects the fact that less work was done on site in 2016-17 than in 2015-16 and that much of the work undertaken was highly specialized and required in a short timeframe. There were no Indigenous firms available that could complete the work and insufficient time to train additional resources in these specialized tasks.

[10] PSAB applies for those contracts over $5,000 with Indigenous populations as the main recipients of the goods or services.

Table 7: Total Number of Persons and Total Person Hours for 2016-17, by Category

Employee type[11]	Total # persons *(incl. contractors)*	Total person-hours	Persons as % of all employees
Northern employees	171	111,194	23%
Indigenous employees	31	34,339	4%
AOC employees	15	20,952	2%
Female employees	253	28,498	33%
TOTAL	758	177,173	100%

Since 2004, the care and maintenance contractor for GMRP has been DCNJV, 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 2016-17, the largest contracts awarded were:

- $3M to Det'on Cho Nahanni Construction – a Yellowknife-based Indigenous firm – for geotechnical drilling and observations (contracted through Parsons and partnered with Foraco Drilling)
- $2.9M to RTL Construction – a Yellowknife-based firm
    - $2.5M for the deconstruction of the A-shaft head frame and hoist room, assay lab, and curling club
    - $400,000 to RTL for borrow material to support Care & Maintenance
- $1.2M to DT Electric – a Yellowknife-based firm – for B3 Substation Upgrades
- $900,000 to Parsons to extend their contracts as the ICM
- $873,000 to Ryfan Electric – a Yellowknife-based firm
    - $486,000 for underground power upgrades
    - $387,000 for communications upgrades
- $533,419 to CanNorth – an Indigenous-owned firm – for the Human Health and Ecological Risk Assessment (HHERA)

The status of these works is summarized in Table 1. All are completed or on track to be completed.

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, Indigenous and Indigenous Opportunity Considerations. Table 9 includes the supplier statistics for 2016-17. The GMRP also tracks purchase of goods and services by supplier category, namely Northern, Indigenous, and Indigenous Opportunity Considerations.

The proportion of expenditures with Northern suppliers was comparable in 2016-17 (64%) and in 2015-16 (68%). Similarly, the proportion spent with AOC suppliers was comparable (28% in 2015-16 and 31% in 2016-17). Contracts with Indigenous suppliers increased as a proportion of total spending on the GMRP (from 28% in 2015-16 to 45% in 2016-17).

[11] Note that these categories may overlap (e.g .a single employee may simultaneously be counted as Northern, Indigenous, AOC, and female – or a combination or subset thereof) and that some employees fit into none of these categories. For both of these reasons, the totals indicated in the bottom row of the table do not represent the sum of the preceding rows.

Table 8: Total Number of Suppliers and Total Value of Contracts for 2016-17, by Category

Supplier type[12]	# suppliers	$ spent	% of total $ spent
Northern suppliers	263	$18,873,807	64%
Indigenous suppliers	23	$13,233,868	45%
AOC suppliers	15	$9,105,587	31%
TOTAL	546	$29,568,493	100%

5.3.1.1 Procurement of a Main Construction Manager (MCM)

PSPC, on behalf of INAC, is conducting a two-phase Request for Proposals (RFP) process for the Main Construction Manager (MCM) requirement at Giant Mine.

What will the MCM's role involve?

- Managing the entire remediation of the Site and tendering subcontracts accordingly for remediation work which will begin in 2020.
- Developing the implementation approach (project work packages and schedule) and advising on the scheduling, sequencing, and feasibility of various components of the remediation plan
- Managing work packages according to schedule; monitoring and reporting regularly on progress

Tendering for the MCM is among the largest-ever procurement efforts for INAC, worth between $600-900 million, and expected to be in place for approximately 10 years.

PSPC ensures all contractual opportunities are managed through an open, accessible, and well-understood process. On August 31 2016, PSPC and INAC hosted an optional pre-tender site visit in Yellowknife for the future MCM RFP at the Giant Mine. This included a morning of presentations that offered an overview of the immense project and included information about the expected timelines, the bidding process and insight into the scope of services that would be required. In the afternoon, 28 participants, representing 14 individual companies, were taken on a surface tour of the site.

The MCM will be responsible for developing updated C&M and environmental monitoring work packages and contracting out this work. The current contracts for ICM (Parsons Canada Ltd.) and C&M services (DCNJV) will overlap with the start of the MCM contract to ensure a smooth transition and ongoing monitoring and maintenance at the site, until the MCM fully takes over site responsibilities.

The MCM will be required to conduct their own labour resource study within the first year of their contract to assess local and Indigenous capacity and demonstrate they have taken this into consideration when developing the work packages to be competitively tendered. This will be outlined in an Indigenous Business Plan. In addition, an Indigenous Business Advisory Panel will be formed to review

[12] Note that these categories may overlap (e.g .a single supplier may simultaneously be counted as Northern, Indigenous, and AOC – or a combination thereof) and that some employees fit into none of these categories. For both of these reasons, the totals indicated in the bottom row of the table do not represent the sum of the preceding rows.

the MCM work package Indigenous achievements and work with the Project Team to provide input on how Indigenous commitments can be met. It is expected full remediation will begin sometime between 2020 and 2022.

The successful bidder must include a Community Economic Development Officer as a member of their team. This individual must be based in Yellowknife and will be responsible for:

- Assisting with developing Socio-Economic Strategy
- Facilitating, promoting and ensuring community and eco development
- Developing and overseeing implementation of Aboriginal Benefits Plan
- Managing and coordinating the Labour Capacity Studies
- Developing economic profiles of regions and communities via Capacity Assessment
- Collaborating with MCM Team and Giant to determine work packages and adjusting AOC criteria to best align with labour capacity
- Collaborating with respective organizations to provide outreach to local, indigenous and northern residents to discuss work and training opportunities

Results

No results to report.

Key Actions

The MCM RFP was issued on January 25, 2017 and the anticipated award date for the MCM contract is December 2017.

Next Steps

Next steps include contracting the MCM firm. The ICM and current C&M contractors will overlap with the MCM to help with the transition and minimize risks from site operations and activities. The MCM will then issue a new C&M contract and one for environmental monitoring.

5.3.1.2 Labour Resource Study

In addition to the existing procurement strategy, the GMRP completed a Labour Resource Study in 2016-17. The purpose of this study was to evaluate the anticipated labour requirements of the GMRP against the available local employment capacity and capacity-building programs relevant to the project. The study looked at available labour resources in the Northwest Territories and Canada, including available Indigenous labour and business resources and their potential involvement in the project.

INAC contracted Stratos, a specialized management consultancy focused on sustainability and with experience working on stakeholder engagement in the north, to conduct the Labour Resource Study. Interviews conducted with Indigenous governments and organizations, supplemented by desktop research, helped to identify existing businesses, skills, interests, experience with capacity building programs in the NWT, preferred communication methods, and expectations for future employment.

The study focused on communities in the vicinity of the GMRP. In June 2016, Stratos conducted interviews with Indigenous governments and organizations, including Tłı̨chǫ Investment Corp., Yellowknives Dene First Nation and Det'on Cho Corporation (joint interview), Det'on Cho Logistics, Łutsel K'e Dene First Nation, Denesoline Corporation Ltd., Northwest Territory Métis Nation, North Slave Métis Alliance.

Results

A report on the labour resource study was submitted in October 2016. The findings demonstrate that there is Northern Indigenous capacity for GMRP entry-level and semi-skilled occupational needs, as well as some skilled occupational needs (e.g. some trades, technicians, blasting/drilling, and environmental monitoring). There is a potential local labour supply for some skilled occupational needs (e.g. some trades, technicians, supervisors, underground miner), where additional training may help increase the available local supply. Finally, there is limited or no local labour supply for some skilled and all professional occupational needs, indicating a need for local capacity building and/or recruitment of out-of-territory workers.

Additional details are provided in Appendix C.

Key Actions

The GMRP will use the information from this study to inform decisions related to work package structure and contracting and to identify where additional capacity development may be required. It will also share this study with the MCM to inform the labour resource study that the MCM is required to do within the first year of their contract.

