Relations Couronne-Autochtones et Affaires du Nord Canada

Crown-Indigenous Relations and Northern Affairs Canada

GIANT MINE REMEDIATION PROJECT

ANNUAL REPORT 2020–21

Government of Northwest Territories

Gouvernement des Territoires du Nord-Ouest

Canada

LAND ACKNOWLEDGEMENT

The Giant Mine Remediation Project acknowledges the Indigenous Peoples and the importance of the land in and around the Giant Mine site, which is located in Chief Drygeese Territory. From time immemorial, it has been and is the traditional land of the Yellowknives Dene First Nation. We acknowledge that the Giant Mine site is also within the homeland of the North Slave Metis Alliance and the Tłı̨chǫ Mǫwhì Gogha Dè Nı̨ı̨tłèè boundary. The Giant Mine Remediation Project respects the histories, languages, and cultures of First Nations, Metis, Inuit, and all First Peoples of Canada, whose presence continues to enrich our vibrant community.

ABOUT THIS REPORT

Welcome to the sixth annual report of the Giant Mine Remediation Project (GMRP). The report provides an overview of the GMRP's key activities and performance for the 2020-21 reporting year[1], focusing on environmental management, health and safety (H&S), and community involvement. The report's purpose is to verify that:

- defined project objectives are being met;
- the GMRP meets the requirements of the Environmental Agreement; and,
- interested rights holders and stakeholders, members of nearby communities, and the broader public have accurate and timely information on the GMRP.

The report is provided to the Giant Mine Oversight Board (GMOB), the independent oversight body established through the Environmental Agreement, which is then responsible for posting on their website (for additional information, see Environmental Agreement – Report Alignment (Appendix A)).

The report's content is largely shaped by the Environmental Agreement signed in June 2015, as well as GMOB's feedback on previous reports and input from the GMRP team. The report aligns with GMRP reporting obligations out of the Environmental Agreement.

For additional information on the GMRP, please visit: **giant.gc.ca.**

[1] April 1, 2020 – March 31, 2021

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MESSAGE FROM THE CIRNAC PROJECT LEADER

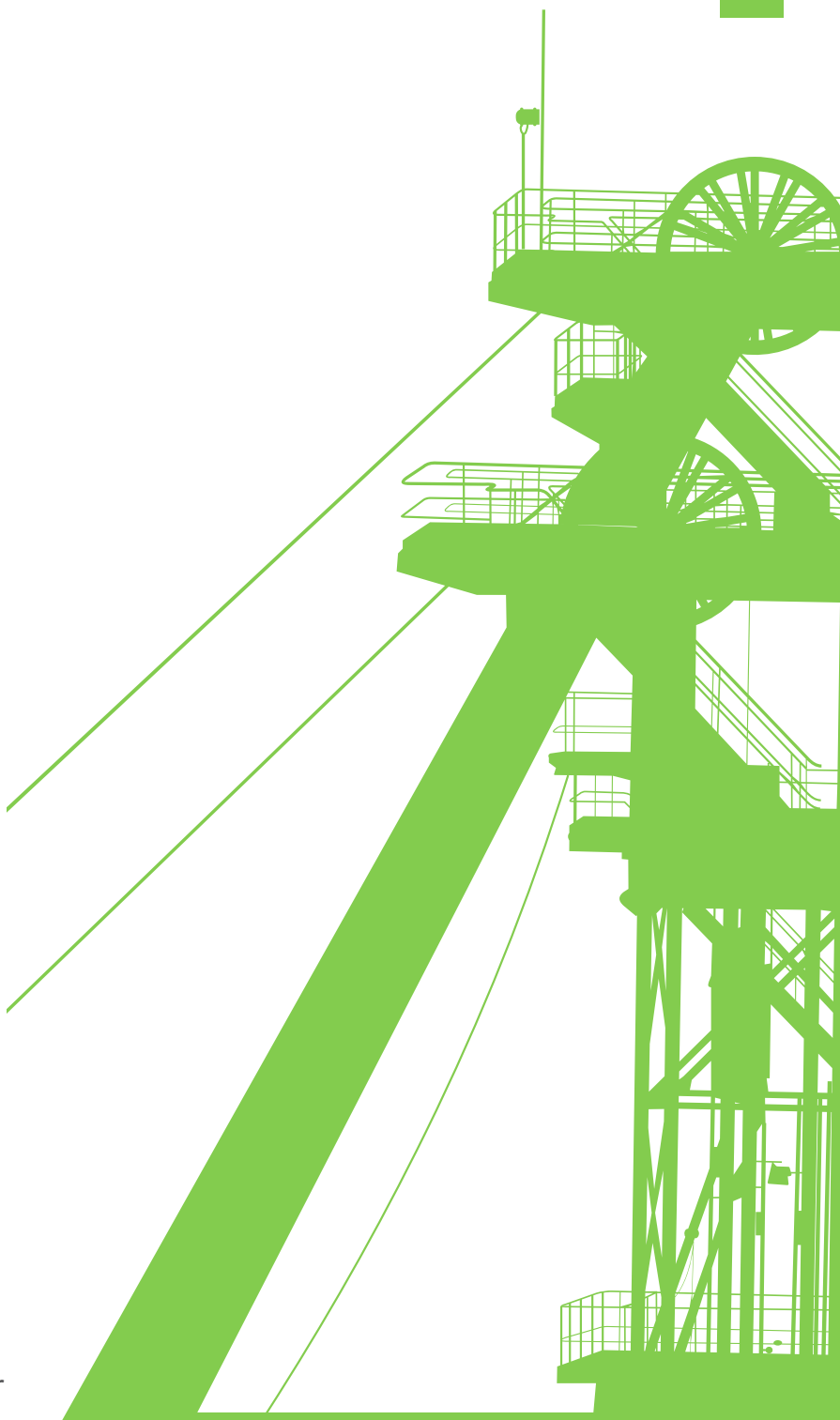
ADM, Northern Affairs Organization

On behalf of the entire Giant Mine Remediation Project (GMRP) team, I am pleased to present the sixth Annual Progress Report to the Giant Mine Oversight Board (GMOB). This report provides our stakeholders and the public with a transparent, comprehensive record of our progress over the last year as we work towards advancing the GMRP. We are committed to following the mandate given to us by the Government of Canada to create more economic opportunity and a higher quality of life in the North of Canada by using public investments to spur economic growth, job creation, and advancing policy and programs that support Northerners and Indigenous Peoples. We will also use this opportunity to support self determination, improve service delivery, advance reconciliation and the renewed relationship between Canada and Indigenous Peoples based on recognition, rights, respect, co-operation, and partnership.

This sixth annual report builds on our prior submissions, with the benefit of input and advice from the GMOB and our other stakeholders. The GMRP reached a number of significant milestones during this year including the issuance of the Water Licence and Land Use Permit, and the finalization of the Townsite Access Agreement, laying the path to beginning full scale remediation work on the site. The GMRP, in collaboration with the Yellowknives Dene First Nation, also made considerable progress in 2020-21 toward the development of a Community Benefits Agreement which seeks to formalize our commitment to provide socio-economic benefits to the First Nation.

I am pleased to report that, despite the many challenges of the global COVID-19 pandemic, the GMRP team has risen to the challenge and adapted to ensure the Project remains on-track. In this context, with the goal of protecting health and safety of all people at the Giant Mine site, the Main Construction Manager, Parsons Inc., put in place a robust COVID-19 Virus Response Plan and procedures. The Project also continues to follow the guidance of the GNWT Chief Public Health Officer.

The GMRP team looks forward to engaging with others throughout the Project life cycle, seeking a collaborative approach that is inclusive



and innovative. We hope our work, and the lessons we learn through it, will inform the management of other complex remediation projects and will allow the Government of Canada to adapt and improve both its management and decision-making processes related to resource extraction, land use, and socioeconomic development in the North.

We will continue to communicate our progress, improve our engagement with, and reporting to, the public, and welcome feedback on our planning and management of the GMRP. Our goal is to achieve an outcome we can all be proud of that addresses the legacy left behind by Giant Mine, and benefits Indigenous Peoples, Northerners, and all Canadians through collaboration, open and sincere dialogue, and learning from each other in order to continually improve.

Serge Beaudoin, B.SC., LL.L
Assistant Deputy Minister,
Northern Affairs Organization

ACRONYMS

ADM	Assistant Deputy Minister
AEMP	Aquatic Effects Monitoring Program
AQMP	Air Quality Monitoring Program
C&M	Care and Maintenance
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CRP	Closure and Reclamation Plan
DG	Director General
DM	Deputy Minister
ECE	Education, Culture and Employment
ECCC	Environment and Climate Change Canada
EEM	Environmental Effects Monitoring
ENR	Environment and Natural Resources
EQC	Effluent Quality Criteria
ETP	Effluent Treatment Plant
GMAC	Giant Mine Advisory Committee
GMOB	Giant Mine Oversight Board
GMRP	Giant Mine Remediation Project
GNWT	Government of the Northwest Territories
HC	Health Canada
H&S	Health and Safety
ITI	Industry, Tourism and Investment
IOC	Indigenous Opportunities Considerations
MCM	Main Construction Manager
MDMER	Metal and Diamond Mining Effluent Regulations
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
NCSP	Northern Contaminated Sites Program
NSMA	North Slave Métis Alliance
O&M	Operations & Maintenance
OMP	Operational Monitoring Program
PSPC	Public Services and Procurement Canada
QRA	Quantitative Risk Assessment
RD	Regional Director
RGD	Regional General Director
SNP	Surveillance Network Program
TCAs	Tailing Containment Areas
TK	Traditional Knowledge
WTP	Water Treatment Plant
YKDFN	Yellowknives Dene First Nation

SUMMARY OF PROGRESS IN 2020–21 & PLANS FOR 2021–22

The table below summarizes key activities planned for 2020-21 (as identified in the 2019-20 annual report), provides a brief description of progress made, and identifies activities planned for 2021-22. This summary enables readers to see at a high level whether the GMRP team achieved what it planned and, where it did not, to understand why not.

DESIGN			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Waste Disposal and Management	Incorporate findings from waste disposal options studies into future decision making.	**Completed:** Held pre-engagement of the Waste Management and Monitoring Plan; submitted the updated plan to the Mackenzie Valley Land and Water Board. **Advanced/Underway:** Advanced development of the standard operating procedure for waste handling (including hazardous waste) and development of a digital database for hazardous waste tracking on site. Further characterized recycling options for demolished materials.	Internal working committee, chaired by the Main Construction Manager (MCM – Parsons), to plan and implement waste management.

DESIGN			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Waste Disposal and Management	Conduct a field study to confirm location of potential buried hazardous waste. Complete the substantive design for the contaminated soils and sediments, disposal of arsenic impacted waste and the non-hazardous waste landfill.	**Completed:** Completed a buried debris geophysical investigation for buried hazardous waste. Completed landfill construction drawings for phase 1. Developed and submitted the non-hazardous waste landfill design plan to the Land and Water Board.	Begin construction of the landfill. Submit the Contaminated Soils and Sediment Design Plan to the Mackenzie Valley Land and Water Board (MVLWB).
Freeze	Complete the substantive design of the freeze area within B1 pit. Complete substantive design of the AR3 and AR4 Freeze areas, including material requirements for the B1 pit. Drill for instrumentation equipment for long-term monitoring. Complete substantive design of the underground.	**Completed:** Completed preparation work for the AR1 freeze pad development. Completed substantive design of AR3 and AR4 freeze areas (which includes B1 pit).	Continue underground stabilization work. Construction of the first of the 4 freeze pads (AR1), including rock blasting.
Water Treatment	Incorporate Water Treatment research findings into the Reclamation Research Plan submitted as part of its Water Licence Application.	**Advanced / Underway:** Advanced the Water Treatment Plant Design Plan.	Submit the Water Treatment Plant Design Plan to the MVLWB.
		Advanced / Underway: Continued to analyze the results from the pilot-scale testing system of the Passive Treatment System study to inform the full-scale system design.	Complete the passive treatment assessment.
Tailing Containment Areas	Complete portions of the substantive design of the Tailing Containment Areas, including the Dams, with the remaining completed in early 2021/22.	**Advanced / Underway:** Advanced the development of the Tailings Design Plan.	Submit the Tailings Design Plan and revised Tailings Monitoring and Management Plan to the MVLWB.
Open Pits Closure	Complete the substantive design for the closure of open pits.	**Advanced / Underway:** Advanced the substantive design of open pits. Completed the substantive design and cost estimate for the closure and initiated work to determine the closure of boreholes on site criteria.	Submit the Open Pits Design Plan. Finalize work on the closure of boreholes based on site criteria. Conduct further field investigations for open pits and openings to surface.

DESIGN			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Other Design Work		**Completed:** Completed substantive designs for multiple aspects of site services (e.g., roads, garage, power etc.), as well as other Project Components: Underground Stabilization and Baker Creek and Surface Water. Initiated a site access multiple accounts analysis to complete bridge crossing and site access and complete bridge design.	Complete a site access multiple accounts analysis to complete bridge crossing and site access and complete bridge design.

OPERATIONS			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Care and Maintenance (C&M)	Continue C&M in accordance with contract and regulatory requirements and site conditions.	**Completed:** Monitored air quality, conducted ongoing dust management activities, prepared for spring freshet, discharged treated effluent at Baker Pond, conducted maintenance of roads and site infrastructure, provided site security, fencing upgrades and new signage.	Continue C&M in accordance with contract, regulatory requirements, and site conditions.
	Stabilize the Bulkhead 36 valve and spigot assembly.	**Advanced/Underway:** Partially completed stabilization work.	Complete the stabilization work and obtain sign-off from design consultant.
Immediate Risk Mitigation	Implement new recommendations from the 2019 structural review, as appropriate.	**Completed:** Implemented recommendations as appropriate. **Advanced / Underway:** Undertook an options analysis for public access to the Marina and Townsite and selected the preferred access.	Thorough review of all the buildings anticipated in 2021-22. Tender the townsite demolition project for construction in 2022.

OPERATIONS			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Immediate Risk Mitigation	Troubleshoot and either repair or replace deep well pumps during summer 2020.	**Advanced/Underway:** Removed and investigated the non-working deep well pump; the system is still under review.	Pump to be repaired and re-installed before freshet 2022.
	Conduct the annual geotechnical dam inspection and continue to enact recommendations put forth by the inspecting geotechnical engineers on site, as appropriate. Complete the 10-yr dam safety review in 2020-21 (draft received in 2019-20). Install thermosyphons to ensure stability of Dam #1 primarily for the protection of the workers accessing the underground via B3 pit, but also for the longevity of the operations of the Effluent Treatment Plant (ETP). To be completed by end of November 2020.	**Completed**: Conducted the annual geotechnical inspection of the dams. Finalized the dam safety review, including a dam break analysis study. Installed thermosyphons to help ensure stability of Dam #1.	Conduct the annual geotechnical dam inspection and continue to enact recommendations put forth by the inspecting geotechnical engineers on site, as appropriate. Conduct ongoing monthly monitoring of the high-risk dams. Include dam safety review recommendations in updates to the OMS manual. Continue to implement dam safety review recommendations to minimize risks to Dams. Continue to monitor Dam #1 stabilization. Determine whether a raise of the dam's crest is required for ETP operations.

ENVIRONMENT			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Air	Continue air quality monitoring, including ongoing community monitoring and site perimeter monitoring, with activity-specific monitoring conducted as applicable.	**Completed:** Continued air quality monitoring activities in 2020-21.	Continue air quality monitoring, including ongoing community monitoring and site perimeter monitoring, with activity-specific monitoring conducted as applicable.
	Continue to treat the Tailing Containment Areas and road network, as needed (dust control).	**Completed:** Applied Soil-Tac and water for dust suppression at roads and on the Tailing Containment Areas as needed.	Continue to treat the Tailing Containment Areas and road network, as needed.

ENVIRONMENT			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Water	Continue monitoring treated effluent prior to and during discharge.	**Completed:** Treated and discharged 692,785 m3 of effluent at Baker Pond.	Continue monitoring treated effluent prior to and during discharge.
	Continue existing water quality monitoring (Surveillance Network Program (SNP), Metal and Diamond Mining Effluent Regulations (MDMER)/ Environmental Effects Monitoring (EEM), Operational Monitoring Program (OMP)).	**Completed:** Conducted monitoring of minewater, surface water and groundwater to meet regulatory and operational monitoring requirements, as well as to continue to collect baseline data to support ongoing modelling efforts and site characterization. Added SNP 43-23 as a monitoring point as per the Water Licence. **Deferred:** Deferred the surface run-off water monitoring program (usually happens in the spring) due to COVID considerations.	Continue existing water quality monitoring (SNP, MDMER/EEM, OMP).
	Rights holders and stakeholders reviewed and commented upon the Aquatic Effects Monitoring Program (AEMP) during the Water Licence and Land Use Permit process in 2019-2020. The Project team will revise in 2020-21.	**Completed:** The AEMP Design Plan received interim approval. **Advanced / Underway:** Completed the field program for Yellowknife Bay baseline (water quality). **Deferred:** The GMRP deferred the large-bodied fish tissue sampling program to summer 2021 due to COVID considerations. This will be used as baseline sampling for the AEMP.	Moderate and high AEMP Action Levels will be engaged upon and submitted to the MVLWB for review and approval. Complete the large-bodied fish tissue sampling program.

ENVIRONMENT			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Water	The Project anticipates receiving the Water Licence and Land Use Permit approval in 2020.	**Completed**: MVLWB approved and issued a Type A Water Licence and Land Use Permit.	Submit annual report (on a calendar year).
	Continue progress on substantive designs for the new Water Treatment Plant (WTP) and outfall.	**Completed**: Completed the substantive design for the WTP and draft substantive design for the intake and outfall.	Finalize substantive design for the intake and outfall.
	Finalize the Phase 6 EEM report and submit to Environment and Climate Change Canada (ECCC) in June 2020.	**Completed:** Finalized and submitted to ECCC the Phase 6 report.	Respond to ECCC's comments. Submit the Phase 7 EEM Study Design to ECCC.
	Incorporate information into fish authorization application materials to Department of Fisheries and Oceans Canada.	**Completed:** Updated the fish authorization applications.	N/A
Land	Continue managing wastes on site.	**Completed:** Continued to manage wastes on site (including monitoring and management of arsenic-impacted waste).	Continue managing wastes on site. Establish Waste Disposal Operations for day-to-day domestic waste to be transferred off-site.
		Completed: Finalized the summary report of the small mammal and vegetation sampling field program.	N/A
		Completed: Updated the Wildlife and Wildlife Habitat Management and Monitoring Plan based on reviewer comments and submitted it in March 2021 to the MVLWB. **Deferred:** Suspended the bird survey as there were no site activities that warranted the survey during that time (due to the COVID-19 pandemic).	Conduct an annual review of the Wildlife and Wildlife Habitat Management and Monitoring Plan and make any revisions necessary to reflect changes in Site operations. Continue to log and report wildlife sightings and interactions including the bird survey.

HEALTH AND SAFETY			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Occupational Health & Safety (H&S)	Continue to track and report on occupational H&S through tracking of training and incidents.	**Completed**: Continued to track occupational H&S through the Northern Contaminated Sites Program (CSP) internal management system on a quarterly and annual basis.	Continue to track and report on occupational H&S through tracking of training and incidents.
Public H&S	The Health Effects Monitoring Program (HEMP) Team is to publish the next report in the fall 2020 by the Health Effects Monitoring Program Team, including toenail sample analysis.	**Completed:** The HEMP team published their progress report. A results brochure was developed and distributed to communities. **Deferred:** In-person community meetings, due to COVID considerations.	The HEMP will prepare for the next round of sample collection to occur in 2022-2023.
	The Hoèła Weteèts'eèdeè Research Team is working to further refine the plan for 2020-21 with implementation planned for the fall of 2020.	**Advanced/Underway:** The Advisory Committee and Technical Committee continued to meet regularly to revise and continue to improve on the study design. **Deferred:** Implementation of the study, due to COVID-19 restrictions.	University of Laurier's research team will lead implementation of the study and engagement.

COMMUNITY			
Component	**Plans for 2020-21**	**Progress in 2020-21**	**Plans for 2021-2022**
Engagement	Engage on the following: Quantitative Risk Assessment, Management Plans, the Perpetual Care Plan, the Hoèła Weteèts'eèdeè: Understanding Community Wellbeing Around Giant Mine study, Socio-Economic Implementation Plan, Baker Creek and Yellowknife Bay.	**Completed:** Engagement sessions held throughout the year, focused on the Quantitative Risk Assessment, Baker Creek and Yellowknife Bay, Management Plans (engagement held on seven plans), Socio-Economic implementation, the Perpetual Care Plan, and the Hoèła Weteèts'eèdeè wellness study. Established an Aquatics Advisory Committee to focus on aquatic-related topics.	Continue engagement on Management Plans (two plans remaining), the Quantitative Risk Assessment, closure criteria, Socio-Economic implementation, Hoèła Weteèts'eèdeè, and the Perpetual Care Plan. Continue Aquatics Advisory Committee engagement.
Socio-economic (Procurement, Employment and Training)	Finalize and communicate Socio-Economic targets; confirm 2020-21 and 2021-22 implementation activities and advance implementation. Track employment, procurement and training statistics.	**Advanced/Underway:** Continued to track suppliers, employment, and workforce training on a quarterly and annual basis. Finalized and communicated Socio-Economic targets. Advanced actions within the evergreen Implementation Plan.	Continue to incorporate focus group inputs into the evergreen Implementation Plan and advance Implementation Plan actions. Update the Socio-Economic Strategy. Hold another Industry Day (late 2021 or early 2022).

1.0 PROJECT OVERVIEW

The GMRP addresses the long-term containment and management of the arsenic trioxide waste, the demolition and removal of all surplus buildings on the surface, and the remediation or risk management of all impacted surface areas, such as soils and tailings ponds. It also includes water management and treatment.

OBJECTIVES & OUTCOMES

The overall objectives of the GMRP are to:

- minimize public and worker health and safety risks;
- minimize the release of contaminants from the site to the surrounding environment;
- remediate the site in a manner that instills public confidence; and,
- implement an approach that is cost-effective and robust over the long term.

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

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

PHASES OF THE GMRP

Figure 1 illustrates the past, current and planned activities of the GMRP.

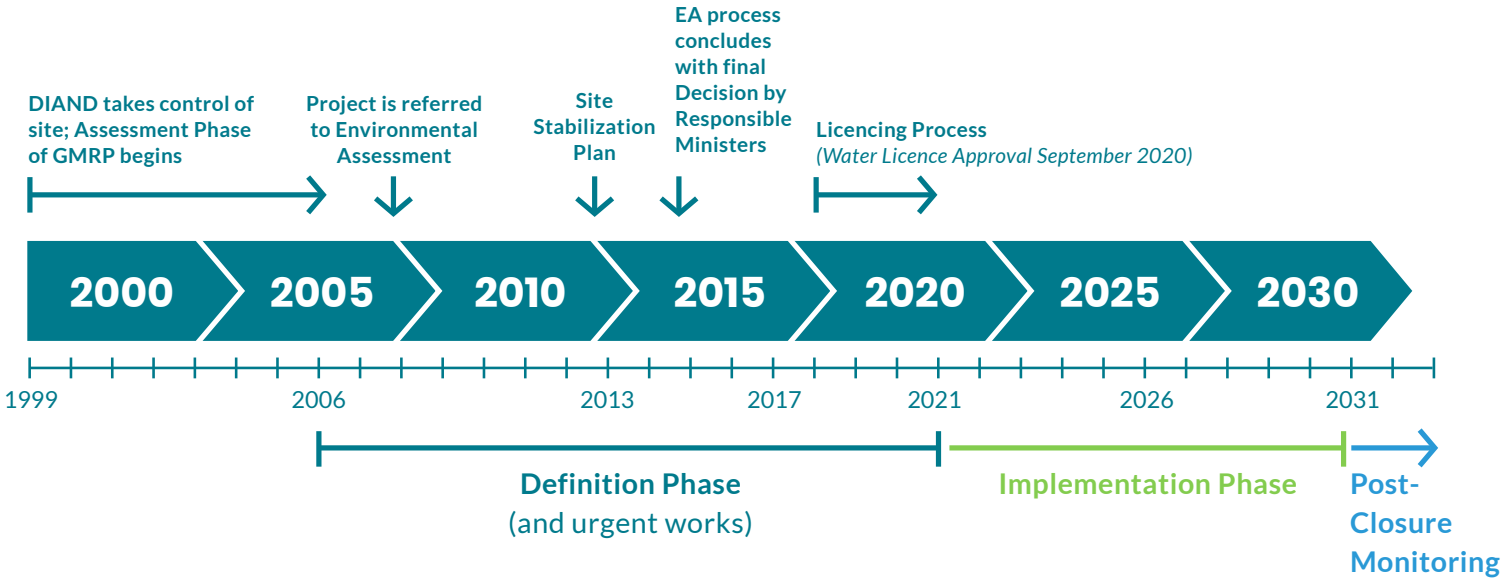


Figure 1: GMRP Activities and Timeline

GOVERNANCE OF THE GMRP

The governments of Canada and the Northwest Territories are co-proponents of the Project. Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) is Canada's lead on the Project while Environment and Natural Resources (ENR) represents the Government of Northwest Territories (GNWT) with Public Service and Procurement Canada (PSPC) playing an important support role.

A joint CIRNAC – PSPC project governance structure has been established to provide oversight, direction, and advisory services to the Project team. The governance and management of the GMRP is also supported by external, independent, and technical reviews provided by multiple groups, such as the GMOB, which was formed in 2015. Figure 2 shows the governance structure of the GMRP.

OTHER GOVERNANCE BODIES

Other governance bodies that provide advice and/or inputs to the GMRP on all topics include:

- Deputy Ministers (DM) Committee (DMs of PSPC and CIRNAC)
- Senior Project Advisory Committee (CIRNAC ADM Northern Affairs Organization; PSPC ADM Real Property; PSPC ADM Acquisitions; PSPC RDG Western Region)
- Senior Project Committee (CIRNAC Senior Director NCSP; GNWT ADM ENR)
- GMOB (CIRNAC, GNWT, YKDFN, NSMA, City of Yellowknife, Alternatives North)
- Giant Mine Working Group (CIRNAC, GNWT, NSMA, YKDFN, City of Yellowknife, Alternatives North, Environment and Climate Change Canada (ECCC), Department of Fisheries and Oceans Canada, Health Canada (HC))
- Giant Mine Advisory Committee (GMAC) (YKDFN representatives)

Figure 2: Governance Structure of the GMRP

2.0 2020–21 YEAR IN REVIEW

2.1 OVERVIEW

The Project team – which includes CIRNAC, PSPC, and GNWT personnel – focused their activities on six main project components over the 2020-21 year (April 1, 2020 – March 31, 2021):

1. Obtained the Type A Water Licence and Land Use Permit and re-submitted its Closure and Reclamation Plan (CRP) and Management and Monitoring Plans to meet the requirements defined by the MVLWB (Section 3);

2. Advanced substantive designs and cost estimates in support of the implementation Treasury Board submission in October 2022 (Section 3);

3. Ensured ongoing C&M of the site (Section 4);

4. Undertook immediate risk mitigation activities (Section 4);

5. Undertook environmental monitoring studies / baseline assessments and continued to advance the health monitoring studies (Sections 5 and 6; Appendix B includes a comprehensive list of the studies conducted in 2020-21);

6. Advanced Socio-Economic Strategy implementation (Section 7).

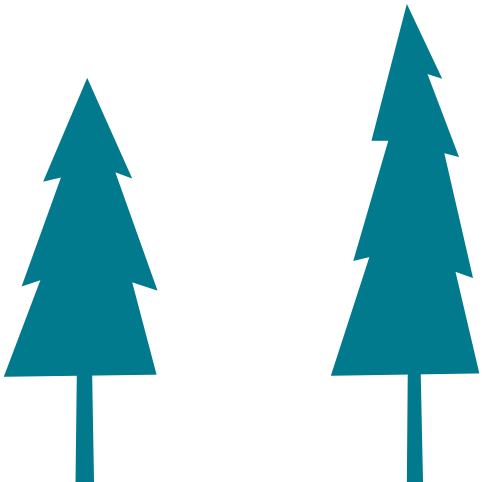
Engagement is a core component of the Project and is described in more detail in Section 7.1. In addition, the GMRP team maintained an active risk identification and management program (described in Appendix C).

