

# 2023 ANNUAL REPORT

GIANT MINE  
**Oversight Board**







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# The Giant Mine Oversight Board at a Glance

## **PURPOSE**

The 2015 Giant Mine Remediation Project Environmental Agreement (“the Agreement”) established the Giant Mine Oversight Board (“GMOB”). GMOB has two primary purposes:

1. Independently monitor, promote, advise, and support the responsible management of the remediation of the former Giant Mine site; and,
2. Manage a research program to seek a permanent solution to the arsenic trioxide dust stored underground at the former Giant Mine site.

## **MANDATE**

To achieve its purposes, GMOB’s mandate is to:

- Monitor and report on the Giant Mine Remediation Project (“the Project”);
- Review, comment, and make recommendations on programs, research, and reports about the Project;
- Support research into a permanent solution for the arsenic trioxide dust stored underground at the former Giant Mine site; and,
- Communicate to the public and Parties to the Agreement about GMOB’s activities.

## **VISION**

GMOB envisions that the remediation of the former Giant Mine site, including the sub-surface, will be carried out in an environmentally sound, socially responsible, and culturally appropriate manner.

## **GOVERNANCE**

GMOB is governed by a six-member Board of Directors. The six Parties to the Agreement each appoint one member to the Board. Each Director acts independently from the Party making the appointment. The Parties are:

1. Government of Canada, Crown-Indigenous Relations and Northern Affairs Canada
2. Government of the Northwest Territories, Environment and Climate Change
3. Yellowknives Dene First Nation
4. North Slave Métis Alliance
5. Alternatives North
6. City of Yellowknife

The Government of Canada and the Government of the Northwest Territories are Co-Proponents of the Giant Mine Remediation Project. They work together as the Giant Mine Remediation Project Team (“the Project Team”).

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# Message from the Giant Mine Oversight Board

The Giant Mine Oversight Board (GMOB) was created pursuant to the 2015 Giant Mine Environmental Agreement. It is an independent Board composed of individuals appointed by the six signatory parties. These include the Government of Canada, Government of the Northwest Territories (Co-Proponents of the Project), Yellowknives Dene First Nation, North Slave Métis Alliance, Alternatives North, and the City of Yellowknife. Once appointed, the members are independent of their appointing organizations. The GMOB's Executive Director and external consultants support the Board.

GMOB monitors and supports the responsible remediation of the Giant Mine site. It is also tasked with seeking a permanent solution to the arsenic trioxide dust that is stored underground at the mine.

This report sets out GMOB's expectations for each of seven key aspects of the remediation project, its observations as to the actions taken in 2023, and its conclusions and recommendations for future work. The report also summarizes GMOB's activities in 2023, including its engagement activities and research endeavors, and provides a status report on past recommendations. This is the eighth annual report issued by GMOB since its establishment.

As with past years, 2023 was very busy for the Project Team, the Main Construction Manager, the Parties to the Agreement, contractors working at the site, and GMOB. Operations were complicated by forest fires in the region and the consequent evacuations.

GMOB has not identified any major environmental issues at the site arising from remediation activities in 2023. Engagement by the Giant Mine Remediation Project Team ("the Project Team") with the Parties to the Agreement on engineering and environmental issues through the various working groups remained strong and effective. GMOB acknowledges the progress made by the Project Team as the engineering and environmental monitoring work has successfully moved into the operational phase.

However, GMOB continues to be disappointed with the continued delay in developing the Perpetual Care Plan and the lack of significant progress on ensuring that northern residents and businesses benefit to the fullest extent possible over the duration of the Project. GMOB is also concerned by the abandonment of the Project site during the forest fire evacuations in the Yellowknife region during August and September of 2023.

Progress on the reporting and analysis of economic aspects of the Project remains below GMOB's expectations. GMOB continues to strongly support better reporting on economic aspects of the remediation project, better analyses to determine where improvements can be made, improved strategic planning, and better application of lessons learned from other remediation projects. GMOB continues to urge the Project Team to improve access to remediation work for local small businesses, and to create more employment and training opportunities for residents.

GMOB built an economic model of the Project to address the information gaps in the Project Team's economic reporting. This model demonstrated the potential economic

benefits arising from the Project and provided a different and more detailed perspective of future labour demand from than that developed by the Project Team. GMOB supports more robust economic reporting, analysis on where improvements can be made, and a continuous application of lessons learned.

GMOB is encouraged by the growing capacity within the Indigenous business community to compete for a larger share of the available work. However, it was disappointed by the drop in both NWT resident and Indigenous employment, and the limited activity by NWT non-Indigenous businesses. GMOB appreciates that the NWT economy has been strong, with a robust labour market and a diversity of opportunities across numerous sectors. Still, this level of activity is not expected to last, with mine closures and government cutbacks expected. GMOB urges the Project Team, particularly the GNWT, to actively and regularly revisit its approaches to employment, procurement, and training to ensure continual improvement throughout the life of the Project.

GMOB firmly believes that future generations should not be burdened with the risk and liability of the arsenic trioxide dust currently stored underground at the site. This report summarizes the progress made by GMOB and its research partners in 2023 in their work to identify a permanent method to deal with the arsenic trioxide dust. This work includes studies to characterize the dust, converting the dust into arsenic sulfide (a more stable and less toxic compound), vitrification (transforming the dust into glass), mixing the dust with cement, and chemical stabilization using local bacteria. GMOB has identified actions and commitments for 2024 that build on the success of the 2023 GMOB Research Program Report (see Appendix B). GMOB held a public meeting in the fall of 2023 to report on these studies.

This report also updates the status of GMOB's past recommendations and identifies those that were accepted, rejected, rejected and no longer relevant, or not addressed. Many recommendations have been repeated over the years, including those related to the Perpetual Care Plan and Reconciliation.

The 2023 recommendations set out in this report include those related to: Economy; Communication, Engagement and Reconciliation; Project Management and Planning; Community Health and Well-Being; and Long-term Planning.

The Board, its Executive Director, and GMOB's partners recognize and appreciate the efforts that all parties have made in working toward successfully remediating the site. We all understand that much has been accomplished but much more needs to be done. We strongly encourage all involved to remain fully engaged in implementing their respective responsibilities in a cooperative and effective manner. Only by doing so can remediation and closure of the site be done in a manner that is environmentally sound, economically beneficial, socially responsible, and culturally appropriate.

David Livingstone  
Chair, Giant Mine Oversight Board



# Project Oversight in 2023

For GMOB, project oversight involves monitoring, reviewing, and commenting on documents and presentations relevant to the Project. It also includes attending meetings, seeking expert advice, making recommendations, and promoting public awareness and engagement. GMOB's project oversight activities fall into seven interrelated areas of responsibility:

- 1. ENVIRONMENT**
- 2. ECONOMY**
- 3. COMMUNICATION, ENGAGEMENT, AND RECONCILIATION**
- 4. PROJECT MANAGEMENT AND PLANNING**
- 5. COMMUNITY HEALTH AND WELL-BEING**
- 6. LONG-TERM PLANNING**
- 7. GMOB RESEARCH PROGRAM**

**EACH PROJECT OVERSIGHT RESPONSIBILITY IS BRIEFLY DISCUSSED, WHERE APPLICABLE, TO ANSWER THE FOLLOWING QUESTIONS:**

- WHY IS THIS IMPORTANT?**
- WHAT DOES GMOB EXPECT?**
- WHAT ACTIONS WERE TAKEN?**
- WHAT WERE THE OUTCOMES OF THE ACTIONS?**
- WHAT ARE THE NEXT STEPS?**
- WHAT DOES GMOB RECOMMEND?**

## Acronyms

<b>AAC</b>	Aquatics Advisory Committee
<b>AEMP</b>	Aquatic Effects Monitoring Program
<b>CIRNAC</b>	Department of Crown-Indigenous Relations and Northern Affairs Canada
<b>DFO</b>	Department of Fisheries and Oceans
<b>ETP</b>	Effluent Treatment Plant
<b>GHG</b>	Greenhouse Gas(es)
<b>GMOB</b>	Giant Mine Oversight Board ("the Board" when referring only to the appointed members, "GMOB" when referring to the Board and staff)
<b>GMRP</b>	Giant Mine Remediation Project ("the Project")
<b>GMWG</b>	Giant Mine Working Group
<b>GNWT</b>	Government of the Northwest Territories
<b>HHERA</b>	Human Health and Ecological Risk Assessment
<b>IOC</b>	Indigenous Opportunities Considerations
<b>MCM</b>	Main Contract Manager, Parsons Corporation
<b>MVEIRB</b>	Mackenzie Valley Environmental Impact Review Board
<b>NSMA</b>	North Slave Métis Alliance
<b>NWT</b>	Northwest Territories
<b>OCAP</b>	Ownership, Control, Access, and Possession
<b>PIP</b>	Project Implementation Plan
<b>PCP</b>	Perpetual Care Plan
<b>PSIB</b>	Procurement Strategy for Indigenous Business
<b>PSPC</b>	Public Services and Procurement Canada
<b>RFP</b>	Request for Proposals
<b>TERRE-NET</b>	Toward Environmentally Responsible Resource Extraction Network
<b>TRC</b>	Truth and Reconciliation Commission of Canada
<b>UNDRIP</b>	United Nations Declaration on the Rights of Indigenous Peoples
<b>WHO</b>	World Health Organization
<b>WLU</b>	Wilfrid Laurier University
<b>YKHEMP</b>	Yellowknife Health Effects Monitoring Program
<b>YKDFN</b>	Yellowknives Dene First Nation

# PROJECT OVERSIGHT

## ENVIRONMENT

### WHY IS THIS IMPORTANT?

Reducing and eliminating environmental risks associated with the former Giant Mine site is the fundamental priority for the Project Team and an important consideration for Yellowknife, Ndilo, and Dettah residents.

A healthy environment contributes to the overall health and well-being of the communities. This priority aligns with the Giant Mine Remediation Project's primary goal to protect human health and safety and the environment.

GMOB acknowledges the progress made by the Project Team as the GMRP engineering and environmental monitoring work enters the operational phase.

**Section 2.2** of the Giant Mine Remediation Environmental Agreement (the Agreement) states that the Parties intend that the Agreement will achieve or support the following objectives:

- a. the remediation of the Giant Mine site in a manner that protects the land, air, water, aquatic life, and other wildlife in the area of or potentially affected by the Project;
- b. the remediation of the Giant Mine site in a manner that eliminates or substantially mitigates the environmental risks posed by the site;
- c. comprehensive, integrated ecosystem-based approaches for the monitoring, management, and regulation of the Project; and,
- d. the minimization of the Perpetual Care requirements at the Giant Mine site.

**Section 3.1 (b) (v)** of the Agreement enables GMOB to compile and analyze available and relevant environmental quality data to review, report, or make recommendations about “environmental or engineering studies conducted by the Co-Proponents in relation to the Project.”

### WHAT DID GMOB EXPECT?

GMOB expects the Project Team to develop and implement effective management, monitoring, design, and construction plans in all phases of the Project. GMOB considers comprehensive emergency response and contingency plans as essential components of the Project.

In light of the emergency evacuations in August and September 2023, GMOB expects a comprehensive review of the Project Team's response and lessons learned. GMOB has not received details on what measures were taken by the Project Team to secure and safeguard the site, remediation infrastructure, and safety equipment. GMOB also seeks clarification on how the emergency plan addressed project security and continuity.

These types of emergency events demonstrate the inherent linkages between contingency plans and the Perpetual Care Plan. GMOB expects these plans to be aligned and coordinated with the City of Yellowknife and other regulatory agencies to minimize the risk of environmental effects on the mine site, and to ensure ongoing safety of on-site workers and the public.

GMOB expects the Project Team and all site contractors to adhere to the Spill Contingency Planning and Report Regulations pursuant to the NWT Environmental Protection Act with respect to reporting spills.

GMOB expects the Project Team's designs and site operations to account for the emerging findings from GMOB's research program. The Project Team's communication about the Project site and future plans should clearly include the temporary nature of freezing the arsenic trioxide dust stored underground and the search for a permanent solution.

The Project Team's leadership in conducting a series of successful arsenic dust core samples from various chambers in 2023 to support the GMOB research program is gratefully acknowledged. This included supporting GMOB's role in coordinating the safe transportation of the samples from the Project site to the SGS Minerals Services facility in Lakefield, Ontario. Strengthened coordination of the Project Team's plans with the GMOB Research Program is essential to ensure that remediation does not compromise the implementation of a permanent solution.

By working with the Project Team, GMOB will also remain up to date with remediation plans that may affect the research program and a permanent solution for the arsenic trioxide dust. Considerations include, but are not limited to, maintaining access to the chambers for future extraction and safe storage of the arsenic trioxide dust, and ensuring that surface sites are available for arsenic trioxide dust treatment in the future.

### **WHAT ACTIONS WERE TAKEN?**

The Type A Water Licence issued by the Mackenzie Valley Land and Water Board ("Land and Water Board") in 2020 requires the Project Team to develop and submit a variety of management, monitoring, design, and construction plans and reports. During 2023, the Project Team provided the required reports and implemented measures to minimize environmental impacts during active remediation.

Monitoring reports found that air quality is consistently good at and near the mine site, and in nearby communities. Monitoring reports also showed that the effluent discharge met the standards set by the Water Licence. Water and aquatic life monitoring results for Back Bay and Baker Creek found no marked change over previous years.

GMOB's review of monitoring and inspection reports in 2023 raised no significant environmental issues. Overall, the Project Team continued to prioritize environmental management and safety throughout the year. However, given the size of the Project site, GMOB questions why there were only two inspection reports filed on the public registry.

The Project is now in the active remediation phase. The Project Team has submitted the required management, monitoring, design, and construction plans and reports to the Land and Water Board. Proposed changes to the current management and monitoring plans were discussed by the Parties, GMOB, and the Project Team before those plans were submitted to the Land and Water Board. The plans and reports were then approved with or without revision by the Land and Water Board.

## **REPORTS AND PLANS REVIEWED BY GMOB IN 2023**

### **The Project Team:**

- 2021 GMRP Annual Report

### **Land and Water Board Reviews:**

- Water Treatment Design Plan v1.0 and v1.1
- Borrow Materials and Explosives Management and Monitoring Plan v2.0
- Dust Management and Monitoring Plan v3.0
- 2022 Water Licence Annual Report
- 2022 Aquatic Effects Monitoring Program Annual Report
- Aquatic Effects Monitoring Program Response Plan
- Underground Design Plan v1.4
- Water Management and Monitoring Plan v4.0
- Borrow Design Plan v1.0

### **Other Reports:**

- Monitoring and Inspection Reports required under the Water Licence
- GMRP Climate Change Report
- Reclamation Research Report – Dam 3 Downstream

The Project Team continued and/or completed the following activities during 2023:

- Continued care and maintenance activities, including the management of:
  - waste storage areas,
  - wastewater discharge,
  - dust control on roads,
  - dust control on tailings containment areas,
  - monitoring and reporting on air and water quality, and
  - responses to inspections.
- Continued the paste backfill program.
- Completed construction of Phase 1 of the non-hazardous waste landfill.
- Completed demolition of the townsite, including those structures near the planned new water treatment plant.