Next Steps

Stratos will conduct additional follow-up interviews in the summer of 2017 with a broader group of interested parties – including capacity building providers (e.g. training/educational institutions, organizations that fund training programs) – to identify relevant capacity building programs that may help address existing gaps and/or align with community interests. An updated report summarizing the information gathered through these interviews is anticipated in late 2017.

5.3.1.3 Socio-Economic Strategy

INAC is committed to promoting socio-economic benefits and supporting reconciliation efforts with Indigenous peoples of Canada. To date, the GMRP has delivered some economic benefits to the region through procurement and employment. Moving forward, the GMRP plans to be more deliberate and strategic in its approach to maximize economic benefits to the region. This is particularly important given the downturn in the NWT economy.

To inform the GMRP's efforts to promote local socio-economic benefits, the Project Team hired consultants to develop a GMRP Socio-Economic Strategy.

Results

Completed in 2016-17, the strategy outlines the project's approach to providing access to employment and procurement opportunities, supporting capacity and skills development, and anticipating, monitoring and mitigating impacts.

The Socio-Economic Strategy includes the following sections:

- Core components:
    - Provide access to employment & procurement opportunities
    - Support capacity and skills development
    - Anticipate, monitor and mitigate impacts

- Potential barriers to strategy implementation, including:
    - Insufficient Northern and Aboriginal workforce capacity
    - Fluctuating Northern and Aboriginal business/contracting capacity
    - Socio-economic impacts risk offsetting GMRP benefits
- Governance and management structure for socio-economic roles and responsibilities
- Monitoring and reporting

Key Actions

Implementation of the Socio-Economic Strategy will be driven by NWT regional dedicated resource(s). The GMRP created a new position for a resource dedicated to socio-economic work in the region. The position is expected to be filled in 2017-18.

Next Steps

Priority implementation actions over the 2017-18 fiscal year include:

- Hiring a dedicated GMRP resource to lead the implementation of the socio-economic strategy
- Establishment of a socio-economic governance/oversight structure (advisory body and working group)
- Tendering and award of the MCM contract
- Development of procurement and engagement plans
- Organization of a multi-stakeholder capacity building workshop to profile and raise awareness of existing capacity building programs relevant to skills and capacities required by GMRP
- Development of a socio-economic monitoring and reporting framework

5.4 Training and Capacity Building

2016-17 Highlights

- In 2016-17, workforce training was provided to more than twice as many Indigenous and female employees as in 2015-16 and nearly four times as many AOC employees. The total person-hours of training increased more than three-fold, with substantial increases in each category of employees.

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 Indigenous 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 201-17, organized by category of Northern, Indigenous, Women and Total.[13]

[13] 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).

In 2016-17, workforce training was provided to more than twice as many Indigenous and female employees as in 2015-16 and nearly four times as many AOC employees. The total person-hours of training increased more than three-fold, with substantial increases in each category of employees.

Table 9: Total Number of People trained and Total Person Hours of Training in 2016-17, by Category

Workforce training[14]	Total # persons	Total person-hours
Northern employees	109	5566
Indigenous employees	25	1521
AOC employees	15	1444
Female employees	40	1455
TOTAL	230	7750

Next Steps

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

Through the Labour Resource Study and Socio-Economic Strategy, the Project Team is exploring opportunities to support and partner with training and capacity building programs that can help local communities realize greater socio-economic benefits from the GMRP.

[14] Note that these categories may overlap (e.g .a single employee may simultaneously be counted as Northern, Indigenous, AOC, and female – or a combination or subset thereof) and that some employees fit into none of these categories. For both of these reasons, the totals indicated in the bottom row of the table do not represent the sum of the preceding rows.

6.0 In Closing

The 2016-17 fiscal year was another busy year for the GMRP – the focus was on ensuring ongoing care and maintenance of the Site, analyzing remedial design options and advancing the overall remediation plan, engaging on health studies and outfall location, and mitigating immediate risks at the site, such as the deconstruction of the A-Shaft headframe and other buildings. The focus for the 2017-18 fiscal year will be as follows:

Component		Plans for 2017-18
Operations	Care and Maintenance	Maintain site infrastructure, Operate the Water Treatment Plant, Site Security 24/7, weekly inspection of Material Storage Area, road maintenance.
	Underground	Backfilling the last remaining high-risk stope complex (C5-09) as part of the Site Stabilization Plan;
	Immediate Risk Mitigation	Evaluation of Site Security options, and implementation of recommendation's from the evaluation, Annual Infrastructure Assessment
EA Measures	Measures	Initiate the Health Effects Monitoring Program sampling program. Finalize HHERA. Finalize Baker Creek realignment location. Establish long-term funding. Initiate drafting of the Water Licence application package.
Environment	Air	Continue air quality monitoring program and host open houses to introduce Niven and Ndilo communities to air stations. Pilot test and full application of new dust suppressant (SoilTac). Update fenceline air monitoring equipment from Dust Trak monitors to e-samples
	Water	Continue effluent treatment and water quality monitoring. Gather additional information on water conditions in Baker Creek and Yellowknife Bay to inform setting the effluent quality criteria (EQC). Finalize Baker Creek alignment report and share with stakeholders and the public.
	Land	Select a location for a future non-hazardous landfill site
	Biodiversity	Continue baseline monitoring (LTMP). Develop an Aquatic Effects Monitoring Plan, conduct additional baseline monitoring at new effluent discharge location, and complete the current investigation of cause study.
Community	Health and Safety	Oversee and manage occupational health and safety through tracking of training and incidents. Conduct additional engagements, then initiate the Health Effects Monitoring Program sampling program. Finalize the HHERA and communicate results. Host focus groups regarding scoping of the stress assessment.
	Engagement	Engage on the Closure and Reclamation Plan and objectives and on the socio-economic strategy. Determine ways to ensure traditional knowledge continues to inform planning. Develop a centralized system to catalogue stakeholder

Component		Plans for 2017-18
		concerns. Continue existing engagement and outreach mechanisms.
	Procurement	Evaluate bids and award contract for the Main Construction Manager (MCM). Through MCM, post tenders for C&M contract and environmental monitoring.

The GMRP will continue to prepare annual reports that describe the progress and performance of the GMRP. In the spirit of continual improvement, we welcome your comments on this report and how it can be enhanced in the future.

For more information or to provide comments on the report, please contact: Craig Wells, GMRP Project Director, Craig.Wells@aadnc-aandc.gc.ca, 819-997-0660 or Natalie Plato, GMRP Deputy Director, natalie.plato@aandc-aadnc.gc.ca, 867-669-2838.

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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 EA Measures and Suggestions

Appendix E – Detailed Work Plan

Appendix A – List of Acronyms

AOC	Indigenous Opportunity Considerations
ADM	Assistant Deputy Minister
AEMP	Aquatic Effects Monitoring Program
AQMP	Air Quality Monitoring Program
C&M	Care and Maintenance
CanNorth	Canada North Environmental Services
DG	Director General
DM	Deputy Minister
EA	Environmental Assessment
EEM	Environmental Effects Monitoring
EHS	Environment, Health and Safety
EHSC	Environment, Health, Safety and Community
EPP	Environmental Protection Plan
EPRP	Emergency Preparedness and Response Plan
ETP	Effluent Treatment Plant
FCSAP	Federal Contaminated Sites Action Plan
FOS	Freeze Optimization Study
FTE	Full-time Equivalent
GMAC	Giant Mine Advisory Committee
GMOB	Giant Mine Oversight Board
GMRP	Giant Mine Remediation Project
GNWT	Government of Northwest Territories
HAZWOPER	Hazardous Waste Operations and Emergency Response
HHERA	Human Health Ecological Risk Assessment
ICM	Interim Construction Manager
INAC	Indigenous and Northern Affairs Canada
IPRP	Independent Peer Review Panel
LTMP	Long-term Monitoring Program
MCM	Main Construction Manager
MMER	Metal Mining Effluent Regulations
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
MVRB	Mackenzie Valley Review Board
MVRMA	Mackenzie Valley Resource Management Act
NAO	Northern Affairs Organization
NCSB	Northern Contaminated Sites Branch
NSMA	North Slave Metis Alliance
OHS	Occupational Health and Safety

OMP	Operational Monitoring Program
PPE	Personal Protective Equipment
PSAB	Procurement Strategy for Indigenous Business
PSPC	Public Services and Procurement Canada
RBAL	Risk Based Activity Levels
RD	Regional Director
RFP	Request for Proposal
SDE	Surface Design Group
SNP	Surveillance Network Program
SSP	Site Stabilization Plan
TDG	Transportation of Dangerous Goods
WHMIS	Workplace Hazardous Materials Information System
WMP	Wildlife Management Program
WSCC	Workers' Safety and Compensation Committee
WWHMP	Wildlife and Wildlife Habitat Management Program
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 Nîîtåèè) 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 two deaths, and the contamination of local soil and vegetation. 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 stopes[15] and chambers.