2.2 IMPACT OF COVID-19

In response to the COVID-19 pandemic, the MCM put in place a detailed COVID-19 Virus Response Plan and procedures, which applied to all people at the Giant Mine site, including MCM staff, subcontractors, consultants, regulators, and any possible visitors to the site. These procedures included self-isolation requirements, and enhanced care and precaution supported by a strengthened health and safety protocol. Non-essential work was paused to limit travel into the territory. The Project also followed the guidance of the GNWT Chief Public Health Officer when bringing in workers from outside the territory who were necessary for specialized work (Parsons, 2020; CIRNAC, 2021b).

2.3 TYPE A WATER LICENCE PACKAGE APPROVAL

In April 2019, the GMRP team submitted its application to the MVLWB for a Type A Water Licence and Land Use Permit together with the Project's CRP. The MVLWB approved the Water Licence and Land Use Permit package in September 2020 (CIRNAC, 2021b), which can be found on the MVLWB's Public Registry (DIAND - GIANT - MV2019X0007 and DIAND - GIANT - MV2007L8-0031).



2.4 PERPETUAL CARE PLAN

As part of the Environmental Agreement, the GMRP is required to develop a 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 scenarios that might affect the Perpetual Care of the Project.

In 2019, the GMRP conducted an initial desktop study to review the work that has been done to date on topics related to the perpetual care of Giant Mine. Following the completion of this study, the GMRP retained a consultant to conduct a series of independent interviews with representatives of the signatories to the Environmental Agreement to better understand perpetual care needs at Giant Mine. The results of the desktop study and independent interviews informed the development of a draft preliminary framework for the Giant Mine Perpetual Care Plan. The Project held facilitated workshops with signatories of the Environmental Agreement, GMRP team members, and other interested members of the public to review and conduct an initial validation exercise of the draft preliminary framework. Following these workshops, a Perpetual Care Plan Advisory Task Force was formed with members of the signatories of the Environmental Agreement.

During the 2020-21 fiscal year, the Perpetual Care Plan Advisory Task Force further refined the framework and established key assumptions for the Perpetual Care Plan. In November 2020, the GMRP submitted the preliminary framework to the Giant Mine Oversight Board. The next steps in 2021-22 are for the Perpetual Care Plan Advisory Task Force to develop a statement of work for the GMRP team to onboard a consultant to support the next phase of work on the Perpetual Care Plan.

2.5 PROGRESS ON ENVIRONMENTAL ASSESSMENT MEASURES

The Report of Environmental Assessment and Reasons for Decision (Mackenzie Valley Review Board, 2013) listed 26 Measures that must be addressed, as well as 16 suggestions that may be implemented at the GMRP team's discretion. The Team's immediate focus is to address the Measures with set timelines, and those with the biggest impact on the project scope. Table 1 provides a brief summary of progress, while Appendix D provides a complete summary of progress against all Environmental Assessment Measures and Suggestions in 2020-21, as well as plans for the 2021-22 year.

STATUS	MEASURES	SUGGESTIONS
Completed	3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 18, 19, 22	8, 13, 15
Underway	9, 10, 16, 17, 20, 23, 25, 24, 26	1, 2, 3, 4, 9, 10, 11, 12, 14, 16
Future Action Required	2, 21	
No Action Required / Outside Scope of Project	1	5, 6, 7

Table 1: Status of Environmental Assessment Measures and Suggestions (as of March 2021)

In 2020-21, the Project focused on advancing the following measures:

- Measure 5: Quantitative Risk Assessment–
  The final report was submitted to the MVLWB in June 2020
- Measure 9: Health Effects Monitoring Program (Section 6.2)
- Measure 10: Hoèła Weteèts'eèdeè: Understanding Community Wellbeing Around Giant Mine (previously called the Stress Study) (Section 6.2)

3.0 ADVANCEMENT OF SUBSTANTIVE DESIGN

3.1 WASTE DISPOSAL AND MANAGEMENT

3.1.1 Waste Disposal Options

Long-term management of arsenic trioxide waste is one of the key components of the Giant Mine CRP. During the life of the mine, mining operations produced approximately 237,000 tonnes of arsenic trioxide waste, which are currently stored in 14 chambers and stopes (Giant Mine Remediation Project, 2018a). Chamber 15 and B1 pits have been identified and assessed as a potential disposal site for arsenic waste related to clean-up activities and options (Giant Mine Remediation Project, 2007; Golder Associates Ltd., 2018).

In 2020-21, the Project established an internal working committee chaired by the MCM to plan and implement waste management. They held pre-engagement on the Management and Monitoring Plan pertaining to waste in October with the GMRP Working Group and submitted the updated plan to the MVLWB. The Project also characterized recycling options for demolished materials, with a target of 75% recycled materials and carried out a buried debris geophysical investigation for non-hazardous arsenic waste. The Design Plan for the Non-Hazardous Waste Landfill was also submitted to the MVLWB in conjunction with the updated Waste Management and Monitoring Plan. The MCM worked to develop their standard operating procedure for waste handling (including hazardous waste) along with a digital database for hazardous waste tracking on site.

Next Steps:

- Construction of the non-hazardous waste landfill is expected to start in 2021-22.
- Advance metal recycling.

3.1.2 Remedial Strategy for Contaminated Soil and Sediment

In support of the CRP, the GMRP team evaluated and selected remedial / risk management strategies associated with contaminated soil and sediment at the Giant Mine Site. This involved an options analysis workshop and selected preferred remedial/risk management options for areas of deep contaminated materials based on (i) technical feasibility, (ii) project objectives, and (iii) long-term performance (Golder Associates Ltd., 2019j; AECOM Canada Ltd., 2020a). The Project also produced a report to address the information gaps on contaminated soil and sediment (Golder Associates Ltd., 2019a). The closure option for pond-water impacted areas was finalized in a report dated January 2021 (Giant Mine Remediation Project, 2021a), which identified options related to "Land Use Management Restrictions, Administrative Measures, Public Awareness and Vegetative Barrier" for the area. This scenario includes the implementation of land use restrictions, placement of signage, maintenance of the current vegetative cover and continued groundwater monitoring in the pond water impacted area.

Next steps:

- Engagement on the outcomes of the workshop and the selected closure option will occur in fall 2021. A closure criterion in development (CS1-8) will be provided for engagement.
- The final closure option, closure criterion, and design engineering will be filed in the Contaminated Soils and Sediment Design Plan for review and approval by the MVLWB.
- The Project will submit the Contaminated Soils and Sediment Design Plan in 2022.

3.1.3 Freeze Designs

Climate change is a critical risk factor for ground freezing systems at the Giant Mine site. In 2018, the GMRP team conducted a review of current climate change documentation to support the advanced design of freeze Areas 1 and 2 (AECOM Canada Ltd., 2018). In 2019-20, the Project team began the substantive freeze design for Areas 3 and 4, which incorporates the design of a portion of B1 pit as well. Climate change projections were also incorporated into the design for Areas 3 and 4.

In 2020-21, the Project team completed preparation work for the AR1 freeze pad development and submitted the Freeze Containment Design Plan and Arsenic Trioxide Shell Monitoring and Management Plan to the MVLWB. The Project Team also completed was substantive design for areas 3 and 4 (including B1 pit).

Next steps:

- Continue to progress underground stabilization work.
- Construct the first of the four (4) freeze pads (AR1).

3.2 WATER TREATMENT PROJECTS

3.2.1 New Water Treatment Plant (WTP)

Management of contaminated water within the site boundary is a key activity to reduce its impact on the environment. Over the past several years, the Project has explored Effluent Treatment Plant (ETP) upgrade options, finalized the preliminary design for the new WTP, completed a siting assessment of the new WTP, and updated the three-dimensional groundwater model to provide predictions for potential future

conditions in the Water Licence period from 2020 to 2040 (AECOM Canada Ltd., 2019b; AECOM Canada Ltd., 2019c; AECOM Canada Ltd., 2019d; AECOM Canada Ltd., 2020c; Golder Associates Ltd., 2020g).

In 2020-21, the Project team advanced the design of the WTP to substantive design. The design was reviewed by the Project's Independent Peer Review Panel and by another 3rd party consultant. In 2021-22 the Project will complete a value engineering exercise to evaluate the design's performance versus cost and to conduct some detailed option selections prior to completing the detailed design. The Project also completed additional surface water and groundwater monitoring and modelling to verify groundwater flow predictions and confirm water treatment capacity of the WTP.

Next steps:

- As outlined in the CRP, the Project Team will install a new water treatment plant and outfall to discharge treated effluent year-round to Yellowknife Bay instead of seasonally to Baker Creek (Giant Mine Remediation Project, 2021a).
- Submit the Water Treatment Plant Design Plan in 2022 to the MVLWB.

3.2.2 Pumping System

The preliminary design of the new WTP includes the installation of mine water intake wells that will replace the current Northwest Pumping System. A new system will be built in approximately 2025, near the former C-shaft area in the core area of the Project site, using a new submersible pumping system, similar to the existing Northwest Pumping System. Operation of this system will be continuous, whereas the current ETP operates during the summer months only, and it is anticipated that no surface water storage will be required.

In 2020-21, the Project team finalized substantive design and planned a pilot hole program to confirm assumptions regarding target locations for the WTP pumps. The Project also refined the assessment of water level fluctuations due to seasonal variation in infiltration. The site water balance was updated based on the most current information on surface water design and pit design. Precipitation scenarios were also updated to reflect climate change and a better estimate of wet and dry scenarios.

Next steps:

- Conduct pilot hole program.
- Conduct value-engineering exercise.

3.2.3 Site-Specific Passive Treatment System

As part of the Giant Mine CRP, the GMRP team assessed the feasibility of treatment wetlands or other applicable passive and semi-passive surface water treatment technologies. At the Giant Mine site, a Passive Treatment System could remove arsenic as well as other parameters of potential concern such as antimony, copper, lead, nickel, zinc, chloride, nitrate, and nitrite from the aquatic environment of Baker Creek.

In 2019, the GMRP completed an off-site pilot-scale Passive Treatment System study to inform full-scale system design (Contango, 2019a). The study concluded that treatment of surface water at the site is possible through passive or semi-passive wetland applications. All parameters of potential concern exhibited some treatment. The study also identified potential risks for arsenic treatment, to be further assessed and addressed.

In 2020-21, GMRP Team continued to analyze the results from the pilot-scale testing (i.e., Phase 3) to determine possible locations and requirements for the maintenance of the treatment structure (Giant Mine Remediation Project, 2021a).

Next steps:

- Complete the passive treatment assessment in 2021-22 to determine whether to proceed to demonstration-scale testing.

3.3 TAILING CONTAINMENT AREAS

Over the operating life of the mine, most tailings were deposited into Tailing Containment Areas. In previous years, the Project developed a Tailing Management and Monitoring Plan to define an approach to managing the Tailing Containment Areas after completion of closure activities (Giant Mine Remediation Project, 2019c), and also reviewed and updated the Operations, Maintenance and Surveillance Manual (Golder Associates Ltd., 2019i), and confirmed design plans through investigative drilling on the tailings areas (CIRNAC, 2019b).

In 2020-21, the Project team advanced the substantive designs of the Tailing Containment Areas along with the Foreshore and Nearshore Sediment areas and post closure dams. A winter investigation program was initiated in order to get further geotechnical information in the Foreshore Tailings and Nearshore sediment areas to assist in cover designs.

Next steps:

- Submit the Tailings Management and Monitoring Plan.
- Continue with the winter drilling investigation program for the Foreshore Tailings and Nearshore sediment areas.
- Finalize the substantive designs for the Tailing Containment Areas.
- Submit the Tailings Design Plan in 2022.

3.4 OPEN PIT CLOSURE

Open pit closure is another component of the overall Giant Mine CRP. There are eight open pits on the Giant Mine site. These open pits pose potential risks to worker and public safety as well as to the environment, given the probability that Baker Creek may flood the area, affecting the underground. To address this risk, the Project has decided to fill or partially fill the pits and conducted studies to identify potential options and suitable borrow[2] material for pit fill with some recommendations for additional investigations (sampling, testing, and modeling) for consideration (AECOM Canada Ltd., 2019a; Giant Mine Remediation Project, 2020a; Golder Associates Ltd., 2019h; Golder Associates Ltd., 2020a; Golder Associates Ltd., 2020c; Golder Associates Ltd., 2020e).

In 2020-21, the Project team advanced the assessment of detailed closure options in an effort to confirm the best closure approach for each pit, and testing was completed to identify the properties of suitable borrow for pit fill.

Next steps:

- Validate assumptions and complete a more thorough assessment of risks.
- Complete the detailed closure options assessment on a pit-by-pit basis.
- Advance and finalize the substantive designs for Open pit closure.
- Finalize work on the closure of boreholes based on site criteria.
- Submit the Open Pits Design Plan in 2022.

[2] borrow is material used to infill a pit

4.0 OPERATIONAL SUMMARY

4.1.1 Care and Maintenance (C&M)

Ongoing C&M at the Giant Mine site is critical to ensure current hazards at the site are managed to prevent harm to staff, surrounding communities, and the environment. In 2020-21, the Project continued care and maintenance activities to keep the site stable and safe until full remediation can begin. These activities included:

- conducting ongoing dust management activities including application of Soil-Tac on Tailing Containment Areas;
- preparing for spring freshet; the 2020 spring freshet occurred without incident;
- conducting ongoing monitoring and sampling of water and effluent;
- discharging treated effluent (692,785 m3 of treated effluent was discharged into the environment at Baker Pond);
- maintaining site infrastructure and roads;
- conducting ongoing monitoring of the dams;
- maintaining the underground travel ways, including underground repairs to existing chutes and head covers to reduce hazards to workers;
- providing full time on-site emergency medical services;
- continuing site security activities including new signage and security fencing upgrades (CIRNAC, 2021b); and,
- conducting weekly inspections of the Material Storage Area.

During routine inspections of the bulkheads associated with stopes and chambers containing the arsenic trioxide dust, it was observed that a valve and spigot assembly associated with bulkhead 36 was heavily corroded. It was recommended that action be taken to stabilize the assembly with an engineered cap. Construction work related to the engineered cap began in 2020-21 and is partially completed. Final assembly and securing of the cap to ensure stabilization will be completed in 2021-22, including engineering sign-off by the design consultant.

4.1.2 Immediate Risk Mitigation

4.1.2.1 Infrastructure Review

The GMRP conducts structural reviews of buildings at the Giant Mine site to assess risks and determine whether immediate action is required to mitigate those risks. The 2019 structural review, which was conducted on 28 buildings, suggested that the next review be held in 2 years time; therefore, a review was not held in 2020.

In 2020-21, the Project continued to implement recommendations from the 2019 structural review to reduce structural risks, including:

- restricting access to unauthorized personnel to the site to ensure safety and welfare of the public and mine staff,
- inspecting the site for any friable asbestos containing material that may have become loose after wind events, and
- inspecting and repairing the safety perimeters (after spring melt).

Next steps:

- Conduct a thorough review of all the buildings anticipated in 2021-22.

4.1.2.2 Upgrades to the Northwest Deep Well Pumping Station (previously named the Akaitcho Deep Well Pump Station)

In 2017, the Project team completed pumping station upgrades using two deep well submersible pumps located near the Northwest shaft (formerly called the Akaitcho shaft) (AECOM Canada Ltd., 2017).

In 2019-20, the new deep well pump station came into operation and was used to dewater during freshet. The new pumping system, the Northwest Deep Well Pumping System, consists of two Baker Hughes submersible pumps installed in steel-cased boreholes drilled from the surface into the mine pool. One pump stopped operating after a brown-out situation in August 2019. In 2020-21 the Project team began an investigation of the system to understand how the issue emerged.

Next steps:

- Re-install the submersible pump before freshet 2022.

4.1.2.3 Geotechnical Inspection of Dams

At the Giant Mine, dams are used for mine water management, surface water management, and tailings solids retention. Dams are inspected annually to assess water level restrictions and geotechnical integrity in order to comply with the Canadian Dam Association Guidelines. While doing regular inspections of the Project's dams, the Project team noticed stability issues with areas in Dam #1 that were historically frozen but had begun to show signs of thawing. Working with design consultants and with the support of the Independent Peer Review Panel (IPRP), the Project team decided to ensure the area remained frozen using thermosyphon technology (CIRNAC, 2021b).

In 2019-20, the Project team completed the desktop study and field component of the 10-year dam safety review, which was available in 2020-21. The Risk Assessment Team concluded that all analyzed dams presented safety issues and/or require some level of ongoing maintenance and monitoring (SRK Consulting, 2020).

- Structures identified as requiring urgent action to reduce risks: Dam #1, Dyke #6, Splitter Dyke, dam #21D were identified as requiring urgent action.
- The remaining dams were considered reasonably safe but do require various levels of maintenance and continued monitoring.

In 2020-21, the Project team installed 38 passive thermosyphons into Dam #1, primarily for the protection of the workers accessing the underground via B3 pit, but also for the longevity of the operations of the ETP until such a time as the new WTP is commissioned (CIRNAC, 2021a; GMOB, 2020).

Recommendations / Next Steps:

- Conduct the annual geotechnical dam inspection and continue to enact recommendations put forth by the inspecting geotechnical engineers on site, as appropriate.
- Monitor high-risk dams monthly.
- Include Design Safety Review recommendations in updates to the OMS manual.
- Continue to implement Design Safety Review recommendations to minimize risks to Dams.
- Continue to monitor Dam 1 stabilization and continue work to mitigate risks of instability due to the thawing permafrost.
- Determine whether a raise in elevation of the dam's crest is required for ETP operations.

4.2 INSPECTIONS IN 2020–21

In 2020-21, there were 6 external inspections including 6 regulatory inspections of the GMRP conducted by external regulators – 4 by CIRNAC and 2 by the Workers' Safety & Compensation Commission (WSCC). This compares to 11 inspections by external regulators in 2019-20, 16 in 2018-19 and 5 in 2017-18. The number of inspections per year is determined by the regulator based on a variety of factors including, but not limited to, the nature of work being undertaken at the site.

There were no non-compliances identified by the regulatory inspections, however, the WSCC desktop geotechnical review highlighted deficiencies from previous inspections. The GMRP is committed to addressing any non-compliance as soon as possible and issued an order to "address all deficiencies and opportunities for improvement identified". To this date, all non-compliance incidents have been addressed.

In addition to these external regulatory inspections, the MCM as well as their subcontractors, conduct their own internal inspections on a regular basis to ensure safe operation at the site and compliance with various regulatory and contractual documents, including the Water Licence, Land Use Permit, and Management and Monitoring Plans. These internal inspections include daily site inspections by C&M staff and regular engineering inspections of major structures (e.g., dams, arsenic chamber bulkheads) and equipment. Only minor non-conformances were identified during internal inspections in 2020-21 and these were promptly corrected.

In 2020-21, there were no formal audits completed; however, CIRNAC initiated the planning for an Environmental Health and Safety (EHS) underground audit that is anticipated to take place in 2021-22.

4.3 SUMMARY OF FISCAL YEAR 2020–2021 EXPENDITURES

Table 2 outlines the planned (i.e., expenditure totals by categories) versus actual expenditures for 2020-21 while Table 3 outlines the planned expenditures in 2021-22.

Table 2: Planned Versus Actual Expenditures

CATEGORY	PLANNED	ACTUALS	% DIFFERENCE
C&M	$20,683,542	$22,166,327	+6.69%
Regulatory	$770,500	$1,134,420	+32.08%
Consultation	$3,168,101	$1,345,500	-135.46%
Remediation	$19,434,232	$14,941,948	-30.06%
Monitoring	$4,365,476	$3,727,700	-17.11%
Program Management	$12,753,274	$13,875,697	+8.09%
Totals	**$61,175,125**	**$57,191,591**	**-6.97%**

Table 3: Planned Expenditures in 2021-22

CATEGORY	OPERATING EXPENDITURES	GRANTS AND CONTRIBUTIONS	SALARY AND EBP	TOTALS
C&M	$26,306,207	$-	$-	$26,306,207
Regulatory	$660,000	$-	$-	$660,000
Consultation	$535,638	$3,821,385	$-	$4,357,023
Remediation	$60,550,586	$617,842	$-	$61,168,428
Monitoring	$5,857,137	$-	$-	$5,857,137
Program Management	$6,531,624	$-	$3,952,737	$10,484,361
Totals	**$100,441,191**	**$4,439,227**	**$3,952,737**	**$108,833,155**

5.0 ENVIRONMENT

5.1 ENVIRONMENTAL MANAGEMENT

The following report sub-sections (Air, Water, and Land) describe key activities and results of existing environmental management programs, additional assessments and monitoring programs (as described in the Long-term Monitoring Program summary below).

LONG-TERM MONITORING PROGRAM

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

The components of the Long-term Monitoring Program include regulatory and due diligence monitoring and can be grouped into the following components:

ENVIRONMENTAL

- Surveillance Network Program (SNP), Metal and Diamond Mining Effluent Regulations (MDMER) including Environmental Effects Monitoring (EEM) Program
- Operational Monitoring Program (OMP) (Effluent Treatment Plant (ETP), underground, annual site-wide bird survey)
- AEMP
- Wildlife and Wildlife Habitat management and Monitoring Plan
- Air quality – site perimeter & community
- Noise

STRUCTURAL

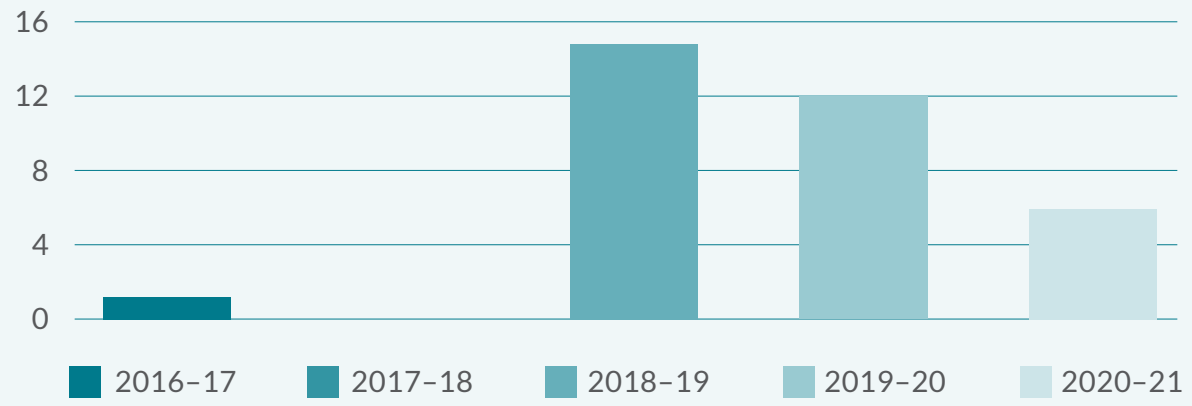
- Freeze
- Dams and seeps
- Landfill
- Pit stability
- Tailings covers
- Underground Structures
- Baker Creek (icing)

The Long-term Monitoring Program is structured in three phases: pre-remediation, remediation, and post-remediation. The intent is for the Program to be operational for the lifetime of the project (100 years). Appendix E provides additional information on the individual components of the monitoring program. **The new Type A Water Licence includes conditions related to monitoring and reporting for many of the above components.**

SPILLS AND ENVIRONMENTAL TRAINING

- **Spills, Accidents, and Significant Malfunctions:** There were a total of 6 environmental incidents reported to the NWT Spill Line resulting in less than 50 L spilled in 2020-21 [spills consisted mostly of mine water (less than 40 L) and small amounts of antifreeze, diesel, hydraulic fluid, power steering fluid, and oil]. Dry lime dust (<5kg) was also spilled (Parsons, 2021). A trend with the number of spills in shown in Figure 3 below, which indicates a downward trend since 2018-19.
- **Environmental Training:** Employees received 241 hours of Environment, Health and Safety Awareness Training and 334 hours of Environment, Health and Safety Environmental Training which included spill response, mine rescue, and others.

Figure 3: Number of spills and incidents from 2016-17 to 2020-2021



5.2 AIR

Activities undertaken at the Giant Mine site have the potential to release contaminants from the site into the air. Of primary interest are particulates carrying arsenic, antimony, iron, lead, or nickel. If these contaminants become airborne, they may be transported off-site and deposited elsewhere. To monitor and minimize air quality impacts, the GMRP team has established an ambient air quality monitoring program, as outlined in the GMRP Air Quality Monitoring Plan (AQMP) – including ongoing air quality monitoring on-site and in nearby communities – and actively manages air quality through dust suppression.

2020-21 HIGHLIGHTS

- Results of the ambient air quality monitoring indicated the air quality of the airshed encompassing the GMRP was representative of regional and local air quality.
- The GMRP team applied Soil-Tac and water for dust suppression at roads and on the Tailing Containment Areas as needed.

5.2.1 Air Quality Monitoring

The GMRP team conducts ambient air quality monitoring throughout the year at nine locations as part of the site perimeter air quality monitoring network. The nine monitoring locations have two co-located monitors to measure real-time total suspended particulate (TSP) and particulate matter measuring less than 10 microns in diameter (PM10). Additionally, TSP, PM10, total inorganic trace metals and PM10 arsenic are measured from filters collected at the nine locations and submitted for analytical analysis.

Three community stations are located off-site in the community of Ndilo (NDL), Niven Lake (NVN), and at the Yellowknife Bay (YKB) in the vicinity of the marina. The community stations measure continuous PM10 and particulate matter measuring less than 2.5 microns in diameter (PM2.5). Integrated TSP, PM10, total inorganic trace metals, and PM10 arsenic are measured from filters collected at the community stations. Nitrogen dioxide is also measured at the NVN community station. In addition, asbestos concentrations are measured when deemed necessary based on site activities. The monitoring stations provide data to monitor potential adverse effects to the local airshed during remediation activities. This data also helps the GMRP team to determine whether additional mitigation measures are required if air quality results exceed established Action Levels in the Dust Management and Monitoring Plan and ambient air quality criteria (summarized in Appendix E).

In 2020, the results of the ambient air quality monitoring program indicated that, similar to previous years, the quality of the local airshed was not significantly impacted by activities associated with the GMRP and was representative of regional and local air quality as per previous years. Blowing dust on October 12-17, 2020, resulted in particulate matter and/or trace metal exceedances of their respective standards (SLR Consulting (Canada) Ltd, 2021). Further information is available in the GMRP 2020 Annual Water Licence Report.

Next steps:

- The AQMP will continue, including ongoing community monitoring and site perimeter monitoring, with activity-specific monitoring conducted as applicable.

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

5.2.2 Dust Suppression

The GMRP team takes active measures to reduce dust from the site's tailings ponds and roads. These measures include communicating daily wind forecasts to GMRP team members each morning, applying dust control products to the tailings ponds and road network, reducing road speeds when wind speeds are elevated, and wetting the tailings ponds. In addition, water trucks are available and on standby 24 hours a day in case of a wind event.

In 2020-21, the GMRP team applied water withdrawn from the Polishing Pond for dust suppression at roads and Tailing Containment Areas (2796 m3 water applied). During an abnormally windy period in October 2020, a helicopter was deployed to manage dust migrating from the center-most sections of the Northwest Pond, as the ground was too soft to deploy the water trucks towards that location. Using the helicopter, 151 m3 of water was applied to both the Northwest Pond and the South Pond. The team also applied dust suppressant (Soil-Tac) to the Tailing Containment Areas (46 m3 of Soil-Tac applied) and used spot treatment as needed (Giant Mine Remediation Project, 2021a). A small amount of EcoSoil product (1 m3) was also applied to a portion of the roadway as a trial product during the 2020 season.

Next steps:

- Ongoing dust control work.

5.2.3 Greenhouse Gas Emissions

The GMRP is taking several steps to proactively reduce greenhouse gas (GHG) emissions and implement federal climate action policies. As required for all new federal buildings, the GMRP is undertaking a GHG assessment of the design of the new WTP to be constructed onsite. This will include a life cycle analysis of the heating system and all supporting equipment, as well as looking at the current proposed fuel oil heating design and a 100% electric heating system using electric boilers. 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 WTP.