The Aquatic Advisory Committee (the “AAC”), established in 2020, continues to provide guidance on mitigations and monitoring decisions for Baker Creek and Back Bay. GMOB expects that the AAC will be useful as an ongoing source of advice and engagement with aquatic experts and knowledge holders. The AAC met once in 2023 to discuss the design of the Project Team’s Aquatic Effects Monitoring Program.

GMOB continues to have concerns regarding the scope of the AEMP, and the limited engagement by the Department of Fisheries and Oceans (“DFO”) and Transport Canada in the Fisheries Act Authorization consultation process.

The Yellowknife wildfire evacuations in August and September 2023 included the Project site. The Project Team has yet to clearly outline the measures taken to secure and safeguard the site, remediation infrastructure (e.g., the water treatment facility), and safety equipment; and, to ensure project security and continuity.

### **WHAT WERE THE OUTCOMES OF THE ACTIONS?**

GMOB found no significant environmental issues associated with the mine site or remediation activities in 2023. Minor concerns related to monitoring and inspections were remedied in an appropriate and timely manner. However, there were ongoing problems with one of the submersible mine water pumps. GMOB understands that a backup submersible pump has been procured and is stored with the manufacturer in Leduc, Alberta.

The Aquatic Effects Monitoring Program identified three “action level” exceedances for water quality and fish health, meaning thresholds were met that triggered an associated response. One low action level response was triggered because six metals had an increasing trend in samples from Baker Creek. Water flowing from beneath the calcine pond was identified as a potential source and the Project Team will investigate this further. Liver weight in female slimy sculpin triggered a low action level response and liver weight in male slimy sculpin triggered a moderate action level response. The Project Team developed and submitted a response plan for the moderate action level exceedance.

Investigation into the elevated dissolved iron concentrations at the mouth of Baker Creek, suggests that the Project activities are not the source of the dissolved iron. The Project Team will continue to monitor water quality trends in Baker Creek. Water and aquatic life monitoring results for Back Bay and Baker Creek found no marked change over previous years.

One exceedance of the Effluent Treatment Plant discharge limits was reported in 2023. The Project Team is investigating this occurrence and implementing corrective action. Monitoring reports also showed that the effluent discharge met the standards set out in the Water Licence, with the one exception noted above.

A blast vibration exceedance was reported in 2023, but it was determined to be due to faulty monitoring equipment. Another test blast showed no exceedances.

There were some instances where air filters picked up evidence of tailings dust that real-time monitoring did not detect. The Project Team is investigating these occurrences.

The Giant Mine Working Group (“GMWG”) provides feedback to the Project Team on remediation plans. Working Group members are:

- Crown-Indigenous Relations and Northern Affairs Canada;
- Public Works and Government Services Canada;
- Government of the Northwest Territories;
- Environment and Climate Change Canada;
- Department of Fisheries and Oceans;
- Alternatives North:
- Yellowknives Dene First Nation;
- North Slave Métis Alliance;
- Health Canada; and,
- City of Yellowknife.

The GMWG met five times in 2023. These meetings provided a useful opportunity for the Project Team to update the Parties on Project activities and for the Parties to review upcoming submissions to the Land and Water Board.

In response to a previous GMOB recommendation (2019-9), the Project Team began tracking and reporting on greenhouse gas (“GHG”) emissions from site activities. They collected a second full year of GHG tracking data in 2023. This data collection is intended to align with the Government of Canada priorities and policies regarding mitigation of climate change effects.

In May 2023, the Project Team provided the Giant Mine Remediation Climate Change report prepared by Golder Associates Ltd. in 2020. This report and subsequent discussions left unanswered questions and raised a number of concerns among the Parties. Consequently, GMOB contracted RFS Energy Consulting & Research Group Inc. (“RFS Energy”) to conduct a high-level review of the Golder report. The review used a climate adaptation and mitigation lens to identify gaps and assess the use of up-to-date metrics,

best practices, and climate science. The RFS report (*Giant Mine Remediation Project - Climate Change Report Review: Summary Report & Recommendations, October 2023*<sup>1</sup>) included recommendations (short and longer-term) for the Project Team and was shared with the Parties.

GMOB encourages the Project Team to continue to gather and use the most up-to-date data regarding climate change in its design and construction phases. It equally encourages the Project Team to publicly share information on climate change impacts on the Project, as well as impacts of the Project on climate change (e.g., GHG emissions from the Project).

### **WHAT ARE THE NEXT STEPS?**

GMOB will continue to:

- review environmental management plans and monitoring reports;
- monitor engagement undertaken by the DFO regarding the Baker Creek and Nearshore/Foreshore Tailings work;
- share concerns and issues through direct dialogue with the Project Team and Parties to the Environmental Agreement as well as in comments to the Land and Water Board; and,
- monitor the Project Team's reporting regarding specific measures taken to secure and safeguard the site and equipment (e.g., the water treatment facility) and to ensure project continuity, during the wildfire evacuation.

GMOB requests that the Project Team clearly address recurring pump failures. It is currently unclear whether the back-up unit, stored in Leduc, Alberta, is routinely tested for operational functionality. If it is not, GMOB encourages the Project Team to produce and share a plan to ensure both the unit's functionality and measures in place for its timely transportation.

GMOB notes the results of recent research by Palmer et al, "*Mineralogical, geospatial, and statistical methods combined to estimate geochemical background of arsenic in soils for an area impacted by legacy mining pollution?*" suggest that the level of naturally occurring arsenic in the Yellowknife area may be lower than previously thought. The elevated levels measured in soil sampling programs within a 25 km radius of Yellowknife appear to be influenced by roaster stack emissions from Yellowknife-area mines.

The GNWT is currently updating its soil quality guidelines. GMOB submitted preliminary comments and questions regarding the potential implications of the Palmer study to the Project Team, the City of Yellowknife, and the Land and Water Board. GMOB will continue to engage in this matter, including conducting a more detailed technical review of the background information.

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1 <https://gmob.ca/wp-content/uploads/2023/10/2023-10-01-GMRP-Climate-Change-Report-Summary-Recommendations-RFS-Energy-2023-F.pdf>

2 [https://nwt.discoveryportal.enr.gov.nt.ca/geoportal/documents/Palmer%20et%20al%202021%20YK%20soils%20\(002\).pdf](https://nwt.discoveryportal.enr.gov.nt.ca/geoportal/documents/Palmer%20et%20al%202021%20YK%20soils%20(002).pdf)



The Project Team recently stated that the findings of the 2018 Human Health and Ecological Risk Assessment (“HHERA”) report, which was developed using GNWT’s 2003 soil guidelines, remains valid. However, GMOB has identified an apparent discrepancy between the 2018 risk assessment and how the GNWT derived its arsenic values for the new guideline for Yellowknife. The research by Palmer et al. shows that roaster stack emissions increased arsenic levels in regional soil, including deeper soil. GNWT uses the term “ambient background” to indicate the current arsenic concentration in soil in the Yellowknife region. “Ambient background” arsenic levels thus include impacts from arsenic trioxide dust released from Giant, Con, and Negus mines in the late 1940s and into the 1950s and do not reflect the true ambient background pre-development. GMOB is of the view that remediation risk assessment should consider whether the pre-development background values should be used rather than the current ambient numbers.

#### **GMOB ACTIONS/COMMITMENTS FOR 2024**

1. GMOB will formalize its review of the Aquatic Effects Monitoring Program. This review will include contracting a consultant report from a subject matter expert. This goal of this review is to determine whether the Land and Water Board’s guidance with respect to Aquatic Effects Monitoring Program engagement and design has been followed..
2. GMOB will request information from the Project Team regarding reports of water leakage and movement from Northwest Tailings Containment Area into the underground and will review the issue further.
3. GMOB will conduct regular meetings with the Project Team, Project inspectors and other regulatory bodies to strengthen mutual communications and information sharing.
4. GMOB will work with the City of Yellowknife, the GNWT and the Project Team to finalize and assess the post-closure land use constraints map. Once final, the map will inform a range of remediation options and decisions related to land-use planning, short-term project management, and long-term planning, including the location of a possible arsenic trioxide dust treatment and storage facility.

## ECONOMY

### WHY IS THIS IMPORTANT?

Between 1948 and 2004, Giant Mine was a major economic driver for the Yellowknife area and the Northwest Territories. When the mine stopped operating and Canada became the site custodian, attention focused on the environmental issues left behind.

The Government of Canada has determined that remediation of the site to today's environmental standards will cost Canadian taxpayers \$4.38 billion, and ongoing work will span 30-plus years.

The Giant Mine Remediation Project will be one of the largest, if not the largest, economic projects in the history of the Yellowknife area. It has the potential to become a watershed for the NWT's future prosperity and will influence other remediation activities expected in the NWT over the next 10 to 20 years. Increasing participation by resident labour and businesses will bring greater prosperity to Yellowknife and surrounding communities and set the NWT on a path for a stronger and more integrated economy in the future.

**Article 2.1 (d)** of the Agreement states that one of its key purposes is to “build public confidence in the Project and enhanced transparency and accountability in relation to the Project.”

**Article 2.2 (a) (ii)** of the Agreement states that the Parties intend that the Agreement will achieve or support the remediation of the Giant Mine site in a manner that protects “the economy, way of life and well-being of the aboriginal peoples of Canada in the vicinity of Yellowknife, and of other residents of Yellowknife, the Northwest Territories and Canada.”

The size and importance of the Project demands that the flow of money be closely monitored and accounted for by the governments of Canada and the NWT. The goal of this oversight is to ensure that every opportunity for resident participation is taken. Likewise, GMOB believes the economic opportunities flowing from the Project require a similar level of attention from the Parties to the Agreement.

### WHAT DID GMOB EXPECT?

The Project is expected to create significant local business, employment, and training opportunities and benefits. These opportunities and benefits will accrue throughout the life of the Project, including post-remediation activities.

**Reporting:** GMOB expects the Project Team to report its economic results, including employment, purchasing, and training records, in a timely manner. These reports are expected to clearly show the participation of NWT Indigenous and non-Indigenous labour and businesses in the Project and the extent to which the money being spent on the Project remains in the NWT. Economic reporting should include all employment effects on public administration and the Main Contract Manager (“MCM”) in addition to the employment associated with Project contractors. GMOB expects the Project Team to also report indirect spending where possible, and to report spending within the NWT, within Canada, and on direct imports. The tracking and timely reporting of results should be done quarterly (where appropriate) and annually as well as on a cumulative basis.

GMOB expects the Project Team to report training outcomes in addition to hours spent in training. Furthermore, GMOB expects the Project Team to provide detailed information on how it funds training, how that funding is being spent, and how the results of that spending are affecting resident employment with the GMRP.

**Project Contracting and Employment:** Amongst its goals, the Project Team aims to build capacity and maximize benefits, and uses Northern Indigenous-centered procurement processes as one of the principal tools to reach those goals. Contract values, employment, and training hours are the primary metrics used to gauge performance.

The number and dollar value of contracts awarded to Indigenous firms has grown since the Project moved into its implementation phase. The latest data show 61% of the dollar value of contracts were awarded to Northern suppliers. The result is approaching the stated target of 65% to 75%.

The most recent employment record (2022–23) shows Northern workforce participation at 36% and Northern Indigenous participation at 16%. In both cases, these results are below the employment targets of 55% to 70% and 25% to 35%, respectively. These participation results are lower than the results from 2021–22, when NWT residents accounted for 45% of the Project labour when measured by hours worked.

GMOB observes that the programs and practices in place are effective in awarding contracts to Indigenous firms, but that is not translating to similar results in employment of NWT residents, whether Indigenous or non-Indigenous. Northern non-Indigenous firms have also expressed frustration with the challenges in securing Project contracts.

GMOB questions whether the relationship between the procurement strategy and the stated employment goals are as strong as is being assumed. This leads GMOB to consider whether a change is needed in the way contracts are awarded such that employment of resident labour is given greater weight.

This mismatch between employment goals and results requires the Project Team to initiate its adaptive management process, as described in the 2023-28 Socio-Economic Strategy: “Adaptive management aims to address issues and risks that are resulting or may result in the GMRP being below or not meeting targets.”

### **Adaptive Management uses interim management outcomes to inform future management strategies (ie, learning from success and mistakes.**

The Project Team committed in its Socio-Economic Strategy to proactively review systems that are not functioning as intended. The disconnect between the procurement strategy and the employment record appears to be one of those non-functioning systems requiring the Project Team to respond.

**Economic vs Social Effects Analysis:** GMOB will distinguish between “economic” effects and “social” effects moving forward, as the term “socio-economic” has been used ambiguously and inconsistently.

GMOB will use the term “economic effects” in reference to:

- the flow of Project money into and through the Yellowknife and NWT economy, including money moving into and through resident business and labour;
- the choices made that affect those flows; and,
- the outcomes resulting from the choices made (or not made).

“Social effects” from the Project will be addressed by GMOB under the topic of Community Health and Well-Being. This topic better aligns with the recognized concept of the social determinants of health, particularly the non-monetary opportunities and benefits and risks. GMOB encourages the Project Team to consider making this corresponding change in its annual reports and other reporting documents.

**The social determinants of health (SDH) are the non-medical factors that influence health outcomes. They are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life. These forces and systems include economic policies and systems, development agendas, social norms, social policies and political systems – World Health Organization (2018)**

GMOB expects the Project Team to share detailed planned expenditures for the Project based on the Project Implementation Plan work activities and work packages. This information will allow GMOB to conduct its own economic effects assessment of the Project, which it will share with the Project Team, the Parties to the Agreement, and the public.

Following the completion of the Economic Strategy, GMOB expects an accompanying Action Plan. The Action Plan’s purpose is to 1) align stakeholders with the Project’s economic opportunities and 2) outline how these organizations will work together to measurably increase economic benefits to local and NWT residents. The Project Team can support the Action Plan’s development by providing expertise in business and/or economics to help guide the discussions of the Socio-Economic Advisory Body and the Socio-Economic Working Group. This support will help inform these two groups’ expectations and decisions, which in turn improve the likelihood that more benefits will flow from the Project to resident labour and business.

## **ECONOMIC BENEFITS**

The Project Team identifies “maximizing benefits” as one of its main objectives. However, this term is not well-defined by the Project Team. GMOB’s interactions with the Project Team, Parties to the Agreement, and the public have shown that there are different definitions in use. GMOB encourages a clear and specific definition to help improve the economic outcomes of the Project.

GMOB understands an economic benefit as something made possible when money is spent. The Project Team completed its Project Implementation Plan in 2022. The plan describes when and where the Project Team intends to spend money over the next 15 years. The planned remediation expenditures cover a vast array of goods and services. Every one of these purchases creates demand within the NWT, Canadian, and sometimes international economies. The suppliers of labour and business goods and services are “benefiting” directly from the Project’s economic activities.

There are other economic benefits; namely, indirect and induced benefits. An indirect benefit occurs when a contractor supplying a good or service to the project spends its own money as part of its business operations. Those businesses create demand of their own. The supplier of that demand could be an NWT resident, or they could be from elsewhere in Canada or the world.

An induced benefit occurs when individuals working either directly or indirectly on the Project spend their wages or salaries. Whether that consumer spending takes place within the NWT economy or elsewhere depends largely on the residency of that individual labourer.

