

Giant Mine Remediation Project 

Long Term Monitoring, Evaluation and Management




Technical Sessions
Yellowknife NT, October 17-21, 2011

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OUTLINE

1. What we've heard and what we said in the DAR
2. Lifecycle of the Giant Mine site and our concept of the path forward
3. Adaptive Management and Environmental Management System
4. Perpetual Care and an invitation to the parties



1. WHAT WE'VE HEARD & WHAT WE SAID IN THE DAR



We Heard Requests for more Detail and Information on:

- Oversight and Accountability Mechanisms
- Content of Monitoring Plans
- Transparency & Access to Monitoring Information
- Adaptive Management



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Oversight and Accountability Mechanisms

- Clarity on accountability & the many hats of AANDC and Increasing Trust
- Possible independent oversight body
- Request for details on the Aboriginal and Government Body cited in the DAR
- Public involvement in developing/implementing the Environmental Management System (EMS)



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Detailed Input into Monitoring Plans

Several IRs asked for monitoring details:

- Location and rationale for air samplers
- Triggers and thresholds to guide mitigation action
- More details on effluent, water quality and biological monitoring
- More details on monitoring riprap and geotextile cover performance



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Transparency and Information Access

- What monitoring data will be made available routinely and how this will be done
- More details (e.g., table of contents) for Annual and State of Environment Report
- MVEIRB was asked to direct AANDC to complete a draft monitoring plan



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Adaptive Management

- Provide additional discussion on adaptive management and potential corrective actions
- Provide details and frequency on how to consider emerging technologies
- MVEIRB was asked to direct AANDC to complete adaptive management structures for consideration of the Parties

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DAR Commitments

- Undertake internal and external assessments of conformance with Environmental Management Plans, according to schedule to be developed as part of EMS
- Reports generated from audits will be provided to the Project Oversight Committee
- As part of comprehensive public engagement, the Project Team will focus on the interests of Yellowknife, N'dilo and Dettah; this will include creation of an Aboriginal and Government Body

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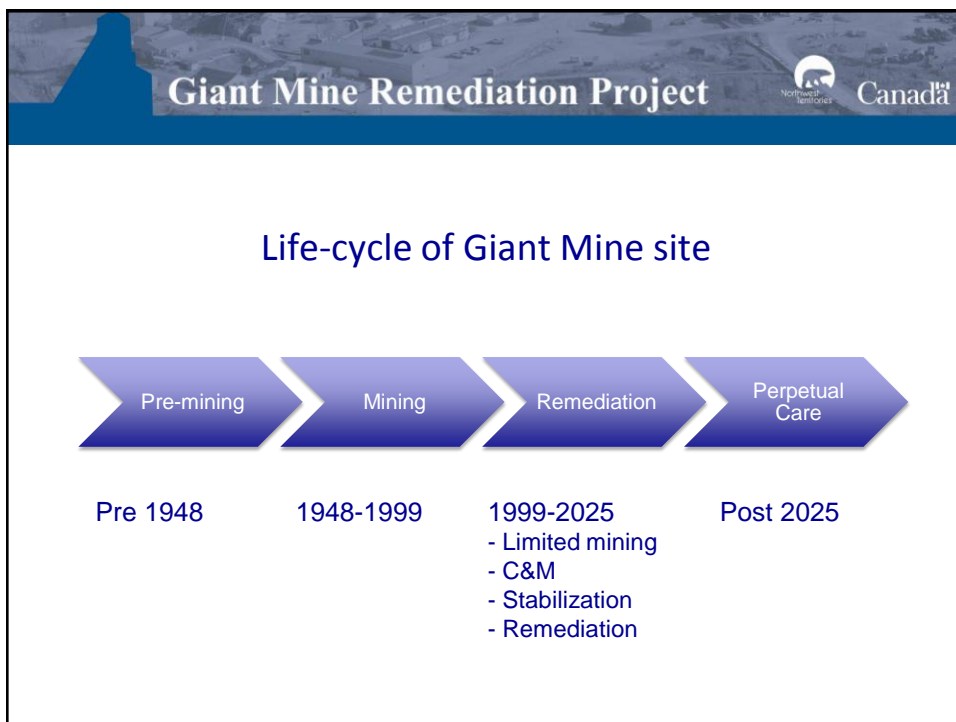
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DAR Commitments (cont'd)

- An Aboriginal and Government Body is proposed to:
 - Incorporate Aboriginal interests into design and implementation
 - Support the collection of traditional knowledge for future decisions related to the Remediation Project
 - Traditional knowledge holders to collect information, to help predict possible impacts, and to develop mitigation methods, adaptive management plans and monitoring program plans

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2. LIFECYCLE OF THE GIANT MINE SITE & OUR CONCEPT OF THE PATH FORWARD



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- Giant Mine is a remediation project not a resource extraction or mine development project
- Its goal is to reduce risks and limit impacts on health, safety and the environment
- Giant Mine is not subject to bottom line profit tensions
- Instead, it is efficiency, value for taxpayers money & overall priority considerations that guide decisions

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Interplay between current decisions and long-term requirements

Remediation
decisions

Define

Perpetual care
requirements





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Peer Reviewers and Auditors

- Members belong to professional associations, governed by codes of ethics
 - Professional engineers, geologists, etc.
 - Certified environmental auditors
 - Commitment to integrity and public safety



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Community Alliance – Intended Functions

- Assist stakeholders and people of N'dilo, Dettah and Yellowknife participate in Project
- Provide community opinions, perspectives and concerns
- Identify need for independent technical advice and expertise
- Disseminate information on Project
- Provide input and feedback into Project decisions
- Prepare annual work plans and hold public registry
- Cooperate with AANDC, GNWT and City on communication
- Hold public meetings