The GMRP is also fully committed to looking for opportunities to reduce its GHG emissions during implementation. The principal source of GHG emissions from the implementation 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.

The MCM is currently tracking and reporting monthly on the Project GHG emissions, however, for the period of this report there was only information available for 3 months (See Appendix F – Greenhouse Gas Emissions for data). It is difficult to establish a project baseline while the Project is in Care and Maintenance, as the level of activity will significantly increase on site once implementation begins in July 2021. The Project is considering gathering GHG data throughout the Early Works implementation period in an attempt to develop a baseline that can serve during the rest of Project implementation.

5.3 WATER

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

2020-21 HIGHLIGHTS

- Monitoring of minewater, surface water, and groundwater was conducted at the Site in 2020 to meet regulatory and operational monitoring requirements, as well as to continue to collect baseline data to support ongoing modelling efforts and site characterization.
- MDMER/EEM results were consistent with results from previous years.
- Submitted the Phase 6 EEM final report.
- The AEMP Design Plan received interim approval.
- Conducted biological surveys as part of the monitoring program for benthic invertebrates and fish species in the Baker Creek area.

5.3.1 Effluent, Surface Water and Groundwater Quality Monitoring

To protect the health and safety of workers, the public, and the environment, water from the Giant Mine site is treated at the on-site ETP before being seasonally discharged to the environment. The ETP system consists of various components including reaction tanks, a settling pond, and a polishing pond that are used – in this order – to treat the mine water. Discharged effluent water must meet standards set by the Metal and Diamond Mining Effluent Regulations (MDMER) under the Fisheries Act and the GMRP Type A Water Licence (MV2007L8-0031). Part of the water quality monitoring program includes testing of effluent chemistry. If the level of arsenic or other regulated parameters in the water is at or approaching the maximum allowable limit, the Project team would stop the release of effluent to Baker Creek and recycle it back through the effluent treatment plant.

Minewater is pumped to surface throughout the year and stored on-site in the Northwest Pond. Treatment of this water typically begins in June of each year, with discharge to the environment typically occurring between July and September once the Arctic Grayling have left Baker Creek.

The Project team undertakes effluent and water quality monitoring in and around the Giant Mine site via different programs to report on surface water, groundwater and underground mine water. These programs track parameters such as the volume of water pumped or discharged, water quality and the performance of the ETP. The effluent and surface water quality monitoring encompass the programs outlined below. These programs are used to monitor existing performance and to inform the design process for remediation activities:

- Surveillance Network Program (SNP)
- MDMER including the EEM Program
- Operational Monitoring Program (OMP)
- Supplemental surface water and groundwater baseline data collection such as the surface water quality and Yellowknife Bay models and the Aquatic Effects Monitoring Program (AEMP)

Parameters tested at all stations include standard general parameters (e.g., temperature, pH, conductivity, hardness), major ions, nutrients, and total and dissolved metals. There are also specific station requirements for other tests such as total cyanide, sulphide, hydrocarbons, and radium-226. Samples collected at sampling location SNP 43-1 must meet federal requirements under MDMER as well as the discharge criteria defined in the GMRP Water Licence (MV2007L8-0031).

5.3.1.1 Annual Water Monitoring

The section below summarizes the monitoring activities conducted in 2020/21 (Table 4). Appendix E provides a detailed table of the monitoring stations (Table 22). The main objectives for water monitoring at the Site in 2020-21 were to conduct operational and regulatory sampling to support the GMRP as it transitions from the existing C&M phase into the active remediation/adaptive management phase. In total, 692,785 m3 of treated effluent was discharged into the environment at Baker Pond, more than double that of the previous three years (312,404 to 363,632 m3 from 2017 to 2019). This significant increase in treated effluent is thought to be related to increased pumping from the underground workings and relatively high surface runoff into the Northwest Pond (Golder Associates Ltd., 2021a).

Table 4: Annual Water Quality Monitoring 2020-21

	ACTIVITIES	RESULTS	RECOMMENDATIONS / NEXT STEPS
Hydrology (water quantity)	Operation of hydrometric stations for continuous water level measurements from spring (before freshet) to fall. Water level surveys and flow measurements to establish a time series of seasonal streamflow. The hydrology program was expanded in 2020 to include a new Trapper Creek station, and stage-streamflow rating curves were further developed to provide additional confidence in continuous streamflow hydrographs for the Site.	The most notable feature of the 2020 hydrological year was unusually high water levels in Great Slave Lake, including Yellowknife Bay. Baker Creek water levels were also high in 2020 in response to regional conditions.	Due to the new meteorological station installed at Site, east of the C Dry building, the rain gauge station will be removed and barologger location be moved to the Baker Pond. Complete a field inspection of the areas upstream of A2 Pit Diversion, including culvert under Highway 4 conveying water from Handle Lake to better define the drainage area of A2 Pit Diversion.
Surface water and minewater quality	Underground minewater sampling as part of the OMP at sumps, mine pools, and bulkheads. Minewater sampling from the C Shaft Void. Surface water sampling to meet the requirements of regulatory and OMPs. Under-ice and open water sampling as part of the Yellowknife Bay baseline program for water quality, toxicity, sediment quality, and plankton.	Minewater and surface water samples were consistent with historical patterns. Treated effluent quality was within all MDMER and Water Licence limits. At lake and creek stations sampled under the SNP and OMP, parameters above the applicable Canadian Water Quality Guidelines were either consistent with previous monitoring years or comparatively low due to relatively high water levels and discharge volumes at the Site in 2020. At some Baker Creek stations, concentrations for fluoride, total aluminum, arsenic, cadmium, copper, iron, and lead, and dissolved zinc were above the Canadian Water Quality Guidelines. Results from the minewater samples collected at multiple depths at the C Shaft Void were comparable to historical patterns and show a general increase with depth in specific conductivity, turbidity, hardness, Total Dissolved Solids, Total Suspended Solids, and some metals, and a decrease with depth in concentrations of antimony and arsenic. The Yellowknife Bay Special Study results show water quality exceedances for total antimony, arsenic, and iron during the open-water season, particularly at stations close to the breakwater and sediment quality exceedances for total arsenic, chromium, copper, lead, and zinc.	In 2021, it is recommended that the underground minewater results (up to the end of 2020) be evaluated to determine if further reductions in the frequency or number of sampling locations is warranted starting in late 2021 or 2022. A new pilot hole to the underground is expected to be drilled in 2021, and this will replace the C Shaft program in the future. Seepage and runoff monitoring programs be combined starting in 2021. Incorporate station Dam 21C and Brock Pit Adit station into the runoff program in 2021 as NWP-R-1. Various follow-up sampling, studies, and analyses are also recommended for further characterization. Adjustments to the Yellowknife Bay Special Study and evaluation of the stations to identify potential additions or reductions to reflect regulatory and project updates.

	ACTIVITIES	RESULTS	RECOMMENDATIONS / NEXT STEPS
Groundwater	Hydraulic head measurements and groundwater sampling at a network of shallow monitoring wells and drive point locations to assess shallow groundwater conditions in the overburden and/or bedrock. Hydraulic head measurements and groundwater sampling at selected well ports to assess groundwater conditions in the deeper bedrock aquifer system.	Groundwater flow directions estimated from hydraulic head monitoring were consistent with previous years.	Review well labelling at S-DIAND-014A/B to minimize the potential of uncertainty in the data analysis. Keep all the drive points as part of the monitoring program for 2021 and monitoring in the spring and fall for consistency with the shallow wells program. Remove monitoring wells within the North, Central, and South ponds from the monitoring program starting in 2021. Further evaluate the hydraulic head increase and arsenic concentrations fluctuation at MW00-02. Review field methods and equipment used for pressure measurements at the deep MP wells due to inconsistencies with the Standard Operating Procedures in 2020. Cut-down OMP well MW01-1B for safer access if the 2021 desktop review indicates that monitoring should continue at this well. Inspect and repair S-1954 before the 2021 spring monitoring program. Assess the requirement to continue sampling at Zone 1 and 3 at well S-1857.

5.3.2 Metal and Diamond Minding Effluent Regulations (MDMER) / Environmental Effects Monitoring (EEM)

The MDMER under the Fisheries Act requires metal mines to conduct EEM. This includes monitoring of effluent and surface water quality, toxicological testing of the treated effluent, and biological monitoring. These results are used to assess and identify any effects that may be caused by the treated effluent. The overall objective of these studies is to protect fish and fish habitat in order to protect fisheries and maintain the safe use of fish by people. Effluent and water quality are monitored annually during periods of discharge and these data are used to help interpret the effects observed in the fish and benthic invertebrates from Baker Creek (i.e., the results from the biological program that is completed every three years).

Key activities in 2019-20 included:

- Effluent characterization and surface water quality monitoring on three occasions to fulfill regulatory requirements.
- Analysis of treated effluent and surface water samples for eight deleterious substances and pH as outlined in Schedules 3 and 4 of the MDMER, as well as the required parameters outlined in Schedule 5 (EEM) of the MDMER, and applicable site-specific parameters recommended by ECCC (2012).
- Testing of treated effluent for acute and sub-lethal toxicity as required by the MDMER (Government of Canada, 2002).
- Weekly sampling for all deleterious substances (including cyanide) plus radium-226 at SNP 43-1.
- Summary of the reference areas used in existing Baker Creek-related studies to inform the establishment of reference conditions for future monitoring, focused on biological monitoring programs (Golder Associates Ltd., 2019f).
- Review of the Phase 6 report by ECCC and provision of comments.

The results of the MDMER report were broadly comparable with previous years; treated effluent samples were not acutely toxic; sublethal effects were observed and the effect of treated effluent was the same or lower than in previous years; and treated effluent and surface water quality in the exposure and reference areas were tested with all scheduled parameters being below applicable MDMER requirements.

Next steps:

- Ongoing operations and maintenance (O&M) of the ETP.
- GMRP will provide response to ECCC comments in 2021.

5.3.3 Aquatic Effects Monitoring Plan (AEMP)

The GMRP submitted the completed Baker Creek AEMP Design Plan and the Draft Yellowknife Bay Conceptual AEMP Design Plan as part of the Water Licence application package. As described in the Guidelines for Designing and Implementing Aquatic Effects Monitoring Programs for Development in the NWT and the Draft Guidelines for Aquatic Effects Monitoring Program, four different types of documents are required under the AEMP: Design Plan, Annual Report, Re-evaluation Report, and Response Plan.

The GMRP is proposing to build a new WTP, which will discharge directly to Yellowknife Bay; however, until the new WTP is commissioned, the existing ETP will be used. The two different treatment plants discharge to different locations, with the AEMP shifting focus from the current discharge into Baker Creek to the future discharge location in Yellowknife Bay with the WTP.

In 2020-21, the AEMP Design Plan received interim approval (Giant Mine Remediation Project, 2021a). The GMRP team conducted monitoring in accordance with the interim approved AEMP Design Plan and collected water samples to determine whether waters from the Giant Mine Site could negatively impact fish species (Golder Associates, 2021b).

The 2020 AEMP report highlights include:

- The treated effluent water quality is within the criteria established by government regulations.
- Dissolved iron concentrations increased 25% in relation to previous years; however, values are within regulated guidelines considered safe for aquatic life. Additional dissolved iron might come from a different source, such as the solid waste facility and a highway near Baker Creek.
- All metals of concern were within, or lower than, values provided by guidelines.
- Toxicity results considering both short-term (acute) and long-term (sublethal) effects reveal that the treated effluent was not toxic to Rainbow Trout, minnow, and small crustaceans (water flea). Nevertheless, the treated effluent might have impacted algae and aquatic plant growth from Baker Creek.
- Tested effluent had the same or lower effects than previous years.

Next steps:

- Continue AEMP monitoring as per the approved Design Plan.
- Develop and engage on Moderate and High Action Levels for the AEMP.
- Resubmit the AEMP Design Plan with Moderate and High Action Levels.

5.3.4 Baker Creek and Yellowknife Bay Fish and Fish Habitat Assessment

In 2019, the Project updated the fish and fish habitat studies of Baker Creek and Yellowknife Bay (Golder Associates Ltd., 2019e).

From the tasks identified during the 2019-21 year (Golder Associates, 2020h), the following progress was made in 2020-21:

- Finalized the fish and habitat mapping in Baker Creek and Yellowknife Bay.
- Established the Aquatic Advisory Committee to support engagement on the details of the Fisheries Act Authorization (see section 7.1.1).
- Began regular engagement with Fisheries and Oceans Canada to discuss the Project and advance the conceptual habitat offsetting plan.

Next steps:

- Begin drafting the Fisheries Act Authorization
- Continue Engagement with Fisheries and Oceans Canada and the Aquatic Advisory Committee

5.4 LAND

The GMRP team undertook several activities to monitor and minimize impacts to land and protect the health and safety of the public, on-site workers, and wildlife. These activities included monitoring and management of arsenic impacted waste, and monitoring of wildlife, as described below.

2020-21 HIGHLIGHTS

- Continued monitoring and management of arsenic-impacted waste on site.
- Logged and reported wildlife sightings and interactions.
- Submitted the updated version of the Wildlife and Wildlife Habitat Management and Monitoring Plan.

5.4.1 Waste Management

In 2014, the decontamination and deconstruction of the Roaster Complex as part of the Site Stabilization Plan produced hazardous waste, primarily arsenic- and asbestos-containing materials. The wastes were safely packaged in lined Transportation of Dangerous Goods bags and stored on site, held in shipping containers within an area secured by a chain-link fence (Material Storage Area). Runoff water from the storage area is collected and treated in the GMRP's ETP. Until the material can be appropriately disposed, the safest place to store it is on an already contaminated site, away from water and people. The materials have therefore remained on-site and continued to be appropriately cared for during 2020-21.

Next steps:

- Continue managing wastes on site.
- Begin construction of the Non-hazardous Waste Landfill.
- Establish Waste Disposal Operations for day-to-day domestic waste to be transferred off-site.

5.4.2 Wildlife Monitoring and Research

A draft Wildlife and Wildlife Habitat Management and Monitoring Plan was developed in 2017-18. It was completed in 2018-19 in consultation with GNWT Environment and Natural Resources and stakeholders and submitted as part of the Water Licence package in April 2019. In 2020-21, the Project team submitted the updated version of the Wildlife and Wildlife Habitat Management and Monitoring Plan.

The Project team has suggested the following procedures for wildlife and wildlife habitat (Giant Mine Remediation Project, 2021d):

- Maintain a wildlife sightings log.
- Conduct pre-disturbance wildlife sweeps as well as site surveillance to identify the presence of wildlife during remediation activities.
- Perform surveys to identify bird nests and ensure that active nests are not destroyed.
- Conduct activities to scare wildlife and prevent them from entering in the area before demolition.
- Report incidents involving wildlife.

In 2020-21, Parsons and contractors logged and reported wildlife sightings and interactions, as required. The Project Team did not conduct the planned site-wide bird survey in 2020-2021 season due to restrictions imposed by the COVID-19 pandemic and reduction in site activities that had a potential to disturb nests.

Next steps:

- The GMRP will conduct an annual review of the Wildlife and Wildlife Habitat Management and Monitoring Plan and make any revision necessary to reflect changes in Site operations.

6.0 HEALTH & SAFETY

COVID-19 PANDEMIC IMPACTS AND ADAPTATIONS

Parsons Inc. implemented a detailed COVID-19 Virus Response Plan and procedures, which applied to all staff, contractors, regulators, and any possible visitors to the site. Keeping workers and community members safe was of utmost importance to the project team. There were no COVID cases associated with Giant Mine activities in 2020-21.

The COVID-19 pandemic delayed both the Health Effects Monitoring Program and the Hoèła Weteèts'eèdeè Understanding Community Wellbeing Around Giant Mine Study. COVID caused the cancellation of all travel and in-person community meetings related to the Health Effects Monitoring Program. Regarding Hoèła Weteèts'eèdeè, the COVID pandemic delayed the submission of the full design package to the Ethics Review Board, as well as training of study personnel and data collection.

6.1 OCCUPATIONAL HEALTH AND SAFETY (H&S)

CIRNAC provides oversight for occupational H&S, while PSPC provides oversight and manages engineering design consultants to ensure that they have in place a H&S plan, H&S procedures, and emergency response plans, and that they follow the procedures and report any H&S incidents.

The Main Construction Manager maintains overall H&S responsibility as the prime contractor at the Giant Mine. To ensure that on-site safety plans are implemented, there is a designated occupational H&S manager who organizes ongoing training and occupational H&S support for managers, supervisors and other employees.

2020-21 HIGHLIGHTS

- There were no major safety incidents, 7 moderate safety incidents, and 3 minor incidents in 2020-21. Minor incidents have trended down since 2018-19 with no clear trend in moderate incidents.
- The number of reported near misses increased to 56 in 2020-21 from 41 in 2019-20 but was lower than 2018-19 incidents (74); when normalized (i.e., incidents per 200,000 person-hours worked), near misses have stayed relatively consistent over the past three years and are much lower than 2016-17 and 2018-19.
- 1.2% of urinalysis samples were above the action level of 35 micrograms of arsenic per litre of urine (µg/L) in 2020-21.

6.1.1 Health & Safety Incidents

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

Based on both CIRNAC and MCM incidents reports, there were no major safety incidents, and 7 moderate incidents in 2020-21 (Table 5). This compares with 3 moderate incidents in 2019-20, 9 moderate incidents in 2018-19, and 1 moderate incident in 2017-18.

The number of minor incidents in 2020-21 (3) decreased from 2019-20 (5), with 11 in 2018-19, 5 in 2017-18, and 2 in 2016-17.

The number of incidents is normalized by person-hours worked to enable comparison across years, when the amount of activity on site may differ. When considering these values (Figure 4), there is no clear trend since 2016-17, although minor injuries have decreased since 2018-19.

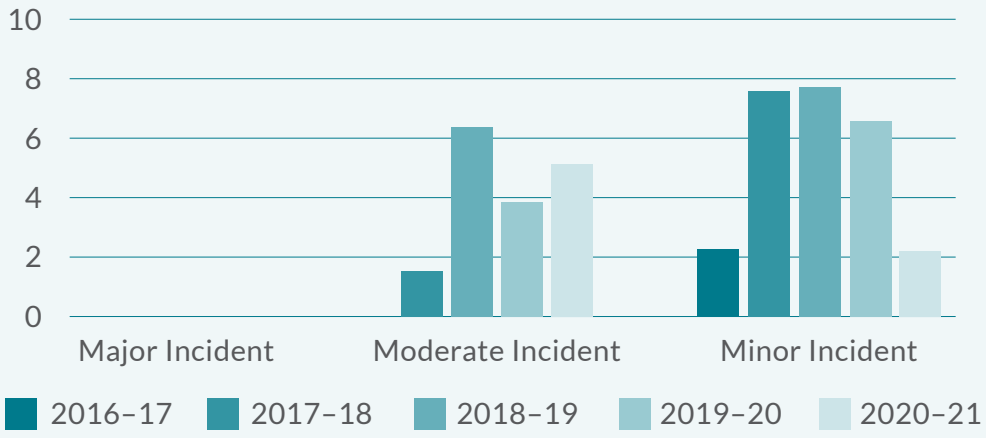
There has been a slight increase in the number of reported near misses last year though the general trend over recent years is still decreasing, with 56 in 2020-21, 41 in 2019-20, 74 in 2018-19, 99 in 2017-2018 and 179 in 2016-17. However, when normalized, near misses in 2020-21 were similar to 2019-20 and 2018-19. A high number of near misses does not necessarily represent poor safety performance, but could represent a strong safety culture, demonstrating high awareness of H&S concerns and a willingness to report those concerns. Incidents and near misses are discussed at daily safety meetings to review lessons learned, root causes and corrective measures.

Table 5: H&S Incidents and Near Misses in 2020-21

INCIDENTS AND NEAR MISSES	2019-20 TOTAL
Major Incident: An incident resulting from activities performed at the site that results in a severe and irreversible disability, impairment, injury, illness or fatality to an individual or individuals.	0
Moderate Incident: An incident resulting from activities performed at the site that results in a reversible disability, impairment, injury or illness that temporarily alters the lives of an individual or individuals.	7
Minor Incident: An incident resulting from activities performed at the site that results in injury or illness that inconveniences an individual or individuals.	3
Near Misses: An unplanned incident resulting from activities performed at the site that did not result in any disability, impairment, injury, illness or fatality, but had the potential to do so.	56

Figure 4 highlights the number of H&S Incidents (normalized) from 2016-17 to 2019-21. The normalization does not account for differences in the nature of activities undertaken from one year to another.

Figure 4: H&S Incidents per 200,000 Person-hours Worked, by year (2016-17 to 2020-21)

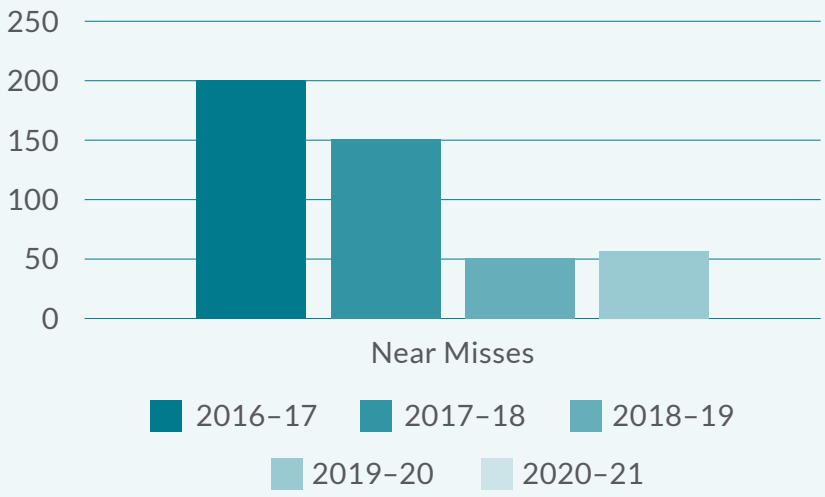


The number of Near Misses from 2016-17 to 2020-21 are presented in Figure 5 to facilitate the comparison per category across years, given the higher number of near misses in comparison with incidents.

Next steps:

- The GMRP team will continue to track and report H&S incidents.

Figure 5: H&S Near Misses per 200,000 Person-hours Worked from 2016-2017 to 2020-2021



6.1.2 Monitoring of Arsenic Levels in Workers

In the 2020-21 reporting year, the GMRP team monitored arsenic levels in the workers who spend time on-site by taking baseline urinalysis samples when workers start on site and then subsequent regular urinalysis samples (weekly samples if on-site full-time). Samples were compared against the Action Level of 35 micrograms of arsenic per litre of urine (µg/L) adopted by the Workers' Safety & Compensation Commission.

Table 6 below shows the total number of samples and the number of samples above the Action Level of 35 micrograms of arsenic per litre of blood. The percentage of samples above the action level (1.2%) is lower than previous years (2.2% in 2019-20, 3.25% in 2018-19, 1.8% in 2017-2018, and 2.6% in 2016-17).

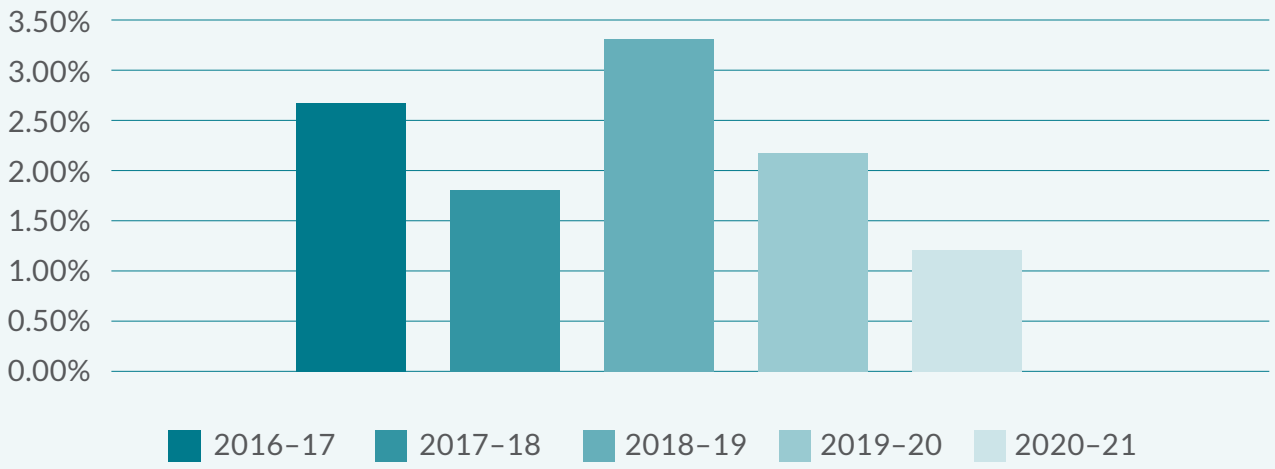
Table 6: Summary of Urinalysis Sampling and Results between 2016-17 and 2020-21

Year	Total samples	Number of samples above the action level (35 µg/l)	Percentage of samples above the action level (35 µg/l)
2020-21	728	9	1.2%
2019-20	682	15	2.2%
2018-19	1938	63	3.25%
2017-18	498*	9	1.8%
2016-17	686**	20**	2.6%

*This value includes 19 baseline samples and does not include invalid test results (45 samples).
**This value includes 125 baseline samples and does not include invalid test results (90 samples).
*** This value includes one baseline sample that exceeded the 35 µg/L action level.

Figure 6 below highlights the key trends in the percentage of samples above the action level from 2016-17 to 2020-21.

Figure 6. Percentage of samples above the Action Level (35 µg/L) from 2016-17 to 2020-21



For any urinalysis sample above the Action Level, the MCM notified Workers' Safety & Compensation Commission, CIRNAC, and PSPC and investigated the root cause (e.g., diet, poor hygiene practices, inadequate procedures). The MCM then took immediate actions to reduce exposure to workers, such as improvement of dust control measures, adoption of more rigorous Personal Protective Equipment procedures, re-training of staff on proper procedures, placing affected workers on limited duty to limit exposure to higher risk activities, or reassigning personnel to other duties (in the rare case of continued / recurring high levels of arsenic).

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

Next steps:

- The GMRP team will continue to provide oversight for the H&S of its employees and contractors through the established management system and associated H&S procedures, including urinalysis for on-site workers.

6.1.3 Health and Safety Training

The MCM's Occupational H&S manager ensures that employees and sub-contractors receive relevant H&S training, including first aid, wildlife safety, water safety, and fire response, as required by applicable regulations. Each year, all new employees are assessed to ensure they have the required training to complete their jobs safely and effectively.

PSPC/CIRNAC and the MCM track the number of person-hours that employees and sub-contractors receive in training. In 2020-21, a total of 10,902 H&S training hours were provided [including general Environment, Health and Safety awareness training (on policy and procedures)].

Next steps:

- The GMRP team will continue to track the type and amount of training received by employees and contractors to ensure that all employees receive the required training. The GMRP team also shares this information with interested parties and stakeholders – such as GMOB and the community – to assure them that on-site personnel are appropriately trained to do their job safely and effectively and are getting some training that is potentially transferable to other employment.

6.2 PUBLIC HEALTH & SAFETY

Since the Government of Canada took over responsibility in 1999, the GMRP team has monitored the site and ensured it is kept safe and secure through 24-hours-a-day C&M work. This work involves ensuring public safety through site security, dust suppression, and minewater and effluent management.

In response to Measure 9 of the Report of Environmental Assessment the GMRP commits to working with other federal and territorial departments to design and implement a broad Health Effects Monitoring Program. In response to Measure 10 of the Environmental Assessment, the GMRP committed to evaluate the indirect effects of the Project through a Stress Study, now called Hoèła Weteèts'eèdeè: Understanding Community Wellbeing Around Giant Mine.

2020-21 HIGHLIGHTS

- Plain language summary on arsenic was distributed to all members of the local communities.
- Regular meetings of the Advisory Committee and Technical Committee for the Stress Assessment - Hoèła Weteèts'eèdeè.