GMOB makes a distinction between economic benefits and other financial transfers. An economic benefit is not compensation, nor is it a government grant or program. It is not a transfer from the federal government to other levels of government, to persons, or to businesses of any kind.

GMOB will use these definitions throughout the life of the Project and encourages the Project Team and Parties to the Agreement to adopt them as well.

More generally, GMOB expects the Project Team to engage with and seek input from local and regional government agencies, the private sector (particularly businesses), and the public on increasing local benefits and mitigating negative impacts of the Project.

GMOB believes that to achieve greater participation in future remediation work throughout the NWT, the Project Team must give more attention to the broader NWT business community when considering contracted work. GMOB expects the Project Team to increase its knowledge of the capacities within the NWT business community and investigate opportunities for broader participation in the Project. GMOB believes these actions can ultimately lower costs, while improving the NWT's capacity to capture a greater share of the economic benefits expected from future remediation projects in the NWT (e.g., the Norman Wells oilfield, abandoned mines on Great Bear Lake, sumps in the Mackenzie Delta, and oil and gas wells in the Cameron Hills and Beaufort Delta).

### **WHAT ACTIONS WERE TAKEN?**

The Project Team oversees the Socio-Economic Advisory Body and the Socio-Economic Working Group, having delegated to them the responsibility for leading, coordinating, and integrating progressive socio-economic initiatives for the Project. These two groups met in 2023 with a focus on:

- a. receiving updates on the Project status, including employment and procurement;
- b. completing the 2023-2028 Socio-Economic Strategy; and,
- c. beginning work on an implementation plan associated with the Strategy.

The Parties have expressed concern that the Project Team reports employment results without the context that might help explain the results, or in a manner that allows them to understand the participation of their own members. The Project Team has indicated it is working to collect this information and will include it in future reporting.

Parsons, the MCM, hosted its annual "Industry Days" on December 5-6, 2023. The session was open to contractors wanting to learn about upcoming work packages and to learn about the rules, regulations, and procedures regarding the bidding and evaluation processes. The sessions were well attended.

GMOB organized and led discussions on the economic effects of the Project based on preliminary economic models built by GMOB in 2022. These preliminary models incorporated the Project Team's planned expenditures as described in the Project Implementation Plan. GMOB thanks the Project Team for providing additional details regarding those planned expenditures that allowed for improved modelling and a more thorough economic analysis of the Project.

Separate discussions were held with the Project Team and with the Parties to the Environmental Agreement. The purpose of these meetings was to fill knowledge gaps regarding the economic potential of the project, and reach a shared understanding of how economics can be used to monitor the success of the Project.

These conversations were followed by a presentation to the Government of the Northwest Territories Standing Committee for Economic Development and Environment. A report

on the findings from the economic analysis, [\*GMRP Economics: Results of an Economic Effects Assessment\*](#)<sup>3</sup>, was subsequently published on GMOB's website. By the end of 2023, work was being planned for an update to that work and further strategies to communicate and raise awareness of the economic performance and potential of the GMRP.

### **WHAT WERE THE OUTCOMES OF THE ACTIONS?**

Improvements to GMOB's preliminary economic model led to new estimates of the Project's economic effects, including its potential contribution to NWT's gross output, Gross Domestic Product, labour income, employment, and government revenues.

GMOB's efforts to share the results from its work garnered attention as members of the NWT's business community were interested in learning of the potential opportunities, and subsequently learned about GMOB's role with respect to the Project. Their interest led to an additional investigation on the part of GMOB to hear more from resident businesses that expressed a wide range of concerns related to accessing contracts issued by the Project. GMOB produced a report of its findings from this investigation, titled [\*GMRP Procurement and Contracting: Northern Contractors' Experiences and Perspectives\*](#)<sup>4</sup>.

GMOB's preliminary estimate of labour demand also garnered attention, where it shows substantively higher job creation over the next 15 years than what is being assumed by the Project Team. GMOB continues to work to understand the Project's potential economic effects and share information it gains with the Project Team, Parties to the Agreement, and the public. There are numerous implications from the estimated labour demand, for example:

- Where will the additional workforce come from? Can it be sourced from within the NWT?
- Does the City of Yellowknife have the capacity to house a larger number of workers than originally anticipated?

Further actions resulting from the preliminary economic analysis, including research into the labour estimates, were planned for the fall of 2023. These actions were put on hold because of the NWT wildfires and evacuation of Yellowknife; work will recommence in 2024.

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3 <https://gmob.ca/wp-content/uploads/2023/07/2023-07-01-GMOB-Economic-Effects-Assessment-of-the-GMRP-F.pdf>

4 <https://gmob.ca/wp-content/uploads/2023/10/2023-10-04-GMOB-Report-GMRP-Procurement-and-Contracting-Report-F.pdf>

## WHAT ARE THE NEXT STEPS?

GMOB intends to continue its efforts to disseminate information regarding the economics of the Project through several initiatives, including:

1. responding to requests from the Project Team, the Parties to the Agreement, and the public to provide presentations on the economic activities associated with the Project and the results of GMOB's economic modelling efforts;
2. engaging with the Project Team to further investigate the challenges associated with underperforming employment results; and,
3. holding a public meeting regarding the current and future economic effects of the Project.

GMOB will continue to request details of the new Project Team expenditures plan. This economic baseline is needed to determine whether all the business and employment opportunities made available by the Project are captured. GMOB is concerned the Project Team has not conducted the needed analysis to determine the potential effects of the Project on economic growth or job creation for the North, for Canada, or for Indigenous Peoples. GMOB will use this expenditure data to refine its 2022 economic effects assessment.

GMOB intends to advocate for an economic strategy that speaks to economic issues and will advocate for increased participation of the Parties in working toward these tangible goals.

## RECOMMENDATION

### 2023-1

GMOB recommends that the GMRP use its adaptive management process to address underperforming resident labour force participation, with the aim to determine the cause and to revise the Strategy accordingly. GMOB expects the actions taken by the Project Team will result in the percentage of NWT resident and Indigenous labour participating in the project to move toward and ultimately reach the top end of its target range.



## COMMUNICATION, ENGAGEMENT, AND RECONCILIATION

### WHY IS THIS IMPORTANT?

The integrity and long-term success of the GMRP depends on successful communication, engagement, and reconciliation. If implemented successfully, they can 1) enable the Project Team, the Parties to the Agreement, GMOB, and the public to work together more effectively, 2) help ensure that the Project is well understood, and 3) help ensure the Project achieves its objectives.

The Parties to the Environmental Agreement represent specific communities (Yellowknives Dene First Nation, North Slave Métis Alliance, and the City of Yellowknife). The GNWT represents the interests of NWT residents and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) those of the Canadian public. Together these communities of interest must be informed about the activities on the Giant Mine site and plans for the near and distant future.

**Articles 2.1 I and (d)** of the Agreement state that the purpose of the Agreement is to “facilitate collaboration among the Parties” and “build public confidence in the Project and enhanced transparency and accountability in relation to the Project.” Article 2.2 (e) also states that the Parties intend that the Agreement will achieve or support “effective communication with future generations”.

**Section 3.1 (b) (ii)** of the Agreement states that GMOB may compile and analyze available and environmental quality data in order to review, report, or make recommendations concerning “the Project’s integration of Traditional Knowledge into its Environmental Program and Plans.”

Since it was first developed, Giant Mine has been a major point of contention between the local Indigenous peoples, the Government of Canada, the mine operators, and to a lesser degree, the Government of the Northwest Territories. Reconciliation between Indigenous peoples and governments regarding the harms caused by the Giant Mine is an ongoing process. This process includes (but is not limited to) negotiations regarding an apology and compensation, opportunities for Indigenous businesses, and improved communications and engagement regarding the entire remediation process (including post-closure).

Communication is an ongoing challenge for the Project and has at times been characterized as inadequate, inconsistent, and a one-way imparting of information by agencies to residents, particularly Indigenous residents. More recently, communication among the Parties has become more effective and more meaningful. However, challenges remain that constrain progress toward full engagement.

The Truth and Reconciliation Commission concluded that reconciliation requires “an ongoing process of establishing and maintaining respectful relationships between Indigenous and non-Indigenous peoples.” It requires true, genuine, and meaningful engagement.

Genuine, meaningful engagement enables a full exchange of information, views, and opinions among the parties, enabling dialogue that can inform and facilitate changes

to proposed plans and operations. It is, in effect, a multi-lane highway where all parties engage in hearing, sharing, and understanding one another in various ways, rather than separate one-way or two-way roads.

Much progress has been made over the past years with communication and engagement among the Parties, and progress continues towards meeting the objectives of reconciliation within the context of the Project. Positive examples include the multi-Party working groups, where all can share information, express views and concerns, and be heard. Review of draft management plans is another area where clear progress has been made in involving all Parties, although some Parties are not as actively engaged in all aspects of the Project as GMOB would hope.

### **WHAT DOES GMOB EXPECT?**

**Strengthening Communication and Engagement:** GMOB expects the Parties and the Project Team to continue to strengthen meaningful communication and engagement with specific audiences and the broader public. Local communities and other northerners should be able to regularly learn about and express their thoughts on the remediation and care of the former Giant Mine site. GMOB expects that relevant public input will be considered in decision-making.

**Strengthening Participation in Technical Reviews:** GMOB has observed a decreasing level of participation and engagement by all Parties in technical reviews of reports submitted to the Land and Water Board. GMOB expects and encourages stronger participation and engagement by the Parties to inform decision-making by regulatory bodies.

**Engagement by the GNWT and the City of Yellowknife:** GMOB expects that the GNWT and the City of Yellowknife will significantly strengthen their roles regarding economic impacts and benefits, and land-use planning for the remediation site, in 2024.

**Websites Updates:** GMOB's review of the websites of the Parties suggests that all Parties need to update their online information about the status of the Project and their respective involvement. GMOB expects and encourages the Parties to update and keep current their respective websites as a convenient, important, and trusted source of information for their respective constituents and communities.

**Reconciliation:** GMOB expects the Project Team and the Parties to view the Project as an opportunity for reconciliation and to act on those opportunities in meaningful and constructive ways. The Project Team should continue to promote and act on the Government of Canada's report entitled *Government of Canada, Principles respecting the [Government of Canada's relationship with Indigenous peoples \(2018\)](https://www.justice.gc.ca/eng/cs-jc/principles.pdf)*<sup>5</sup>, and the relevant actions set out by the Truth and Reconciliation Commission. The Project Team should consider the principles of reconciliation in all its remediation plans and decisions. GMOB expects that reconciliation will remain an integral part of the remediation process.

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5 <https://www.justice.gc.ca/eng/cs-jc/principles.pdf>

## **WHAT ACTIONS WERE TAKEN?**

Reconciliation with the Indigenous communities that are negatively affected by the historic operations at Giant Mine is an ongoing process. Incremental progress is being made.

Meaningful engagement requires continued efforts by all Parties to hear, to share, and to build mutual respect, trust and understanding. Without these efforts toward full engagement by all Parties, the Project will not reach its maximum potential benefit – environmental, economic, cultural, and social – and will fall short of achieving the principles of reconciliation.

GMOB strongly encourages all Parties to continue to build on past successes, to strengthen their respective participation in all aspects of the remediation process, to continue to build their understanding of all aspects of the remediation program, and to strengthen working relationships generally, particularly between governments and Indigenous peoples.

While there is clear and demonstrable progress on communications generally, one area that requires more public engagement by the Project Team is the fate of the public boat launch. The Project Team has engaged with the Great Slave Sailing Club and the Great Slave Yacht Club about plans for the public boat launch area. It has committed to continuing and broadening these discussions. However, most of the general boating public are not affiliated with either of these groups and still need to be engaged by the Project Team in discussions about future plans for the site.

The Project Team continued to engage with the Parties. These included meetings of the:

- Giant Mine Working Group
- Aquatic Advisory Committee
- YK Health Effects Monitoring Program Technical Committee
- Socio-Economic Working Group
- Socio-Economic Advisory Body

**Reconciliation is an ongoing process that occurs in the context of evolving Indigenous-Crown relationships. – Government of Canada, Principles respecting the Government of Canada's relationship with Indigenous peoples (2018), Principle 9**

**Reconciliation is about establishing and maintaining a mutually respectful relationship between Aboriginal and non-Aboriginal peoples in this country. – Truth and Reconciliation Commission, (2015)**

The Project Team continued to make resources available to assist the Parties to prepare for and meaningfully participate in meetings on engineering, environmental, health and socio-economic matters.

Technical working sessions and public meetings have increasingly returned to in-person events where possible.

The Project Team shared information about its remediation activities through public service announcements, electronic newsletters, and social media postings. The federal government and the GNWT maintain and update Project-related information on their respective websites.

The independent YK Health Effects Monitoring Program team successfully completed the five-year sampling study in 2023. The research team has communicated the study results and arsenic education bulletins to the public on an ongoing basis, mainly through radio announcements and brochures.

**GMOB's 2022 Community Survey:** The consolidated results of the GMOB 2022 Community Survey were publicly released in March 2023. The results have informed GMOB's approach to communications and outreach. GMOB anticipates that they are also informing the communication and engagement efforts of the Parties and the Project Team.

### **WHAT WERE THE OUTCOMES OF THE ACTIONS?**

The [Giant Mine Remediation Project Annual Report 2022-23<sup>6</sup>](#) lists key stakeholder concerns that the Project Team heard through its public engagement activities. The Annual Report also lists the Project Team's responses to these concerns, and the decisions taken or altered because of public input. For example, the Project Team heard several questions about post-closure land use. In response the Project Team developed a "post-closure constraints map" with specific land-use categories.

The Project Team met several times with the Yellowknife Historical Society and the Great Slave Sailing Club in 2023. While progress has been made, the public boat launch is an area that clearly needs more attention and engagement with the public.

### **WHAT ARE THE NEXT STEPS?**

GMOB is committed to encouraging the effectiveness of communication and engagement on Project environmental, engineering, health, safety, and economic matters. GMOB remains committed to enhancing its capacity to oversee communication and engagement activities and monitor outcomes and trends. GMOB urges the Project Team to continue identifying key engagement indicators and report on them semi-annually.

The Parties and the Project Team should likewise continue to develop and implement more effective means of engaging with specific audiences and the broader public.

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6 <https://gmob.ca/wp-content/uploads/2024/01/NAO-NCSP-GIANT-GMRP-Annual-Report-2022-2023-FINAL-Designed-LOW-RES-December-15-2023-1.pdf>

GMOB will continue to monitor and encourage the Project Team's work to engage with the Yellowknife Historical Society and Great Slave Sailing Club, advocating for mutually acceptable outcomes.

GMOB will continue to urge the Project Team to host meetings of the boating communities in Yellowknife, Ndilq and Dettah in 2024 to seek their input on plans and schedules for the public boat launch (including the parking areas) renovations. The meetings should be documented, suggestions incorporated into the Project Team's plans, and the results reported in the 2024 GMRP Project Annual Report.

## RECOMMENDATION

### 2023-2

GMOB recommends that the Project Team host meetings of the general boating community in Yellowknife, Ndilq and Dettah in 2024 to seek their input on the plans and schedule for the public boat launch redevelopment. The meetings should be documented, and suggestions incorporated into the Project Team's plans, and results reported in the 2024 GMRP Project Annual Report.