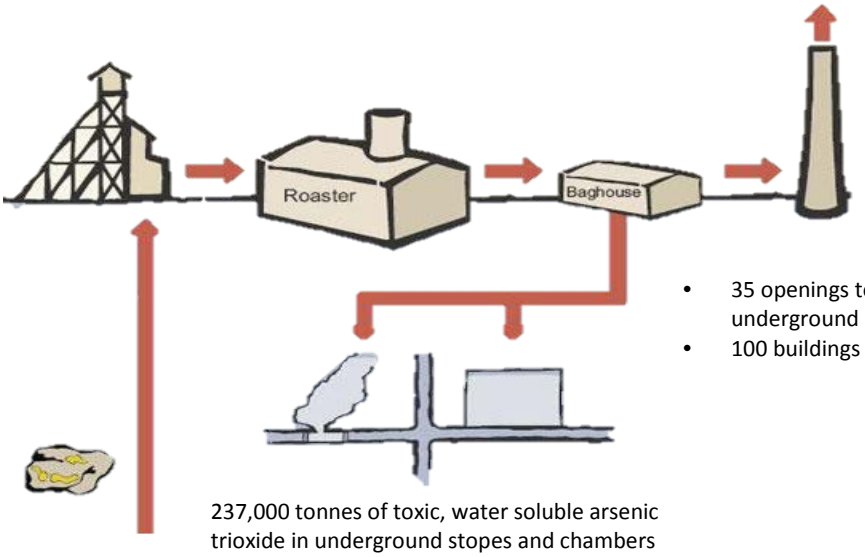
Arsenic trioxide dissolves in water and is dangerous to both people and the environment. If left unmanaged, the dust stored at Giant Mine could gradually dissolve and arsenic concentrations in groundwater would increase substantially. The contaminated groundwater would make its way into local water bodies 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 tailings[16] 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.

[15] Large underground spaces created during the mining process.
[16] Ground rock and process effluents that are generated as a waste slurry in the mining process.

Figure 2: Giant Mine Site

- 950 hectare footprint
- 8 open pits
- 4 tailings ponds
- 325,000 cubic metres of contaminated soil



- 35 openings to the underground mine
- 100 buildings on-site

237,000 tonnes of toxic, water soluble arsenic trioxide in underground stopes and chambers

The Remediation of Giant Mine

Background

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 engagement 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 engagement 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 GMRP 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 method[17] of immobilizing the arsenic trioxide was incorporated into the Remediation Plan for Giant Mine.

In 2007, the GMRP submitted a Water Licence application to the Mackenzie Valley Land and Water Board (MVLWB) for the remediation of the Site. While the MVLWB determined that the project should advance directly to the regulatory process, the Yellowknife City Council voted unanimously to refer the project to Environmental Assessment, as the mine is within the boundaries of the City.

[17] 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 Report[18], the Freeze Optimization Study, five days of technical sessions, five days of public hearings, more than 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 GMRP will be issued, which would allow the GMRP to proceed to remediation. These 26 Measures 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 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

[18] 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.

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 for at least 100 years. 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.

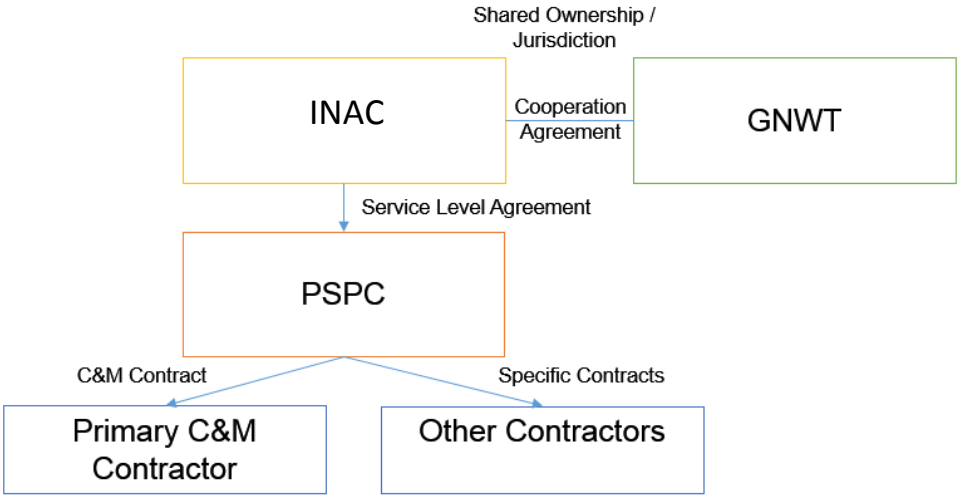


Figure 3: Management Structure for the GMRP

The key members of the Project Team are:

a. Project Leader: Assistant Deputy Minister, Northern Affairs Organization (ADM NAO);

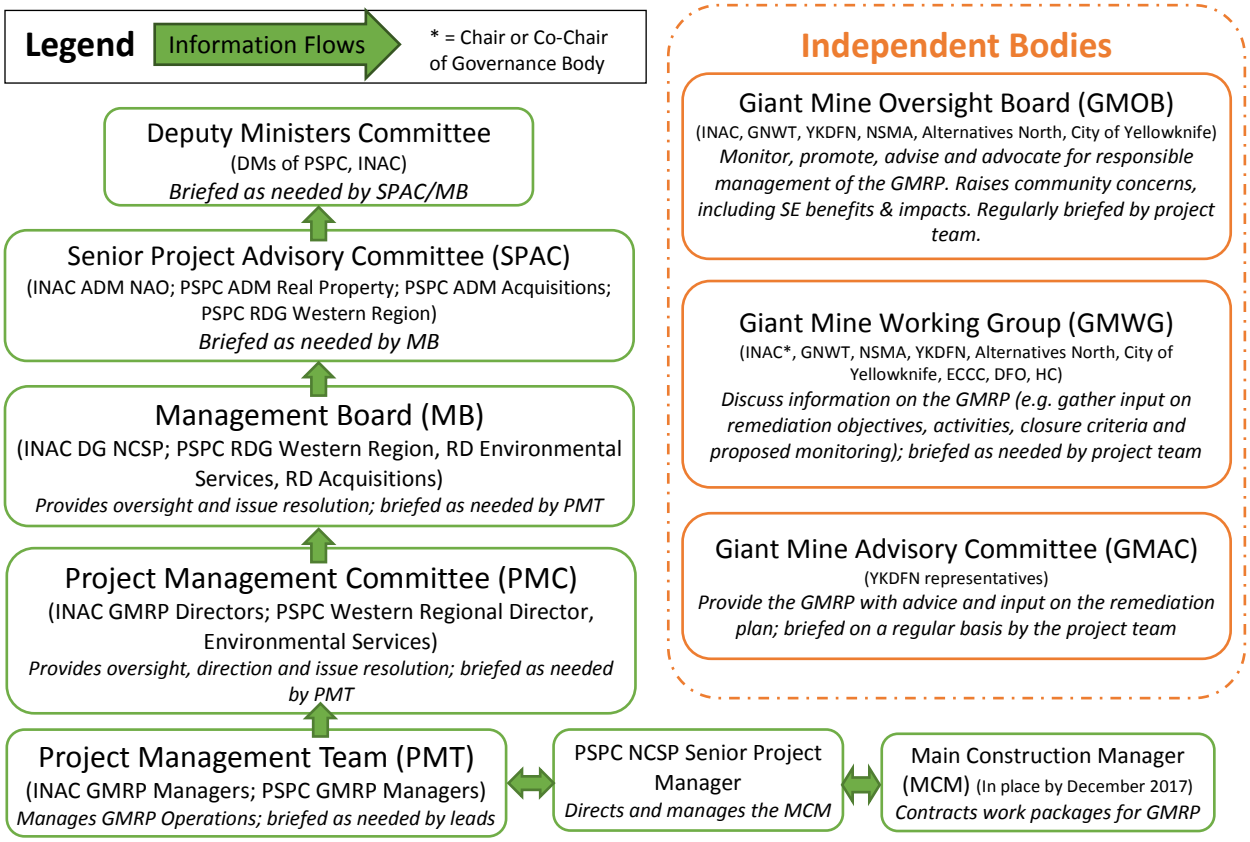
b. Project Sponsor: Director General, Northern Contaminated Sites Branch (DG, NCSB);
c. INAC Project Director
d. Project Implementation Team, including the INAC Senior Project Leads and Project Leads and the PSPC Senior Project Managers, Project Managers and GNWT representative

The Assistant Deputy Minister (ADM) of the Northern Affairs Organization (NAO) of INAC is the **Project Leader** and is accountable to the INAC Deputy Minister for the overall delivery of the GMRP. 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.