6.2.1 Health Effects Monitoring Program

The Health Effects Monitoring Program in Ndilǫ, Dettah and Yellowknife focuses on effects in people related to arsenic and other contaminants[3] that might result from the GMRP. The monitoring includes studies of baseline health and ongoing periodic monitoring, in accordance with Measure 9 of The Report of Environmental Assessment and Reasons for Decision (Mackenzie Valley Review Board, 2013). Dr. Laurie Chan, based at the University of Ottawa, is leading the monitoring program. A Health Effects Monitoring Program Advisory Committee was established for the program with representatives from GNWT Health and Social Services, Health Canada, the City of Yellowknife, the YKDFN, the NSMA, GMOB and the Project team. The committee meets monthly and provides advice to the program.

The monitoring program completed its baseline sample collection in 2018. There was a total of 2037 participants between Fall 2017 and Spring 2018. Individual results were reported back to all the participants by mail, and a progress report summarized key results (Chan, et al., 2019). Public engagement was undertaken in May 2019 to report back on the initial results of the study. In general, the results from the first two waves of the study are similar to those in the Canadian Health Measures Survey, which is a representative of the Canadian population.

In 2020-21, the Health Effects Monitoring Program Advisory Council developed a plain language summary on arsenic, which the Project distributed to all members of the local communities through a mass mail out. The next representative study with children will be starting in 2022 and with both children and adults in 2027, when the remediation is happening (CIRNAC, 2019a).

Next steps:

- The next report will be published in the winter of 2022. It will examine the relationships between diet and lifestyle variables, genetic information, the concentrations of metals in urine and the arsenic concentrations in the toenail, and results of the medical history and medical file analysis. All personal health information will be kept confidential.

The implementation schedule for the Health Study is as follows:

1. **2019-22:** Research Team and Health Effects Monitoring Program Advisory Committee will implement the follow-up plan to promote healthy living and a healthy community.
2. **2022-23:** The Health Study Team will carry out follow-up sampling for children participants.
3. **2027:** The Health Study Team will carry out follow-up sampling with both adults and children participants.

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

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

6.2.2 Hoèła Weteèts'eèdeè: Understanding Community Wellbeing Around Giant Mine

Measure 10 of the Environmental Assessment requires the Project team to also evaluate the indirect effects of potential exposures to arsenic on wellness, including stress. Since 2017, the University of Laurier has been leading the development of the Hoèła Weteèts'eèdee` Understanding Community Well-being around Giant Mine Study with various rights and stakeholders. There are two committees associated with this study including the Hoèła Weteèts'eèdee` Advisory Committee made up of representatives from the signatories to the Environmental Agreement, Health Canada and the University of Laurier and the Hoèła Weteèts'eèdee ` Technical Committee made up of technical experts. During 2020, the two Committees met regularly to revise and continue to improve on the study design. Due to delays related to COVID-19, next steps reported on in 2019-20 GMRP Annual Report did not take place as planned, including:

- Submission of the full design package to the Ethics Review Board and the NWT Aurora Research Institute (delayed due to COVID-19 protocol requirements).
- Training of study personnel in September 2020 upon approval of the Ethics Permit.
- Data Collection to begin in October 2020.

Furthermore, the implementation of this study could not take place until the NWT COVID-19 restrictions were eased to allow for the in-person components of the study to take place.

Next steps:

- The University of Laurier's research team will lead the 2021 implementation of this study and will also independently lead the engagement related to the dissemination of the results of the study with the support of the GMRP.

7.0 COMMUNITY

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

COVID-19 PANDEMIC IMPACTS AND ADAPTATIONS

COVID-19 pandemic impacts extended to the Project's plans for and approach to engagement. Throughout most of 2020-21, there were restrictions on in-person meetings in Yellowknife, requiring most engagements to be held virtually. The Team adapted by using virtual meeting platforms, such as Zoom. Meeting facilitators ensured that participants were provided with guidance in advance and at the start of meetings to help promote participation. Small in-person meetings were held when permitted, following all health and safety regulations. The Project would like to thank all participants for their patience and adaptability throughout the year!

7.1 ENGAGEMENT

The overall GMRP engagement goals are:

1. Affected parties have increased trust in the Project, the Project team, the overall project management, and are confident in the direction the Project is taking moving forward.

2. The GMRP is operating in an open, inclusive and transparent manner.

3. Affected parties feel increased ownership and optimism with respect to the future remediation of the mine site, as a result of collaborative input into decision making with stakeholders/affected parties and the GMRP team.

The Project team assesses the effectiveness of its communications and engagements through various means, such as the engagement log, gathering feedback from the public and keeping a media log to track inquiries and topics. The team also tracks the number and type of engagement activities planned and achieved within their engagement log. An updated Engagement Plan was submitted to the Mackenzie Valley Land and Water Board in March 2021 (GMRP Engagement Plan link)

Working groups are an important way for the GMRP team to engage with key affected parties in a meaningful way, both to provide information and to solicit input. There are numerous working groups, with those focused on specific areas, such as socio-economic issues, to those focused on the Project as a whole (e.g., the Giant Mine Working Group). The full list of working groups is summarized in the Engagement Plan.

2020-21 HIGHLIGHTS

- Transitioned to virtual meetings to adapt to the COVID-19 pandemic.
- The GMRP team continued its engagement of key affected parties through the established working groups.
- The GMRP created a new committee – the Aquatics Advisory Committee - to engage on aquatic issues related to the site; the group focused on Baker Creek in 2020.
- The GMRP undertook an in-depth engagement process to pre-engage on the Monitoring and Management Plans.
- Key decisions made based on input from engagement sessions included, changing the name of the Stress Study to the Hoèła Weteèts'eèdeè Understanding Community Well-being around Giant Mine Study, holding a test blast for initial blasting to take place on-site (for AR1 freeze pad construction) for rights and stakeholders to observe and learn, including a monitoring location near Ndilo for the test blast, completing an Archaeological assessment of AR1 pre-construction and a more detailed assessment of nearshore areas, and including various rights- and stakeholder recommendations into Baker Creek work.
- Conducted public outreach via virtual Annual Public Forums held in March 2021. Additional outreach activities (school visits, participation in the Spring Trade Show and YKDFN Job Fair), were not possible due to the COVID-19 pandemic.
- Regular communications continued (e.g., e-newsletter, website, Twitter account, public service announcements, media briefings and responses to inquiries).

7.1.1 Engagement and Events

In 2020-21, the GMRP team undertook or participated in 84 engagement activities and events, aligned with and in support of the Project or related activities. This is up from 67 engagement events in 2019-20 and 43 in 2018-19.

KEY GMRP ENGAGEMENT ACTIVITIES IN 2020–21 INCLUDED:

Quantitative Risk Assessment (QRA) (Environmental Assessment)

The QRA engagement has been a phased approach, initiating in 2018. The process has involved the Giant Mine Working Group, the Giant Mine Advisory Committee, the YKDFN, the NSMA, the City of Yellowknife, Alternatives North, and Yellowknife residents (CIRNAC, 2019c; CIRNAC, 2019a). Over the last fiscal year (2020-21), the Project initiated Phase 4 of the QRA, which focused on:

- Presenting and understanding the results of the QRA
- Receiving input on the results, and
- Discussing and receiving input on how the results can be used to improve the Project.

While COVID-19 impacts did result in delays to engagement, a session was held with the Giant Mine Working Group and other participants in June 2020. Additional separate sessions were held with the NSMA (July 2020) and YKDFN (September 2020). Final engagement on the QRA is expected in 2021/2022 and will be reporting on acute health risks.

Perpetual Care Plan

The GMRP established a Perpetual Care Plan Advisory Task Force in October 2019 to provide support and recommendations to the Giant Mine Working Group about the development of a comprehensive Perpetual Care Plan. The Task Force includes representatives from all signatories to the Environmental Agreement.

In 2020-21, the Task Force met regularly to refine the Perpetual Care Plan draft framework, which was submitted to GMOB in November 2020 to meet the submission deadline in the GMRP Environmental Agreement. Following that submission, the Task Force planned a series of workshops to draft a statement of work to support the procurement of a consultant for the next phase of development of the plan, which will be held in 2021-22.

Socio-Economic Strategy Implementation

The GMRP team held virtual meetings with the Socio-Economic Working Group and Socio-Economic Advisory Body throughout 2020-21. The Team also held focus groups to inform the Socio-economic Implementation Plan. The purpose and outcomes of these meetings are further discussed in Section 7.2.

Aquatic Engagement

In 2020, the Project established an Aquatics Advisory Committee that includes all signatories to the Environmental Agreement along with additional members from the YKDFN and the NSMA. The committee was established to allow for participants with a keen interest in the GMRP aquatics environment to actively participate in meaningful conversations and exploration of concepts. The objective of the Committee is for participants to develop a deeper knowledge of the Project, the regulatory framework, the aquatic environment, and environmental monitoring concepts. Furthermore, the Aquatics Advisory Committee and associated engagement was designed to meet the engagement

requirements of Fisheries and Oceans Canada Fisheries Authorization for the GMRP.

In the fall of 2020, the Aquatics Advisory Committee met over 2-days on Baker Creek design, fish and fish habitat. The GMRP Team provided details on the final alignment and design of Baker Creek (that was influenced by the past surface design engagement sessions) and gathered input from attendees on recommended fish species and habitat. The attendees had the opportunity to provide input on how success could be measured. Two one-day meetings were also held on Yellowknife Bay design; the proposed design and the monitoring plans were presented at these initial meetings.

The Aquatics Advisory Committee will continue to meet in 2021 on Area 1 (AR1) blasting and protection of Baker Creek, Yellowknife Bay (fish and fish habitat), aquatic monitoring, fisheries authorization requirements, and a report back on Baker Creek.

Early Works Implementation Plan

The Project held engagement on the Early Works Implementation Plan throughout 2020-21, including presentations to the Giant Mine Working Group, the Socio-Economic Working Group, the Socio-Economic Advisory Body, and the Great Slave Sailing Club. It was also presented at the Annual Public Forum.

Management and Monitoring Plans

The Project team worked with the Giant Mine Working Group to develop a staggered approach to sharing revised management and monitoring plans. The Project team pre-engaged on seven plans in 2020-21; this process included a 2-week review period followed by a 2-hour dedicated meeting and a 2-week comment period (for each plan). A template was available for comments. Moving forward, the GMRP will use the MVLWB review process for sharing annual revisions of the plans with rightsholders and stakeholders (as per Water Licence conditions).

Other

Since 2010-11, the GMRP team has held Annual Public Forums to discuss general Project updates and key studies or initiatives for that respective year. The team held virtual meetings in March 2021 with the YKDFN, NSMA, and the City of Yellowknife. The GMRP team typically participates in additional events, such as the Yellowknife GeoSciences Forum, YKDFN Job Fair, and the Spring Trade Show), but was unable to due to the COVID-19 pandemic.

In addition to the above regularly scheduled meetings, the Team provides updates on GMRP activities and progress through multiple communication techniques (Giant Mine Remediation Project, 2019b), including:

- e-newsletter: Sent regularly to more than 283 email addresses and posted on the GMRP website;
- website (www.giant.gc.ca);
- Twitter account (@GiantMine and @MineGiant);
- media briefings and responses to media requests
  - There were 25 media interactions, including interviews and requests for information, in 2020-21;
- responses to unforeseen events;
- topic-specific public service announcements, as required; and
- topic-specific engagements, as appropriate.

Key Stakeholder Concerns

The GMRP team captures stakeholder concerns through their meeting minutes, the GMRP's Consultation Log, emails, and other correspondence. The GMRP team endeavours to respond in a timely manner. Key concerns raised in 2020-21 were as follows:

Concern	GMRP Response
Dust Management Rights-holders and stakeholders have expressed concerns over the tailings dust and the management of the dust.	As per the MVLWB directive, the GMRP will be developing a dust communications plan in winter 2021/22. The GMRP will be engaging on the dust communications plan to ensure that rights holder and stakeholder concerns are being addressed.
Apology and Compensation The YKDFN have requested an apology and compensation regarding the historical operation of the Giant Mine site.	The minister of CIRNAC is working on the apology and compensation file in coordination with the YKDFN. As part of the apology and compensation request, the YKDFN requested a Community Benefit Agreement that includes various socio-economic benefits (e.g., training, economic development) for the period of remediation that is expected to take 10-15 years.
Action Levels During the engagement on the Management and Monitoring Plans, rights holders and stakeholders expressed concern that the action levels were not proactively protective of the environment and the public.	The GMRP provided details verbally through the pre-engagement process on the Management and Monitoring Plans and is planning to provide additional information on the action levels during Working Group meetings in the fall of 2021. The dust communication plan that will be drafted will also include information and how to communicate the actions proactively taken at site to protect the environment and people.
Sediment Quality Community members are concerned about Yellowknife Bay sediment quality near communities for swimming and playing in the water. There is also concern regarding a lack of clarity on new studies.	A meeting was scheduled to discuss sediment results and to display the new GNWT sediment tool. Unfortunately, the meeting was delayed due to COVID. The meeting will be rescheduled for the winter of 2022.

Concern	GMRP Response
Post Closure Land Use Post closure land use vision/land constraints is a regular concern heard at various engagement forums (e.g., Perpetual Care, Giant Mine Working Group, AAC).	The GNWT is the lead on Land Use Planning as the land is Commissioner Land. The GMRP is responsible for developing the constraints map. This map is currently under development and the first draft will be presented at a Working Group meeting in the fall of 2021.
Socio Economic Governance Structure The Socio-Economic Working Group (SEWG) has had frequent turnover of members as well as lack of participation and input from some parties because of the large size of the group.	To enhance the effectiveness of the working group and support broader socio-economic engagement, the Project is proposing to limit the GMRP SEWG to rights holder and stakeholders and invite other government departments (e.g., GNWT ECE) to pertinent meetings. Bilateral meetings will be held with all parties as required and/or requested.

Next steps:

Engagement activities in 2021-22 will continue to focus on, community and business outreach on procurement and contracting opportunities, Socio-economic Strategy update and implementation, closure criteria for various site requirements (e.g., contaminated soils), aquatics (Baker Creek design and future conditions of Yellowknife Bay), mine water levels, action levels, the Perpetual Care Plan, Health Effects Monitoring Program community outreach, Hoèła Weteèts'eèdeè: Understanding Community Wellbeing Around Giant Mine, and the Project Implementation Plan for the remainder of the site remediation.

The GMRP will continue to host community forums for YKDFN, NMSA and residents of Yellowknife, to engage with the external advisory bodies, and to communicate in a frequent and transparent manner via the established channels (e.g., e-newsletter, website, Twitter, radio, school outreach). Meetings will likely continue to be held virtually, with in-person engagements where permitted.

7.1.2 Incorporation of Traditional Knowledge (TK)

The YKDFN and the NSMA have developed and shared extensive knowledge of the Giant Mine site and surrounding area. Engagement with Indigenous Organizations (rights holders) is part of the 26 measures listed in the Report of Environmental Assessment and Reasons for Decision (Mackenzie Valley Review Board, 2013) to mitigate negative environmental impacts, and address public concerns. As a result, incorporating TK into planning and work on site was a requirement for obtaining the Water Licence. While some TK has been incorporated in GMRP activities to date (e.g., to help determine the best time of year to deconstruct buildings), the Team acknowledges that there is always a need for continual improvement for the incorporation of TK and community perspectives within Project initiatives.

- In 2018-19, YKDFN Lands and Environment completed TK Study, which aimed at documenting YKDFN knowledge, values, priorities, concerns, perceptions of risk, and understanding of impacts to past and current land use (Yellowknives Dene First Nation & Trailmark Systems, 2019).
- In 2019-20, the NSMA completed a TK study "Summary of Traditional Land-Use by the Indigenous Métis People in the Yellowknife Bay Area" (Shin Shiga Consulting, 2020)
- In 2020-21 the Project team completed an Archaeological Impact Assessment. The YKDFN participated in a multi-day walkthrough of the site, providing Traditional Knowledge on areas of Traditional Land Use. An NSMA elder provided Traditional Knowledge via telephone and an NSMA member did a one-day visit to key areas. In addition, the GMRP gathered traditional and local knowledge through the Aquatic Advisory Committee (AAC), which has influenced Project remediation activities.

Ultimately, the goal of this information is to:

- enable the inclusion of YKDFN/NSMA knowledge and perspectives into the Giant Mine Remediation Project and risk assessment in the GMRP;
- support YKDFN/NSMA values and future land use aspirations; and,
- recognize the history of the First Nations within Project presentations and materials where relevant.

7.2 SOCIO-ECONOMIC

The Project team developed a Socio-Economic Strategy in 2016-17 and publicly released an updated version in September 2019 [Socio-Economic Strategy Plain Language Summary link]. The overall aim of the Strategy is to maximize Northern and Northern Indigenous benefits and deliver on regional socio-economic commitments and requirements within guiding policies and other requirements. To accomplish this goal, the strategy involves three distinct streams of activity:

- providing access to employment and procurement opportunities;
- supporting capacity and skills development; and,
- anticipating, monitoring, and mitigating negative impacts.

To ensure that the Project is well-positioned to maximize socio-economic opportunities for Northerners and Northern Indigenous peoples, GMRP's Socio-Economic Working Group was joined by other experts in February 2020 to identify actions for successful implementation of the Socio-Economic Strategy. The collaborative discussion resulted in a Socio-Economic Implementation Plan, which identifies actions, deliverables, timelines, and responsible parties. The Implementation Plan is evergreen, which means that it is regularly updated based on advancements in activities and input from stakeholders and rightsholders.

2020-21 HIGHLIGHTS

- The Project team held focus groups with the YKDFN, NSMA and the City of Yellowknife's Mayoral Task Force for Economic Development to seek additional input on the Socio-Economic Implementation Plan.
- The Project team held a Social Impacts Focus Group to share information, identify potential social impacts, and identify opportunities to work together.
- 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.
- In 2020-2021, total workforce training increased across all categories except Indigenous Opportunity Considerations (IOC); Indigenous training increased significantly with the inclusion of training provided by Dechita Nàowo into the statistics this year.
- The GMRP initiated development of 5-year training plans with the YKDFN, NSMA and Tłı̨chǫ.

7.2.1 Socio-Economic Governance

To enhance coordination and preparedness for socio-economic benefits, the Project team established the following advisory and coordinating bodies in 2018-19:

- **Socio-Economic Advisory Body:** The Socio-Economic Advisory Body provides strategic advice to the Socio-economic Working Group and acts as senior government champions for the implementation of the Socio-economic Working Group's approach. The Advisory Body is chaired by the Northern Contaminated Sites Program Executive Director and is comprised of senior level representatives from Alternatives North, Canadian Northern Economic Development Agency, CIRNAC, City of Yellowknife, GNWT [ENR, Industry Tourism and Investment (ITI) and Education, Culture and Employment (ECE)], PSPC, Service Canada, NSMA, YKDFN, and Tłı̨chǫ. The Giant Mine Oversight Board acts as an observer.

- **Socio-Economic Working Group:** The Socio-Economic Working Group coordinates and integrates socio-economic activities for the Project. This working group shares information and seeks opportunities to improve collaboration, as well as reports to and seeks advice from the Socio-Economic Advisory Body on the implementation approach. It meets on a monthly basis, and is comprised of representatives of Canadian Northern Economic Development Agency, CIRNAC, City of Yellowknife, GNWT (ENR, ITI, ECE, and Health and Social Services), Parsons (MCM), PSPC, NSMA, Tłı̨chǫ, and YKDFN. The Giant Mine Oversight Board acts as an observer.

In 2020-21, the Socio-Economic Working Group met virtually, via Zoom, every 1-2 months. The Advisory Body met twice (August and December 2020), also virtually. Both committees are managed by external facilitators.

The Project considered establishing an Indigenous Benefits Plan Monitoring and Advisory Committee prior to participation of the YKDFN and NSMA on the Socio-Economic Working Group. The Project assessed the need for such a committee over the past two years and decided that, at this time, an additional committee is not required because the existing groups and committees already implement the planned mandate of the proposed Committee.

7.2.2 Employment and Procurement

Providing access to employment and procurement opportunities is one of the Projects' key approaches to maximize Northern and Indigenous benefits. The table below summarizes the employment and procurement activities from the Implementation Plan that the Project advanced and/or completed in 2020-21.

Table 7: Key Actions and Deliverables Advanced in 2020-21 – Employment and Procurement

	Action	Deliverable
Employment	**Monitor projected labour demand to inform risks and opportunities associated with the GMRP schedule**	**Labour Demand Forecasts:** Parsons' Constructability Review Team prepared Labour Demand Forecasts for 2020-21 contracts as well as the Early Works Implementation Plan. **Apprentices/Trainees:** The Project team conducted an exercise to cross-reference the list of Early Works Implementation Plan positions with the GNWT Education, Culture and Employment's apprenticeship programs and training provided in the North Slave region; this information was shared with YKDFN, Tłı̨chǫ and NSMA. **Labour Capacity Survey:** Parsons developed and sent out to businesses, including Indigenous development corporations, an initial Labour Capacity Survey to help inform the Project about work readiness.
Procurement	**Modify Procurement Tools**	**Deductions:** Participants at the Feb 2020 implementation planning meeting identified the concern that contracting deductions were retained by the Crown (5-10% of contractor payment can be retained if contractors do not meet their commitments); CIRNAC can now transfer funds to impacted communities based on deductions applied. **Indigenous Opportunity Considerations (IOC) eligibility:** PSPC and Parsons have introduced recommended baseline IOC commitments to encourage contractors to make higher commitments. **Contract area map:** The Project team simplified the contract area map and made additional changes to incorporate input from Indigenous stakeholders (e.g., adding the nearby communities of Ndilo and Dettah).
	Determine best approach to right-size contracts and timing to maximize local Northern and Indigenous procurement	**Right-size contracts:** The Project considers the size of contracts for each work package it procures; an example of "right-sizing" a contract in 2020-21 was the separation of the bear monitoring work package from an overall wildlife monitoring work package; the Project also simplified the Request for Proposals document and included a mandatory requirement for the contractor to bring onboard an Indigenous trainee; bear monitoring will continue to be procured as a separate work package going forward. **Procurement Strategy for Aboriginal Business (PSAB):** The Project team developed Early Works Implementation Plan work packages in 2020-21 to be released as Request for Proposals in 2021-22; all four of the work packages will be set aside as PSAB; in addition, two "common services" work packages were set aside as PSAB in 2020-21.
	Engage with Northern and Indigenous businesses ahead of formal procurement processes to improve their preparedness for upcoming contracts	**Industry Day:** Parsons held a multi-day virtual Industry Day in October 2020; the session focused on upcoming remediation work (e.g., AR1 Freeze Pad Construction), including scope, labour & equipment requirements, and tentative schedule. **Bilateral meetings:** Parsons also met individually with NSMA, Det'on Cho LLP, and Tłı̨chǫ Investment Corp in 2020, as well as with the Chamber of Mines.
	Definition of Northern Resident and Northern Business	**Definition:** Members of the Socio-Economic Advisory Body requested that the Project consider whether its definition of Northern Employee was inclusive enough, in the context of Project's performance measuring targets. The Project conducted research to confirm the policy context and broader program and departmental definitions. The outcome was a separate document outlining the Project's definitions for "Northern employee" and "supplier". The definitions themselves did not change from what the Project has been using in the past.

2020-21 Employment Results

The GMRP tracks several employment statistics, including total employment and employment by certain categories, namely Northern, Indigenous, IOC , and Female employees. The tracking of employment statistics has evolved over time, informed by input from GMOB and engagement with the Socio-Economic Working Group and Advisory Body on the development of key performance indicators.

The Project reports the employment statistics for Parsons and its contractors, CIRNAC contractors, and combined data. Parsons and its contractors provide on-site/local employment, while CIRNAC contractors tend to be large engineering firms that provide Project design support. Table 8 shows the employment statistics for Parsons and its contractors for 2020-21 and Table 9 shows the employment statistics for CIRNAC contractors.

Table 8: Total Number of Persons and Total Person Hours (Parsons + Parsons' contractors) for 2020-21, by Category

Employee type[5]	Total # persons (incl. contractors)	Total person-hours	Persons as % of all employees	Person-hours as % of all person-hours
Total	**249**	**134,477**	**100%**	**100%**
Northern employees	122	96,066	49%	71%
Southern employees	127	38,411	51%	29%
Indigenous employees	57	41,065	23%	31%
IOC employees[6]	44	33,959	18%	25%
Female employees	63	22,109	25%	16%

Table 9: Total Number of Persons and Total Person Hours (CIRNAC contractors only) for 2020-21, by Category

Employee type[7]	Total # persons (incl. contractors)	Total person-hours	Persons as % of all employees	Person-hours as % of all person-hours
Total	**566**	**134,516**	**100%**	**100%**
Northern employees	22	4,928	4%	4%
Southern employees	544	129,588	96%	96%
Indigenous employees[8]	2	1,525	0%	1%
IOC employees	0	0	0%	0%
Female employees	215	41,416	38%	31%

[5]Note that these categories may overlap (e.g. a single employee may simultaneously be counted as Northern, Indigenous, IOC, and female – or a combination or subset thereof) and that this information may not be available for all employees). For this reason, the totals indicated in the bottom row of the table do not represent the sum of the preceding rows.

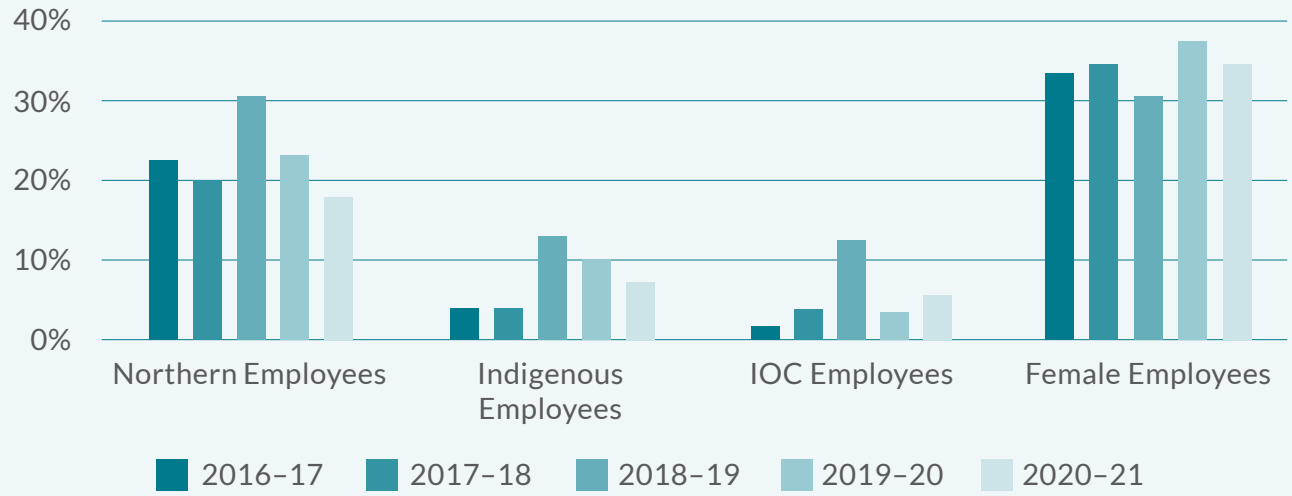
[6]All IOC employees are Indigenous employees under Parsons data collection methodology.

[7]Note that these categories may overlap.

[8]Unlike Parsons' data, IOC employees were not consistently categorized as Indigenous employees in CIRNAC's data; therefore, there is a difference in statistics. However, it can be assumed that all IOC employees are also Indigenous (i.e. the values should be the same).