## PROJECT MANAGEMENT AND PLANNING

### WHY IS THIS IMPORTANT?

The Project is a multi-year, multi-billion dollar endeavor. The Project Team's primary goal is to protect human health and safety and the environment. Planning the work and activity on the site must account for varying levels of arsenic trioxide contamination. Effective project management and planning is critical to keeping a project of this size and complexity under control, with respect to both schedule and cost.

**Section 2.2** of the Agreement states that the Parties intend that the Agreement achieve or support the following objectives:

1. the remediation of the Giant Mine site in a manner that protects the land, air, water, aquatic life, and other wildlife in the area of, or potentially affected by the Project;
2. the remediation of the Giant Mine site in a manner that eliminates or substantially mitigates the environmental risks posed by the site;
3. comprehensive, integrated ecosystem-based approaches for the monitoring, management, and regulation of the Project; and,
4. the minimization of the Perpetual Care requirements at the Giant Mine site.

**Section 3.1 (b) (v)** states that in furtherance of its mandate, the GMOB may compile and analyze available and relevant environmental quality data in order to review, report, or make recommendation concerning, *"environmental or engineering studies conducted by the Co-Proponents in relation to the Project."*

### WHAT DOES GMOB EXPECT?

GMOB expects continuous progress and improvement by the Project Team in implementing the Project. This improvement includes planning, engineering, and monitoring using the best available information, and applying adaptive management principles.

While the GNWT and the Government of Canada are the Co-Proponents of the Project, external organizations are also involved. GMOB expects that the Project Team will take an integrated approach to project management to ensure that 1) economic and social elements are considered in addition to engineering, and 2) all interested parties are aware of remediation plans and opportunities.

GMOB expects the Project Team to modify work plans based on monitoring results, adaptive management practices, and new information brought forth by external researchers, community members, and others. This includes the impacts of climate change on the Project and impacts of the Project on climate change (e.g., GHG emissions).

GMOB expects the Project Team's designs to consider GMOB's ongoing research toward a permanent solution for the arsenic trioxide dust stored in the underground chambers. The temporary nature of freezing the arsenic trioxide dust in underground chambers and the search for a permanent solution needs to be incorporated into designs so remediation

work does not compromise a permanent solution. GMOB expects that the Project Team and GMOB will work closely together to achieve the following goals:

- the Project Team is aware of research developments and their implications for site remediation.
- GMOB is aware of any Project plans or work that may interfere with the development and implementation of a permanent solution.

GMOB expects the City of Yellowknife, the GNWT and the Project Team to finalize the post-closure land-use constraints map and use it to inform remediation options and decisions. GMOB expects these constraints will affect land-use planning, short-term project management and long-term planning. GMOB expects the potential location of any arsenic trioxide dust treatment and storage facility infrastructure to be factored into longer-term plans.

GMOB expects that GNWT will fully engage in all Project areas including promoting procurement opportunities for Northern companies. Some Northern contractors have experienced challenges regarding on-site management, logistics and coordination. These challenges have occurred, in part, from having multiple Project “leads.” The Main Contract Manager (Parsons) manages logistics with a reliance on “just-in time” delivery (i.e., materials, equipment, and/or workers are scheduled to arrive only when they are needed). This approach has contributed to equipment and worker congestion, causing work delays that contribute to lost productivity and reduced profit by contractors (particularly smaller firms). GMOB expects the Project Team and Main Contract Manager to resolve these challenges by incorporating lessons learned and adaptive management.

GMOB expects that as the Project proceeds, the Project working groups will include external expertise in business and/or economics. Such resources will help guide the Project Team and the Parties towards providing maximum opportunities and benefits to the Yellowknife region and affected Indigenous communities.

GMOB expects to continue to meet with the Project Team at least twice a year to promote and share all relevant Project information and GMOB’s work and research. These meetings will be in addition to the existing semi-annual meetings with the Parties.

### **WHAT ACTIONS WERE TAKEN?**

In 2022, the Project Team extended the project timelines to complete active remediation in 2038 instead of 2035. The projected Project total expenditure increased from a little over \$1 billion to \$4.38 billion.

The Project has moved into the active remediation phase. This requires the submission of various management and monitoring, design, and construction plans to the Land and Water Board. In addition to care and maintenance activities, the Project Team continued the paste backfill program, construction of Phase 1 of the non-hazardous waste landfill, and demolition of the townsite, including those structures near the planned new water

treatment plant. The Project Team ensured that the site remained stable and posed no significant environmental or safety risks in 2023.

The Project Implementation Plan (PIP) was released in April 2022. It describes how the elements of the project will be delivered.

### **WHAT WERE THE OUTCOMES OF THE ACTIONS?**

Construction of Phase 1 of the Non-hazardous Waste Landfill is now complete, as is the construction of the AR1 Freeze Pad and demolition of the townsite. Site preparation work has begun for construction of the new Water Treatment Plant.

The Project Team's care and maintenance activities continued in areas where active remediation has yet to begin. The Project Team improved core care and maintenance tasks necessary for the stability and safety of the mine site. There have been some delays to the planned schedule, as presented in the [2022–2023 GMRP Annual Report<sup>7</sup>](#), but these delays did not materially affect the overall project schedule.

### **WHAT ARE THE NEXT STEPS?**

GMOB has requested additional information about the increase in the Project's budget. From an integrated project management viewpoint, GMOB expects that this information will be provided annually and will also inform future Project Team management and planning efforts.

Condition B.20 of the Project's Type A Water Licence requires that the Project Team submit an annual report to the Land and Water Board by April 30 annually. The report must summarize the previous year's site activities including reclamation work. The report must also provide a schedule of anticipated activities and planned submissions to the Land and Water Board for the upcoming year. In conjunction with the Project Implementation Plan, the Water Licence Annual Report will inform GMOB's oversight of the Project Team's project management and planning. The report is helpful in tracking progress, identifying deviations in schedules, and understanding trends. Where possible, this report should be distributed as soon as practical following the April 30 date to align with review schedules for meaningful technical reviews by GMOB.

GMOB will continue to review and comment on plans and reports required by the Land and Water Board.

GMOB will continue to evaluate Project Team contingency planning efforts. GMOB has also provided commentary in this report regarding the absence of a contingency plan in the event of a future evacuation. The need for a contingency plan has been made very clear following the 2023 Yellowknife wildfire evacuation, which lasted three weeks.

GMOB has concerns regarding the disposal of heavily contaminated materials in the B1 Pit and Chamber 15 and implications for reversibility and long term site management. GMOB will continue to evaluate how these disposal activities may affect a permanent solution for the dust as more detailed information becomes available.

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<sup>7</sup> <https://gmob.ca/wp-content/uploads/2024/01/NAO-NCSP-GIANT-GMRP-Annual-Report-2022-2023-FINAL-Designed-LOW-RES-December-15-2023-1.pdf>



Future use of the Giant Mine site will be an important measure of the Project's overall success. The GNWT administers the Commissioner's Land upon which the former Giant Mine site sits. A Federal Reserve has been established for Crown-Indigenous Relations and Northern Affairs Canada ("CIRNAC") to allow for the implementation of the remediation of the site. The status and eventual disposition of the Project site continues to be discussed between the City of Yellowknife, GNWT and CIRNAC. Regardless of the outcome of the discussion, each level of government has a role in this process of developing a land use plan.

The need for a land use plan is necessary given the on-going decisions that need to be made by the Project Team regarding:

- the location of critical infrastructure,
- the differing degrees of site remediation depending on location,
- potential interest in land by the City of Yellowknife and Yellowknives Dene First Nation,
- the potential to unnecessarily close off critical infrastructure options for treating the underground arsenic trioxide,
- the implications of the ongoing GMOB Research Program, and
- the development of the Perpetual Care Plan.

Contingency planning is required pursuant to [GNWT legislation](#) and [federal policy](#) (e.g., [Federal Policy for Emergency Management, December 2009](#)<sup>8,9</sup>).

The 2023 emergency evacuation of Yellowknife and surrounding communities demonstrated the type of event that the Project Team should be able to respond to efficiently and effectively. While GMOB is unaware of any incident on the Project site during the evacuation, there are questions about the processes used to secure the site. During the evacuation the gate access remained open for certain contractors, and there was no on-site security.

Contingency plans are currently required for individual project components on the Project site. The Project Team maintains a risk register and the Project's Emergency Management and Spill Response Plan guides responses to specific events such as spills. However, contingency planning does not appear to have been completed for large-scale events affecting the entire site.

While the City of Yellowknife was shut down, the Canadian Armed Forces, RCMP, and local and outside fire departments actively monitored the municipality and could effectively respond to emergency events. There seems to have been no equivalent system in place for the Project site. At a minimum, the site should have been properly secured due to potential safety risks related to unauthorized access, potential vandalism, and equipment loss and/or failure (e.g., the water treatment plant).

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8 <https://www.justice.gov.nt.ca/en/files/legislation/emergency-management/emergency-management.a.pdf>

9 <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/plc-mrgnc-mngmnt/index-en.aspx>

When the evacuation event ended, the Project Team progressively resumed normal activities. During this time, it was found that the treated effluent discharged to Baker Creek exceeded the pH levels stipulated in the Project Water Licence. It is not clear if the time away from the Project site during the evacuation contributed to this occurrence.

In addition, GMOB has identified a concern specific to potential consequences of fire on or near the site. Arsenic concentrations in the forested portions of the site and immediate area are elevated. A burn in these areas might release arsenic into the air that could pose an increased health risk to fire-fighting personnel and returning residents. Further study of this risk, and subsequent information on increased health risks related to potential arsenic concentrations in the environment and on the site, should be incorporated into emergency contingency planning for the site.

GMOB expects that the outcomes from these activities will include a comprehensive contingency plan that includes regional or site-wide emergency events. Increasing the scale of anticipated emergencies will improve the ability of the Project Team to respond safely and effectively. This plan will also help the Project Team more quickly and effectively resume site operations after such an event, and proactively reduce the potential for exceedances and other operational or regulatory issues.

Additionally, incorporating information regarding arsenic release during potential emergency events would identify whether there are increased risks to responding personnel. Effective mitigation measures should be incorporated into any emergency response action for the site.

## RECOMMENDATIONS

### 2023-3

GMOB recommends that Project Team contingency planning include events that could affect overall site operations. The planning should include robust protocols for evacuation of the site and ensure that there is contingency planning for security and monitoring of all operational systems on the site. This planning should be completed prior to the start of significant on-site work in 2024. A summary of all contingency planning exercises and reviews is recommended as a separate section of the next GMRP Annual Report

## RECOMMENDATIONS

### 2023-4

GMOB recommends that detailed information specific to the risk of arsenic release from forested site areas during a fire be incorporated into the Project Team's response plan and be communicated to all organizations and entities potentially affected by such an event.

### 2023-5

GMOB recommends the City of Yellowknife, GNWT, and the Project Team immediately undertake regular, formal communications with the Parties and the public regarding their land-use planning process for the Project site, including:

- what the process looks like,
- where they are in the process,
- the public engagement process, and
- their overall vision for the development of these sites.

### 2023-6

GMOB recommends the Project Team coordinate the development of the Perpetual Care Plan with the GMOB Research Program so that planning for the basic site requirements (space and pad) for future arsenic trioxide roaster waste treatment facilities and transformed waste material storage (pilot and full scale) is fully integrated. These treatment facilities should be included in the upcoming Site Infrastructure Design Plan (Part 2) and will also be addressed directly in the development and application of the Perpetual Care Plan.

## COMMUNITY HEALTH AND WELL-BEING

### WHY IS THIS IMPORTANT?

The Giant Mine site has 237,000 tonnes of arsenic trioxide dust temporarily stored underground. There is widespread surface contamination on and off the site. Residents are understandably concerned about arsenic and other unsafe elements in soil, tailings, dust, surface water and groundwater, and flora and fauna in the area.

**Article 2.2 (a) (ii)** of the Giant Mine Remediation Project Environmental Agreement states that the Parties intend that the Agreement will achieve or support the remediation of the Giant Mine site in a manner that protects *“the economy, way of life and well-being of the aboriginal peoples of Canada in the vicinity of Yellowknife, and of other residents of Yellowknife, the Northwest Territories and Canada.”*

### WHAT DID GMOB EXPECT?

GMOB continues to expect that residents and the Parties will have ready access to all information related to community health and well-being. Residents' access to timely information relies on ready access to information held by GMOB, the Project Team, and the Parties. This information should provide residents with a reasonable understanding of:

- The Closure and Reclamation Plan and its implications for future land use.
- Current and future public health risks related to dust, runoff, construction, and contaminated soils associated with the Project area.
- Current and future risks related to activities such as hiking, eating fish, gathering medicinal plants and berries, and using the boat launch in the area during and after remediation.
- Studies on arsenic exposure and related health outcomes. This includes the provision in accessible language regarding a general (non-technical level) awareness of the HHERA approach regarding risk modeling for chronic vs. acute exposures and outcomes. This applies to both the Project site and adjacent areas.

GMOB expects the Project to bring maximum economic benefits and mitigate negative effects to residents and their ways of life. GMOB expects that risks to community health and wellness are minimized, and always clearly understood by residents.

Corresponding to the decision to distinguish and clarify the term “socio-economic,” GMOB has decided to use the term “Community Health and Well-Being” instead of “Community Health and Wellness” (as used in prior annual reports). This change will increase reporting on the qualitative metrics encompassing the social aspects and impacts of the Project. These metrics will now be addressed through the concept of the “social determinants of health.” The Project Team is encouraged to make this corresponding change in its annual reports and other reporting documents.

## WHAT ACTIONS WERE TAKEN?

The Yellowknife Health Effects Monitoring Program (“YKHEMP”) started in 2017 studying the human health effects of arsenic and other contaminants resulting from the Giant Mine Remediation Project.

The YKHEMP team has communicated the results of the study and arsenic education bulletins to the public on an ongoing basis, mainly through radio announcements and brochures.

The first phase study results were presented in-person to Yellowknives Dene First Nation, North Slave Métis Alliance, and the broader Yellowknife community. The second phase (Year 5 of the program) of sampling was completed in two phases (Spring 2023 and Fall 2023) and included children and teens ages 3–19. In the third phase (Year 10 of the program, 2027–2028), the study will again sample all age groups.

## WHAT WERE THE OUTCOMES OF THE ACTIONS?

From 2020 through 2022, the Aurora Research Institute and Queen’s University conducted the [\*Yellowknife Garden Metals Study: Arsenic and Mining Associated Metals in Local Garden Produce in the Yellowknife Area\*](#)<sup>10</sup>.

The study analyzed the amount of arsenic and other mining-related contaminants (antimony, cadmium, lead, manganese, copper, zinc, and vanadium) in backyard garden soils and produce in Yellowknife, Ndilo, Dettah, and surrounding areas. The study was completed in 2022; however, the project report has not been finalized.

In 2022, the Project Team engaged the engineering consulting firm WSP to evaluate hazards and risks associated with acute arsenic exposure from soil in areas that will not be remediated. WSP provided a preliminary report to the Giant Mine Working Group in October 2022 and a final report was submitted in September 2023. GMOB will undertake a review of the final report in early 2024 and work with the Project Team on appropriate risk messaging.