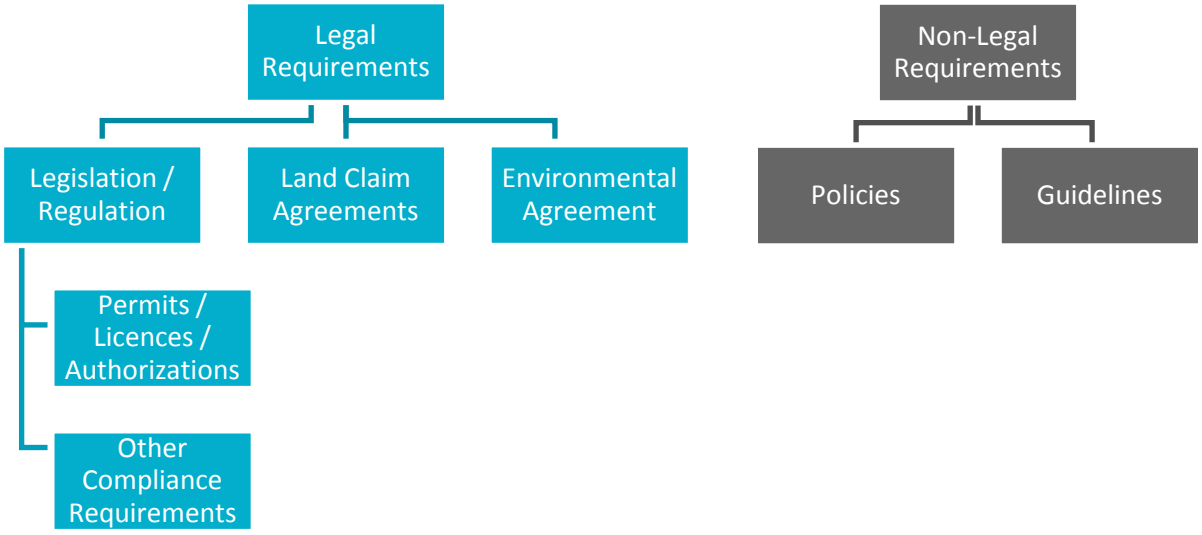
Figure 4: Governance Structure of the GMRP



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 Indigenous employment and Indigenous business opportunities (see Section 5.2 for more information). As of 2014-15, the Akaitcho 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 Akaitcho territory during the GMRP'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 (GMOB)). 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.

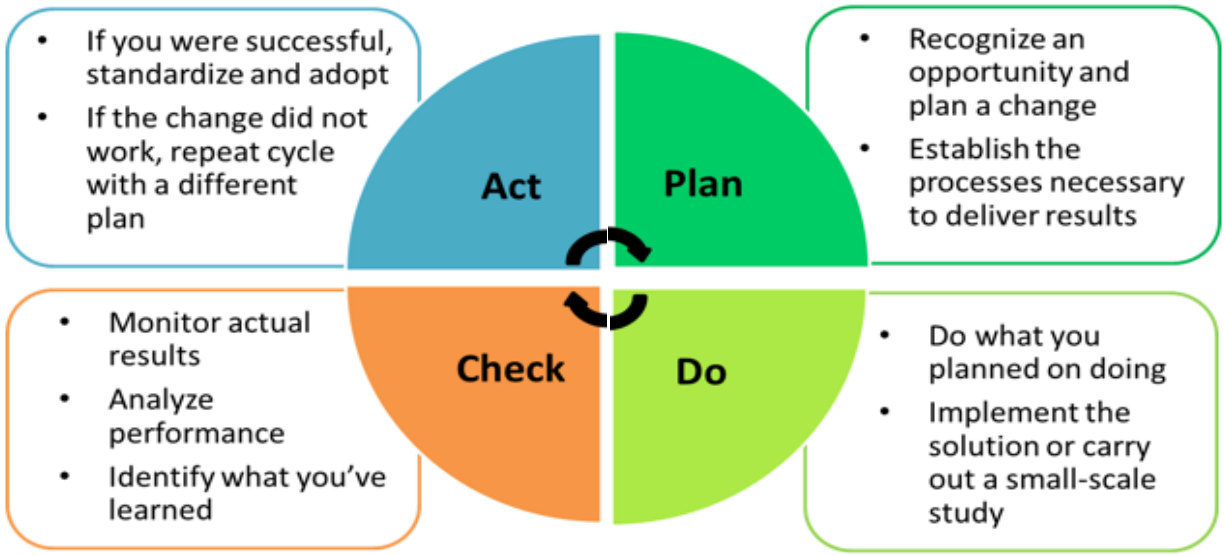
A key regulatory instrument for environmental management is a Type A Water License, issued by the MVLWB under the *Mackenzie Valley Resource Management Act*, *Northwest Territories Waters Act* and *NWT Water Regulations*. INAC will apply for a Type A Water License for the implementation phase of the GMRP. 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 GMRP 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 System[19], 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**[20], 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.

[19] 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).
[20] 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 GMRP, 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 process[21] 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 the implementation of a range of site security measures to prevent unauthorized entry to 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.

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

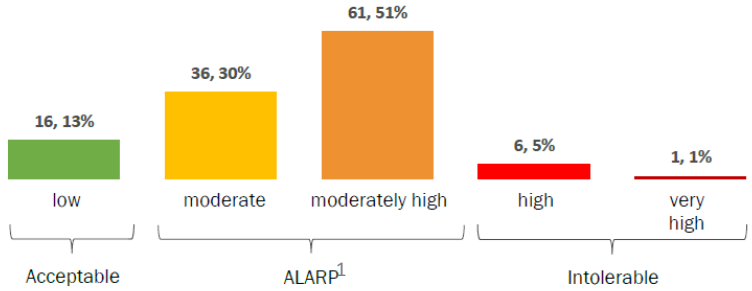
Risk Profile Summary – 2016-17

This section provides a summary of the GMRP 2016-17 risk profile. The information is from the GMRP Risk Register (a large excel file), and summarizes the number of risks by status (i.e. active, closed), number of risks by category (e.g. dams), the distribution of risks across levels (e.g. low, moderate), the distribution of risks across types (active vs legacy), the active risk drivers, and the historical profile since 2010.

A more detailed summary report, previously provided to GMOB, is available under separate cover. The detailed summary report describes each active risk, its driver, level, and treatment.