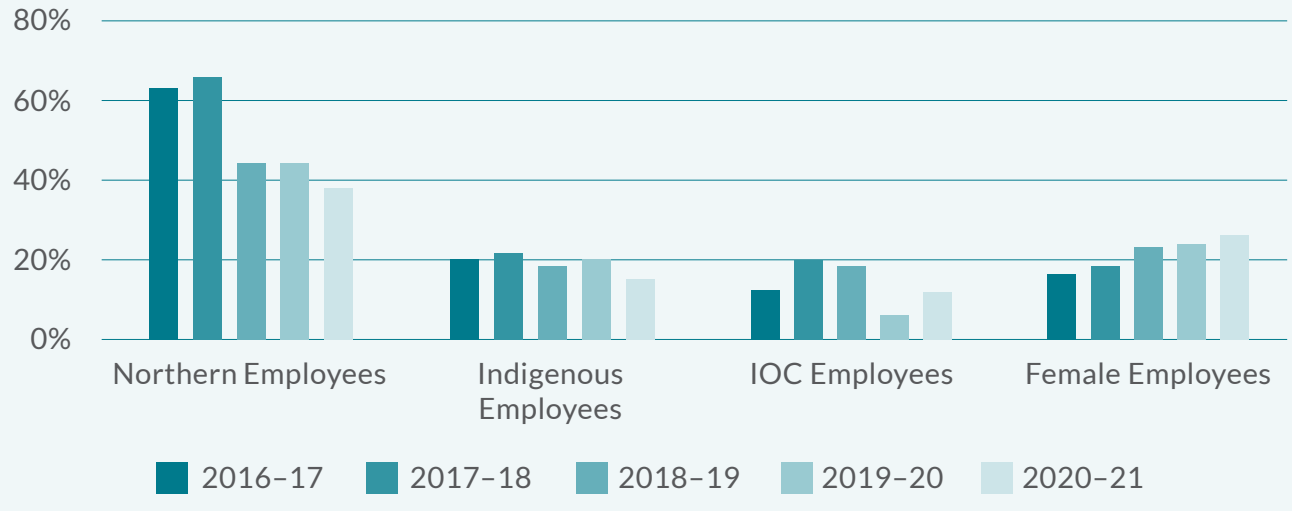
The following figures highlight key trends of the Total Number of Persons and Total Person Hours, by Category, for 2016-17 to 2020-21 (Figure 7 and Figure 8). These results represent the combined data reported by both CIRNAC and Parsons. When considering the number of persons employed, there are downward trends in both Northern employees and Indigenous employees, with no clear trend in IOC employees and female employees.

Figure 7: Persons as % of all Employees by Category from 2016-17 to 2020-21



When considering the percentage of person hours worked, Northern employment declined from previous years, at 38% (it was 44% in 2018-19 and 2019-20, 67% in 2017-18 and 63% in 2016-17). Indigenous employment also declined slightly in 2020-21, at 15%, having been relatively consistent over the previous past four years (19-20%). IOC employment increased to 13% from 8% in 2019-20 (compared to 12-20% in previous years).[9] Female employment increased slightly to 24% from 22% in 2019-20 and 2018-19 and is higher than 2016-17 and 2017-18 values (16-17%).

Figure 8: Percentage of Person Hours by Category from 2016-17 to 2020-21



[9]In 2018-19, the MCM accounted for all Northern Indigenous employees as IOC employees, which accounts for the higher value compared to other years. Tracking was recorded properly in 2019-20.

Table 10 highlights the employment statistics broken down further into Northern Indigenous/ non-Indigenous. It is the second year that this data has been available, which prevents the identification of trends (trend information will be provided in the 2021-22 report). Compared with 2019-20 results, total person hours per category are higher across all categories, however, the person-hours as a percentage of all person hours are the same or lower.

Table 10: Employment - total number of persons and person-hours, by Northern sub-category (Parsons and CIRNAC combined), in 2020-21

Employee type	Total # persons (incl. contractors)	Total person-hours	Persons as % of all employees	Person-hours as % of all person-hours	2019-20 person hours as % of all hours
Northern Indigenous women	11	8,999	1%	3%	3%
Northern non-Indigenous women	20	5,722	2%	2%	4%
Northern Indigenous men	43	30,959	5%	12%	4%
Northern non-Indigenous men	70	55,315	9%	21%	24%

NWT Residential status information is only available from Parsons and their contractors. In 2020-21, there were more NWT residents as a percentage of all employees (Table 11).

Table 12 provides the skill level of Northern, Indigenous and female employees for Parsons and their contractors only.

Table 11: NWT Resident status (total # and %) (Parsons and their contractors only) in 2020-21

Status	Total # persons	Persons as % of all employees
NWT Resident	128	51%
Non-resident	121	49%

Table 12: Skill level of Northern, Indigenous and Female employees (Parsons and their contractors only) in 2020-21

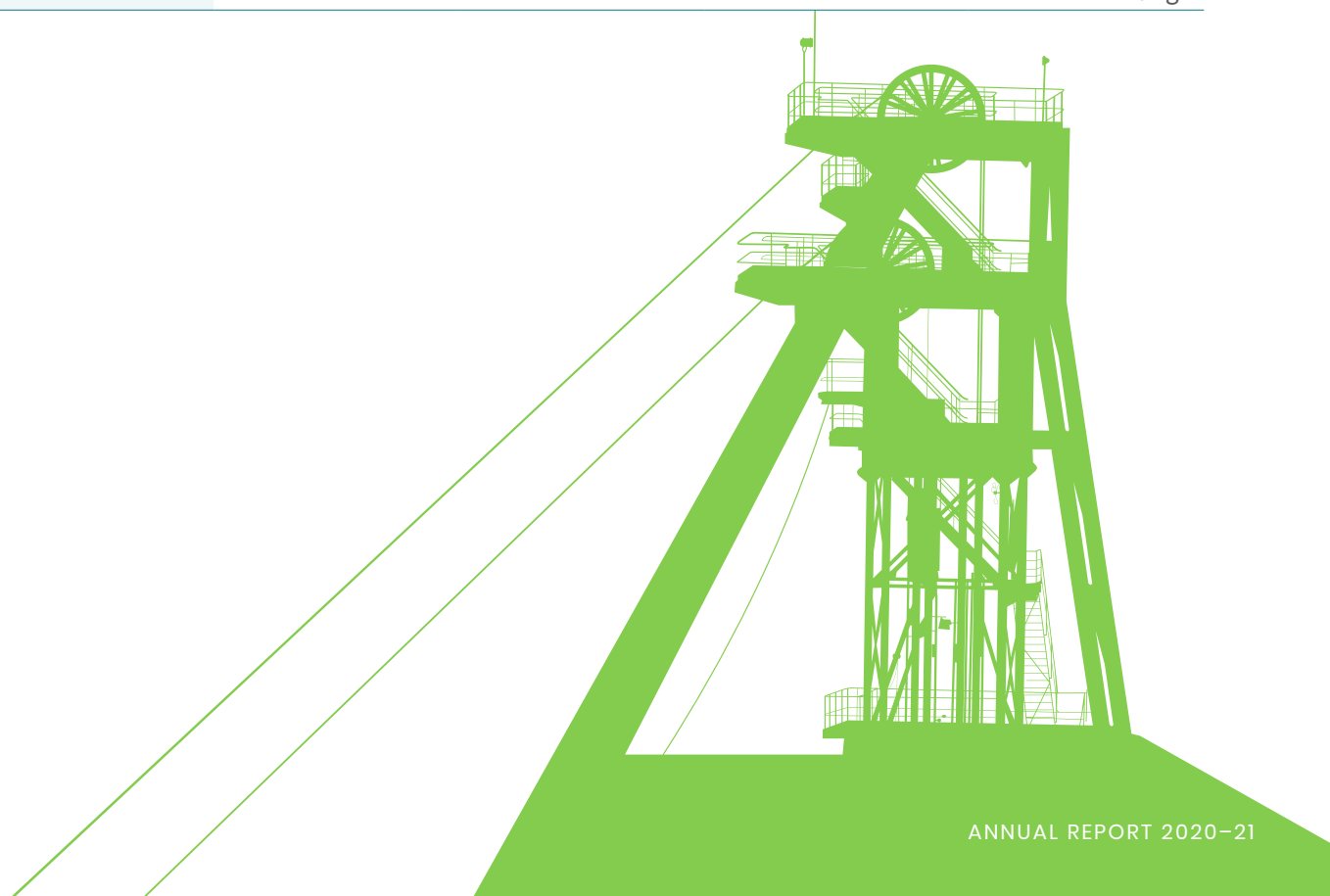
Skill level	Total	Northern	Indigenous	Women
Entry-level	11	9	9	2
Semi-skilled	51	45	22	19
Skilled	61	40	21	5
Professional	126	28	5	37

Results compared to Target Ranges

In 2019-20, the Project approved a set of employment target ranges for the Implementation Phase of the Project, through extensive engagement with the Socio-Economic Working Group and the Socio-Economic Advisory Body. While the Project is still in the Design Phase, GMOB and other parties have requested that data be compared to target ranges. Table 13 compares the actual person-hours (%) to the targets. Employment accounted by women was within the target range in 2020-21; however, employment accounted by Northerners and Northern Indigenous employees are below the lower end of the target range. When considering these results, it is important to highlight the distinction between the results of Parsons and their contractors (i.e., on-site work) and CIRNAC contractors (largely engineering design work). The Project anticipates that the Northern and Northern Indigenous employee statistics will improve during the Implementation Phase of the project because there will be more onsite work; however, it recognizes that there is more to be done to increase employment of Northerners, Northern Indigenous peoples, and women overall and seeks to work with its partners to identify and implement actions within the Implementation Plan.

Table 13: Total employment accounted for by Northerners, Northern Indigenous, and Women, 2020-21, compared to Target Ranges

Key Performance Indicator	Number of person hours	Person-hours as % of all person-hours	Target Ranges for the Implementation Phase	Gap
Employment accounted by Northerners	100,994	38%	55-70%	17-32%
Employment accounted by Northern Indigenous	39,958	15%	25-35%	10-20%
Employment accounted by Women	63,525	24%	15-30%	Within target range



2020-2021 Procurement Results

Suppliers Statistics

The GMRP tracks the total number of suppliers and the total value of contracts by four categories: Northern, Southern, Indigenous and IOC.

Table 14: Total Number of Suppliers and Total Value of Contracts (Parsons and its contractors), in 2020-21, by Category

Supplier type[10]	# suppliers	$ spent	% of total $ spent
Total	**201**	**$21,698,278**	**100%**
Northern suppliers	120	$12,443,561	57%
Southern suppliers	81	$9,254,717	43%
Indigenous suppliers	18	$9,842,89	45%
IOC suppliers	17	$9,702,972	45%

Table 15: Total Number of Suppliers and Total Value of Contracts (CIRNAC contractors), in 2020-21, by Category[11]

Supplier type[12]	# suppliers	$ spent	% of total $ spent
Total	**151**	**$18,413,846**	**100%**
Northern suppliers	62	$552,132	3%
Southern suppliers	89	$17,861,714	97%
Indigenous suppliers	-	$1,335	<1%
IOC suppliers	0	$0	0%

The following figures highlight the Total Number of Suppliers (Figure 9) and Percent of Total Value of Contracts (Figure 10), by Category, for 2016-17 to 2019-21. These results represent the combined data reported by both CIRNAC and the MCM. The proportion of expenditures with Northern suppliers decreased in 2020-21 (32%) from previous years (44% in 2019-20, 56% in 2018-2019, 47% in 2017-18, 64% in 2016-17). The proportion spent with Indigenous suppliers decreased in 2020-21 (25%) from previous years (36% in 2019-20, 28% in 2018-19, 41% in 2017-18, 45% in 2016-17). The proportion spent with IOC suppliers also decreased in 2020-21 (24%) from previous years (35% in 219-20, 28% in 2018-19, 35% in 2017-18, 31% in 2016-17).

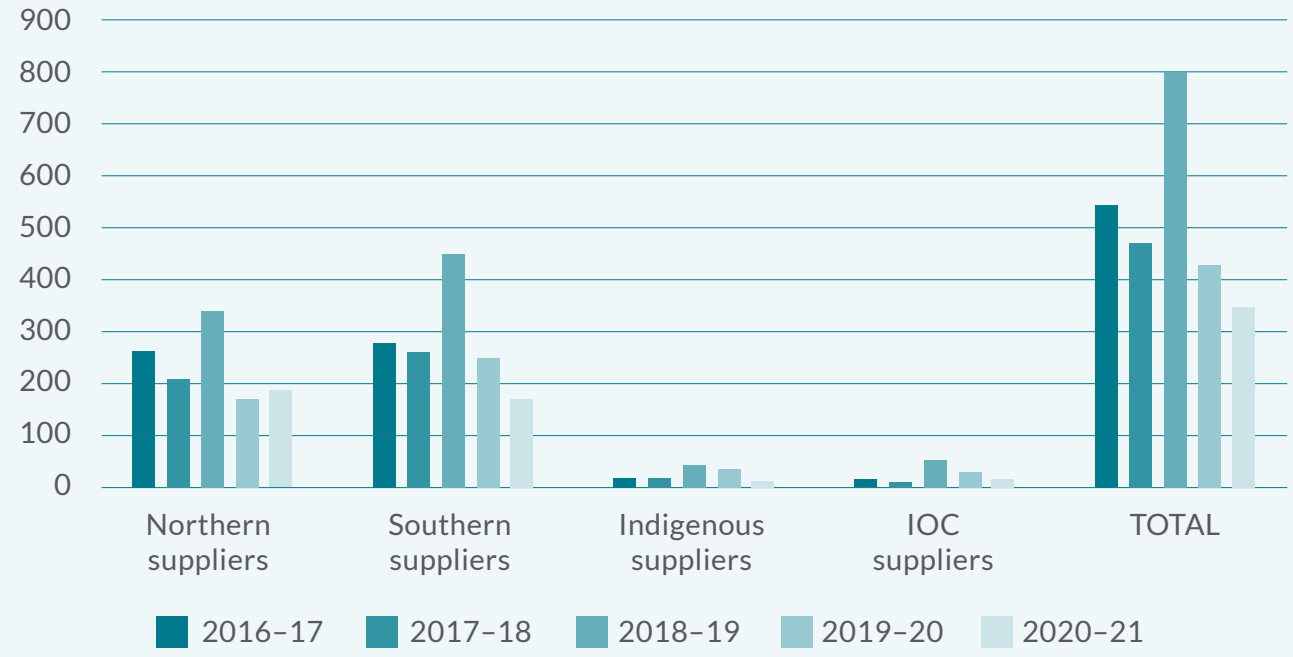
From 2005 to March 2021, under the Giant Mine Remediation Project, out of a total of approximately $499 million contract values awarded, $220 million (or 44%) went to Indigenous contractors.

[10]Note that these categories may overlap (e.g. a single supplier may simultaneously be counted as Northern, Indigenous, and IOC – or a combination thereof) and that category information was not available for all suppliers. For these reasons, the totals indicated in the top row of the table do not represent the sum of the proceeding rows.

[11]The tracking of suppliers by CIRNAC sub-contractors was very detailed (e.g. taxi, meals, materials, airlines, hotels, etc.).

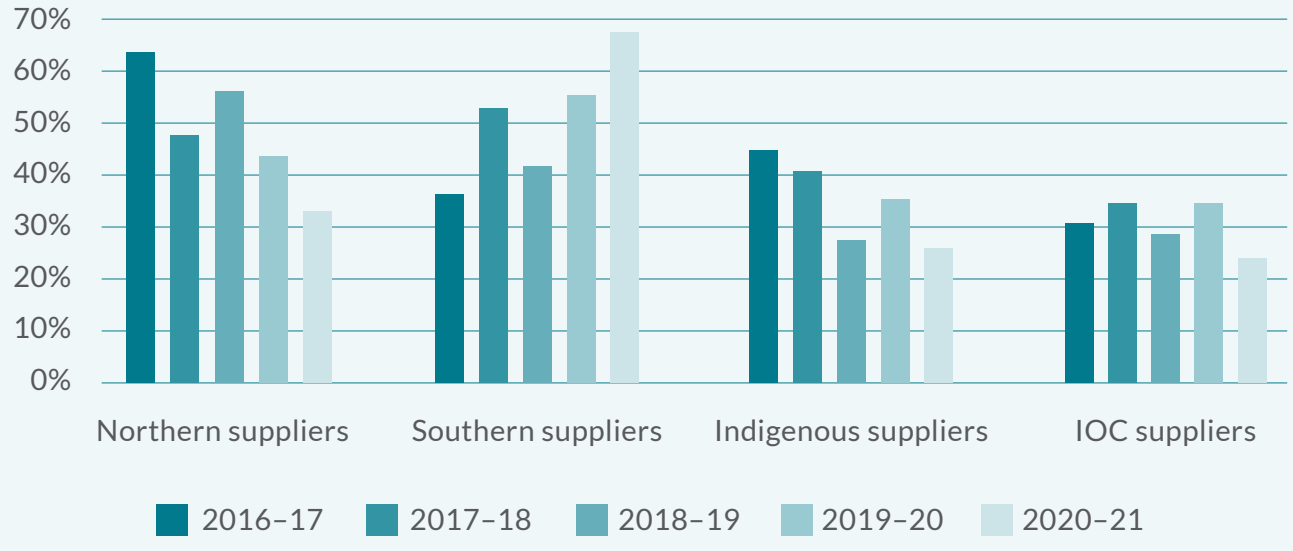
[12]Note that these categories may overlap.

Figure 9: Total Number of Suppliers from 2016-17 to 2020-21



*Note: In previous reports, 2018-19 values were miscalculated. These have been fixed in this report.

Figure 10: Percent of Total $ Value Spent from 2016-17 to 2020-21



*Note: In previous reports, 2018-19 values were miscalculated. These have been fixed in this report.

Results against Targets

Table 16 compares the actual contract values (%) to the targets. Procurement accounted by Northerners is below the lower end of the target range. As highlighted above, under Employment, when considering these results, it is important to highlight the distinction between the results of Parsons and their contractors (i.e., on-site work) and CIRNAC contractors (largely engineering design work). During the 2020-21 year, work was heavily focused on project design and very little on site construction work. The majority of design work is completed by professional engineers; most of whom are located in the south. The Project anticipates that the Northern and Northern Indigenous procurement statistics will improve during the Implementation Phase of the Project because there will be more onsite work; however, it recognizes that there is more to be done to increase procurement of Northern and Indigenous suppliers and seeks to work with its partners to identify and implement actions within the Implementation Plan.

Table 16: Total procurement accounted for by Northerners, 2020-21, compared to Target Ranges

Key Performance Indicator	Total Value of Contracts	Value of contracts as % of all contracts	Target Ranges for the Implementation Phase	Gap
Employment accounted by Northerners	$12,995,692	32%	65-75%	33-43%

Major Procurements

The major procurements awarded between April 1, 2020 and March 31, 2021 are included in Table 17 below. Some of the values are contract extension amounts (i.e., a contract had been awarded previous to the 2020-21 fiscal year, and it includes the value and duration of extension), while others are for single or multi-year contracts starting in 2020-21.

Table 17: Major work packages awarded by Parsons in 2020-21

Value	Scope of work	Awarded to
$4,796,581*	Underground C&M: Awarded June 1, 2018. Extended to March 31, 2022	Det'on Cho Procon JV
$1,729,382*	Surface C&M: Awarded June 15, 2018. Extended to March 31, 2021	Det'on Cho Nuna JV
$1,812,750	ETP Operations from April 1, 2020 to March 31, 2021	BluMetric Environmental and Det'on Cho JV
$1,710,632*	Ambient Air Quality Monitoring: Awarded December 31, 2018. Extended to March 31, 2021	SLR Consulting (Canada) Ltd
$930,871*	Emergency Medical Services: Awarded June 15, 2018. Extended to March 31, 2023	Det'on Cho Medic North JV
$883,279*	Surface Water Ground Water: Awarded May 6, 2019. Extended to March 31, 2021	Dillon Consulting
$1,054,378	Winter Investigation Drilling: From March 1, 2021 to July 31, 2021	Earth Drilling Company and Det'on Cho Management LP JV
$844,650	Dam 1 Stabilization (thermosyphon installations): From September 14, 2020 to November 30, 2020	Arctic Foundations
$812,039	Dam 1 Stabilization (drilling): From October 3, 2020 to December 16, 2020	Boart Longyear Canada
$292,728*	Laboratory Services (Medical): Awarded June 11, 2018. Extended to March 31, 2022	ALS Environmental
$198,397*	Laboratory Services (ETP & Pilot Plant): Awarded June 11, 2018. Extended to March 31, 2022	Taiga Environmental Laboratory

*Note: contract extension value – not total work package value

Additional Procurement Key Performance Indicators

Additional procurement Key Performance Indicators include:

- Procurement accounted for by:
  - — Northern Indigenous suppliers and amount spent (#, $, %)
  - — Northern Non-Indigenous suppliers and amount spent (#, $, %)
- Modifications to procurement procedures to increase Indigenous participation (e.g., advances communications of procurement, set asides) (description and #) to be reported on in the following fiscal year.
- New joint ventures and partnerships established (#) to be reported on in the following fiscal year.
- New Northern Indigenous and Northern non-Indigenous contractors bidding (#) to be reported on in the following fiscal year.

Table 18 highlights the procurement accounted for by Northern Indigenous and by Northern non-Indigenous suppliers for 2020-21.

Table 18: Procurement accounted for by Northern Indigenous and Northern Non-Indigenous suppliers (Total number, $ spent and % of total value spent) (Parsons + CIRNAC) for 2020-21

Supplier type[13]	# suppliers	$ spent	% of total $ spent
Northern Indigenous suppliers	21	$9,844,231	25%
Northern non-Indigenous suppliers	161	$3,151,461	8%

Next Steps: Employment and Procurement

The evergreen Socio-economic Implementation Plan has identified additional actions and deliverables for the Project to focus on in 2021-22, several of which are highlighted below:

Employment:

- Create and maintain links between GMRP and other large infrastructure projects to identify opportunities to gain employees from project closures and to identify potential employment shortages
- Enhance the assessment of labour demand for common services and project implementation activities
- Continue to enhance communication to increase employment desirability and support recruitment of potential hires (e.g., attend YKDFN job fair and provide information about employment opportunities and job supports)
- Enhance apprenticeship / trainee uptake

Procurement:

- Continue to modify/enhance procurement tools to support the procurement of local, Indigenous and Northern businesses, including the use of IOC and PSAB.
- Engage with Northern and Indigenous businesses ahead of formal procurement processes to improve their preparedness for upcoming contracts, including Industry Day in late 2021 or early 2022, and additional bidder's conferences in advance of procurement opportunities.

[13]Note that these categories may overlap.

7.2.3 Training and Capacity Building

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

The table below summarizes the training activities from the Implementation Plan that the Project advanced and/or completed in 2020-21.

Table 19: Key Actions and Deliverables Advanced in 2020-21 – Employment and Procurement

Action	Deliverable
Establish a group dedicated to training coordination	Participants at the Feb 2020 implementation planning meeting identified the need for a coordinated Training Hub in the North Slave region. GMRP collaborated with GNWT Education, Culture and Employment to identify the purpose and format of the Hub, with input from the Socio-Economic Working Group. In 2020, GNWT contracted a third-party organization to lead the initiative, which will be a virtual platform. GMRP will provide information to the coordinators and will stay engaged in this initiative.
Contribute towards strengthening local remediation capacity	Over the course of 2020-21, GMRP worked with the YKDFN to initiate the development of a 5-year training plan for the YKDFN's Dechı̨ta Nàowo program; the Project team also engaged with NSMA and Tłı̨chǫ to initiate development of respective plans.
Develop links between training providers, contractors and the Project	Parsons included a new section in all Request for Proposals that lists local training institutions, the training they provide and their contact information; Parsons also shared labour requirements with local training institutions.

Sky Lennie, Environmental Technician

Sky Lennie joined the Parsons' team working on the Giant Mine Remediation Project in October 2020 as an environmental technician. She was born in Wrigley, a 140-person community in the Deh Cho area of the NWT known as Pedzéh Kı́ or "Clay place."

After graduating from high school in Yellowknife, Lennie worked for the Det'on Cho Corporation, now known as Det'on Management LP. The company supported her taking 3 programs with them in 6 months. These included:

- the environmental monitoring coordinator program, where she:
  - observed the environmental impact of industrial activity
  - learned how to communicate the information
- the contaminated site remediation coordinator program
- the environmental site assistant program

Taking these courses confirmed that her passion and joy was the journey she was being led to take. Later, Lennie found work in Yellowknife with Golder Associates Ltd. at the Giant Mine site in support of the hydrologists. This inspired her to work more towards the water side of the environmental field. "It seems like it was meant to be," she said. "To do something you love every day and excited to go to work. It's a sign that I'm moving in the right direction."

Lennie is working toward getting the science credits to apply for college or university, to pursue more of this type of work.

2020-21 Training Results

The GMRP tracks its workforce training by number of people who have participated in training exercises, as well as the number of person hours. Based on statistics reported by both CIRNAC and the MCM, workforce training for 2020-21 is summarized in Table 20, organized by category of Northern, Northern Indigenous, Indigenous employees, IOC employees, Women and Total.

In 2020-21, workforce training provided to Northern employees (113) was within the average range of values from previous years (102). Workforce training for IOC employees (32), increased from the previous year but was within average range since 2016-2017. Workforce training for Indigenous employees (68) and female employees (74) increased from previous years as a result of the inclusion of Dechita Nàowo in the statistics for 2020-2021. The total number of people trained remained within the range from previous year.

Table 20: Total Number of People trained and Total Person Hours of Training in 2020-21, by Category

Workforce training[15]	Total # persons	Total person-hours	Persons as % of all employees	Person-hours as % of all person-hours
Total	**228**	**20,211**	**100%**	**100%**
Northern employees	113	19,577	50%	97%
Southern employees	115	634	50%	3%
Indigenous employees	68	18,445	30%	91%
IOC employees	32	3,235	14%	16%
Female employees	74	5,747	32%	28%

Figure 11 highlights the percentage of people trained by employee category, from 2016-17 to 2020-21. The overall number of people trained for each employee group remained the same or increased since 2016 and the proportion of Indigenous employees, IOC employees, and female employees trained increased over the years, while there is no discernable trend for Northern employees due to high variability over the years.

Figure 11: Percentage of People Trained by Employee Group from 2016-2017 to 2020-2021

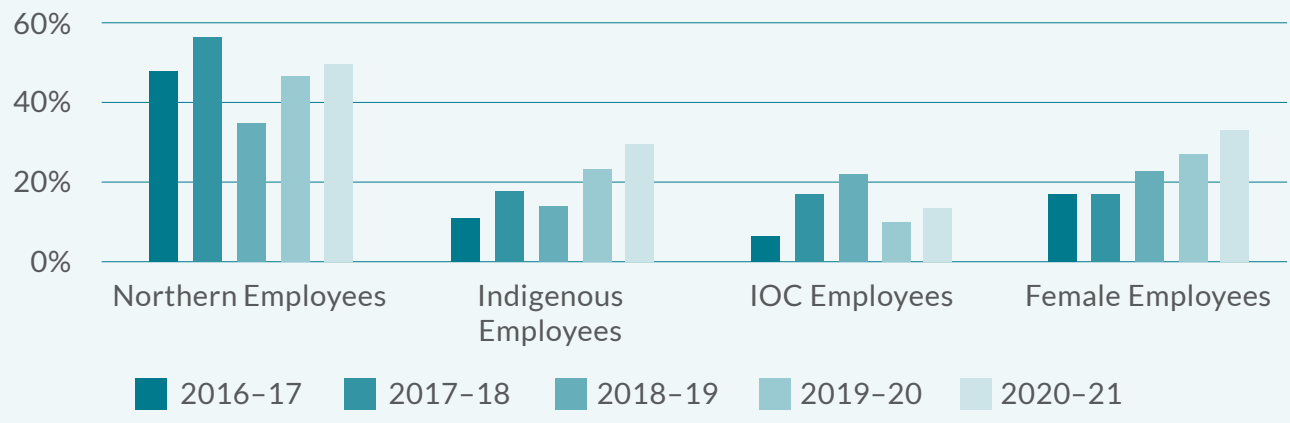
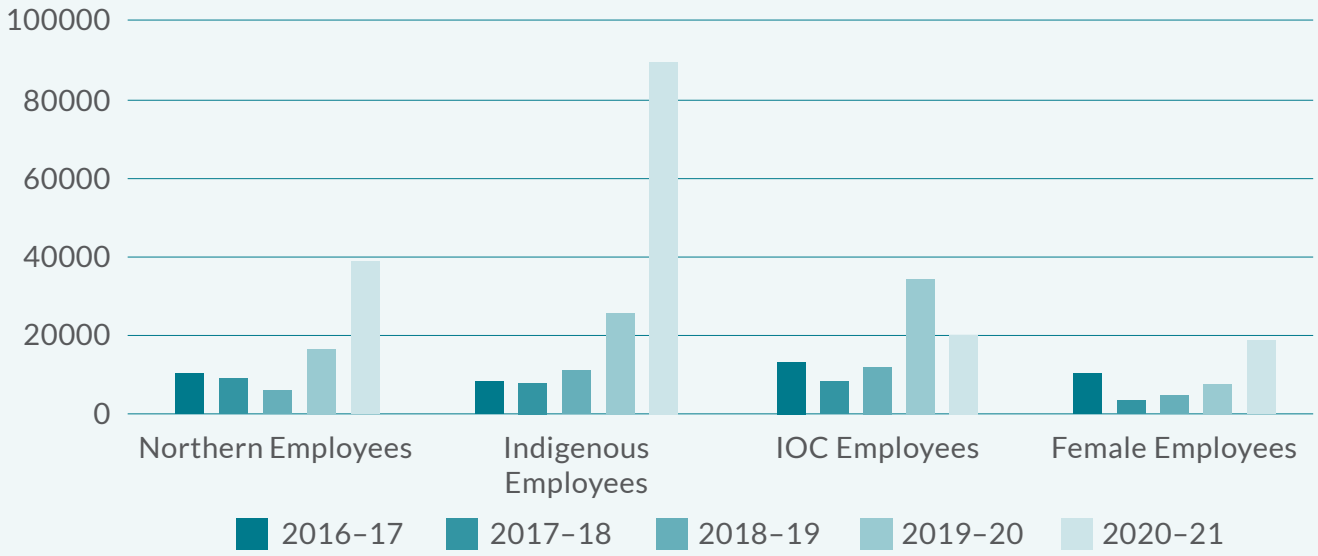


Figure 12 highlights the number of person-hours of training by employee group from 2016-17 to 2020-21. The number of person-hours of training is normalized by person-hours worked to enable comparison across years, since the total number of training hours may significantly differ over the years. In the past, mandatory training (e.g., first aid, WHIMIS) were excluded from overall calculations of training statistics. To streamline the process, as of 2019-20, all training is now included in calculations of training statistics. As a result, the number of person-hours of training for Northern, Indigenous, and IOC employees increased significantly since 2016 while the numbers for the female employees increased since 2017. In addition, a significance increase was perceived in Indigenous employees training due to the inclusion of Dechita Nàowo in the statistics for 2020-2021.