In 2023, the Project Team shared its new version of a [\*digital model\*](#)<sup>11</sup> of the Giant Mine site with GMOB. The model is used as an additional resource to help residents visualize the Project site (in virtual reality format) and to inform the public about the remediation efforts and post-closure model.

GMOB has also included several observations, expectations, and actions, and one recommendation, in the “Communication, Engagement, and Reconciliation” section of this report. GMOB will continue its project-wide efforts to strengthen communication, engagement and working relationships with the public and the Parties to the Environmental Agreement.

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10 <https://nwtresearch.com/yellowknife-garden-metals-study>

11 <https://apps.apple.com/ca/app/giant-mine-reclamation-viewer/id1532446729>

## **WHAT ARE THE NEXT STEPS?**

As with previous recommendations on risk communication, GMOB believes that deliberate and continuous communication and dialogue with the broader Yellowknife community regarding exposure to arsenic near the Project site, both during remediation activities and after active remediation, remain important. Notably:

- Only disturbed areas within the former Giant Mine industrial footprint will be remediated to either GNWT 2003 residential or industrial soil quality guidelines. Soil in all undisturbed areas will be left unremediated, and in many cases will contain arsenic levels that exceed soil quality guidelines.
- The 2018 Human Health and Ecological Risk Assessment concluded that for specific activities, such as hiking through non-restricted areas, people are unlikely to be exposed to high amounts of arsenic.
- The 2023 Acute Arsenic Assessment indicates toddlers could be exposed to a considerably higher amount of arsenic if they eat a small amount of contaminated soil.
- The difference between the health consequences from these scenarios needs to be communicated. Examples of clearer communication may include plain-language summaries, red/yellow/green risk categories for areas and activities that may occur on the site once remediated, and public Q&A sessions. An outreach plan should be included as an appendix in the Project Team's *2024 GMRP Annual Report*.

## LONG-TERM PLANNING

### WHY IS THIS IMPORTANT?

Perpetual care of the Project site was raised during the Giant Mine Remediation Project Environmental Assessment. The Review Board concluded that there was significant public concern regarding the long-term management of the site and, during the proceedings, the GMRP committed to developing a comprehensive Perpetual Care Plan (“PCP”).

**Section 4.2 (a)** of the Agreement states that, ‘the Co-Proponents shall develop a comprehensive Perpetual Care Plan that must address improvements in records management, communication with future generations, long term access to funds for the Project and analysis of different possible future scenarios that might affect the Perpetual Care of the Project.’”

**Section 4.2 (b)** of the Agreement states that, “the Co-Proponents shall provide the Oversight Board with a first draft Perpetual Care Plan no later than five years after the Effective Date of this agreement (June 09, 2015).”

Work on the Project site will continue for the indefinite future. While the planned remediation will reduce most of the hazards on the site, some residual risks will need to be managed, e.g., access to unremediated areas of the site. A robust plan is needed to account for all the elements of the site that will require regular monitoring and maintenance. After remediation, some areas of the site may be available for commercial, recreational, or residential use; other areas will be permanently off limits. Future land uses need to be better communicated so that remediation decisions do not inadvertently reduce options for possible future activities.

### WHAT DOES GMOB EXPECT?

GMOB expected that the PCP would be completed in accordance with the Agreement. Unfortunately, drafting of the Perpetual Care Plan has not yet started, and will not until well into 2024.

GMOB expects that the Project Team will guarantee adequate funds over the long term to implement the approved PCP, and to guarantee funds to address any future issues as they arise. Thus far the Project Team has declined to do so.

GMOB expects that future land use planning for the Project site will be led by the City of Yellowknife with the support and involvement of the Government of the NWT.

### WHAT ACTIONS WERE TAKEN?

The first draft of the PCP was to be provided to GMOB by the GMRP in 2020. Instead, an Advisory Task Force was established to guide the development of the PCP, which has caused its delay. The Task Force comprised the Parties and key stakeholders, and worked collaboratively to develop a detailed preliminary framework for the PCP.

In 2022, the Task Force completed the guiding requirements for the PCP. The PCP requirements were given to Public Services and Procurement Canada, which prepared a Request for Proposals (“RFP”) based on the guidance document. The RFP closing date is

April 15, 2024. Following the selection of the successful contractor, which may take several months, the work is anticipated to take between two to three years.

GMOB wants to ensure that key stakeholders are part of the RFP review process and involved in reviewing drafts of the PCP as the contract progresses.

### **WHAT WERE THE OUTCOMES OF THE ACTIONS?**

The development of the PCP continues to be years behind schedule. The RFP for the PCP was finalized and issued in January 2024, with a submission deadline of April 15, 2014. Following the selection of the successful contractor, the work is anticipated to take between two to three years.

Advance planning and design must ensure that remediation work does not compromise the development and implementation of a permanent solution. Closure Objectives include keeping the option open to permanently solve the arsenic storage problem. The Underground Design Plan submitted by the Project Team in 2022 included plans to construct a long-term access portal as part of the underground remediation program. The status of the GMOB Research Program toward a permanent solution is described in detail in that section and Appendix B of this document.

Beyond preparing a preliminary constraints map developed by the Project Team and shared with the City of Yellowknife, there remain certain overlaps regarding Commissioner's Lands. No progress has been reported on a land use plan for the Giant Mine site.

### **WHAT ARE THE NEXT STEPS?**

GMOB expects that key stakeholders will be part of the RFP review process and involved in the review of the drafts as the contract progresses. Specifically, GMOB expects that:

- A representative of the GMWG will be included in the review process of the submitted RFPs;
- Drafts of the PCP will be shared with the Parties and GMOB; and,
- The PCP ultimately submitted to GMOB will fully address stakeholder concerns and will ensure that the Project site will be maintained safely in perpetuity.

GMOB expects the proposal evaluation and selection process for the development of the PCP will be concluded in 2024. GMOB understands that Plan development may take two to three years once the contract is issued.

GMOB expects the selected contractor to engage early in the PCP development process, including engaging with the organizations and individuals who participated in the PCP development framework workshop in October 2019.

GMOB expects the Project Team's plans and designs will take into consideration GMOB's research toward a permanent solution for the arsenic trioxide dust temporarily stored in the underground chambers. The Project Team's planning and communications about the site should include information as to the temporary nature of the frozen shell and the search for a permanent solution. Advance planning and design must ensure that remediation work does not compromise the development and implementation of a permanent solution.



GMOB expects that the schedules for the development of the GMRP Annual Reports, the GMOB Annual Reports and potentially other relevant annual reports be aligned, where practical, for efficiency and increased opportunities to include and review relevant information and data.

GMOB expects that the Project Team will reconsider the existing proposed plan for remediation of the current boat launch/parking area and the Great Slave Sailing Club (“Sailing Club”) and Yellowknife Historical Society (“Historical Society”) lease areas. Remediation and reconstruction are planned to begin in 2028 and be complete by 2036. The current plan is for the general boating public to share the current Sailing Club area for lake access until the current boat launch/parking area is remediated. Both groups are to then share the current boat launch/parking area until remediation of the Sailing Club area is completed. However, there is currently insufficient parking space for both the needs of the Historical Society and the Sailing Club. Consideration needs to be given to expanding the current parking capacity at the Sailing Club to better meet demand. GMOB also expects that the Project Team’s discussions with the Historical Society, the Sailing Club, and the Great Slave Lake Yacht Club can resolve these concerns.

Discussions also need to engage the larger segment of the boating community who are not members of these water-based clubs. To date, these boaters have been unable to review and provide input to the final design of the redevelopment.

GMOB will continue to review Mackenzie Valley Land and Water Board submissions in the context of implementation of permanent solutions. GMOB will continue to regularly update its research partners as to the status of the research program. As discussed in greater detail in the Research section of this report, these updates include:

- Notwithstanding the demonstrated progress (and positive impact and benefits for the Parties and the public) on the research front in the laboratory, GMOB will continue to be mindful of communicating internal and external expectations regarding the potential challenges when the permanent solution is scaled beyond the laboratory to the Project site. For example, there will be challenges in aligning the timelines for the Research Program with Phases 1 and 2 of site engineering. GMOB will also continue to communicate that the remaining arsenic impact beyond the project site boundary will not be addressed by this research.
- GMOB and the Project Team will work closely so that the Project Team is fully informed by research developments and their implications for site remediation, and that GMOB is fully informed of the Project Team’s plans that may affect the Research Program and a potential permanent solution, including ensuring access to the chambers, extraction, and safe storage of the arsenic trioxide dust.
- GMOB will hold regular workshops with the GMOB Research Program researchers and the public and host a separate technical workshop with the researchers.

## RECOMMENDATIONS

### 2023-7

GMOB recommends the Project Team include a representative of the GMWG in the evaluation process to select the successful contractor for the development of the draft PCP. The GMWG should be involved in the review of draft documents as the contract progresses.

### 2023-8

GMOB recommends to the GNWT, the City of Yellowknife, and the Project Team that on-site land use planning occur in tandem with active remediation and be led by the City of Yellowknife. Parallel land use planning and remediation processes provide greater opportunities to:

- Mitigate risks of closing off options for a permanent solution to the arsenic trioxide dust.
- Align remediation plans with desired post-closure access and use of the site.
- Make cost-effective adjustments that may be impossible or impractical after remediation is completed.

### 2023-9

GMOB recommends that the Project Team provide to GMOB the expected completion date of the PCP.

## GMOB RESEARCH PROGRAM

### WHY IS THIS IMPORTANT?

A total of 237,000 tonnes of arsenic trioxide dust is stored in 14 underground stopes (excavated chambers) at the Giant Mine site. In 2002, the Government of Canada had an independent peer review panel with a wide range of technical expertise examine 56 options to deal with the underground contaminant. After several public sessions, the “frozen block” method was selected as the best choice.

However, the 2008 public [\*Environmental Assessment of the Giant Mine Remediation Project\*](#)<sup>12</sup> concluded that the frozen block method “will proceed only as an interim solution for a maximum of one hundred years. A permanent alternative is necessary beyond that point.”

As a result, Article 7 of the Agreement tasks GMOB with managing a formal research program focused on finding a permanent management solution for the arsenic trioxide dust currently stored underground at the site. It is important to arrive at a safe and permanent solution so future generations are not burdened with this liability.

The GMOB research program has three components:

1. GMOB-funded research with the TERRE-NET (Toward Environmentally Responsible Resource Extraction Network) partnership;
2. other research with TERRE-NET partners made possible by accessing funds from external sources; and,
3. research proposals from other researchers.

### WHAT ACTIONS WERE TAKEN?

The Project Team’s leadership in conducting a series of successful arsenic dust core sample extractions from various chambers in 2023 to support the Research Program is gratefully acknowledged. This leadership included facilitating GMOB’s coordination of safe transportation of the samples to the SGS Minerals Services facility in Lakefield, Ontario. Strengthened and ongoing engagement by the Project Team with the GMOB Research Program is essential. Strong engagement will help ensure that the remediation designs and site work do not compromise the development and implementation of a permanent solution.

Throughout 2023, GMOB worked on each part of its Research Program, as described on the following page.

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<sup>12</sup> [https://reviewboard.ca/upload/project\\_document/EA0809-001\\_Giant\\_Report\\_of\\_Environmental\\_Assessment\\_June\\_20\\_2013.PDF](https://reviewboard.ca/upload/project_document/EA0809-001_Giant_Report_of_Environmental_Assessment_June_20_2013.PDF), (page 71)

1. GMOB-funded research with TERRE-NET

GMOB continued to fund multiple arsenic trioxide stabilization research projects through its TERRE-NET partners. The research projects include:

- i. Assessing the chemical and physical properties of the arsenic dust.
- ii. Chemically changing the arsenic dust into a less toxic and more stable sulfide mineral.
- iii. Mixing the arsenic dust into a cement paste backfill.
- iv. Assessing the stability of arsenic glass.

2. Additional research with external funding

Three other research streams were added to the program through funding provided by the Alliance program of the Natural Sciences and Engineering Research Council of Canada. These research projects are:

- i. Stability of iron arsenate phases: chemically changing arsenic dust into a less toxic and more stable arsenic-iron mineral.
- ii. Biogenic sulfide precipitation: using microbes to change arsenic dust into a less toxic and more stable arsenic sulfide mineral.
- iii. Implementation and application of Sb (antimony) isotope systems: using antimony as a substitute for arsenic to identify geochemical processes related to the weathering of arsenic dust.

Details of progress on the four TERRE-NET research projects and three Alliance-funded projects are described in Appendix B.

3. Consideration of proposals from independent researchers

GMOB's independent expert panel reviewed an unsolicited research proposal. A meeting with the proponent resulted in new information being provided which was then shared with the panel. The expert panel made a final recommendation to GMOB and asked the proponent questions that are to be answered before GMOB will make a final decision. A later meeting was held with the proponent and further information is forthcoming.

### **WHAT WERE THE OUTCOMES OF THE ACTIONS?**

As part of its mandate, GMOB has supported research to find a permanent solution to manage the toxic arsenic trioxide dust stored underground at the Giant Mine site.

GMOB's Research Program public outreach and resulting communications was a new action in 2023 and included the first public meeting to share the results of the GMOB Research Program. The outcomes for this initiative included a two-day session in November 2023 with the researchers, the Board, and the Project Team, ending with a well-attended public presentation. Plain-language research project summaries and a series of infographics were provided to participants..

GMOB heard from participants that the open discussion regarding the research strategy and progress to date was “encouraging” and “illuminating.” The researchers confirmed the extent of their respective investment into finding viable solutions and appreciated the open discussion with the community.

The GMOB Research Program Public Meeting Report is available through the [GMOB website](#)<sup>13</sup>.

## **WHAT ARE THE NEXT STEPS?**

GMOB actions/commitments for 2024

1. GMOB will complete the GMOB Research Program Strategy in 2024. This Strategy will provide the foundation and framework for the advancement of its research program.
2. GMOB will continue to work with its research partners to pursue additional research funding from external sources.
3. GMOB will work with the Project Team and the GNWT on options to initiate the 20-year review of the GMRP. The goal of the review is to ensure a number of issues (including security of project records, information, and knowledge management) are addressed and that knowledge and project security and continuity are maintained.
4. GMOB will work closely with the Project Team to ensure that it is fully informed of research developments and their implications for site remediation. GMOB in turn will be fully informed by the Project Team of plans that may affect the Research Program and a potential permanent solution, including ensuring access to the chambers, extraction, and safe storage of the arsenic trioxide dust.
5. GMOB will collaborate with the Project Team and Parties to ensure that the PCP will incorporate the eventual treatment and safe storage of the arsenic trioxide dust currently stored underground.
6. Notwithstanding the progress on the research front at a laboratory scale, GMOB will continue to be mindful of communicating internal and external expectations regarding the potential challenges (e.g., aligning the timelines for the Research Program with Phases 1 and 2 of site engineering) when the permanent solution is scaled beyond the laboratory to the Project site.
7. GMOB will continue to invite independent research proposals and investigate potential linkages with other similar initiatives. The Independent Expert Panel will evaluate proposals submitted to GMOB and make its recommendations.
8. GMOB will continue to share, in accessible and relevant language, formal progress reports of its research program on its website and at its public meetings.
9. GMOB will plan for regular workshops with the GMOB Research Program researchers and the public.