ACTIVE RISKS BY LEVEL

This chart shows the distribution of risks across levels

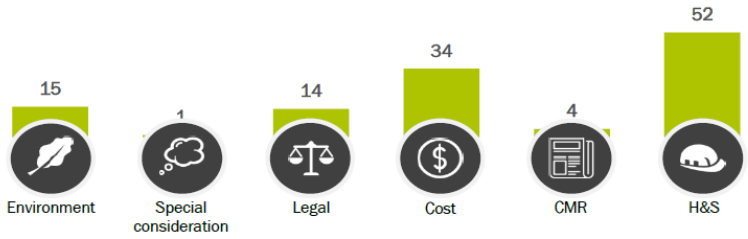


ACTIVE RISK TYPE DISTRIBUTION

This chart shows the distribution of risk across types (legacy vs. activity)

ACTIVE RISK DRIVERS

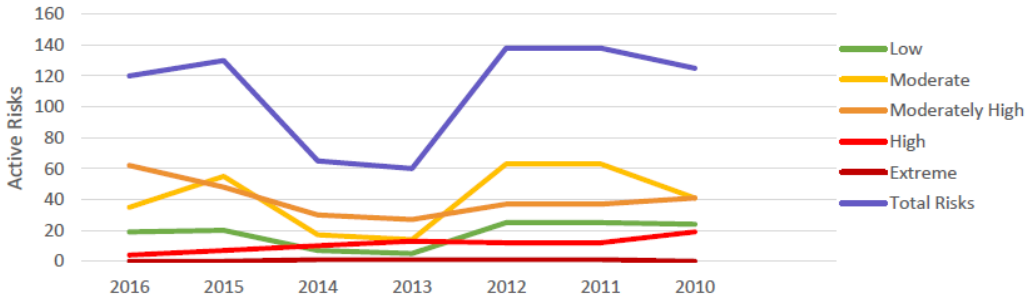
This chart shows the distribution of risks against their "driving" risk categories (i.e. those that determine the highest risk score)



[1] ALARP – as low as reasonably possible

HISTORICAL PROFILE

This chart graphs the historical risk numbers by level and type as entered on the Risk History Tab



Appendix C – Additional Information on Project Activities and Results

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

C.1 Environment

C.1.1 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 (PM_{10})
- 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:

Table 10: Air Quality Monitoring Program Parameters, Sampling Frequency, and Criteria

Parameter	Averaging Time Period	Source[22]	Criterion (µg / 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 > 5µm 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 10µm (PM_{10})	24 hr	[1]	50
Particular matter less than 2.5µm ($PM_{2.5}$)	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.

C.1.2 Water

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 waterbodies 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.

[22] 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)

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 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 is comprised of seven active sampling locations, five of which are located within the lease area. Natural waterbodies include Trapper Creek, Baker Creek, Pocket Lake, and the Yellowknife Bay area near the Baker Creek breakwater. The mine functions as a closed system with underground minewater being pumped and stored in the Northwest Tailings Pond until treated and released through the seasonally operated ETP. The treated effluent is released through a single discharge into Baker Creek (SNP 43-1).

Table 11: Water Quality Monitoring Station Locations and Frequency

ACTIVE WATER MONITORING STATIONS 2016		
STATION	**LOCATION**	**FREQUENCY**
SNP 43-1	Treated effluent discharge pipe - autosampler	Daily during discharge from ETP (June – Sept); monthly grab samples (during active discharge period)
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	Weekly, throughout the year
SNP 43-22	Pocket Lake	Monthly during open water (May-Oct)

Parameters 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. SNP 43-1 is the only compliance station, therefore discharge samples have to meet federal requirements under MMER. The same parameters (terms and conditions) are required under of the former Water Licence (N1L2-0043), with several additional requirements (e.g. oil and grease).

C.1.3 Land

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. These will be removed during final closure and remediation of the site Contaminated materials and

waste must be managed appropriately to ensure no further negative effects on the land surrounding the Giant Mine.

Additionally, minimizing impacts on permafrost and terrestrial habitat loss remains one of the goals of the GMRP.

C.1.3.1 Assessment of Radiation Hazard Potential of Granodiorite (Pink granite)

Golder completed an assessment of the radiation hazard potential of "pink granite" bedrock outcrops near the mine site. The assessment consisted of a field surface survey for gamma radiation and a laboratory study for radon to assess the radiation hazard potential. Field work was completed in October 2016; Golder surveyed a total of 14 locations for Naturally Occurring Radioactive Materials (NORM) concentrations and collected three samples for radon emanation testing.

In low concentrations, NORMs typically only pose a hazard to human or fauna from ingestion, inhalation, or absorption (internal hazard). Typically, the pathways for internal hazard are from gas or airborne dust. Only in high concentrations, usually encountered in mining or radioactive materials, do NORMs pose a risk through indirect exposure. High levels of NORMS do not typically lead to deterministic effects (e.g. radiation sickness) but to stochastic effects where there is an increased likelihood, but no guarantee, of cancers.

Based on the results of the field surveying and laboratory testing, the radioactive hazard potential from gamma and radon for the "pink granite" is low in its current state, and applicable guidelines[23] for NORM materials are unlikely to be exceeded.

The assessment completed on the "pink granite" is representative of the material in its current state: a massive bedrock outcrop exposed to atmospheric conditions (i.e. ventilated). Should the material be blasted, excavated, and used as a fill material, either as run-of-quarry rock-fill or crushed, a risk assessment for radon generating potential may be considered – depending on the use of the fill. If the fill were to be exposed to atmospheric conditions, the radioactive hazard would be lower than if it were unventilated (e.g. below an enclosed structure or underground backfill). Likewise, the crushing process may elevate the presence of airborne long-lived radioactive dust. This would be similar to crushing most other materials; however, under the right conditions (e.g. closed quarters, poor ventilation) additional protection may be required to mitigate the hazard of radioactivity potential.

C.1.4 Biodiversity

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 and birds, including ravens, sparrows, mew gulls, kestrels, horned grebe, red-necked grebe, canvas-backed ducks, and scaup.

[23] Canadian Guidelines for the Management of Naturally Occurring Radioactive Materials (NORM) (2013)

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 potential 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.

The Giant Mine Project 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, addressing the Measures of *The Report of Environmental Assessment and Reasons for Decision* (MVRB, 2013) requires minimizing the release of contaminants to avoid negative impacts on wildlife and aquatic life.

C.1.4.1 2016-2017 Bird Survey

The GMRP contracted Golder to conduct the annual site-wide bird survey. The survey was scheduled to coincide with the spring nesting season and involved eight site visits between May 17 and June 9, 2016, each conducted on foot from 5 a.m. to 10 a.m. The bird surveys' purpose was to document how birds use site infrastructure, as well as looking at disturbed and undisturbed areas at the site where work was planned or ongoing in 2016. The surveys concentrated on areas where birds were considered to be at greatest risk due to current or planned future site activities and/or the presence of artificial perching or nesting structures such as buildings.

Birds were identified both visually and audibly, on the site and in adjacent undisturbed areas. The consultants searched the exteriors of site structures (including buildings, head frames, poles, derelict vehicles and equipment, open pits and water management areas) for bird presence or evidence of nesting. Site staff were questioned for knowledge of nests. The consultants' observations of birds, habitat types, and site features that may be used for nesting were recorded on paper and with a digital camera. They also recorded any other observations of wildlife that indicated a risk to either humans or wildlife.

The surveys also documented bird use of contaminated areas and were used to recommend and inform the site managers of appropriate mitigations to reduce the risk to birds, their eggs, and their nests from

industrial activities. Report findings and recommendations are taken into account prior to undertaking various site activities, such as upgrades or deconstructions.

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 2016-2017 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 9 through August 13), 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).
- Openings in buildings should be covered to prevent birds accessing the inside of infrastructure. This work should be completed outside of the nesting period to prevent nesting birds from becoming trapped. Examples of buildings where openings were observed during the surveys

include the C-boiler and elect shop, A-boiler and sump building, A-shaft and associated buildings (including the headframe), old town site building and the assay lab.

- 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.
- Numerous engineering solutions are available and could be deployed to reduce the risk of birds coming in contact with contaminated water. Examples include vegetation control along banks to reduce attractiveness to waterfowl and constructing steeply sloped banks to reduce the amount of beach, thereby reducing attractiveness to shorebirds. Exclusion fencing can deter terrestrial access to contaminated water and may be used to cover small water bodies. A wide range of methods and technologies have been applied to deter birds from areas where they are pests (e.g. agricultural fields), areas that present hazards (e.g. mining tailings ponds, garbage dumps), and areas where birds present hazards to people (e.g. airports). A summary of the various available methods and their efficacy is provided in a previous Golder report.

C.2 Health and Safety

C.2.1 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.

C.2.2 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 and Ecological Risk Assessment and a Stress Assessment.

C.3 Community

C.3.1 Engagement

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 GMRP 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 2015-20, 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 Project Team develops an Engagement Work Plan each year. The work plan details the planned communications and engagement activities that are ongoing or new.

To facilitate communication and engagement with interested parties, the GMRP has established a set of independent bodies. The following table provides information about these bodies.