Figure 12: Number of Person Hours of Training per 200,000 Person-hours Worked by Employee Group from 2015-16 to 2020-21



Additional Training Key Performance Indicators

Additional training Key Performance Indicators include:

- Workforce training accounted for by (Table 21):
  - Northern Indigenous women (# of persons, p-hrs, %)
  - Northern Indigenous men (# of persons, p-hrs, %)
  - Northern non-Indigenous women (# of persons, p-hrs, %)
  - Northern non-Indigenous men (# of persons, p-hrs, %)
- Professional development scholarships funded (# of scholarships, $ amount of each, and # filled by priority groups): to be reported on during the Implementation Phase.
- Northern Indigenous and Northern Non-Indigenous apprentices supported (#, % out of total apprentices): to be reported on during the Implementation Phase.

Table 21: Total Number of People trained and Total Person Hours of Training, by Northern sub-category (Parsons and CIRNAC), in 2020-21

Employee type	Total # persons (incl. contractors)	Total person-hours	Persons as % of all employees	Person-hours as % of all person-hours
Northern Indigenous women	18	5,511	8%	27%
Northern non-Indigenous women	10	100	4%	0.5%
Northern Indigenous men	49	12,887	21%	64%
Northern non-Indigenous men	36	1,080	16%	5%

Dechita Nàowo

Through a Contribution Agreement, the GMRP funded the YKDFN Dechita Nàowo Training Program in 2020-21. The 2020-21 training programs and number of participants are summarized below:

- BEAHR Module 1 – Core Environmental Monitoring (10 participants; 2,800 hours for all participants)
- BEAHR Module 2 – Environmental Monitoring Regulatory (8 participants; 1,120 hours total for all participants)
- BEAHR Module 3 – Environmental Monitoring Research (5 participants, 350 hours total for all participants)
- BEAHR Module 4 – Contaminated Sites Remediation (8 participants; 2,520 hours total for all participants)
- BEAHR Module 5 – Environmental Site Assessment Assistant (8 participants; 1,120 hours total for all participants)
- HAZWOPER Training (10 participants; 400 hours total for all participants)
- Heavy Equipment Operator Hands-on Training (11 participants; 5,197.50 hours total for all participants)
- Other – includes the following: Training Orientation, Safety Meeting, Supervisor Training (2 participants; 302.50 hours for both combined), and Kitchen Helper (10 participants; 1,294.50 hours total for all participants)

Next Steps: Training

The implementation Plan has identified a set of training actions to advance, which include:

- Support establishment of the new Training Hub (North Slave Region Training Hub) by providing information on Project work packages, labour estimates and schedule.

- Contribute towards strengthening local remediation capacity (e.g., continue supporting the development of 5-year training plans; better understand opportunities for higher-capacity positions and the training required).

7.2.4 Social & Cross-cutting Actions and Deliverables

The Socio-Economic Strategy describes several common potential social impacts of large projects in Northern communities, noting that:

"Identifying the potential for negative impacts during the project planning stage and working to minimize and mitigate these, including through enabling and supporting programs that help alleviate unavoidable impacts, will be an important component of the Strategy."

In 2020-21, the Project identified potential social impacts using desktop research as well as through a focus group. The table below provides a summary of the actions and deliverables related to social / cross-cutting that were advanced or completed.

Action	Deliverable
Hold Focus Groups to further inform the Socio-Economic Implementation Plan	As described in the Engagement section, the Project hosted several focus group sessions in 2020-21 to inform the SE Implementation Plan. The Project also hosted a Social Impact Workshop (detailed below).
Identification of Social Impacts	In October 2020, the Project hosted a virtual workshop with several organizations with mandates for health and wellness. There were 17 participants in addition to Project Team members[16]; participating organizations included GNWT Health and Social Services, Native Women's Association of Canada, YKDFN Community Wellness, and the Institute for Circumpolar Health Research, along with several members of the SEWG. The focus of the workshop was to: • Provide current information about the Project, the Socio-economic Strategy and the Socio-economic Implementation Plan, and • Discuss potential social impacts and possible monitoring and mitigation measures. As a follow-up to the Social Impact Focus group, the Project developed a Social Impact Management document that summarized the potential social impacts as well as the potential associated mitigation measures.

Next Steps: Training

The implementation Plan has identified a set of training actions to advance, which include:

- Continue to build relationships and share labour demand with relevant social service providers.
- Determine what is already being done on site and what can be done to reduce social impacts (e.g., ensuring drug and alcohol awareness and screening programs are in place; delivering financial literacy workshops

[16]Public Services and Procurement Canada (PSPC); Government of Northwest Territories, Environment and Natural Resources; and Crown Indigenous and Northern Affairs Canada (CIRNAC)

8.0 IN CLOSING

In 2020-21, the GMRP reached a major milestone and was issued the Water Licence and Land Use Permit While the ongoing safety requirements and restrictions related to Covid-19 presented some challenges to how the Project conducted work throughout the year, there was still significant progress made while adhering to the site's COVID-19 Virus Response Plan and procedures. The GMRP continued site operations (C&M), immediate risk mitigation activities, community engagement, and health studies while progressing work on the review and resubmission of management and monitoring plans and other requirements under the Water Licence in order to prepare for initial remediation work to begin in 2021-22.

In 2021-22, the Project expects to start or continue the following activities:

- construction of the non-hazardous waste landfill;
- continuation of underground stabilization;
- construction of the first of the 4 freeze pads, including rock blasting;
- ongoing O&M of the effluent treatment plant;
- waste management, including temporary hazardous waste storage;
- sewage and greywater management; and
- temporary road upgrades to facilitate hauling townsite debris to the landfill.

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

For more information or to provide comments on the report, please contact:

Natalie Plato, GMRP Deputy Director
natalie.plato@canada.ca
867-669-2838

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APPENDICES

Appendix A: Environmental Agreement – Report Alignment

Appendix B: List of 2019-20 Studies / Reports

Appendix C: Project Risks

Appendix D: Progress on Environmental Assessment Measures and Suggestions

Appendix E: Additional Information on Monitoring Parameters

Appendix F: Greenhouse Gas Emissions

APPENDIX A – ENVIRONMENTAL AGREEMENT – REPORT ALIGNMENT

A significant driver for the development of the GMRP Annual Report is the Environmental Agreement, the signing of which is a mandatory requirement per Measure 7 of The Report of Environmental Assessment and Reasons for Decision (Mackenzie Valley Review Board, 2013). This agreement establishes an independent oversight body (i.e., GMOB) for the GMRP, and was signed in June 2015 by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC; formerly Aboriginal Affairs and Northern Development Canada [AANDC]), the Government of the Northwest Territories (GNWT), the City of Yellowknife, the Yellowknives Dene First Nation (YKDFN), Alternatives North, and the North Slave Métis Alliance (NSMA).

Article 5 of the Environmental Agreement stipulates that "the Co-Proponents shall prepare, provide to GMOB and make available to the public an annual report on the Project each year," to be submitted to GMOB "no later than October 1 in each year," starting October 1, 2016 (the report addressing the 2015-16 fiscal year).

The Environmental Agreement specifies what content must be included in each annual report. The following table outlines each requirement and where the content can be found in this 2019-20 report.

Section of Report	Environmental Agreement Requirement
Operational Summary	A summary of the Project's key operational activities and associated expenditures
Advancing Design Environment Health and Safety Community	A summary of any other significant developments relating to the Project
Environment Health and Safety	A summary of the results or findings of all monitoring done for the Environmental Programs and Plans and a description of actions taken or planned to implement Adaptive Management
Environment: Air Environment: Water	An assessment of the effectiveness of actions already taken to address the results or findings of all monitoring completed for the Environmental Programs and Plans
Advancing Design Operational Summary Environment: Water; Land Appendix B: Studies	A summary of any environmental or engineering studies conducted by the Co-Proponents in relation to the Project
Not applicable for this reporting year	A summary of any changes to, or plans for changes to, the Environmental Program and Plans
Operational Summary	A summary of the environmental audits of the Project, and the Co-proponents' response to the audit
Operational Summary Environment	A summary of any reportable spills, accidents or significant malfunctions, and a summary of the Co-Proponents' responses
Operational Summary	A listing of regulatory inspections, reports or directions, and a summary of the Co-Proponents' response to any issues arising therefrom
Environment Health and Safety Community	An analysis of trends in environmental effects data over time
Community: Engagement	A summary of significant public engagement activities, or matters raised as public concerns, and the Co-Proponents' responses
Progress Update and Plans Operational Summary In Closing	A summary of the Project's planned key operational activities for the coming year and associated planned expenditures, subject to the need to protect commercially sensitive financial information
Progress on Environmental Assessment Commitments Appendix D	A summary of the progress of the Project, including with respect to the Mackenzie Valley Resource Management Act (MVRMA) Measures, MacKenzie Valley Environmental Impact Review Board (MVEIRB) Suggestions, and Co-Proponents' Commitments
References	References to all sources relied on by the Co-Proponents in coming to conclusions in the annual report
Plain Language Summary	A plain language summary of the annual report

APPENDIX B – LIST OF 2020–21 STUDIES

Table 22 lists environmental or engineering studies conducted in 2019-20 by the GMRP. It includes studies that were completed, as well as several that are still underway. Many of these studies are intended to provide information needed to inform closure design, while others are monitoring programs to ensure the safety of the surrounding communities during current site operations. Additional details on these studies can be found throughout the report.

Table 22: Studies Undertaken in 2020-21

Theme	Study / Report
Design	• Dam 1 Gap Analysis Technical Memo • Baker Creek Buttress Investigation C1 Pit Tension Cracks Geotechnical Investigation Report • Review of Fish Swim Performance at Proposed Water Treatment Plan Outfall • Geotechnical Monitoring Annual Report – 2020 • Dam Breach Analysis and Inundation Study • AR1 CH14 and 15 Highway Stability Assessment • Trapper Creek Culvert Assessment • Dam Slope Stability Assessment Report • Foreshore Tailings Area and Nearshore Sediments Area Options Evaluation Report • B2 Dam Slope Stability Assessment Report • Contaminated Soil Program Northwest Territories Power Corporation Substation Investigation
Air	• Ambient Air Quality Monitoring Program Annual Report – 2020
Water	• Aquatic Effects Monitoring Program (AEMP) 2020 Annual Report • Annual Water Licence Report 2020 • Final Interpretative Report Phase 6 Environmental Effects Monitoring Program • Runoff Program Evaluation • Non-Lethal Fish Tissue Sampling Study • Water Balance Model: 2020 Updates • Annual Water Monitoring Report 2020
Health & Safety	• 2019 Dam Safety Review Report. • 2019 Dam Safety Review Results and Implementation Plan. • Health Effects Monitoring Program (Health Study - ongoing)

APPENDIX C – PROJECT RISKS AND MITIGATION

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

The GMRP has a risk management procedure and process[17] which it uses to reduce risks to acceptable levels (e.g., legacy risks; see text box) and to manage risks which may increase with increased project activity (e.g., project activity risks; see text box).

Examples of GMRP Risks

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

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

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

Risk Profile Summary – 2020-21

This section provides a summary of the GMRP 2020-21 risk profile. The information is from the GMRP Risk Register (a large excel file) and summarizes the number of risks by status (i.e., active, closed), number of risks by category (e.g. dams), the distribution of risks across levels (e.g. low, moderate), the distribution of risks across types (active vs legacy), the active risk drivers, and the historical profile since 2010.

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

(Giant Mine Remediation Project, 2021b)

NUMBER OF RISKS BY STATUS	
Total Active Risks	108
Total Closed Risks	161
Total Issues	3

Figure 13: GMRP Risk Profile Summary

NUMBER OF ACTIVE RISKS BY CATEGORY

25	BUILDINGS & STRUCTURES
17	UNDERGROUND
14	DAMS
13	INFRASTRUCTURE
4	WATER TREATMENT
3	OPEN PITS
6	HUMAN RESOURCES
2	GENERAL H&S
0	CONTAMINATED SOIL
1	OTHER – TECHNICAL
3	GOVERNANCE
1	FUNDING
3	TAILINGS & SEDIMENTS
4	DIVERSIONS
2	ENGAGEMENT
3	PROCUREMENT
2	PLANNING & CONTROLS
3	REGULATORY
2	FUEL TANKS
0	WASTE ROCK
0	WASTE, BARRELS...
0	FRAUD
0	OTHER – MANAGEMENT

Figure 14: Active Risks by Level

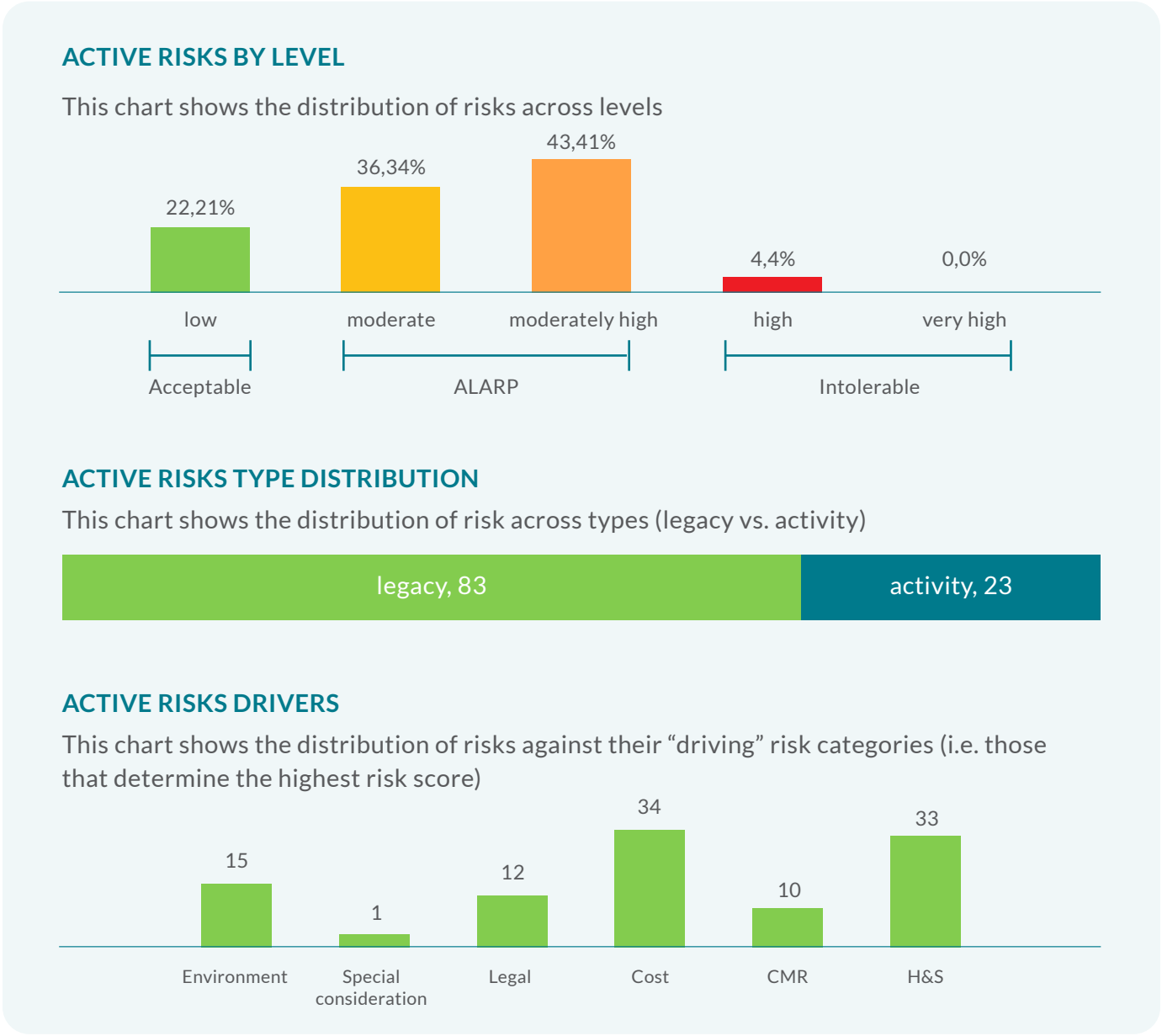
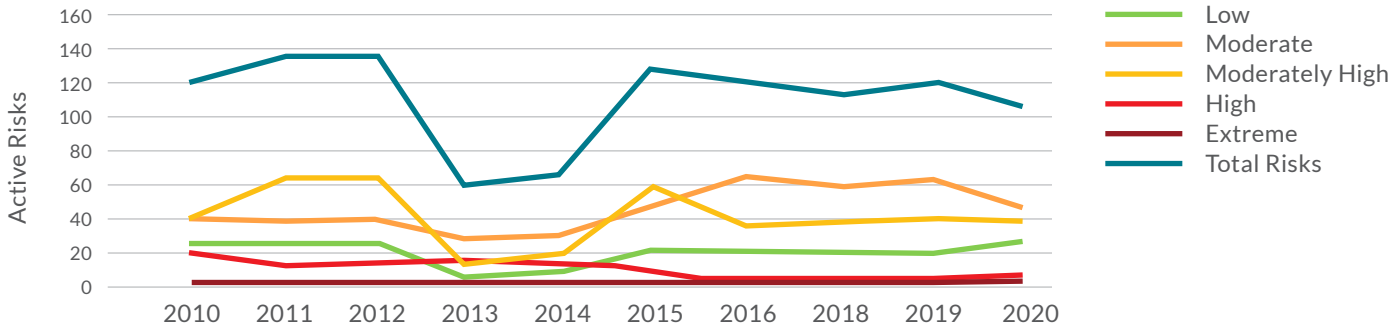


Figure 15: Historical Risk Profile

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



The dip in risks reflects a change in how risks were captured in the risk categorization process

APPENDIX D – PROGRESS ON ENVIRONMENTAL ASSESSMENT MEASURES AND SUGGESTIONS – DETAILED TABLES

This appendix provides supplemental details about progress toward achieving the Measures stipulated via The Report of Environmental Assessment and Reasons for Decision (Mackenzie Valley Review Board, 2013), and plans for 2020-21. Throughout these tables, "the Project" refers to the GMRP. The language in the Measure column is drawn directly from The Report of Environmental Assessment and Reasons for Decision (Mackenzie Valley Review Board, 2013).

Table 23: Giant Mine EA Measures Tracking Table (as of March 2021)

#	Measure	Status	GMRP Comments on Status
1	To prevent the significant adverse impacts on environment and the significant public concern from the proposed perpetual timeframe, the Project will proceed only as an interim solution, for a maximum of 100 years.	No Action Required	The closure period is 100 years as outlined in the CRP.
2	Every 20 years after the beginning of Project implementation, the Developer will commission an independent review of the Project to evaluate its effectiveness to date, and to decide if a better approach can be identified. This will: 1. consider results of the ongoing research 2. be participatory in nature 3. follow the requirements of procedural fairness and be transparent in nature. If the periodic review identifies a better approach that is feasible and cost-effective, the Developer will further study it, and make the study and its results of the study public.	Future action required	Article 8 of the June 9, 2015 Environmental Agreement further formalized the process through which the future Independent Project Review will be conducted. The Agreement ensures the independent review of the Project is conducted in a manner that considers ongoing research results, is participatory and transparent in nature and follows the requirements of procedural fairness.
3	To facilitate active research in emerging technologies towards finding a permanent solution for dealing with arsenic at the Giant mine site, the Developer will fund research activity as advised by stakeholders and potentially affected Parties through the GMOB. The ongoing funding for this research activity, and additional resources required to manage its coordination, will be negotiated and included as part of the Environmental Agreement specified in Measure 7 and will make best use of existing research institutions and programs. The GMOB will ensure through the research activity that, on a periodic basis: 1. reports on relevant emerging technologies are produced; 2. research priorities are identified; 3. research funding is administered; 4. results of research are made public, and 5. results of each cycle are applied to the next cycle of these steps.	Complete	Articles 7 & 11 of the June 9, 2015 Environmental Agreement provide a commitment of funding for the Oversight Body (which will be known publicly as the Giant Mine Oversight Board, or GMOB) to manage a research program as required by Measure 3. Initial funding flowed for this Measure in 2016-17 and will be ongoing.

#	Measure	Status	GMRP Comments on Status
4	The GMOB will provide the results of the research funded by the Developer to the periodic reviews of the Project described in Measure 2. If better technological options are identified through the funded research in-between these periodic 20-year reviews, these will be reported publicly by the GMOB to the Parties, the Developer and the Canadian public. The Developer will consider these technologies and make decisions regarding their feasibility. The Developer will make any such decisions public.	Complete	The Giant Mine Oversight Board (GMOB) hosted a research workshop in March 2018 and negotiated an MOU with the University of Waterloo for TERRE-NET researchers to establish a formal research relationship with respect to alternate technological options for the permanent remediation solution for the arsenic trioxide dust stored at the Giant Mine site. Currently, the research focus is on stabilization of the dust; the safe extraction of the dust will be a future focus.
5	In order to mitigate significant adverse impacts that are otherwise likely, the Developer will commission an independent Quantitative Risk Assessment to be completed before the Project receives regulatory approvals. This will include: 1. explicit acceptability thresholds, determined in consultation with potentially affected communities 2. an examination of risks from a holistic perspective, integrating the combined environmental, social, health and financial consequences. 3. possible events of a worst-case/ low frequency high consequence nature 4. additional considerations specified in Appendix D of the Report of Environmental Assessment From this, the Developer will identify any appropriate Project improvements and identify management responses to avoid or reduce the severity of predicted unacceptable risks.	Complete	An independent consultant (Wood) was retained in 2018 to complete the Quantitative Risk Assessment. A separate consultant was retained to develop the engagement component (Stratos). The report and findings will be presented during engagement sessions in Spring / Summer 2020. The completed report was submitted to the MVLWB in June 2020. Results will continue to be carried forward in Project documentation as applicable, such as Design Plans.
6	The Developer will: • investigate long-term funding options for the ongoing maintenance of this Project and for contingencies, including a trust fund with multi-year up front funding, • involve stakeholders and the public in discussions on funding options; and, • make public a detailed report within three years that describes its consideration of funding options, providing stakeholders with the opportunity to comment on the report.	Complete	The Measure 6 report on long term funding options for Giant Mine was finalized in July 2019 (Deloitte LLP, 2019a).

#	Measure	Status	GMRP Comments on Status
7	The Developer will negotiate a legally-binding environmental agreement with, at a minimum, the members of the Oversight Working Group, and other appropriate representative organizations, to create an independent Oversight Body (GMOB) for the GMRP. These negotiations will build on the existing discussion paper and draft environmental agreement of the Giant Oversight Working group. This GMOB will exist for the life of the Project unless otherwise agreed by the Parties to the Environmental Agreement. Every effort will be made to have the GMOB in place as early as possible. The negotiations will make significant progress within six months of the Ministers' Environmental Assessment decision or proceed to mediation. The Developer will cover any mediation costs. The environmental agreement will include a dispute resolution mechanism to ensure compliance with the agreement and a stable funding mechanism for the GMOB.	Complete	Through negotiations with the six affected parties (GNWT, CIRNAC, Alternatives North, the NSMA, the YKDFN, the City of Yellowknife) an Environmental Agreement was signed in June 2015. This Agreement established the mandate for GMOB. Details of the Board's mandate are included in the Giant Mine Environmental Agreement and Society's by-laws found on the GMOB's website.
8	The activities of the oversight body will include: • keeping track of monitoring activities by the Developer and the results of those activities, including water quality and aquatic effects monitoring, health monitoring and other monitoring; • considering the adequacy of funding for the Project and ongoing research; • providing advice to the Developer, regulators and government on ongoing improvements in monitoring and Project management to prevent risks and mitigate any potential impacts; • sharing the oversight body's conclusions with the general public and potentially affected communities in a culturally appropriate manner	Complete	The Environmental Agreement provides for the creation of the Oversight Board and funding to fulfill these obligations going forward. Article 3 of the Environmental Agreement outlines the mandate of the GMOB. The GMRP continues engaging with GMOB staff and directors through various engagement initiatives and venues, further described in the Engagement Plan.
9	The Developer will work with other federal and territorial departments as necessary to design and implement a broad health effects monitoring program in Ndilǫ, Dettah and Yellowknife focusing on arsenic and any other contaminants in people which might result from this Project. This will include studies of baseline health effects of these contaminants and ongoing periodic monitoring. This will be designed with input from: • Health Canada, GNWT Health and Social Services and the Yellowknife medical community; and • The Yellowknives Dene and other potentially affected communities. The organization conducting the monitoring will provide regular plain language explanations of the monitoring results in terms that are understandable to lay people, and communicate this to potentially affected communities in a culturally appropriate manner.	Underway	The Health Effects Monitoring Program was established in 2017. The Program is carried out by University of Ottawa's Dr. Laurie Chan and his team. It is a long-term monitoring program to establish levels of arsenic and other contaminants of concern in residents of Ndil?, Dettah and Yellowknife. The results of baseline data collection phase (two waves in 2018 and 2019) indicated: that overall arsenic levels in urine are similar between the overall Yellowknife population and the Canadian Health Measures Survey (CHMS) levels, which represent the general Canadian population. Additional public sessions were intended for May 2020 to communicate more details of the results with respect to additional sample analysis but were postponed due to COVID-19 restrictions. Public sessions will be held once public health restrictions have been lifted.