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<sup>13</sup> <https://gmob.ca/wp-content/uploads/2023/11/2023-11-GMOB-Research-Program-Public-Meeting-Report-F.pdf>



# APPENDICES

# APPENDIX A

## The 2023 Status of Previous Recommendations

The status of previous GMOB recommendations is assessed as follows:

- **ADDRESSED:** Actions were taken to implement the recommendation. Actions may be completed or showing evidence of progress toward completion in the foreseeable future. Even though a recommendation may be assessed as “addressed,” GMOB will continue to monitor the matter in question with the view to understanding the outcomes of actions taken.
- **IN PROGRESS:** Actions were taken to implement the recommendation, but progress is insufficient to determine if completion can be anticipated in the future.
- **NOT ADDRESSED:** The party to whom the recommendation was directed either did not accept and/or did not act on the recommendation.
- **NOT ADDRESSED AND NO LONGER RELEVANT:** GMOB has concluded that the recommendation is no longer relevant in current circumstances.

**Note:** unless a direct quote, the term “Project Team” is used in the following table to refer to the Co-Proponents for consistency with the rest of this report.

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Environment</b>		
2016-7A/B 2017-10 2018-9	Improve integration, monitoring, and reporting on environmental activities.	<b>IN PROGRESS:</b> Management and monitoring plans have been completed and approved or are being prepared. With the Remediation Project now in the active remediation phase, continual monitoring of plan development and implementation will be required.
2019-9	Reduce greenhouse gas (GHG) emissions where feasible, consider offsets, and report annually.	<b>IN PROGRESS:</b> The Project Team committed to annual reporting and reductions where feasible. However, commitments fall short of current federal government policies.
2020-1	Develop a short- and long-term strategy that sets targets and commits to action to proactively reduce GHG emissions.	<b>IN PROGRESS:</b> The Project Team committed to a GHG assessment for the water treatment plant design; limiting fuel use; reducing haul distances for borrow; tracking GHG emissions on a monthly basis; and annual reporting on emissions. GMOB will monitor these commitments and assess them within the context of current federal government policies.
2021-1	To enhance project oversight activities, GMOB recommends that the Project Team undertake more active reporting on key indicators of trends in each of the seven areas: 1) Environment, 2) Economy, 3) Engagement, 4) Reconciliation, 5) Project Management and Planning, 6) Community Health and Wellness, and 7) Long-term planning.	<b>NOT ADDRESSED:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, “The Project team does not support the development of additional indicators to those that have already been developed.” GMOB encourages the Project Team to continue to identify key indicators and actively report on them.



YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Environment</b>		
2022-1	GMOB recommends that the GMRP adopt and communicate the standards by which they track and compare annual GHG emissions.	<p><b>IN PROGRESS: Project Team Response:</b> The MCM [Main Contract Manager] tracks and reports on site GHG emissions. However, given the short period in which this data has been collected, the Project Team believes there is an insufficient amount of data to complete an accurate comparison of annual GHG emissions. In response to GMOB’s comments on the 2022 Status of Environment Report, the Project Team committed to further discussions on GHG emissions including a climate change indicator in future reports, once a sufficient amount of data is collected.</p> <p><b>IN PROGRESS: GMRP Draft Annual Report: 6.2.3. Greenhouse Gas Emissions.</b> The Project Team is taking several steps to proactively reduce GHG emissions and implement federal climate action policies. The Project Team stated that it is fully committed to finding opportunities to reduce its GHG emissions during implementation. The principal source of GHG emissions from implementation activities will be through the operation of heavy construction equipment. Given that heavy construction equipment must be used for a remediation project of this nature, the principal tool available to minimize GHG emissions will be to minimize fuel use and reduce haul distances where possible. As required for all new federal buildings, the Project Team has been undertaking a GHG assessment of the design of the new water treatment plant to be constructed onsite. This includes a life cycle analysis of the heating system and all supporting equipment. In 2022, the Project Team engaged the GMWG on the Water Treatment Plant Design Plan, with a focus on providing an update on the GHG Emissions Study. GHG emissions will be calculated for each option over the 40-year lifespan of the facility to demonstrate the reduction in emissions. Results of this assessment will be considered in the final design of the new Water Treatment Plant (CIRNAC, 2022a) (CIRNAC, 2022b) (CIRNAC, 2022c). The MCM Tracks and reports on the Project’s GHG emissions monthly. The indirect emissions emitted on site in 2022-23 (April 2022 to March 2023) were 2.12M Kg CO<sub>2</sub>e and the direct emissions emitted on site were 2.04 MKg CO<sub>2</sub>e. These emissions are lower than emissions in 2021-22, the baseline year for emissions tracking. Future reports will provide trend information and will include explanations for the observed trends, where available.</p>

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Long-term Planning</b>		
2022-2	GMOB recommends that the Aquatics Advisory Committee (AAC) continue to operate on an as-needed basis to provide a venue for updates, to share knowledge, and seek advice on all things related to aquatics management for 2023-24. The Project Team should evaluate with AAC members the need to continue or cease operations after 2024.	<p><b>IN PROGRESS: Project Team Response:</b> The Project Team will continue to hold AAC meetings on an as-needed basis.</p> <p><b>IN PROGRESS: GMRP Draft Annual Report: 8.1.1 Aquatic Engagement</b> In 2022-23, the Project Team met several times with the AAC to discuss the Fisheries Act Authorization and future AEMP reference area locations. Committee members also took part in a tour of site.</p>
2017-8	Complete measure six in the Mackenzie Valley's Environmental Impact Review Board's Report of Environmental Assessment.	<b>ADDRESSED:</b> While this measure was addressed, GMOB considers the outcome unsatisfactory.
2019-6	Use legislation to guarantee long-term funding.	<b>NOT ADDRESSED:</b> No progress has been made on long-term funding.
2019-8	Develop a land-use plan for the site.	<b>NOT ADDRESSED:</b> No progress has been made to develop an onsite land use plan.
2020-4	Ensure northerners have central roles in the care, maintenance, and management of the Giant Mine site into the future.	<b>NOT ADDRESSED:</b> The development of a PCP continues to be delayed.
2021-1	To enhance project oversight activities, GMOB recommends that the Project Team undertake more active reporting on key indicators of trends in each of the seven areas: 1) Environment, 2) Economy, 3) Engagement, 4) Reconciliation, 5) Project Management and Planning, 6) Community Health and Wellness, and 7) Long-term planning.	<b>NOT ADDRESSED:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, "The Project team does not support the development of additional indicators to those that have already been developed." GMOB encourages the Project Team to continue to identify key indicators and actively report on them.
2021-4	It is expected that a request for proposals to develop a Perpetual Care Plan will be issued by May 2022. GMOB is hopeful that inefficiencies associated with a committee-based approach to drafting the request for proposals will not create further delays. GMOB strongly recommends that the Project Team permit no further delays in the preparation of an appropriate Perpetual Care Plan.	<b>NOT ADDRESSED:</b> The Project Team stated that the RFP for the PCP was intended to be tendered in the fall of 2022, and it expected that a consultant would be retained towards the end of 2022 to begin drafting the first official version of the Perpetual Care Plan. Delays continue.

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Long-term Planning</b>		
2022-10	GMOB recommends that the Perpetual Care Plan be completed and submitted to GMOB for review no later than March 31, 2024.	<p><b>NOT ADDRESSED: Project Team response:</b> The Project Team agreed that the PCP development is very important and recognizes that it is behind the schedule set out in the Agreement. However, this schedule was arbitrary and defined before a full project implementation schedule was realized; a final PCP is not needed until the site remediation is complete (currently scheduled for 2038). That said, the Project Team has worked closely with Rights holders and stakeholders over the past several years to develop an inclusive scope of work and has issued a Request for Information on CanadaBuys to assess interest within the contracting community and further refine the RFP. The Project Team expects the first version of the PCP to be completed by 2024-25.</p> <p><b>NOT ADDRESSED: GMRP Draft Annual Report:</b> Table 26, page 123 Section 2.2 Perpetual Care Plan page 28. The Project Team, with significant input from the Task Force, developed a Scope of Work which outlines the requirements of Version 1 of the PCP. This supplements a Request for Information to inform a final RFP to be issued in 2023-24, with a contract award anticipated by fall of 2023.</p>
2022-11	GMOB recommends that onsite land-use planning for the Giant Mine site occur in tandem with active remediation and be led by the City of Yellowknife.	<b>NOT ADDRESSED: GMRP response:</b> N/A – this recommendation is directed to the City of Yellowknife.
<b>Reconciliation</b>		
2016-3B 2017-4 2018-5 2019-4	Respond to the requests from the Yellowknives Dene First Nation for an apology and compensation.	<b>IN PROGRESS:</b> There has been reported progress in the negotiations between the Government of Canada and the Yellowknives Dene First Nation regarding an apology and compensation.
2016-3B 2017-4 2018-5 2019-4	To enhance project oversight activities, GMOB recommends that the Project Team undertake more active reporting on key indicators of trends in each of the seven areas: 1) Environment, 2) Economy, 3) Engagement, 4) Reconciliation, 5) Project Management and Planning, 6) Community Health and Wellness, and 7) Long-term planning.	<b>NOT ADDRESSED:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, “The Project team does not support the development of additional indicators to those that have already been developed.” GMOB encourages the Project Team to continue to identify key indicators and actively report on them.

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Project Management and Planning</b>		
2016-2	Develop performance measures to enable monitoring of the Remediation Project.	<b>IN PROGRESS:</b> The Type A Water Licence granted by the Minister of Northern Affairs on September 18, 2020, in accordance with the Mackenzie Valley Resource Management Act, partially addressed the need for indicators. Additional work on indicators for the <i>Status of the Environment Report</i> is underway.
2016-4	Develop a Traditional Knowledge Strategy.	<b>NOT ADDRESSED:</b> The Government of the NWT funded the <i>Yellowknives Dene First Nation Traditional Knowledge Study</i> in 2017/18 but no formal traditional knowledge strategy for the Remediation Project has been released.
2016-5A	Identify foreseeable additional advanced remedial work required prior to full remediation. The team should provide appropriate justification for such work.	<b>ADDRESSED:</b> Achieved through ongoing monitoring, application of lessons learned and responsiveness to change.
2016-5B	Develop, monitor, and report on a risk profile of the site.	<b>ADDRESSED:</b> Achieved through ongoing monitoring and communication of trends in the risk profile.
2016-6	Identify and mitigate delays in remediation planning.	<b>ADDRESSED:</b> Due to regulatory approvals, active remediation began in 2021.
2016-10	Consider options to a government-driven and controlled approach to the Project.	<b>NOT ADDRESSED:</b> No action was taken aside from contracting the MCM.
2017-5 2018-6 2019-5	Provide a five-year project plan and critical path to link and integrate aspects of the Project.	<b>NOT ADDRESSED AND NO LONGER RELEVANT:</b> No explicit action was taken, although the Project now has regulatory authority to proceed with full reclamation within specific parameters and timelines. As such, this is no longer relevant.
2017-6 2018-7	Describe the Main Construction Manager's responsibilities.	<b>ADDRESSED:</b> Responsibilities are articulated.
2017-7	Provide results of Independent Peer Review Panel on remediation and stabilization of arsenic dust.	<b>ADDRESSED:</b> The Panel provided results on one occasion.
2017-8 2018-8	Complete measures five and six in the Mackenzie Valley's Environmental Impact Review Board's Report of Environmental Assessment.	<b>IN PROGRESS:</b> The Quantitative Risk Assessment is being conducted and results will be integrated on an ongoing basis into plans for the Remediation Project.
2017-9	Mackenzie Valley Land and Water Board to consider an interim water licence.	<b>NOT ADDRESSED AND NO LONGER RELEVANT:</b> Rejected by the Mackenzie Valley Land and Water Board and the Project Team. This recommendation is no longer relevant.

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Project Management and Planning</b>		
2021-1	To enhance project oversight activities, GMOB recommends that the Project Team undertake more active reporting on key indicators of trends in each of the seven areas: 1) Environment, 2) Economy, 3) Engagement, 4) Reconciliation, 5) Project Management and Planning, 6) Community Health and Wellness, and 7) Long-term planning.	<b>NOT ADDRESSED:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, “The Project team does not support the development of additional indicators to those that have already been developed.” GMOB encourages the Project Team to continue to identify key indicators and actively report on them.
2021-3	The Project Team’s annual water Licence Report will inform GMOB’s project management and planning oversight activities. This report will be helpful in tracking progress, identifying deviations in schedules, and discerning trends. GMOB recommends that the Project Team identify key project management and planning indicators that can be consistently monitored and reported in the annual report and the Project Team’s upcoming <i>Status of the Environment Report</i> .	<b>IN PROGRESS:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, “The Project team does not support the development of additional indicators to those that have already been developed.” However, the Project Team did respond positively to this recommendation with the State of Environment Report and marked changes in its Annual Report to GMOB. GMOB encourages the Project Team to continue to identify key indicators and actively report on them.
2022-7	GMOB recommends that a summary of all contingency planning exercises and reviews be included as a separate section of the <i>GMRP Annual Report</i> .	<b>NOT ADDRESSED AND NO LONGER RELEVANT:</b> <b>GMRP response:</b> “The Project Team completes a thorough review of its risk register on an annual basis. The risk register reviews involve ensuring the risk statements are current and accurate; reviewing likelihoods and consequence severities; and updating the project’s risk responses. Contingency planning is one risk response used by the project, but other responses are also adopted, as appropriate. The risk register is an input into the Project Team’s annual work planning cycle. Activities required to actively manage risk or to put in place contingencies are scoped into the annual Work Package Project Plans (WPPPs) and are implemented at the work package level. However, this is only one way in which the team addresses contingency planning. It is an activity which is inherent in the day-today work completed by the team as a whole as they are managing their work packages. Through regular meetings, communication, and collaboration, issues are both identified and mitigated as needed. As site managers, the MCM [Main Contract Manager] also has an important role to play. As such, the Project Team thanks the GMOB for its recommendation, but at this time does not plan to create a separate report section providing a summary of all contingency planning exercises and reviews.”

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Project Management and Planning CONTINUED</b>		
2022-8	GMOB recommends that local management be provided with appropriate purchasing authority to respond to any on-site emergency situations.	<b>NOT ADDRESSED: Project Team response:</b> Should there be an emergency situation, PSPC [Public Services and Procurement Canada], along with MCM, has authority to purchase goods and services more quickly than under normal procurement processes and procedures. In this case (pump failure) the other submersible pump was able to handle the required pumping capacity and has been designed to do this as part of redundancy in the system. The time it took to replace the failed pump was not due to the lack of efficient purchasing authority, but the time required to build and deliver the replacement pump. The project has initiated the purchase of a shelf spare pump to remain at the site and will continue to ensure spares are available.