Table 12: Types of Engagements and Frequency of Meetings

Independent Bodies	Frequency
Giant Mine Advisory Committee (GMAC) (Yellowknives Dene First Nation membership through designates) • 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) • The Giant Mine Working Group is a multi-party committee that consists of the Expert Support Departments, Indigenous 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 Oversight Board (GMOB)
• The Oversight Board was established to provide advice and to promote public awareness of the GMRP, 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:
  • 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. Ken Froes (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**
Yellowknife Dene First Nation Chief and Council	Yearly
Yellowknife Dene First Nation Land & Environment	Monthly
Yellowknife City Staff	Monthly
Yellowknife City Council Updates	Yearly
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

In addition to the above regularly scheduled meetings, the Project Team provides updates on GMRP activities and progress through multiple communication techniques, including:

- E-newsletter: sent monthly to more than 300 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 25 media interactions, including interviews and requests for information, in 2016-17.
- Responses to unforeseen events

- Topic-specific public service announcements, as required
- School presentations
- Topic-specific engagements as appropriate

The Project 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.

- 50 community events and engagements were held in 2016-17.

Engagement and event highlights from the 2016-17 reporting year include an Annual Public Forum, a Giant Mine Healing the Land Ceremony, and engagements related to the outfall location and the HHERA, which are summarized in the following sections. The Surface Design Engagement is now complete, with preliminary results shared in early 2017 and the decision is expected in 2017/18.

C.3.1.1 Annual Public Forum

On March 2, 2017, 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 GMRP 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 – particularly the continuing work to stabilize the underground and conduct environmental monitoring, as well as the work to design and implement health-related studies to make sure remediation activities will not have a negative effect on people's health – as well as future plans (including as they relate to the regulatory process) and progress on EA measures.

The Project Team held a similar forum to engage with Yellowknives Dene First Nation members in Dettah on March 1 at 6pm at Chief Drygeese Conference Centre.

C.3.1.2 Giant Mine Healing the Land Ceremony

On June 21, 2016, the Yellowknives Dene First Nation held its annual Feeding the Fire / Healing the Land Ceremony at the Weledeh Site. This Ceremony promotes 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. It marks the seasonal start of the healing the land process, as work continues on site activities. The event involves a Feeding the Fire ceremony, and was accompanied by traditional drumming.

GMRP staff members, including Deputy Director Natalie Plato and Engagement Manager Sharon Low, were on hand to take part.

C.3.1.3 Outfall Locations and Conceptual Design Engagement

The construction of a new effluent treatment plant (ETP) will be part of the final remediation plan for Giant Mine. The first stage of this work was to select a location for the outfall—where the treated water will be released into Great Slave Lake (Yellowknife Bay). The water will be discharged near the shore, near Giant Mine and will be drinking water quality, per CCME guidelines.

The process to determine the outfall location included engagements with the Giant Mine Working Group and the YKDFN GMAC and the broader YKDFN community in September 2016. The discussion was mainly focused on where these parties would like to see the outfall located, the impacts of the outfall, and what the design could potentially look like. Subsequent engagement sessions occurred in November 2016 (YKDFN GMAC only) and December (Giant Mine Working Group only), and February 2017 (both groups).

Based on input from the engagement sessions, the Project Team considered and assessed four locations. The evaluation criteria for the four options were informed by the preferences expressed during the engagements. From the four options, the Project Team chose an area in the vicinity of Baker Creek outlet for the new outfall. This was also the location preferred by the YKDFN GMAC. Further work is required to identify the exact location of the outfall; this is expected to be completed in 2017-18.

C.3.1.4 Surface Design Engagement Process

Throughout 2015 and into 2016 the Project Team worked with stakeholders in a surface design engagement process to support surface design decisions. Surface design engagement (SDE) 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 final phase of the Surface Design Engagement process wrapped up in February 2016. During 2016-17, the results of the Surface Design Engagement were shared.

- **April 2016:** An initial draft of the report, presenting the outcomes of the Options Evaluation Workshop, was provided to the Giant Mine Working Group and to the YKDFN GMAC for their review and input. Their comments were considered for incorporation into the final report.
- **June 2016:** The Project Team hosted meetings in which it presented the draft Surface Design Engagement Report to various stakeholder groups, including the Yellowknives Dene First Nation, the North Slave Métis Alliance, and the City of Yellowknife.
- **September 2016:** The final Surface Design Engagement report was shared with stakeholders.[24] The report documents the result of the workshops held between May 2015 and February 2016, as well as all of the additional input received throughout the engagement process.
- **February 2017:** On February 15th, 2017 the GMRP held a final surface design engagement session to report back to stakeholders on results from the SDE process. During this session, the Project Team presented some key decisions made based on input from SDE, including the alignment of Baker Creek onsite, filling the pits, remediating the near shore sediments in the townsite, and a rock cover for the tailings. Outstanding decisions include what material to fill the pits with and how to remediate soils. The surface design engagement process allowed participants to provide direct input into the many interconnected decisions required to plan for the future of the site after remediation. The Project Team has analyzed the results of

[24] Interested parties can email giantmine@aandc-aadnc.gc.ca or call (867) 669-2426 to make arrangements to receive a copy of the SDE report.

Surface Design Engagement options and potential impacts on the GMRP and will incorporate the selected options into the final Giant Mine surface remediation plan and Closure and Reclamation plan.

The final design decisions will be presented in the Closure and Reclamation Plan. This will be the main document submitted in the regulatory process and will document the objectives and updated remediation plan. A first draft is expected by 2018. Engagement on the Closure and Reclamation Plan will continue throughout 2017 and 2018.

While the final result may not reflect everybody's first choice or vision for the surface, the engagement process allowed the Project Team to have an understanding of the many perspectives that need to be considered throughout the planning process.

C.3.2 Procurement and Employment

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 Indigenous employment / procurement during the implementation phase of the GMRP. 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 GMRP (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 Indigenous. The total expenditure for the GMRP 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 Indigenous people through employment and procurement.*

C.3.2.1 Labour Resource Study

Based on the information gathered, Stratos identified GMRP occupations/positions with Northern Indigenous supply (i.e. areas with more than three suppliers or areas with interest, training and some expertise), occupations/positions with potential supply (i.e. areas with interest or training and some expertise) and gaps (i.e. areas with no interest, no or limited expertise and no training).

Key findings included:

- Economic conditions have resulted in recent mine closures, project cancellations and labour force reductions in Canada. Significant economic growth is not expected in the NWT until new mines come online around the turn of the next decade. The GMRP will therefore not likely face a competitive environment for recruiting workers needed for the GMRP and could target its communication of job opportunities to mining and construction workers who may be unemployed due to closures or slowdowns.
- The NWT is expected to face occupational shortages in construction, trades and engineering occupations.
- Indigenous workforce participation rates are low, but have the potential to grow over time if appropriate education and training are made available.
- The NWT has the highest proportion among the three territories of a commuter (i.e. out-of-territory) workforce. An awareness of immigration support programs will be important to ensure GMRP labour needs are met.

C.3.2.2 Training and Capacity Building

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

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 EA Measures and Suggestions – Detailed Tables

This appendix provides supplemental details about progress toward achieving the Measures stipulated via The Report of Environmental Assessment and Reasons for Decision (MVRB, 2013), *and plans for 2016-17. Throughout these tables, "the Project" refers to the GMRP. The language in the Measure column is drawn directly from The Report of Environmental Assessment and Reasons for Decision* (MVRB, 2013).

Table 13: Giant Mine EA Measures Tracking Table (as of July 31, 2017)

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
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	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: 1. consider results of the ongoing research 2. be participatory in nature 3. follow the requirements of procedural fairness and be transparent in nature. 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.	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 2017-2018
3	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 Body. 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 Body will ensure through the research activity that, on a periodic basis: 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 Body (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 2016-2017 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 Body 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 are identified through the funded research in-between these periodic 20-year reviews, these will be reported publicly by the Oversight Body 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.	Complete	Article 8 of the Environmental Agreement further formalized this obligation for the Oversight Body (GMOB).	No action required until closer to the 20 year review date.