#	Measure	Status	GMRP Comments on Status
10	The Developer will commission a comprehensive quantitative human health risk assessment by an independent, qualified human health risk assessor selected in collaboration with Health Canada, the Yellowknives Dene, the City of Yellowknife, and the Developer. This human health risk assessment will be completed before the Project receives regulatory approvals. It will: 1. Include a critical review of the 2006 Tier II human health risk assessment and the previous screening reports; 2. Consider additional exposures and thresholds (as specified in Appendix F of the Report of Environmental Assessment); 3. Decide whether a Tier III risk assessment is appropriate; 4. Provide a plain language explanation of the results in terms that are understandable to the general public, and communicate this to potentially affected communities in a culturally appropriate manner; 5. Provide interpretation of results and related guidance; and 6. Inform the broad health effects monitoring program (described in Measure 9 above). The Developer may conduct the human health risk assessment concurrently with the Quantitative Risk Assessment described in Measure 5. Based on the results of this human health risk assessment, and on any existing results of the health effects monitoring program (described in Measure 9 above), the Developer will, if necessary in response to this information, identify, design and implement appropriate design improvements and identify appropriate management responses to avoid or reduce the severity of any predicted unacceptable health risks. Also, footnote #133 in the Report of Environmental Assessment (Appendix D) is revised to read, in its entirety, "Including inference of causality and pathologies deducted from any available health studies."	Underway	The Human Health Ecological Risk Assessment (HHERA) was completed by Canada North Environmental Services. The HHERA was carried out with significant input from stakeholders, community members and traditional knowledge holders. This input included both the scope of the assessment and the implementation to better assess risks considering differences in traditional land use, food consumption, and lifestyles for residents living in Yellowknife, Ndilo and Dettah. The final report was released in January 2018. Additional considerations for communications are underway to ensure residents understand the outcomes which have informed public health advisories through the GNWT Department of Health and Social Services. The GMRP is currently developing the Hoèla Weteèst'eèdeè study (formerly called the Stress Study) via an independent research team through the University of Wilfred Laurier. Wilfred Laurier are the principal investigators of the study which has been co-designed with the YKDFN. The requirement of this study was identified in Appendix F to the Report of Environmental Assessment noting the requirement to "evaluate indirect effects of potential exposures to arsenic on wellness, including stress effects. Ongoing discussions are occurring with affected parties. Implementation has been delayed due to COVID-19 restrictions but it is anticipated implementation will occur in 2021-22.

#	Measure	Status	GMRP Comments on Status
11	The Developer, with meaningful participation from the Oversight Body and other parties, will thoroughly assess options for, and the environmental impacts of, diversion of Baker Creek to a north diversion route previously considered by the Developer or another route that avoids the mine site and is determined appropriate by the Developer. Within one year of the project receiving its water license, a report outlining a comparison of options including the current on-site realignment will be provided to the appropriate regulatory authorities, the Oversight Body and the public. Once informed by the advice of the Oversight Body and regulatory authorities, the Developer will determine and implement the preferred option. In doing so, the Developer will consider the advice of the Oversight Body, regulatory authorities, and the public, and will ensure that the primary considerations in selecting an option are to: a) minimize the likelihood of Baker Creek flooding and entering the arsenic chambers, stopes and underground workings, and b) minimize the exposure of fish in Baker Creek to arsenic from existing contaminated sediments on the mine site, surface drainage from the mine site or tailings runoff. If off-site diversion is selected, the Developer will seek required regulatory approvals to implement the diversion within five years of receiving its water license.	Complete	A comprehensive evaluation of diversion alternatives was undertaken and documented in the Baker Creek Diversion Alternatives Evaluation Report. The assessment included an evaluation of alignment options based on environment, society and feasibility. The Draft Report was engaged on with GMOB, the GMRP Working Group, and the YKDFN Giant Mine Advisory Committee. Engagement details are documented in the engagement log. Overall support for the recommendations provided for alignment option. The Final report was provided as Appendix 5.5A to the Closure and Reclamation Plan in the Water Licence Package. Actions taken as part of the Baker Creek design to address a) include: • providing Baker Creek with geomorphic channel including floodplain conveyance; • designing closure channel and floodplain conveyance for floods up to and including the Probable Maximum Flood (PMF), sealing underground mine openings to surface to mitigate potential for inundation and uncontrolled flow to the underground mine during extreme events and placing pit fills in a manner to provide additional flood protection. Actions taken as part of the Baker Creek design to further address b) include: removing tailings, where present from Baker Creek and removing fine sediments, where present, from Baker Creek.

#	Measure	Status	GMRP Comments on Status
12	To prevent significant adverse impacts on Great Slave Lake from contaminated surface waters in the existing or former channel of Baker Creek, should it be re-routed to avoid the mine site, the Developer will ensure that water quality at the outlet of Baker Creek channel will meet SSWQO based on the CCME *Guidance on the Site-Specific Application of Water Quality Guidelines in Canada.*	Complete	Water quality objectives specific to and protective of Yellowknife Bay were developed based on CCME Guidance and are presented in the Effluent Quality Criteria (EQC) report. Extensive modelling including a site model in GoldSim, a near field model of the mixing zone (CORMIX) and a 3D Model of Yellowknife Bay (GEMSS) were developed to support the development of EQC and demonstrate the Project's ability to meet Water Quality Objectives. Modelling documentation is included in the EQC report along with prediction of future water quality in Yellowknife Bay. The Water Quality Objectives will be met upon completion of the GMRP active remediation phase and will be met in the vicinity of the outlet of Baker Creek (see Measure 13), at the edge of a 200 m mixing zone (see Measure 15) that includes the Project's new WTP outfall and the influence of Baker Creek. Site Specific Water Quality Objectives (WQO) were presented as part of pre-engagement and submitted in the EQC Report to the MVLWB for approval in April 2019. These were discussed at the first technical session in July 2019, hosted by the MVLWB, in support of the Water Licence application process and approved by the MVLWB in July 2020. Final EQC were determined by the MVLWB and included in the GMRP Water Licence MV2007L8-0031 issued September 18, 2020.
13	The Developer will design and, with the applicable regulators, manage the Project to ensure that, with respect to arsenic and any other contaminants of potential concern, the following water quality objectives are achieved in the vicinity of the outlet of the existing or former channel of Baker Creek, should it be re-routed to avoid the mine, excluding Reach 0: a) Water quality changes due to discharge from the former channel of Baker Creek will not reduce benthic invertebrate and plankton abundance or diversity; b) Water quality changes due to discharge from the former channel of Baker Creek will not harm fish health, abundance or diversity; c) Water quality changes due to discharge from the former channel of Baker Creek will not adversely affect areas used as drinking water sources, d) Water quality changes due to discharge from the former channel of Baker Creek will not adversely affect any traditional or recreational users; and, e) There is no increase in arsenic levels in Great Slave Lake due to discharge from the former channel of Baker Creek beyond the parameters described in Measure 12.	Complete	Measure 13 a) through d) are satisfied by selecting Water Quality Objectives for Yellowknife Bay that are protective of aquatic life and drinking water. Arsenic concentrations in Great Slave Lake, beyond the edge of the mixing zone (200 m from breakwater), will not increase from present-day concentrations as demonstrated in the EQC report and supporting documentation (see Measure 12).

#	Measure	Status	GMRP Comments on Status
14	The Developer will add an ion exchange process to its proposed water treatment process to produce WTP effluent that at least meets Health Canada drinking water standards (containing no more than 10µg/L of arsenic), to be released using a near shore outfall immediately offshore of the Giant mine site instead of through the proposed diffuser. The Developer will achieve this concentration without adding lake water to dilute effluent in the treatment plant.	Complete	The new WTP will include ion-exchange technology as part of the treatment process and will discharge effluent meeting the criteria of 10 ug/L of Arsenic. The outfall location was identified through stakeholder engagement and options analysis and will be located nearshore of the Giant site in the vicinity of Baker Creek. No diffuser is proposed. Final EQC were determined by the MVLWB and included in the GMRP Water Licence MV2007L8-0031 issued September 18, 2020.
15	The Developer and regulators will design and manage the Project so that, with respect to arsenic and any other contaminants of potential concern: 1. Water quality at the outfall will meet the Health Canada Guidelines for Canadian Drinking Water Quality; and, 2. The following water quality objectives in the receiving environment are met: a) Water quality changes due to effluent discharge will not reduce benthic invertebrate and plankton abundance or diversity at 200 metres from the outfall; b) Water quality changes due to effluent discharge will not harm fish health, abundance or diversity; c) Water quality changes due to effluent discharge will not adversely affect areas used as drinking water sources; and, d) There is no increase in arsenic levels in Yellowknife Bay water at 200 metres from the outfall: and, e) There is no increase in arsenic levels in Yellowknife Bay sediments at 500 metres from the outfall	Complete	All parameters of potential concern (POPC) will meet relevant Canadian Drinking Water Guidelines (DWG) at the edge of the mixing zone. Water Quality Objectives specific to Yellowknife Bay have been developed to be protective of aquatic life and drinking water and all Water Quality Objectives will be met at the edge of the mixing zone. Arsenic concentrations in Great Slave Lake, beyond the edge of the mixing zone will not increase from present-day concentrations due to effluent discharge. See Measure 12 for more details on Water Quality Objectives and supporting evidence. Final EQC were determined by the MVLWB and included in the GMRP Water Licence MV2007L8-0031 issued September 18, 2020.
16	Before construction, the Developer will model re-suspension of arsenic from sediments and resulting bioavailability in the vicinity of the outfall. If the modeling results indicate that the outfall may re-suspend arsenic from sediments, the Developer will modify the outfall design until operation does not cause resuspension of arsenic from sediment.	Underway	The GMRP is taking a more protective approach and mitigating the potential of sediment resuspension through design of a sediment cover, rather than modelling. The design criteria for the outfall will include the requirement to avoid resuspension of arsenic from sediments.

#	Measure	Status	GMRP Comments on Status
17	Before operating the outfall, the Developer will design and implement a comprehensive aquatic effects monitoring program that is sufficient to determine if the water quality objectives listed in Measure 15 are being met. This program will: 1. at a minimum, be able to identify any accumulation of arsenic over time in the water, sediment or fish in the receiving environment; 2. include appropriate monitoring locations near N'dilo, in Back Bay and in Yellowknife Bay, with a focus on areas in the vicinity of the outfall and areas used by people; 3. include the establishment of a baseline for aquatic effects in Back Bay before beginning Project construction and installation of the outfall; 4. be developed according to AANDC Guidelines for Designing and Implementing Aquatic Effects Monitoring Programs for Development Projects in the Northwest Territories, June 2009, with corresponding action levels and management response framework.	Underway	The AEMP Design Plan focussing on the period up to 2026 (current discharge location) was submitted to the MVLWB in April 2019 and interim approved by the MVLWB in August 2020. Details including Water Licence conditions were discussed in Technical Session 1 in July 2019, Technical Session 2 in September 2019 and the Public Hearings in January 2020. The Plan was resubmitted in December 2020 for conformity check and approval. A baseline field monitoring program began in 2018-19 to develop baselines for aquatic effects in Back Bay and further afield, and is ongoing. The AEMP Design Plan will be updated prior to the WTP, as required by the Water Licence.
18	Prior to preparing chambers and stopes for freezing, the Developer will conduct a comprehensive Quantitative Risk Assessment evaluating both wet and dry methods for the initial freezing design, with respect to current risks and implications for future removal. This will include an evaluation of potential effects of the proposed freezing and wetting method on the thawing or frozen excavations, and potential impacts of ongoing design changes prior to implementing the Project. The Developer will release a plain language report to the public describing its considerations and the resulting design.	Complete	The Freeze Design Basis Report was finalized in 2016 and included an evaluation of wet versus dry methods, resulting in the selection of the dry method. The plain language report was finalized and distributed to the Giant Mine Working Group, YKDFN Giant Mine Advisory Committee, and email distribution list (June 2019).
19	Considering the results of the risk assessment described in Measure 18, the Developer will not adopt any method of freezing that significantly reduces opportunities for future arsenic removal or other remediation by future technologies.	Complete	The Freeze Design Basis Report was finalized in 2016 and included an evaluation of wet vs dry. The Project is proceeding with the dry method, which combined with a passive freezing approach will allow for reversibility if needed. Closure Objective F2 and associated closure criteria address reversibility in the CRP.

#	Measure	Status	GMRP Comments on Status
20	The Developer will conduct all major demolition and construction activities with the potential to release large amounts of dust or contaminants into the air when wind directions will minimize the chances of dust and contaminants blowing into the City of Yellowknife, Dettah and N'dilo.	Underway	The Dust Management and Monitoring Plan defines wind levels for carrying out site activities as well as requirements for timing of activities including demolition to be carried out during times of forecasted low winds and in a direction to minimize potential impacts to local communities. As well, the site wide Air Quality Monitoring Plan is an existing and ongoing program that was designed to adapt to changing activities on site, and will incorporate all suitable measures and activities to mitigate the risks of exposure to contaminated dust throughout the life of the Project. The Air Quality Monitoring Plan is an appendix to the Dust Management and Monitoring Plan.
21	The Developer will collect dust and contaminant level data from soil and vegetation in the vicinity of major reclamation activities before and after major demolition or construction activities to serve as a baseline for any related adaptive management activities that may follow.	Future Action Required	Activity specific monitoring such as dust and contaminant level data from soil and vegetation in the vicinity of major reclamation activities will be identified in future versions of the Dust Management and Monitoring Plan closer to the time when major demolition activities are planned. The details of dust monitoring will take into consideration the timing of demolition relative to each building, the contaminants of potential concern, the size of the building and the amount of dust expected.
22	The Developer will conduct a study to determine appropriate depth of the tailings cap and B1 pit cover, in consultation with Environment Canada and responsible regulators, to verify that the depth proposed will ensure the tailings cap and B1 pit cover are not compromised by vegetation growth. The Developer will provide a report of this study to the MVLWB before it issues a water license for the Project.	Complete	During Surface Design Engagement some affected parties preferred the selection of a non-vegetated tailings cover. The selection of a rock cover as outlined in the CRP addresses the concern of the cover being compromised by vegetation growth. As a result of input received during engagement and the selection of a rock cover, this measure has been addressed.
23	The Developer will work cooperatively with responsible regulatory authorities and interested Parties in the development and submission of a Tailings Management and Monitoring Plan prior to receiving regulatory approvals. This plan will not only identify potential issues for the management of tailings but will also identify mitigation measures to prevent problems related to the tailings cap failure, and will include consideration of the B1 pit cover as applicable.	Underway	A Tailings Management and Monitoring Plan (Version 1.0) was developed as part of the Water Licence application and approved (for Phase 1). A revised version of the Tailings Management and Monitoring Plan is anticipated to be submitted by summer 2022.
24	The Developer will physically prevent all-terrain vehicle access to the tailings cap and B1 pit cover to prevent the surface from being eroded or otherwise compromised. The Developer will monitor the effectiveness of this prevention, and will take any additional management measures as necessary to prevent all-terrain vehicle access.	Underway	The selection of a coarse rock cover will prevent the surface from being eroded or comprised through ATV access. Closure objective T6 addresses this in the CRP.

#	Measure	Status	GMRP Comments on Status
25	The Developer will work cooperatively with responsible regulatory authorities and interested Parties in the development and submission of an Air Quality Management Plan which incorporates an ongoing air quality monitoring program. This ongoing monitoring program will include all previously identified on-site air quality monitoring stations and one off-site air quality monitoring station near Niven Lake. At a minimum, ambient concentrations of NO2 and PM2.5 will be monitored at the Niven lake site. Total suspended particulate and metal concentrations will be monitoring at the on-site locations. This AQMP will identify action levels and trigger additional management and mitigation activities, if required.	Underway	The AQMP comprises eight site perimeter stations and three community stations. PM2.5 is measured at the community stations, with the Niven community station also measuring NO2. The AQMP, in conjunction with the Dust Management and Monitoring Plan, identifies action levels which trigger additional management and mitigation measures as required.
26	In conjunction with Measure 10 above, the Developer will consider the results of the comprehensive human health risk assessment, and consult with the YKDFN and City of Yellowknife when determining suitable end uses of the site, to ensure that those proposed uses do not pose a health risk to people, including toddlers.	Underway	The Human Health Ecological Risk Assessment was completed in 2018 and results were presented to the YKDFN, the City of Yellowknife and other affected parties. The constraints to end land use are presented in the CRP. The Engagement Plan outlines the extensive number of engagement activities that have taken place on the Human Health Ecological Risk Assessment and the CRP. The Project team will continue to work with its municipal, territorial and federal counterparts to communicate site risks and end land use constraints.

Table 24: Giant Mine Environmental Assessment Suggestions Tracking Table (as of March 2021)

#	Suggestion	Status	GMRP Comments on Status
1	The Developer should consult with surrounding communities, including Dettah, Ndilǫ and the City of Yellowknife, prior to finalizing its Project design, so that design improvements may be incorporated to address any remaining concerns.	Underway	The extensive engagement completed since the EA is documented in the CRP, Engagement Plan and the Engagement Log. This includes the Surface Design Engagement process and regular ongoing engagement through the Giant Mine Working Group, the YKDFN GMAC and other engagement venues.
2	The Developer should create a monument as a memorial to the impacts of past contamination from Giant Mine on Indigenous communities and the environment.	Underway	The Project has committed to a monument as this was widely supported by affected parties during Surface Design Engagement, however the details of exactly what and where the monument would go were not discussed during Surface Design Engagement The Project will engage on this with affected parties prior to finalizing the details of the monument and communicate this decision to the public.

#	Suggestion	Status	GMRP Comments on Status
3	To encourage widespread learning from and remembering of the experiences of the Giant Mine, the Developer, in conjunction with the GNWT Department of Education, Culture and Employment, should: 1. develop an education resource unit on the impacts of Giant Mine on the land and on people, including impacts on Indigenous peoples, and 2. distribute this resource unit for use within the school curriculum across Canada.	Underway	GMRP is working with the YKDFN, NSMA, GMOB, and GNWT Education, Culture and Employment to develop a Giant Mine education resource for the Grade 10 Northern Studies curriculum.
4	The Federal Contaminated Sites Action Program should develop a policy framework and guidance for the perpetual care and management of remediated contaminated sites.	Underway	A Perpetual Care Plan is a requirement under the Environmental Agreement. A Perpetual Care Task Force (the Task Force) has been established to assist in the development of the PCP. The Task Force is made up of representatives from each signatory to the GMRP Environmental Agreement. Under the Agreement, a draft was to be available to GMOB by June 2020; however, GMRP requested a formal extension from GMOB until November 2020 to account for incorporating the results of the Quantitative Risk Assessment. A draft Perpetual Care Plan framework was submitted to the Giant Mine Working Group in August 2020 for feedback prior to the GMOB submission. The Project began engagement in 2019-20. *Please note: GMRP no longer falls under the Federal Contaminated Sites Action Program, but is under the Northern Abandoned Mine Reclamation (NAMR) program.*
5	To ensure long-term funding throughout the life of the Project, the Developer should create an independently managed self-sustaining trust fund with multi-year up-front funding for the ongoing maintenance of this Project and for contingencies. A third-party expert should independently manage this trust fund. Annual reports on the condition of the fund should be provided to stakeholders and the public.	Outside of the Project scope	This suggestion is linked to the outcome of Measure 6. A final report as required under Measure 6 was completed in 2019/20. A response to this suggestion is outside the be mandate of the GMRP, however the Project team will ensure the report is provided to the relevant department(s) in the Government of Canada and continue to work with our counterparts in the federal system to ensure funding is in place throughout the life of the Project.
6	To reduce public concern about the multiple roles of AANDC in this Project and to increase public confidence, AANDC should produce guidelines to clarify reporting structures to ensure that Project inspectors, advisors and managers employed by the federal government can perform their duties objectively and without undue pressure from within the federal government. These should be made available to the public within six months of Ministerial acceptance of this Report of Environmental Assessment.	Outside of the Project scope	A response to this suggestion is outside the mandate of the GMRP, however the existing Treasury Board Values and Ethics Code for the Public Sector is available to the public at http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=25049

#	Suggestion	Status	GMRP Comments on Status
7	Based on the results of the health risk assessment described in Measure 10, the appropriate government authorities should remediate garden and playground soils where arsenic concentrations exceed current guidelines for urban soils in Canada.	Outside of the Project scope	The remediation of garden and playground soils is out of scope of the GMRP. The Project continues to cooperate with relevant federal and territorial agencies to share information.
8	The Developer should consider the Trail Human and Environmental Health Committee as a model for the development of the health program.	Complete	The Health Effects Monitoring Program has incorporated lessons learned and similar concepts from that of the Trail BC Monitoring Program.
9	During its review of the diversion of Baker Creek, the Department of Fisheries and Oceans should consider the habitat loss of the existing Baker Creek and decide on any habitat design requirements for the diversion to the extent it deems appropriate. Any resulting habitat compensation requirements should be applied on the new diversion.	Underway	The GMRP is working with the Department of Fisheries with respect to habitat loss and compensation. Discussions began in 2018 and continued in 2019 and 2020. The GMRP, is committed to engaging with the Working Group, GMAC, and the affected parties to determine the appropriate habitat design requirements are incorporated into the final design of Baker Creek. Fisheries and Oceans Canada will determine the final habitat design requirements through the Fisheries Act Authorization process.
10	The Developer should investigate the potential advantages and disadvantages of adding an engineered wetland to the Project to reduce arsenic in surface drainage. This investigation should include possible locations in the channel that formerly contained Baker Creek and in the Baker Creek diversion. On completion, the Developer should make a public report of the results of this investigation and of any resulting changes to Project design. This should be completed before a water license is issued for the Project.	Underway	A Research and Reclamation Plan entitled Passive and Semi Passive Treatment systems is an Appendix to the CRP. This plan outlines research undertaken to date on engineered wetlands and the proposed further steps to investigate the feasibility and potential effectiveness of applying passive and semi-passive treatment systems on the Giant site.
11	To manage the risks of airborne exposure of contaminated dust from deconstruction of buildings or other structures on site, the Developer should: • prepare a dispersion model of dust plume given typical wind direction and speed • define the meteorological window of opportunity to describe acceptable wind conditions to eliminate the potential for a dust cloud release and transport of surrounding communities. • consult a meteorologist to develop a sound model of weather conditions, to indicate when winds are steady and not gusting, blowing to the north • stop if winds change or any dust controlling equipment fails	Underway	The AQMP is an existing and ongoing program that was designed to adapt to changing activities on site, and will incorporate all suitable measures and activities to mitigate the risks of exposure to contaminated dust throughout the life of the Project. The Dust Management and Monitoring Plan includes Action Levels which include a number of potential mitigations and contingencies, up to and including work stoppage.

#	Suggestion	Status	GMRP Comments on Status
12	To prevent impacts on people from potentially harmful contaminant releases from deconstruction of buildings or other structures on site at the Giant Mine site, the Land and Water Board should specify allowable wind directions and wind speeds in degrees, to ensure that contaminated structures are not demolished during blustery multi-directional winds at ground level.	Underway	The Air Quality Monitoring Plan (AQMP) is an existing and ongoing program that was designed to adapt to changing activities on site, and will incorporate all suitable measures and activities to mitigate the risks of exposure to contaminated dust throughout the life of the Project. The Dust Management and Monitoring Plan includes Action Levels which include a number of potential mitigations and contingencies, up to and including work stoppage.
13	The Developer should investigate options for filling in the pits, in consultation with the City of Yellowknife and YKDFN.	Complete	The option to fill pits was investigated and outlined in the Open Pits Options Assessment Report. Pit filling options were evaluated and engaged on during the Surface Design Engagement, where there was support from most affected parties to fill pits. As outlined in the CRP, the pits will be filled or partially filled.
14	The Developer should consider the baseline conditions for existing fish habitat in Back Bay (including a fish habitat assessment in the area of the foreshore tailings and the aquatic effects baseline required in Measure 17) and develop a foreshore tailings cover design and foreshore tailings monitoring and mitigation plan for review by the Department of Fisheries and Oceans pursuant to habitat provisions of the Fisheries Act.	Underway	Fish Habitat surveys of the foreshore tailing areas, the near shore contaminated sediments and the outfall area in Yellowknife Bay began in 2018 and continued in 2020/21. This work will inform and be presented in the Project's application for Department of Fisheries and Oceans Canada Authorization. Yellowknife Bay baseline condition surveys began in 2018 and will inform a future AEMP Design Plan focused on Yellowknife Bay.
15	The Developer should consult with the City of Yellowknife in the design of any landfill on the Giant Mine site.	Complete	Engagement sessions occurred with the City of Yellowknife through the Giant Mine Working Group and in the City-GMRP monthly meetings to present the proposed locations and other details of the on-site landfill, resulting in support of the proposed location in the CRP. The Non-Hazardous Waste Landfill Design Plan was submitted to the MVLWB in March 2021.
16	The Developer should consult with Indigenous groups with respect to reduced traditional use cumulatively resulting from the proposed Project in combination with contamination from Giant Mine. This should occur prior to finalizing Project design, so that design improvements may be used to address any remaining concerns.	Underway	The extensive engagement completed by the Project is documented in the CRP, Engagement Plan and Engagement Log. The GMRP has supported Traditional Knowledge studies and continues to incorporate community and Traditional Knowledge across programs and plans, as available.

APPENDIX E – ADDITIONAL INFORMATION ON MONITORING PARAMETERS

E.1 Air Quality Monitoring Program

The GMRP team is committed to maintaining air quality parameters below the protective thresholds set by the AQMP and listed below.

Table 25: AQMP Air Quality Criteria (SLR Consulting (Canada) Ltd, 2021)

Analyte	Source[18]	Averaging Period	Guideline / Standard Concentration (µg / m3 unless wotherwise specified)
Total suspended particulates	[3]	24 hr	120
	[3]	Annual	60
Particular matter less than 10µm (PM_{10})	[1]	24 hr	50
Particular matter less than 2.5µm ($PM_{2.5}$)	[2]	24 hr	28
Nitrogen dioxide	[3]	1 hr	213 (ppb)
	[3]	24 hr	106 (ppb)
Arsenic (As)	[1]	24 hr	0.3
Iron (Fe)	[1]	24 hr	4
Lead (Pb)	[1]	24 hr	0.5
Nickel (Ni)	[1]	24 hr	0.2
Antimony (Sb)	[1]	24 hr	25
Asbestos as fibre > 5µm in length	[1]	24 hr	0.04 fibres/cm^3
Fence line – Total suspended particulates Risk Based Action Level*	[4]	15-minute	333
Fence line – PM_{10} Risk Based Action Level*	[4]	15-minute	159

* Derived from toxicological references for the hypothetical on-site worker/trespasser, chronic criterion based on protection against both an incremental carcinogenic risk of 1 x 10^{-5} (Health Canada, 2004) using the Health Canada Inhalation Unit Risk Factor.

E.2 Water Quality Monitoring

The GMRP team undertakes effluent and water quality monitoring in and around the Giant Mine site via different programs in order to report on surface water, groundwater and underground minewater. These programs track parameters such as the volume of water pumped or discharged, water quality, and the performance of the ETP.

Parameters tested at all stations include standard general parameters (e.g., temperature, pH, conductivity, hardness), major ions, nutrients, and total and dissolved metals and metalloids. There are also specific station requirements for other tests such as cyanide, sulphide, hydrocarbons, and radium-226. Samples collected at SNP 43-1 must meet federal requirements under MDMER as well as the discharge criteria defined in the former Water Licence (N1L2-0043).

The figures below highlight the locations of surface water quality monitoring stations as well as groundwater monitoring wells and well status.

[18] SOURCES: [1] Ontario Ambient Air Quality Criteria (December 2016), [2] Canadian Council for Ministers of the Environment (2015) Canadian Ambient Air Quality Standards, [3] Guideline for Ambient Air Quality Standards in the Northwest Territories (February 2014), [4] Health Canada 2004.

Figure 16: Surface Water Quality Monitoring Stations

Figure 17: Groundwater Monitoring Wells and Well Status

APPENDIX F – GREENHOUSE GAS EMISSIONS

Table 26 below provides the summary of monthly consumption on site (Parsons Inc., 2021).