<b>Economy (Socio-Economic)</b>		
2016-11	Apply a structured framework from a community health and well-being perspective to evaluating social, economic, and cultural aspects of the Remediation Project.	<b>ADDRESSED:</b> Improvements in public engagement and communications especially for various studies and plans indicate that this framework is not needed.
2017-1 2018-1	Develop and implement a socio-economic strategy to ensure northerners, particularly local Indigenous people, are positively impacted by the Project.	<b>ADDRESSED:</b> The strategy developed has an implementation plan to guide monitoring. However, the effectiveness of this response is unclear. GMOB will continue monitoring the responses to this recommendation.
2019-1	Appoint a special envoy to work with the various interests to develop and implement an integrated economic strategy.	<b>NOT ADDRESSED:</b> The Project Team has not provided a qualified independent or internal lead for socio-economic reporting. The process of updating the <i>Socio-Economic Strategy, 2016-2021</i> is an opportunity to engage this expertise.
2020-2	Use the findings of GMOB's independent review to improve outcomes and reporting on its <i>Socio-Economic Strategy, 2016-2021</i> as well as strategy renewals and updates.	<b>NOT ADDRESSED:</b> The Project Team responded to GMOB's independent review and recommendations but offered no commitments. The proposed update of the <i>Socio-Economic Strategy, 2016-2021</i> provides an opportunity to make progressive change.
2020-3	Bring forth socio-economic considerations identified in the Perpetual Care Plan framework into the goals of the Perpetual Care Plan.	<b>NOT ADDRESSED:</b> The Socio-Economic Working Group has not addressed any perpetual care planning considerations. The development of a PCP continues to be delayed.
2020-4	Ensure northerners have central roles in the care, maintenance, and management of the Giant Mine site into the future.	<b>NOT ADDRESSED:</b> The development of a PCP continues to be delayed.

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Economy (Socio-Economic)</b>		
2021-1	To enhance project oversight activities, GMOB recommends that the Project Team undertake more active reporting on key indicators of trends in each of the seven areas: 1) Environment, 2) Economy, 3) Engagement, 4) Reconciliation, 5) Project Management and Planning, 6) Community Health and Wellness, and 7) Long-term Planning.	<b>NOT ADDRESSED:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, “The Project Team does not support the development of additional indicators to those that have already been developed.” GMOB encourages the Project Team to continue to identify key indicators and actively report on them.
2021-2	GMOB will continue to bring concerns about contracting processes to the Project Team and advocate for new tools and approaches to address these issues. GMOB recommends that the Project Team meet with local contractors to discuss opportunities for improving contracting processes.	<b>NOT ADDRESSED:</b> The Project Team identified Parsons, the MCM, as responsible for engaging with the business community and gathering lessons learned on contracting tools used to procure work on the site. This is valid but does not address the concern that GMOB highlighted, which was to actively listen to and consider the input of local contractors who are affected by the federal policies on how contracts are set up, awarded and managed.
2022-3	GMOB recommends the Socio-Economic Working Group meet no more than three or four times a year while the associated Advisory Body meet only once or twice per year. These meetings are time-consuming and expensive and not always well attended. Without metrics to determine if the meetings serve their intended purpose, GMOB questions their value.	<b>NOT ADDRESSED: Project Team Response:</b> “The Socio-Economic Advisory Body was established in late 2018 and the Working Group in early 2019. However, neither of these groups play the lead role in implementing socio-economic activities for the Project, as this lies with the GMRP team. From the Terms of Reference for the two groups: - SEWG [Socio-Economic Working Group]: coordinate and conduct activities related to the implementation of the GMRP’s Socio-Economic Strategy – SEAB [Socio-Economic Advisory Body]: provide strategic advice to the Socio-Economic Working Group and act as senior government champions for the implementation of the SE Working Group’s approach. Regarding frequency of meetings, the Project Team has sent out several surveys to Working Group committee members to gauge their interest and effectiveness of the committee. The frequency of meetings was adjusted from every month to every other month based on the response to the surveys. Attendance continues to be strong, with the greater majority of member groups always represented. Individual member representatives continue to change but that is normal for a committee of this size and diversity. The Project Team will continue to monitor and evaluate frequency of these meetings.”

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Economy (Socio-Economic) CONTINUED</b>		
2022-3 CONTINUED	GMOB recommends the Socio-Economic Working Group meet no more than three or four times a year while the associated Advisory Body meet only once or twice per year. These meetings are time-consuming and expensive and not always well attended. Without metrics to determine if the meetings serve their intended purpose, GMOB questions their value.	<p><b>NOT ADDRESSED: GMRP Draft Annual Report: 8.2 Socio-Economic 2022-23 Highlights</b></p> <ul style="list-style-type: none"> <li>• The Project Team finalized a revised five-year Socio-Economic Strategy through engagement with the Socio-Economic Working Group and the Socio-Economic Advisory Body.</li> <li>• The Socio-Economic Working Group and the Socio-Economic Advisory Body continued to provide expertise and support to advance implementation of the Socio-Economic Strategy.</li> <li>• The Project Team met with GMOB once to discuss its recommendations on socio-economic analysis and reporting and continues to keep open communication with GMOB to provide requested statistics. GMOB also attended all of the Socio-Economic Working Group and Socio-Economic Advisory Body meetings.</li> <li>• The Project Team and the NSMA [North Slave Métis Alliance] signed a Community Benefit Agreement on March 6, 2023.</li> <li>• Funding for training has been committed by the Project Team as part of the Community Benefit Agreement for YKDFN's [Yellowknives Dene First Nations'] Dechįta Nàowo program and most recently for the NSMA. The Project Team provides annual funding to Tłıchų for training and long-term training plans will form part of an Economic Benefits Agreement that is currently in negotiations with the First Nation.</li> <li>• Female employment increased from 20% in 2021-22 to 22% in 2022-23 which remains within the target range of 15-30%.</li> <li>• The proportion of expenditures with Northern suppliers reached 61% of all the Projects expenses. The results are also higher than previous reported years (59% in 2021-22, 44% in 2019-20, 56% in 2018-2019).</li> <li>• In 2022-23, the Project Team obtained the highest training numbers registered. The total number of people trained (377) is 11% greater than the previous year (335 in 2021-22, 228 in 2022-21, and 230 in 2019-20).</li> </ul>



YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Economy (Socio-Economic)</b>		
2022-4	GMOB recommends that the Project Team consider changing its approach to these meetings to give more attention to the broader economics of the Project and the economic environment in which the Project is taking place. All Parties to the Agreement require better information so they can consider potential actions by their own organizations and look to the Working Group and Advisory Body meetings as opportunities to co-operate and coordinate.	<b>NOT ADDRESSED: Project Team Response:</b> GMOB and the Project Team met in May of 2023 to go over the findings that are referenced here. The Project Team agreed that further discussions are needed on GMOB's findings. The Project Team would like to work with GMOB to present and discuss these findings with the GMRP's two dedicated Socio-Economic committees. This could result in a dedicated agenda item on broader economics of the Project and the economic environment in which the Project is taking place.
2022-5	The GNWT has a far greater role and responsibilities for the economic outcomes of the Project than does the federal government, but all Parties to the Environmental Agreement have an important role. If the Socio-Economic Working Group and Advisory Body are to meaningfully contribute to the success of the Project, GMOB recommends that all Parties must attend and fully participate in meetings.	<b>NOT ADDRESSED: Project Team Response:</b> As a co-proponent, the GNWT is committed to fully participating in the meetings.

<b>Community Health and Well-being</b>		
2016-8 2017-12 2018-11 2019-7	Deal with offsite contamination issues including land use, safety, public health, and environmental concerns.	<b>IN PROGRESS:</b> Risk assessment work and improved public engagement and communications are progressing to address these issues.
2016-12 2017-11 2018-10	Communicate effectively on studies that address arsenic contamination and risk and health studies.	<b>IN PROGRESS:</b> Improved public engagement and communications are progressing to address these issues.
2018-4 2019-3	Improve the City of Yellowknife's engagement of local residents in all aspects of the Remediation Project.	<b>ADDRESSED:</b> The City of Yellowknife has developed and regularly updates its Giant Mine information webpage which includes a contact information webpage which includes a contact email.
2020-7	Continue to improve engagement and communications activities to ensure that local people: a) are not experiencing unnecessary stress or fear due to dust coming off the Giant Mine site, and b) understand the three main types of site remediation standards – residential, industrial, undisturbed – and how they apply to the site.	<b>IN PROGRESS:</b> Improved public engagement and communications are progressing to address these issues.
2021-1	To enhance project oversight activities, GMOB recommends that the Project Team undertake more active reporting on key indicators of trends in each of the seven areas: 1) Environment, 2) Economy, 3) Engagement, 4) Reconciliation, 5) Project Management and Planning, 6) Community Health and Wellness, and 7) Long-term Planning.	<b>NOT ADDRESSED:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, "The Project team does not support the development of additional indicators to those that have already been developed." GMOB encourages the Project Team to continue to identify key indicators and actively report on them.

YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Community Health and Well-being CONTINUED</b>		
2022-9	<p>In light of the discontinuation of the <i>Hoèla Weteèts'èedeè Understanding Community Well-being around Giant Mine Study</i>, GMOB recommends that the Project Team request direction from the Mackenzie Valley Environmental Impact Review Board (MVEIRB), the responsible Ministers, and the Parties to the Agreement regarding Measure #10 and the evaluation of broader health impacts such as stress effects.</p>	<p><b>ADDRESSED:</b> Members of the Advisory Committee, including all Environmental Agreement Signatories, are the following:</p> <ul style="list-style-type: none"> <li>• Wilfrid Laurier University,</li> <li>• the City of Yellowknife,</li> <li>• the North Slave Métis Alliance,</li> <li>• the Giant Mine Oversight Board,</li> <li>• Alternatives North,</li> <li>• Health Canada,</li> <li>• the Government of the Northwest Territories Department of Health and Social Services, and</li> <li>• Crown-Indigenous Relations and Northern Affairs Canada</li> </ul> <p>After careful deliberation, the Advisory Committee unanimously advised on September 15, 2022 that the Project Team and research team should no longer proceed with the study. As such, the Project Team made the difficult decision to discontinue the wellness study. However, it is the Project Team's understanding that YKDFN may be interested in carrying out their own independent wellness study. The Project Team's response letter to YKDFN of November 16, 2022 expressed the Project Team's willingness to discuss further, however no conversations have occurred. At this time the Project Team does not feel it's appropriate to push or pursue this further. YKDFN is best positioned to speak to their decision and next steps.</p>

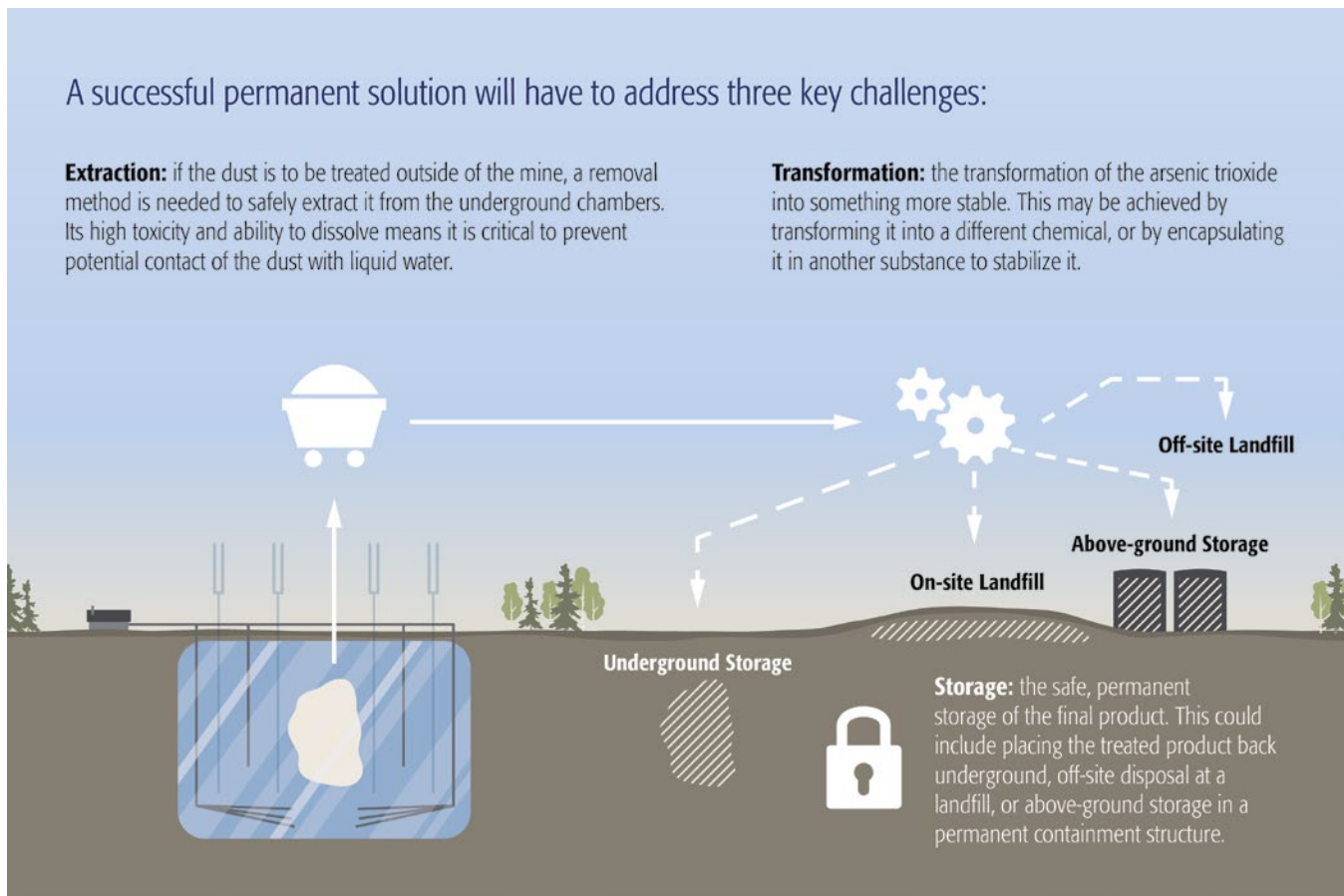
YEAR and RECOMMENDATION #	TOPIC	STATUS
<b>Engagement</b>		
2016-3A 2017-2 2018-3	Give priority to engagement and communications with the public and the Parties to the Giant Mine Remediation Project Environmental Agreement.	<b>IN PROGRESS:</b> Public engagement and communications continue to improve although it is unclear the degree to which the general public is aware of and supports Project activities and planned outcomes.
2016-9 2017-3 2018-2 2019-2	Ensure all Parties to the Giant Mine Remediation Project Environmental Agreement have adequate resources to fully participate in all aspects of the Project.	<b>ADDRESSED:</b> Proposal-based funding is addressing resource needs of the various Parties.
2018-4 2019-3	More information and engagement from the City of Yellowknife that ensures citizens know about social and economic benefits.	<b>ADDRESSED:</b> The City of Yellowknife developed and regularly updates a Giant Mine information webpage.
2020-6	The City of Yellowknife make the website interactive to enable Yellowknife residents to provide their input to the Project.	<b>ADDRESSED:</b> The City of Yellowknife's webpage includes a contact email.
2020-5	Identify indicators to enable the measurement of the effectiveness of engagement and communications activities.	<b>NOT ADDRESSED:</b> The Project Team has not responded to this recommendation.
2021-1	To enhance project oversight activities, GMOB recommends that the Project Team undertake more active reporting on key indicators of trends in each of the seven areas: 1) Environment, 2) Economy, 3) Engagement, 4) Reconciliation, 5) Project Management and Planning, 6) Community Health and Wellness, and 7) Long-term Planning.	<b>NOT ADDRESSED:</b> The Project Team stated in its response to the GMOB 2021 Annual Report recommendation that, "The Project team does not support the development of additional indicators to those that have already been developed." GMOB encourages the Project Team to continue to identify key indicators and actively report on them.