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
5	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: 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 From this, the Developer will identify any appropriate Project improvements and identify management responses to avoid or reduce the severity of predicted unacceptable risks.	Future action required.	No activities took place in 2016-17, with the exception of planning within the project team.	Engagement on scope of QRA with the various stakeholders (WG, GMAC and others). Draft QRA report by June 2018.
6	The Developer will: • 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.	Report was provided to the Giant Mine Working Group and GMOB July 2017. The report outlines options for long term source of funds (i.e to the end of active remediation) and long term (i.e – post closure monitoring and maintenance), and included in the report
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 Body 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 Body 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 Body 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 Body.	Complete	The Environmental Agreement came into effect on June 9, 2015	None
8	The activities of the oversight body will include: • 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;	Complete	The Environmental Agreement provides for the creation of the Oversight Body (GMOB) and funding to fulfill these obligations	None.

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
	• 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		going forward.	
9	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: • Health Canada, GNWT Health and Social Services and the Yellowknife medical community; and • The Yellowknives Dene and other potentially affected communities. 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.	Underway	Dr. Laurie Chan confirmed as lead for Health Effects Monitoring Program. Advisory Committee established with representatives of Health Canada, GNWT HSS, Office of Chief Medical Officer, YKDFN, City of Yellowknife, NSMA, GMOB and other stakeholders. Draft monitoring proposal and engagement plan issued for review to Advisory Committee to address Measure 9.	The Health Effects Monitoring Program held a community information session in April. The recruitment of participants and sample collection to begin in Sept. First Wave of sampling to be completed from Sept to December. Results of First wave shared Spring of 2018. Same process will be completed starting in Fall of 2018.
10	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: 1. Include a critical review of the 2006 Tier II human health risk assessment and the previous screening reports; 2. Consider additional exposures and thresholds (as specified in Appendix F of the Report of EA); 3. Decide whether a Tier III risk assessment is appropriate; 4. 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; 5. Provide interpretation of results and related guidance; and 6. Inform the broad health effects monitoring program (described in Measure 9 above). 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	Underway	Engagement on the method of selection of the contractor completed with the Working Group. Contract awarded to CANNORTH for the HHERA. Dietary survey completed in January. Country foods sampling initiated to support HHERA. Engagement with WG and GMAC throughout year.	Country food sampling to be completed. Draft report review and discussion with GNWT Health in August 2017. Engagement on results of HHERA. October 10-12, 2017 engaging on Draft report by holding community sessions with residents of Yellowknife, Dettah and Ndilo. Final report completed by

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
	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. Also, footnote #133 in the Report of EA (Appendix D) is revised to read, in its entirety, "Including inference of causality and pathologies deducted from any available health studies."			December 2017. Early 2018 engagement on Stress Effects Study
11	The Developer, with meaningful participation from the Oversight Body 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 Body and the public. Once informed by the advice of the Oversight Body and regulatory authorities, the Developer will determine and implement the preferred option. In doing so, the Developer will consider the advice of the Oversight Body, regulatory authorities, and the public, and will ensure that the primary considerations in selecting an option are to: a) minimize the likelihood of Baker Creek flooding and entering the arsenic chambers, stopes and underground workings, and b) 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	Baker Creek was a key component in the Surface Design Engagement discussions and option evaluations. General stakeholder support for onsite alignment. Project will also fill pits to address flood risk and remove contaminated sediments to minimize exposure to fish in Creek. Additional input received from FCSAP Expert support and GMOB in October 2016.	A draft options report issued to stakeholders, including GMOB in August 2017 Baker Creek options to be discussed at the September Working Group meeting. Finalize report in November 2017.
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 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 *Guidance on the Site-Specific Application of Water Quality Guidelines in Canada.*	Future action required	Worked on site specific water quality objectives to feed into the SDE process and future stakeholder discussions.	Ongoing work to solidify the site specific water quality objectives. Engage on draft SSWQOs in Jan 2018. Finalize by May 2018.
13	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: 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;	Future Action Required	See Measures 11&12	See Measures 11&12

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
	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.			
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	An outfall study was initiated to choose a general location and conceptual design. Four potential discharge locations, and three discharge cooling options were considered and evaluated; Engagement was undertaken at the Working Group, GMAC and with the City. An outfall location in Yellowknife Bay somewhere in the vicinity of Baker Creek is recommended with no cooling. A draft report will be prepared and submitted for internal review by the end of this FY.	The Final Outfall Options report was issued in June 2017. The final siting option near the mouth of Baker Creek will be selected in 2018 in conjunction with work related to SSWQO.
15	The Developer and regulators will design and manage the Project so that, with respect to arsenic and any other contaminants of potential concern: 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: 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, abundance or diversity; c) Water quality changes due to effluent discharge will not adversely affect areas used as drinking water sources; and,	Future Action Required	As part of the Outfall location selection, mixing studies were completed at each of the potential locations. The Preliminary mixing study results indicate that the outfall location chosen, in Yellowknife Bay somewhere in the vicinity of Baker Creek, has sufficient mixing to achieve relevant drinking water and	A more detailed mixing study will be completed in order to select the exact outfall location. Additional engagement will also be required. Draft Effluent Quality Criteria (EQC) for the outfall and SSWQOs for Yellowknife Bay

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
	d) There is no increase in arsenic levels in Yellowknife Bay water at 200 metres from the outfall: and, e) There is no increase in arsenic levels in Yellowknife Bay sediments at 500 metres from the outfall		aquatic life parameters; however this work is still on-going.	will be engaged on in Jan 2018. Finalized by May 2018.
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 resuspend 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 (Scheduled for 2018-19).
17	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: 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 N'dilo, 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 *Guidelines for Designing and Implementing Aquatic Effects Monitoring Programs for Development Projects in the Northwest Territories, June 2009*, 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. Conceptual design for the AEMP will be completed by May 2018.
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. Evaluation of wet vs dry completed in Design Basis Report. Project proceeding with dry method. Freeze Plain Language Report drafted internally.	Finalize plain language report and distribute to WG, GMAC
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 arsenic removal or other remediation by future technologies.	Future Action Required	Decision to proceed with dry method for freezing and passive approach will allow for reversibility if needed.	None
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 N'dilo.	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	Future Action Required	None	None anticipated

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
	follow.			
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	The design of the tailings cover was engaged on through SDE. Based on input, a rock cover was selected (non-vegetated). This addresses this measure as there will be no vegetation.	Conceptual design of tailings cover and objectives to be finalized.
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	Tailings Monitoring and Management Plan will be part of the full Water License package to be engaged on in May 2018.
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	The selection of a rock cover supports addressing this measure.	To be considered in the Tailings Monitoring and Management plan, see Measure 23.
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 and new Ndilo stations were put in place, and operational	Replacement of equipment as needed, and continue to implement the AQMP.
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	HHERA work was awarded. Engagement was ongoing through regular meetings with GMAC, Working group, City of Yellowknife, and through the Surface Design Engagement Process.	HHERA to be finalized in December 2017. Ongoing engagement. Final suitable end land uses to be summarized in Closure and Reclamation Plan, Engagement with WG and GMAC on Closure Objectives.

#	Measure	Status	Progress in 2016-17	Plans for 2017-18
				Draft Closure Plan engaged on in May 2018.

Table 14: Giant Mine EA Suggestions Tracking Table (as of July 31, 2017)

#	Suggestion	Status	Progress in 2016-17	Plans for 2017-18
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 engagement efforts through regular meetings with the Giant Mine Working Group and the YKDFN GMAC. Surface Design Engagement Process (SDE) initiated in 2015 continued in 2016 with the SDE draft report submitted in June 2016. A final engagement session was held in February 2017 to discuss the "current thinking". Ongoing meetings with City of Yellowknife staff to provide updates on the project.	Ongoing engagement activities with GMAC, Working Group and the City of Yellowknife. Detailed design engagement as appropriate. Ongoing follow-up 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 Indigenous communities and the environment.	Future Action Required	Continued interaction with the Communicating with Future Generations Working Group. This project was completed with the implementation of the Toxic Legacies workshop held in September 2016 The Surface Design Engagement Process considered the creation of a monument or memorial.	None
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: 1. develop an education resource unit on the impacts of Giant Mine on the land and on people, including impacts on Indigenous 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.	None.