Table 26: Summary of Monthly Consumption as of March 2021

		January	February	March	Annual
Indirect Emissions					
Purchased Electricity	**Unit of Measure**	**Monthly Usage (kWh)**			
Purchased Electricity	kWh	545000	517500	549000	161500
Direct Emissions					
Fuel Combustion (for heating or otherwise)		**Fuel Consumed**			
Fuel Type	**Unit of Measure**				
Natural Gas	m3	0	0	0	0
Propane	L	137887	132636	142919	413442
Diesel Fuel	L	59884	49549	59266	168669
Gasoline	L	0	0	0	0
Mobile Transportation		**Fuel Consumed**			
Vehicle Type	**Fuel Type (Unit of Measure)**				
Light Duty Vehicle (excluding trucks, SUV's and minivans)	Gasoline (L)	0	0	0	0
	Diesel (L)	0	0	0	0
	Propane (L)	0	0	0	0
	Natural Gas (kg)	0	0	0	0
Light Duty Truck (<3,900 kg GVWR)	Gasoline (L)	0	0	0	0
	Diesel (L)	5280.33	8312	6065	19657.33
Heavy Duty Truck (>3,900 kg GVWR)	Gasoline (L)	0	0	0	0
	Diesel (L)	0	0	0	0
Off-Road Vehicle/Construction Equipment (including ATV's and Snowmobiles)	Gasoline (L)	268	80.9	203.3	552.2
	Diesel (L)	5061.25	3423	7240	15724.25
Mobile Air Conditioning		**# in Fleet**			
Vehicles (Including haul trucks and construction Equipment		17	17	17	17

Comments:

1. Mobile Air Conditioning Vehicles include light-duty vehicles
2. Propane consumption is the actual propane received on-site rather than used as there are no flow meters installed on them

Table 27: GHG Emission Summary as of March 2021

	Total Emissions (kg CO2e)			
	January	February	March	Annual
Indirect Emissions				
Purchased Electricity	185213	175867	186572	547652
Direct Emissions				
Stationary Fuel Combustion by fuel type				
Natural Gas	0	0	0	0
Propane	213449	205320	221239	640008
Diesel Fuel	161986	134030	160314	456331
Gasoline	0	0	0	0
Mobile Transportation by Vehicle Type				
Light Duty Vehicle (excluding trucks, SUV's and minivans)	0	0	0	0
Light Duty Truck (<3,900 kg GVWR)	14558	22916	16721	54195
Heavy Duty Truck (>3,900 kg GVWR)	0	0	0	0
Off-Road Vehicle/Construction Equipment (including ATV's and Snowmobiles)	15785.92	10435.61	22149.59	48371
Mobile Air Conditioning	607.75	607.75	607.75	1823.25

ANNEXES

Annex A: Plain Language Summary

ANNEX A – PLAIN LANGUAGE SUMMARY

Introduction to the Giant Mine Remediation Project

The Giant Mine is a former gold mine located within Yellowknife, Northwest Territories city limits. It is about 5 km north of city centre. The site lies within the asserted traditional territory of Indigenous communities and groups.

- The site is within the Yellowknives Dene First Nation's traditional territory. As part of the Akaitcho Territory Dene First Nations, they are negotiating a land, resource, and governance agreement with the governments of the Northwest Territories and Canada.
- The Tłı̨chǫ have a recognized area of traditional land use known as Monfwì Gogha Dè Nı̨htł'è. In this area, members exercise rights set out in the Tłı̨chǫ Agreement. The Giant Mine site falls within this area's boundaries.
- The North Slave Métis Alliance represents Métis in Yellowknife. Members assert Indigenous rights in the area that includes the Giant Mine site.
- The Northwest Territories Métis Nation represents the Métis from the Northwest Territories' South Slave region. The Giant Mine site is next to Great Slave Lake, which is within the boundaries of the Land and Resources Final Agreement they are negotiating with the governments of Canada and the Northwest Territories.

The Giant Mine operated from 1948 to 2004. When the owners went bankrupt, Canada became responsible for the site and the contamination left behind. This includes 13.5 million tonnes of tailings and 237,000 tonnes of arsenic trioxide waste. The Giant Mine Remediation Project (the Project) is jointly managed by:

- the Government of Canada, represented by Crown-Indigenous Relations and Northern Affairs Canada, and
- the Government of the Northwest Territories, represented by the Environment and Natural Resources Department.

Together, they manage the site to protect human health and the environment while they plan how they will clean up the site.

About the Annual Report

The Project team is committed to informing interested parties about Project progress, activities, and plans. The team engages and shares information in several ways. One way is through submitting an annual report to the Giant Mine Oversight Board.

The report describes what has happened on the site and the activities in support of planning the clean up that took place over one federal fiscal year. A fiscal year is the budget year of the federal government, from April 1 to March 31.

In the annual report, the team provides a detailed explanation of its activities, important findings, and future plans. This is so interested parties can keep track of the Project's progress.

The Project team needs to prepare an annual report as part of the terms of the Giant Mine Remediation Project Environmental Agreement. The agreement guides what information the Project must include in the report. The Giant Mine Oversight Board reviews and comments on the report each year. This process will continue to shape the report's format and content.

This document is a plain language version of the full annual report, which provides more details about progress in 2020-21. This annual report is Giant Mine Remediation Project's sixth. It covers the period from April 1, 2020 to March 31, 2021. Activities and updates related to the Project after March 31 will be covered in next year's report.

Impact of COVID-19 on the Project

In response to the COVID-19 pandemic, the main construction manager put in place a response plan and procedures. It applied to all people at the Giant Mine site. Procedures included self-isolation requirements and enhanced health and safety protocols. Non-essential work was paused to limit travel into the territory. The Project also followed the guidance of the GNWT Chief Public Health Officer when bringing in workers from outside the territory necessary for specialized work.

Project Status

In 2007, the Giant Mine Remediation Project team submitted a Water Licence application to the Mackenzie Valley Land and Water Board. The application included a remediation plan for all aspects of underground and surface clean-up. The City of Yellowknife referred this plan to Environmental Assessment. The assessment was completed in 2014. It included a Report of Environment Assessment with 26 measures the Project team must complete. The measures included developing a new clean-up plan, called a CRP. The CRP is the result of extensive engagement and design work done by the Project team since the Report of Environmental Assessment.

In April 2019, the Project team submitted the new plan and supporting documents to the Mackenzie Valley Land and Water Board. The board approved the Project's land use permit in August 2020 and the water licence in September 2020. These can be found on the board's public registry.

Progress on Environmental Assessment Measures

The Report of Environmental Assessment included 26 measures. The team's immediate focus was measures with set timelines and those with the biggest impact on project scope. Since the Report of Environmental Assessment, the Project has completed and advanced many measures. The table below includes their status, as well as the status of suggestions included in the Report of Environmental Assessment.

STATUS	MEASURES	SUGGESTIONS
Completed	3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 18, 19, 22	8, 13, 15
Underway	9, 10, 16, 17, 20, 23, 25, 24, 26	1, 2, 3, 4, 9, 10, 11, 12, 14, 16
Future Action Required	2, 21	
No Action Required / Outside Scope of Project	1	5, 6, 7

In 2020-21, the Project focused on the following measures:

- **Measure 5 – Quantitative Risk Assessment**
  - The Project submitted the final report to the Mackenzie Valley Land and Water Board in June 2020.
- **Measure 9 – Health Effects Monitoring Program**
  - Described in more detail below (see: health and safety)
- **Measure 10 – Hoèła Weteèts'eèdeè: Understanding Community Wellbeing Around Giant Mine (previously called the Stress Study)**
  - Described in more detail below (see: health and safety)

Advancement of substantive designs

In 2020-21, the Project worked to advance substantive designs for several project components. This included:

- waste disposal and management (waste disposal options, contaminated soil and sediment, freeze design)
- water treatment projects (water treatment plant, pumping, passive treatment system)
- tailings containment areas
- open pit closure

Ongoing Site Management

Ongoing management at the Giant Mine site is critical to ensuring it stays stable and safe for staff, area communities and the environment during remediation. This includes:

- maintaining the site
- managing risks
- conducting inspections
- monitoring the environment
- keeping dust levels down
- treating water
- health and safety activities

Key activities in 2019-20 included:

Care and Maintenance

Ongoing care and maintenance at Giant Mine is important to manage current risks and prevent harm to staff, area communities, and the environment. In 2020-21 the Project continued care and maintenance activities. These included:

- air quality monitoring and sampling
- dust management activities, including applying SoilTac to tailings containment areas
- preparing for the spring freshet (that is, spring thaw)
- monitoring and sampling water and effluent
- discharging treated effluent
- maintaining site infrastructure and roads
- maintaining the underground travel ways (including underground repairs to chutes and head covers to reduce hazards to workers)
- providing full time on-site emergency medical services
- site security activities, including putting up new signs and upgrading security fences
- conducting weekly inspections of the Material Storage Area

Infrastructure Review

Every few years the Project examines buildings to see if they are putting people on site at risk. If they need to be addressed before cleanup takes place the Project team takes action. In July 2019, a consulting firm examined 28 buildings on site for signs of distress, deformation or deterioration. No buildings were at risk of immediate structural failure. However, they recommended those buildings be reviewed every 2 years. As a result, the Project did not review the buildings in 2020.

Northwest Deep Well Pumping Station Upgrade

The Northwest Deep Well Pumping Station was previously called the Akaitcho Deep Well Pump Station. It pumps water out of the underground at the Giant Mine so water stays well below where the arsenic trioxide is stored. After operating for 4 years, the pump system was working at a slower rate. This could cause risks at the site. In 2017-18, the Project developed a plan to upgrade the station. In 2018-19, the Project installed new pumps and an electrical building to power them. In 2019-20, a new deep well pump station began operating. One pump stopped working in August 2019, after a power brown-out. In 2020-21, the Project began an investigation to understand how this issue happened.

Dam Inspections

Dams are used to manage mine and surface water on the site; they also keep solids out of the tailings. Every year, the dams are inspected for safety and to assess water levels. In 2020-21, the Project installed 38 thermosyphons in Dam 1 to address an issue identified in the 2019-20 inspection. The thermosyphons will keep the ground around the dam frozen and protect workers accessing the underground in the area. It also will also help make sure the effluent treatment plant can continue to work until the Project builds its new water treatment plant.

Regulatory inspections

In 2020-21, external regulators conducted 6 inspections of the Project. The regulators decide how many inspections per year are needed, based on what work is being done at the site. There were no non-compliances identified. The main construction manager their subcontractors also conduct regular internal inspections. This includes daily site inspections by care and maintenance staff and regular engineering inspections of major structures and equipment. These inspections identified minor issues only, and these were quickly address and corrected.

Environment

The Project has an Environmental Management Plan that guides how each major component of the site is managed. Currently, the Project has several active monitoring programs in place for key environmental issues. The Project's Long-Term Monitoring Program combines all current monitoring activities and those that will be required. This includes monitoring of the environment and structures/technology.

ENVIRONMENTAL	STRUCTURAL
• Surveillance Network Program • Metal and Diamond Mine Effluent Regulations, including Environmental Effects Monitoring Program • Operational Monitoring Program (Effluent Treatment Plant, underground, annual site-wide bird survey) • Aquatic Effects Monitoring Program • Wildlife and Wildlife Habitat management and Monitoring Plan • Air quality – fenceline & community • Noise	• Freeze • Dams and seeps • Landfill • Pit stability • Tailings covers • Underground Structures • Baker Creek (icing)

The Long-term Monitoring Program is used to:

- determine baseline conditions;
- monitor current conditions and performance of management programs; and
- inform the design process for remediation activities.

Air

The Project monitors air quality on a regular basis. In 2020-21, monitoring showed that the air quality where the Project's air emissions are located is similar to regional and local air quality. The Project also kept dust down so residents are not exposed to contaminants from activities occurring at the site. In addition, the Project is taking steps to actively reduce greenhouse gasses and looking at ways to minimize emissions during remediation.

Water

The Project continues to treat effluent (that is, liquid waste) at the site's effluent treatment plant. It is treated to meet the criteria in the former mine's water licence and criteria that meets relevant regulations. In 2020-21, 692,785 m3 of treated effluent was discharged into the environment. Tests showed the treated effluent met requirements before discharge. The Project conducted environmental effects monitoring to see if the treated effluent caused negative effects on aquatic life. Results were similar to previous years' results: there were no significant concerns.

In 2020-21, other key Project activities included:

- receiving the Mackenzie Valley Land and Water Board's interim approval of the Aquatic Effects Monitoring Plan
- updating fish and habitat studies for Baker Creek and Yellowknife Bay
- creating an Aquatics Advisory Committee to support engagement with respect to the Project's Fisheries Act authorization
- engaging with Fisheries and Oceans Canada on conceptual habitat offsetting plans for Baker Creek

Land

The Project monitors and manages arsenic-impacted waste on site, as well as other hazardous and non-hazardous waste. Monitoring and reducing impacts on wildlife are other important activities on site. In 2020-21, key activities included:

- submitting an updated Wildlife and Wildlife Habit Management and Monitoring Plan to the Mackenzie Valley Land and Water Board
- logging and reporting wildlife sightings and interactions
- continuing monitoring and managing arsenic-impacted waste

Health and Safety: Occupational and Public

Occupational Health and Safety

Health and safety on site are very important to the Project team. The Project keeps track of how many incidents and near misses happen each month and reports this information to the Project director. Workers discuss incidents and near misses in daily safety meetings so workers can review lessons learned, identify causes, and prevent future incidents.

The table below shows the incidents and near misses in 2020-21.

INCIDENTS AND NEAR MISSES	2020-21 TOTAL
Major Incident: an activity on site that leads to a severe and permanent disability, impairment, injury, illness or death to someone.	0
Moderate Incident: an activity on site that leads to a reversible disability, impairment, injury or illness that temporarily alters someone's life.	7
Minor Incident: an activity on site that leads to injury or illness that inconveniences someone.	3
Near Miss: an activity on site that did not result in any disability, impairment, injury, illness or fatality, but could have.	56

The number of moderate and minor incidents have changed each year. The Project looks at the number of incidents compared to the number of hours worked. Moderate incidents were higher in 2020-21 than 2019-20. Minor incidents have trended down since 2019-20. The number of reported near misses in 2020-21 (56) are higher than 2019-20 (41) but lower than 2018-19 (74).

The Project also tracks arsenic levels in workers on site. In 2020-19, there were 9 urine samples that were above the accepted level, out of 728 samples taken (1.2%). This percentage was lower than the previous year (2.2%). When a worker's sample is above the accepted level, the Project takes immediate action. This includes taking steps to reduce the worker's exposure, which may mean changing the type of work they do until their levels return to below the accepted level. The Project also investigates the cause of the exposure.

The care and maintenance contractor also ensures employees and subcontractors receive relevant health and safety training. This includes first aid, wildlife safety, water safety and fire response, as required by applicable regulations.

Health Effects Monitoring Program and Hoèła Weteèts'eèdeè

The **Health Effects Monitoring Program** will establish current levels of arsenic and other contaminants of concern in people's bodies. This means the study had to take place before the cleanup starts. During remediation, the participants will provide samples again. These new results will be compared to the current levels. This study will help make sure the remediation activities do not negatively impact people's health.

The monitoring program completed its baseline sample collection in 2018. Public engagement was held in May 2019 to report back on the initial results of the study. The results from the two waves of sampling are similar to Canada's population in general. A study with children will start in 2022 and with both children and adults in 2027, when the remediation is happening.

Hoèła Weteèts'eèdeè: Understanding Community Wellbeing Around Giant Mine (formerly called a stress study) will:

- evaluate indirect effects on health from stress related to the possibility of arsenic exposure
- include engagement with affected community members

During 2020-21, study committees met to revise and improve Hoèła Weteèts'eèdeè. As a result of Covid-19, the study team had to delay implementation. Wilfrid Laurier University's Dr. Ketan Shankardass and the study team continue to work toward being able to move the study forward.

Key Engagement

Engagement is an important and valued part of the Giant Mine remediation process. In 2020-21, the Project team continued its regular engagement with key affected parties through avenues such as:

- the Giant Mine Oversight Board;
- the Giant Mine Advisory Committee;
- the Giant Mine Working Group; and,
- the annual forum

Specific engagement sessions were also held to focus on:

- the Quantitative Risk Assessment
- the Perpetual Care Plan
- carrying out the early works
- carrying out the Socio-Economic Strategy
- management and monitoring plans
- open pits
- aquatics such as Baker Creek design and future conditions of Yellowknife Bay
- community-based monitoring

In 2021-22, engagement will focus on:

- outreach to communities and businesses with respect to procurement and contracting opportunities
- carrying out the Socio-Economic Strategy
- minewater levels
- action levels
- the Perpetual Care Plan
- community outreach for the health studies
- the Project Implementation Plan for remediation of the site

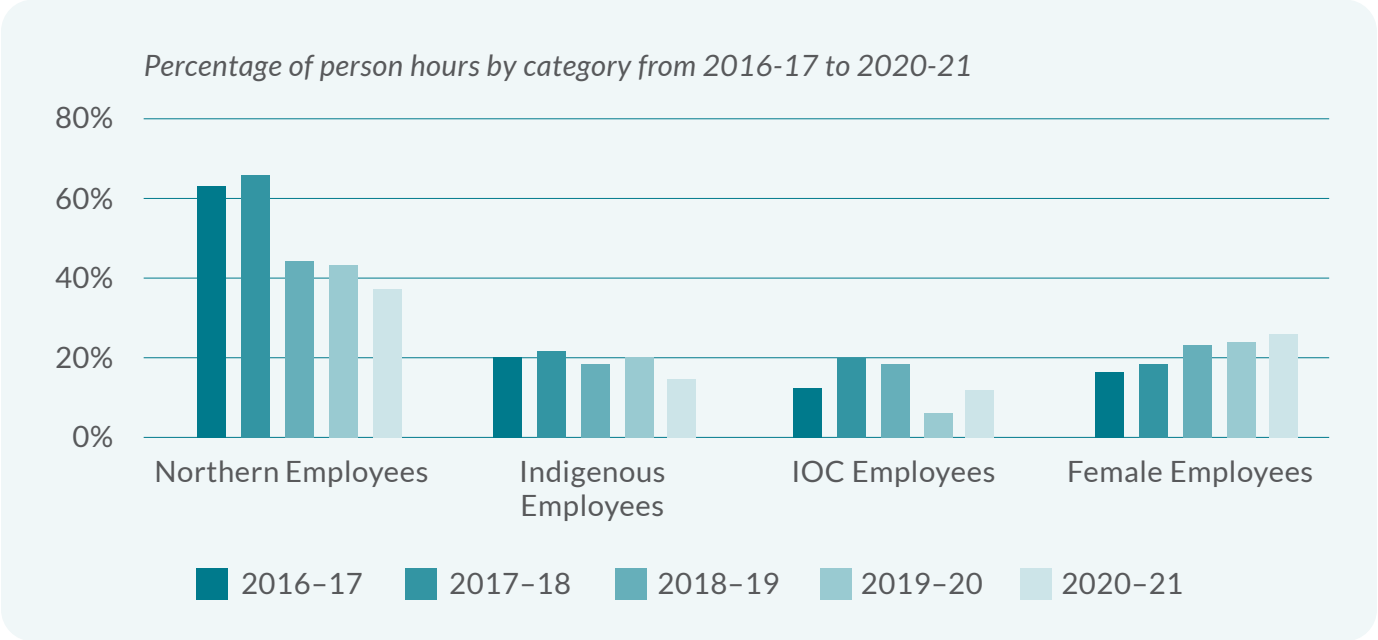
Socio-economic

The Giant Mine Remediation Project works to deliver social and economic benefits to Indigenous and Northern communities while protecting the environment and people's health. Parsons, the main construction manager, uses several tools to help the Project team achieve their socio-economic goals. This includes subcontracting to Indigenous and Northern businesses and incorporating criteria into all tenders that encourage employment, training, and apprenticeships for Indigenous workers.

The Project tracks total employment and employment by certain categories. This includes:

- Northern workers
- Indigenous workers
- how Indigenous Opportunities Considerations[19] commitments are met during procurement
- female workers

In terms of hours worked, Northern employment declined in 2020-21. Indigenous employment declined slightly to 15%, while IOC employment increased compared to previous years, from 8% to 13%. Female employment increased slightly in 2020-21, from 22% to 24%.



In 2019-20, the Project worked with the Socio-Economic Working Group and the Socio-Economic Advisory Body to set employment targets for the Project's implementation. This year, while employment accounted by women was within the target range, employment accounted by Northerners and Northern Indigenous employees are below the lower end of the target range. The Project anticipates that the Northern and Northern Indigenous employee statistics will improve when there is more onsite work. The Project also recognizes there is more to be done to increase employment of Northerners, Northern Indigenous peoples, and women overall. The Project is working with its partners to identify next steps in improving these employment figures.

[19]IOC is used by procurement officers to review proposals and evaluate the commitments made by firms, such as the percentage of labour force that is local Indigenous peoples. Incentives and penalties are applied to encourage firms to meet or exceed commitments outlined in their proposal.

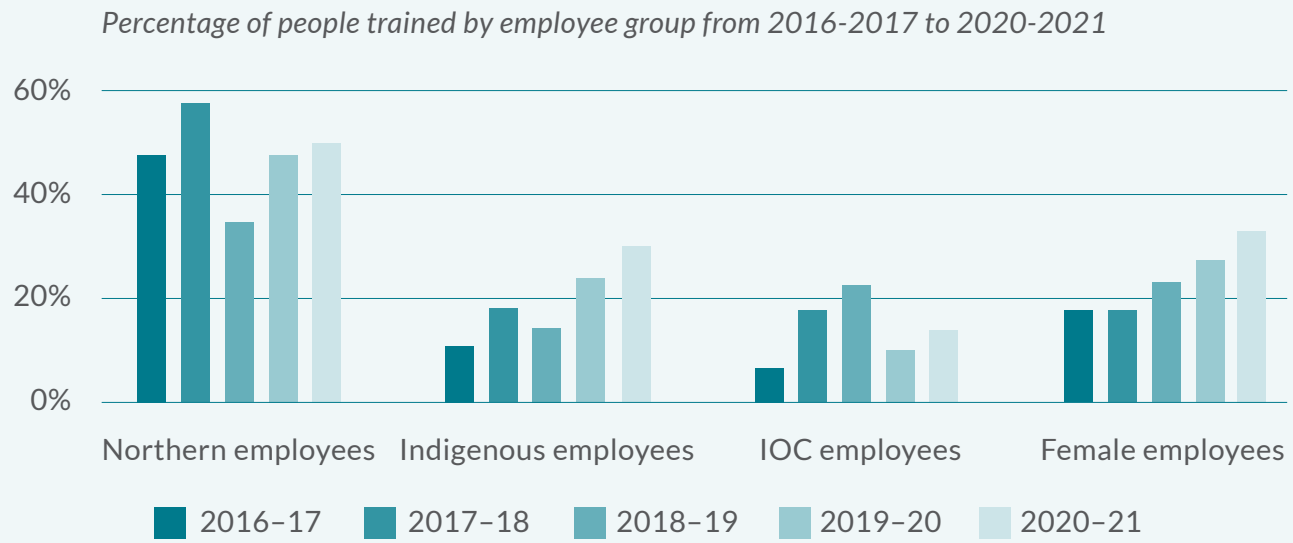
The table below shows total employment accounted for by Northerners, Northern Indigenous, and Women in 2020-21 compared to the target ranges.

Key Performance Indicator	Number of person hours	Person-hours as percentage of all person-hours	Target ranges for the implementation phase	Gap
Employment accounted by Northerners	100,994	38%	55-70%	17-32%
Employment accounted by Northern Indigenous	39,958	15%	25-35%	10-20%
Employment accounted by Women	63,525	24%	15-30%	Within target range

The Project also tracks suppliers by type, specifically Northern, Indigenous and IOC. In 2020-21, the proportion of money spent on contracts decreased for Northern suppliers compared to previous years. Of approximately $18 million spent on suppliers, 32% went to Northern businesses. The proportion spent with Indigenous suppliers decreased in 2020-21, to 25%. The proportion spent with Indigenous Opportunity Considerations suppliers decreased slightly in 2019-20 from previous years, to 24%.

The Socio-Economic Working Group and the Socio-Economic Advisory Body continued to meet in 2020. The working group has team members from federal, territorial and municipal governments. It shares information and works to advance socio-economic activities for the Project. The advisory body provides advice to the working group and acts as senior government champions. Its members include senior level representatives from federal, territorial, municipal, and Indigenous partner organizations.

In addition to the occupational health and safety training, Project contractors deliver workforce training, including site orientations. In 2020-21, workforce training provided to Northern employees (113) was within the average range of values from previous years (102). Workforce training for Indigenous Opportunities Consideration employees (32) increased. Workforce training for Indigenous employees (68) and female employees (74) increased from previous years as a result of the inclusion of Dechita Nàowo training. The total number of people trained remained within the range from previous year.



In Closing

In 2020-21, the Project was issued its Land Use Permit and Water Licence, signalling remediation can move forward while the Project also continues to protect human health and safety and the environment by keeping the site safe and stable. The Project continued care and maintenance activities, risk mitigation, engagement activities, and progressing the review and resubmission of its management and monitoring place.

The Project will continue to prepare annual reports about its progress and performance, and to develop a plain language summary of its annual reports.

For more information or to provide comments, please contact:

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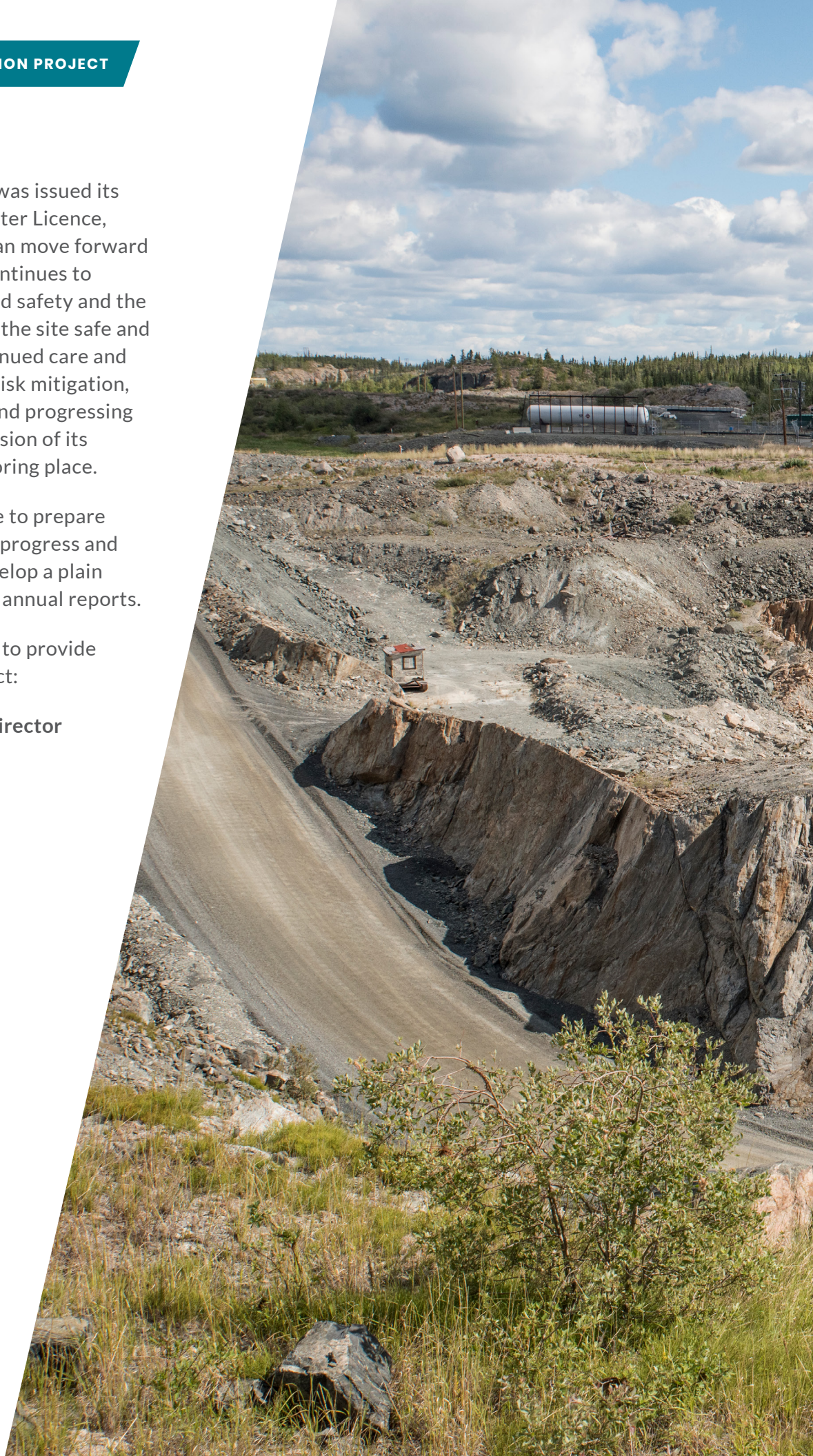

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