## APPENDIX B

### Overview of GMOB Funded Research: November 2023 Report

Article 7 of the Giant Mine Remediation Environmental Agreement tasks GMOB with undertaking research into technical approaches that do not require constant and forever care and maintenance of the arsenic trioxide at the mine site. As shown in the figure below, a permanent solution must tackle three key challenges: extraction of the dust, transformation to a much less toxic material, and safe storage of the final product.

#### KEY CHALLENGES TO ADDRESS FOR A PERMANENT SOLUTION TO ARSENIC TRIOXIDE DUST STORED UNDERGROUND AT GIANT MINE



#### BACKGROUND

In 2018, GMOB partnered with TERRE-NET, an integrated network of leading academics from universities across Canada who work toward managing mine waste and mitigating contamination from mining operations. One of TERRE-NET’s goals is to find sustainable ways to deal with environmental challenges associated with the resource sector, including the management of hazardous wastes from mines. These experts work in various scientific and social science fields.

TERRE-NET is headquartered at the University of Waterloo. GMOB has asked TERRE-NET to focus on technology that will transform the arsenic trioxide into a stable, much less toxic material.

## A SUMMARY OF THE RESEARCH PROJECTS AND PROGRESS TO DATE.

# Understanding the makeup of the arsenic dust at Giant Mine

### PRESENTED BY

- Matthew Lindsay, Associate Professor, Department of Geological Sciences, University of Saskatchewan
- Heather Jamieson, Professor Emerita, Department of Geological Sciences & Geological Engineering, Queen's University

The larger Giant Mine research program is exploring several different ways to stabilize the arsenic dust, and these projects include testing how well each stabilized product stands up to conditions that it might encounter in storage (for example, flooding by groundwater or lake water).

The arsenic dust currently stored underground at Giant Mine presents a serious environmental challenge. The dust is one of the by-products that were produced when rocks that naturally contained gold, arsenic and sulfur were mined and roasted at extremely high temperatures to extract the gold.

The dust contains large amounts of arsenic trioxide, a dangerous substance that dissolves in water, but it also contains iron, calcium, sulfur and more. These additional elements, which were present naturally in the mined rock, cause the dust to behave differently from pure arsenic trioxide. These differences affect how the dust can be treated so that it is stable for the long term.

**The project has two goals. The first goal is to gain a clear picture of the dust's chemical and physical properties. The second goal is to learn how the dust dissolves in the different types of water that exist in and near the Giant Mine (e.g., lake water or groundwater).**

The first step is to closely examine the arsenic dust using specialized equipment to gain a better picture of what exactly is in it. The dust's composition has implications for how it behaves and reacts, both in the environment and when it is transformed and stored for the long term.

The next step is to test how the arsenic dust dissolves in water under different environmental conditions such as fresh lake water or salty groundwater from deep underground. The results from these tests will help explain why the dust behaves the way it does, both in the environment and in potential remediated products (e.g., when mixed with cement or transformed to glass).

## PROJECT UPDATE

### RESEARCH PROGRESS: 90%

**Where we are now:** This was the first project initiated in this research program, and it is nearly complete. The first step, understanding the dust's properties, is complete and a scientific paper describing these results was recently published. The second step, examining how the dust dissolves in water, is nearing completion with ongoing efforts focused on data analysis and interpretation.

**What comes next:** The results of dissolving the dust in water under different conditions are currently being described in a second scientific paper that is being prepared for publication. Once published, this project will be complete.

## Understanding the long-term stability of iron arsenic solids

### PRESENTED BY

- Matthew Lindsay, Associate Professor, Department of Geological Sciences, University of Saskatchewan
- Heather Jamieson, Professor Emerita, Department of Geological Sciences & Geological Engineering, Queen's University

As the GMOB research program is exploring several different ways to stabilize the underground arsenic dust, one very common way of treating arsenic waste materials – specifically, arsenic dissolved in water – is to add an iron-rich compound. This process removes the arsenic from the water and forms iron-rich solids that contain the arsenic.

However, there are many knowledge gaps around the long-term stability of iron-arsenic solids, both when stored aboveground for decades and when conditions change through remediation (e.g., if they are covered in soil and planted over). These knowledge gaps have implications for not only potential treatments for the arsenic dust at Giant Mine, but also for any treatment process that produces these solids as a by-product.

**The goal of this project is to learn more about the long-term stability of iron-arsenic solids by exposing them to a range of environmental conditions and studying what physical and chemical changes might occur.**

The first step is to produce iron-arsenic solids in the lab, then examine them using special equipment such as the Canadian Light Source Synchrotron to understand their composition. The second step is to expose the solids to a range of conditions. These conditions include exposure to soil, water with different acidity levels, both oxygen-rich and oxygen-poor conditions, and microbes that occur naturally around the mine. These tests will shed light on how different possible reclamation scenarios might affect the long-term stability of the iron-arsenic solids.

### PROJECT UPDATE

#### RESEARCH PROGRESS: 20%

**Where we are now:** The research team has produced iron-arsenic solids and performed initial tests to get a better picture of their chemical and physical makeup.

**What comes next:** The work is continuing as researchers prepare to begin testing the samples under a range of environmental conditions, performing the microbial tests and closely studying any changes that might occur to the solids.

## Turning arsenic dust into a mineral that won't dissolve in water

### PRESENTED BY

- Tom Al, Professor, Department of Earth and Environmental Sciences, University of Ottawa

Arsenic sulfide is up to 10,000 times less soluble than arsenic trioxide and could provide a safe and permanent solution when stored underwater, deep in the mine.

**The goal of this project is to “trap” the arsenic in a more stable mineral called “arsenic sulfide”.**

In its current form, the arsenic trioxide is simply arsenic “linked” to oxygen. The first step is to dissolve the arsenic trioxide in water to break the arsenic free from the oxygen. Like adding sugar to tea, heating the water is important to ensure it dissolves completely. **The most important challenge for the research team** is figuring out how hot the water needs to be, and for how long, to completely dissolve all the arsenic trioxide.

Next, the researchers add sulfides to the dissolved mixture. This process, called “sulfidation,” traps the arsenic in arsenic sulfide. After dissolving the arsenic trioxide, a small amount of “residue” remains. Studying this residue is another important phase of this project to determine if it needs to be treated and how that could be done.

Should arsenic sulfide be used in a permanent solution, it would be important to keep it away from oxygen so new arsenic trioxide doesn't form, meaning it would need to be stored underwater in the deepest part of Giant Mine.

### PROJECT UPDATE

#### RESEARCH PROGRESS: 60%

**Where we are now:** Researchers now have a good idea of the temperature and time needed to dissolve the arsenic dust in water. Their key finding is that the water will need to be 200°C or higher, and the time could range from 5 to 10 minutes (although these numbers may require adjustment for a full-scale operation). They have also begun studying the residue, which contains about 5–10% of the arsenic from the original sample, to better understand what extra treatment it might need.

**What comes next:** Researchers are putting the final touches on the process for dissolving the arsenic dust. Next, they will test the sulfidation process and finish studying the residue.

## Using bacteria from the environment to produce an essential ingredient for stabilizing arsenic

### PRESENTED BY

- Carol Ptacek, Professor, Department of Earth and Environmental Sciences, University of Waterloo

One potential option for safe, permanent storage is to dissolve the arsenic dust in water and combine the arsenic with sulfur, which will “bind” to the arsenic and trap it in a mineral form (arsenic sulfide) that can be safely stored deep underground (see Project 3 for more details).

Sulfur, in the form of sulfide minerals, occurs naturally in the rocks that were mined at Giant Mine. When mined and exposed to oxygen, sulfide minerals release sulfate, which can be found in the not-yet-treated wastewater at the mine. This form of sulfur cannot be used to treat the arsenic dust – but certain kinds of bacteria that live near Giant Mine may be harnessed to treat the water so it can. These bacteria “breathe” sulfate instead of oxygen in the wastewater to produce a form of sulfur, called “sulfide,” that does bind with arsenic to make a mineral that is not very soluble.

**The goal of this project is to explore whether local bacteria can produce sulfide from not-yet- treated mine wastewater to treat arsenic dust at Giant Mine.**

This project has three steps. First, researchers will collect bacteria from nearby wetlands and feed them nutrients (e.g., from local food waste) to help them grow and multiply. Second, they will use the bacteria to process untreated wastewater from the mine and produce sulfide. Finally, they will add the sulfide to dissolved arsenic dust to trap the arsenic in a much less soluble mineral.

By harnessing local bacteria to produce sulfide from locally available mine wastewater, it should be possible to treat the arsenic dust while also improving the quality of the mine wastewater before it goes on to further treatment.

### PROJECT UPDATE

#### RESEARCH PROGRESS: 10%

**Where we are now:** A graduate student has just started on this project, beginning with a review of the existing scientific research and collection of samples from several wetland areas on the Giant Mine site. This work builds on the development of a process for dissolving the arsenic dust (Project 3).

**What comes next:** Soon work will begin on the three steps described above. The first step will be to “feed” the bacteria in a lab setting to increase their numbers and learn more about how much local waste/nutrients will be needed.



# Testing the long-term safety of arsenic-containing glass

## PRESENTED BY

- Alana Ou Wang, Post-doctoral Fellow, Department of Earth and Environmental Sciences, University of Waterloo

Arsenic-containing mine waste (dust) can be transformed into a highly stable glass, which has the potential to provide a safe, permanent storage option for the arsenic dust at Giant Mine. However, Giant Mine dust contains many impurities and may not always behave as expected.

**The goal of this project is to stress-test arsenic glass samples, produced using arsenic dust from Giant Mine, and learn which conditions may cause arsenic to leak out. If the glass can withstand these tests, it may be strong enough to provide a safe long-term storage solution for the arsenic dust.**

This project includes several steps. First, researchers will study the glass to learn its physical structure and chemical makeup. Next, they will test crushed and uncrushed glass samples with a wide range of liquids (water, acids, and more) to simulate extreme environments and learn what might cause the arsenic to leak from the glass. By studying crushed samples, they can learn whether potential physical damage would increase the likelihood of arsenic escaping from the glass.

Finally, they will subject the glass to environments that might occur in storage. They will pack uncrushed glass samples into plexiglass cylinders and pass three types of water through them to mimic exposure to Giant Mine groundwater, Great Slave Lake water, or acid rain.

These tests will reveal whether the glass can withstand exposure to different conditions or if the arsenic will eventually escape into the natural environment. This information will also help the researchers identify the safest storage conditions for the glass.

## PROJECT UPDATE

### RESEARCH PROGRESS: 70%

**Where we are now:** Researchers have finished analyzing the chemical and physical makeup of crushed and uncrushed glass. They have finished testing the samples that were exposed to different liquids and are currently preparing to report on the results. The water exposure tests using Giant Mine groundwater and Great Slave Lake water are ongoing, as the researchers want to be sure that the glass can withstand being exposed for a prolonged time.

**What comes next:** The researchers decided to add a third exposure test using acidic rainwater, which were started this summer. They will also study samples of both the glass, and the water that was in contact with the glass, to learn more about any changes that may have occurred.

## Trapping arsenic dust in a cement paste to be stored underground

### PRESENTED BY

- Isabelle Demers, Professor, Research Institute on Mines and Environment, Université du Québec en Abitibi-Témiscamingue
- Nicholas Beier, Associate Professor, University of Alberta

Mixing the waste materials from mining (“tailings”) with cement for underground storage is a common practice in mine reclamation. When wet, the mixture is a thick paste that can be transported and pumped into underground storage chambers. Unlike regular cement, which hardens into concrete, a cemented paste contains much more water and hardens to a consistency like a stiff soil.

Arsenic trioxide is not a typical ingredient in cemented paste, meaning the mixture could behave in unexpected ways. **The goal of this project is to test different cemented paste mixtures – and the conditions needed for the paste to harden – to learn the most stable “recipe” for trapping and permanently storing the arsenic underground.**

This project has two steps. The first step is to test different recipes to see which produces the strongest cemented paste once hardened. Researchers will then place hardened samples from each recipe in moving water to see if any arsenic leaks out from them. The second step is to subject the cemented paste to the extreme temperature changes that might occur at Giant Mine. These changes include freezing before the paste has hardened, freezing for long periods, or repeated freeze-thaw cycles, all of which might weaken the final hardened paste (like soils heaving as they freeze).

Together, these tests will allow researchers to see if there is a mixture that will withstand the eventual storage conditions at Giant Mine without leaking arsenic into the environment.

### PROJECT UPDATE

#### RESEARCH PROGRESS: STEP 1 – 80%

**Where we are now:** The first step is nearly done. Researchers learned that adding arsenic dust causes the paste to behave differently than expected, and they were able to rule out several mixtures that were not strong enough. For example, they tried replacing some of the cement with lime kiln dust (a method for reducing costs), and the result was very unstable. They are analyzing the samples that performed poorly to better understand why this was happening. There are a few remaining tests required to identify the best recipe..

**What comes next:** Once the best recipe for the cemented paste is identified, step two involves subjecting the paste to different freezing scenarios (before, during and after it has hardened). Researchers will then look at the hardened paste through a powerful microscope to see if cracks form that could allow arsenic to escape.

## Monitoring arsenic pollution using a stable isotope analysis of antimony

### PRESENTED BY

- David Blowes, Professor, Department of Earth and Environmental Sciences, University of Waterloo

Understanding where arsenic came from on-site and how it moves through the environment is important for managing and treating it in the future. This kind of information can be learned using a method called “stable isotope analysis.” However, this kind of analysis can only be performed using certain elements, and arsenic is not one of them.

Fortunately, arsenic has a close chemical cousin called “antimony” that can be used for stable isotope analysis. Antimony is found in the arsenic dust at Giant Mine and tends to “tag along” with arsenic. This means researchers can learn how arsenic behaves by studying the antimony that travels with it.

**The first goal of this project is to develop and test a method that uses antimony to monitor arsenic pollution in the environment around Giant Mine.** This work will make it possible to identify whether antimony (and thus arsenic) detected in a water sample came from the mine, and possibly even which storage chamber it came from. This could provide an early warning if arsenic enters the groundwater from any of the chambers, helping researchers quickly pinpoint the contamination source.

**The second goal is to enable more detailed testing of the potential permanent storage options.** The main challenge facing researchers is designing a method that is tailored to the arsenic dust and environment at Giant Mine. Stable isotope analysis using antimony is quite new, and researchers are breaking new ground by using it for this purpose. Researchers will test samples from the other projects using stable isotope analysis and learn if there have been chemical changes that other methods could not detect. This is important because subtle chemical differences could impact a method’s long-term stability.

### PROJECT UPDATE

#### RESEARCH PROGRESS: 25%

**Where we are now:** There have been delays to date due to issues with the equipment needed to perform the stable isotope analysis. In the meantime, the researchers have prepared for the analysis, including collecting samples from Giant Mine surface water and groundwater monitoring stations and tailings ponds.

**What comes next:** The necessary equipment is now in place and researchers have begun the process of analyzing the samples.

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