#	Suggestion	Status	Progress in 2016-17	Plans for 2017-18
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
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	GNWT ENR is looking at needs for revisions to their contaminated sites guidelines.
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 has initiated discussions with DFO on this issue and will continue to 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	Future Action Required	None	All relevant options will be considered in the overall analysis of remedial strategies for the site

#	Suggestion	Status	Progress in 2016-17	Plans for 2017-18
	changes to Project design. This should be completed before a water license is issued for the Project.			
11	To manage the risks of airborne exposure of contaminated dust from deconstruction of buildings or other structures on site, the Developer should: • 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 *Fisheries Act*.	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. The Project has held discussions with City officials on the selected location for the landfill.

#	Suggestion	Status	Progress in 2016-17	Plans for 2017-18
16	The Developer should consult with Indigenous 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 engagement with the YKDFN through the GMAC group. YKDFN was a key participant in the SDE process.	Ongoing engagement and engagement as detailed design is developed.

Appendix E: Detailed Work Plan

STATUS REPORT AGAINST THE APPROVED 2016/17 DWP				
Giant Mine				
Category	**Level 2**	**Level 3**	**Status of Task**	**Notes/Comments**
Care & Maintenance	**2.1 Base Care & Maintenance**	2.1.1 General Care and Maintenance	Ongoing	Renewed each FY
		2.1.2 Site wide Energy Provision	Ongoing	Renewed each FY
	2.2 Construction Manager Management Services	2.2.1 Interim Construction Manager (ICM) Management Services	Ongoing	Renewed each FY - will continue until the MCM is in place.
		2.2.2 Main Construction Manager Management Services	Delayed - No work in 16/17	Delayed due to confirmation of contarct documents
	2.4 Monitoring	2.4.1 LTEMP/MMER/EEM Implementation & Mgmt	In Progress	This work continues into next FY as per the 16/17 WPPP. Only a delay in the development of the LTEMP framework into the new fiscal year, which was planned to be completed in the summer of fiscal year 2016-17.
		2.4.2 Habitat Vertebrate Study	In Progress	This work continues into next FY as per the 16/17 WPPP
		2.4.3 Stope Monitoring Program	In Progress	Renewed each year
		2.4.4 Air Quality Monitoring Program	Ongoing	Renewed each year
		2.4.5 Dam Infrastructure	Delayed - No work in 16/17	Delayed due to approach yet to be defined

Regulatory	**1.4 Regulatory & Permitting**	1.4.1 Interim Licencing & Permitting	No work in 16/17	No work will be completed in this work package - any work pertaining to the WL will take place in 1.4.2.
		1.4.2 Water License Package Prep	No work in 16/17	
Consultation	**1.3 Consultation & Engagement Activities**	1.3.1 Ongoing Engagement	Ongoing	Renewed each FY
		1.3.2 Oversight Body	Ongoing	Renewed each year
		1.3.3 Project Communications	Ongoing	Renewed each year
		1.3.4 Surface Design Engagement	Complete in 16/17	
Remediation	**2.3 Immediate Risk Mitigation (Site Stabilization Plan)**	2.3.2 Underground Stabilization	Ongoing	2.3.2.3 -C5-09 - Stabilization - as per 16/17 WPPP
		2.3.6 Site Security Upgrades	Ongoing	Renewed each year
		2.3.7 Deteriorating Infrastructure Action Plan	Ongoing	This work continues into next FY as per the 16/17 WPPP
		2.3.8 Worker Exposure HHRA	Complete in 16/17	
		2.3.9 Building Deconstruction	Complete in 16/17	2.3.9.1 - A Shaft and Curling club
	2.5 Site Infrastruture Improvements	2.5.1 Mine Water Management	Ongoing with delays	2.5.1.1.2 - Option Analysis and Pumping system upgrades - continues into next FY as per 16/17 WPPP with significant delays due to scope, approach and contract negotiation
		2.5.2 ETP	Complete in 16/17	2.5.2.2 - ETP Improvements - any additional elements moved to 2.1 - C&M
		2.5.3 Electrical	Complete in 16/17 Ongoing Complete in 16/17	2.5.3.1 - B3 Substation Reconfiguration 2.5.3.2 - C-Shaft Power Feeder Replacement -

				continues into next FY 2.5.3.3 - U/G Power Distribution Upgrades
		2.5.4 Communications System	Complete in 16/17	
		2.5.5 Underground Utility Improvements	Ongoing	This work continues into next FY as per the 16/17 WPPP
		2.5.7 Borrow Development to Support C&M	Complete in 16/17	
	2.6 Tailings Management	2.6.1 Interim Dust Management	Cancelled	2.6.1.2 - Implementation - activities moved to C&M (2.1)
	3.2 Risk Assessment	3.2.1 HHRA	Complete in 16/17	
		3.2.3 Quantitative Risk Assessment	In Progress	This workplan is continuing into the FY 17-18. Only delay was with the gap analysis completion, which was delivered in late December of 2016. Also a delay to FY 2017-18 for the engagement portion of this work plan due to stakeholder availability.
	3.3 Remedial Options Analysis & Design	3.3.01 Freeze Program	Ongoing Ongoing	3.3.1.1 - Optimization Study - continues into next FY as per the 16/17 WPPP 3.3.1.2 - Gap Analysis - continues into next FY as per the 16/17 WPPP
		3.3.02 Underground Stabilization	Complete in 16/17 Complete in 16/17	3.3.2.1 - Remainder Stope Drilling 3.3.2.2 - Mine Re-flooding Risk Assessment

		3.3.03 Baker Creek	Complete in 16/17 Ongoing	3.3.3.1 - Development of selection of Alignment Option 3.3.3.3 - Development and Selection of Alignment Option - continues into next FY as per 16/17 WPPP
		3.3.04 Effluent Treatment Plant	Complete in 16/17 Ongoing Ongoing	3.3.4.2 - Near Shore Outfall - finalization of report will occur in April 2017 3.3.4.4 - Pilot Plant - continues into next FY with delays due to approach taken 3.3.4.5 - Desgin and Cost Estimate - continues into next FYas per 16/17 WPPP
		3.3.05 Contaminated Soils	Complete in 16/17 Ongoing	3.3.5.1 - Arsenic Characterization 3.3.5.3 - Design completion and cost estimate - continues into next FY as per 16/17 WPPP
		3.3.08 Tailing Rehabilitation	Ongoing	3.3.8.1 - confirmation of design objectives - continues into next FY with delays due to additional review with regards to the tailing cover option
		3.3.11 Waste Stream Management	Ongoing Ongoing	3.3.11.1 - Arsenic waste Disposal Options - continues into next FY as per the 16/17 WPPP 3.3.11.2 - Non Hazardous Waste Disposal Options - continues into next FY with delays due to final preperation - will continue into

				next fy
		3.3.12 Borrow Sources	Ongoing	3.3.12.1 - design completion and cost estimate - continues into next FY as per the 16/17 WPPP
		3.3.09 Surface Water Management	Complete in 16/17	3.3.9.1 - Arsenic Loading Study 3.3.9.2 - Design completion and cost estimate
		3.3.14 Closure & Reclamation (C&R) Plan Development	Ongoing	Continues into next FY as per the 16/17 WPPP
Program Management	**1.1 AANDC Project Management**	1.1.1 SWE	Ongoing	Renewed each FY
		1.1.2 Travel	Ongoing	Renewed each FY
		1.1.3 Socio-Economic Strategy	Complete in 2016/17	1.1.3.1 - Development Strategy
		1.1.4 EHSC MS	No work in 16/17	
		1.1.5 Admin & Other Disbursements	Ongoing	Renewed each FY
		1.1.6 Agreements & Transfers	Ongoing	Renewed each FY
	1.2 PWGSC Project Management & Support	1.2.1 PWGSC Fees	Ongoing	Renewed each FY
		1.2.2 Travel	Ongoing	Renewed each FY
		1.2.3 Admin & Other Disbursements	Ongoing	Renewed each FY
		1.2.4 PM Support services	Ongoing	Renewed each FY
	1.5 Data Management	1.5.1 Data and Information Management	Ongoing	Renewed each FY
	3.1 Technical Advisory & Support	3.1.1 AANDC	Ongoing	Renewed each FY
		3.1.2 PWGSC	Ongoing	Renewed each FY