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Community Alliance Membership

- YKDFN
- NSMA
- Canadian Public Health Association – NWT Chapter
- NWT Mine Heritage Society
- Ecology North on behalf of ENGOS
- Northern Territories Federation of Labour
- Yellowknife Chamber of Commerce
- City of Yellowknife
- GNWT representative (observer)
- AANDC representative (observer)

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Engagement and Communication Activities to Date

- Giant Mine Community Alliance
- Open houses, public sessions
- Media information events
- Workshops (i.e. around arsenic trioxide)
- Mine Tours

Through Review Board EA

- Round I of IRs
- Technical Session



Engagement and Communication Activities Looking Forward

- Establish an Aboriginal and Community engagement process
- Incorporate Traditional Knowledge more effectively
- Develop and implement an EMS
- Maintain a Website and Giant Mine Public Registry
- Hold open houses, community meetings
- Workshops on themes like surface remediation, Baker Creek, and environmental monitoring
- Hold tours of the Giant Mine Site





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3. ADAPTIVE MANAGEMENT & THE ENVIRONMENTAL MANAGEMENT SYSTEM



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Overview of Presentation:

Moving Towards Integrated Environmental Management

- Introducing the Concepts
- Understanding the Linkages
- Making It Work
- Moving Forward



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Introducing the Concepts:

Adaptive Management

- A structured, iterative approach of decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring
- Key features of adaptive management are:
 - a) Evaluating results and adjusting action on the basis of what has been learned
 - b) Feedback between monitoring and decisions (learning)
 - c) Explicit characterization of system uncertainty
 - d) Use of statistics to summarize evidence
 - e) Embracing risk and uncertainty as a way of building understanding



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Introducing the Concepts:

Adaptive Management: Elements of Adaptive Management

- Elements of Adaptive Management include:
 - a) Predict – during the EA
 - b) Mitigate – during Project implementation
 - c) Monitor – to confirm predictions and identify additional potential concerns
 - d) Adapt – to address emerging concerns



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graph TD
    Predict --> Implement_Mitigate[Implement / Mitigate]
    Implement_Mitigate --> Monitor
    Monitor --> Adapt
    Adapt --> Predict
    subgraph Center
        AM[Adaptive Management]
    end
  
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Introducing the Concepts:

Environmental Management System (EMS)

- That part of an organization's management system used to develop and implement its environmental policy and manage its environmental aspects
- DAR commitment to implement an ISO 14001 compatible EMS
- *ISO 14001:2004 - Environmental Management Systems (EMS) – Requirements with guidance for use* was developed by the International Organization for Standardization to:
 - a) Provide a set of internationally recognized criteria for EMS
 - b) Establish a common set of requirements, terms, and definitions pertaining to the EMS and its various elements

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Understanding the Linkages:

Environmental Management Approach for Giant Mine Remediation Project

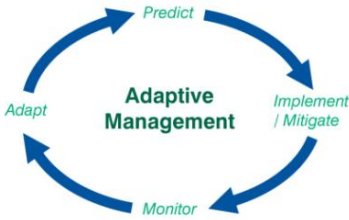
Framework	• Environmental Monitoring and Evaluation Framework
Guiding Principles	<ul style="list-style-type: none"> • Adaptive Management • Comprehensive Monitoring and Evaluation • Transparency & Public Participation
Implementation Tools	<ul style="list-style-type: none"> • Environmental Management System (EMS) • Environmental Management Plans (EMPs)

- The EMS will not replace current programs and initiatives
- The EMS will integrate existing efforts & improve coordination between functional areas

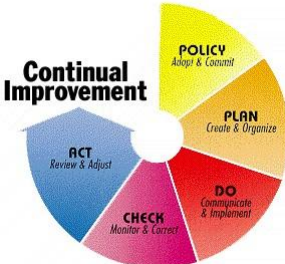
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Understanding the Linkages:


Continual Improvement Cycle



Adaptive Management



EMS/ISO 14001


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Making it Work:

Integrating DAR Commitments into the EMS: External Communications/Aboriginal and Public Engagement

- ISO 14001 requires procedures for receiving and responding to external communications
- Two-way public communications will be established to facilitate engagement, and reporting
- Traditional Knowledge will be incorporated in advance of project implementation, particularly for the development of EMPs
- Mechanisms will also identify how public concerns will be addressed


Engaging on the development and implementation of the EMS, including sharing the results of audits and adaptive management, is viewed as essential to the success of the EMS



Making it Work:

Integrating DAR Commitments into the EMS: Environmental Management Plans (EMPs)


- The EMPs will specify requirements to ensure effective prevention or mitigation of the potential biophysical and cultural impacts
- The EMPs will address:
 - a) The environmental and social objectives, targets, and commitments
 - b) The application of mitigation and risk reduction measures described in the DAR, the final outcomes of the EA process and as required by regulation and licensing
 - c) Implementation and monitoring aspects of the project
 - As the project progresses, additional plans or amended plans will be developed as required



Making it Work:

Integrating DAR Commitments into the EMS: Evaluation of Environmental Performance - Auditing


- Audits will be completed to assess conformance to the EMS program
- Audits will provide senior project management and the public with an accurate understanding of the project's environmental status
- Audits will contribute to the continual improvement processes to create a more effective project
- Action plans will be developed and aimed at achieving improved environmental performance



Making it Work:

Integrating DAR Commitments into the EMS:
Evaluation of Environmental Performance - Management Review


- Monitoring, inspection, audit and management review serve as key inputs to Adaptive Management
- Management review and non-conformance, corrective and preventive action serve as a key feedback loops for Adaptive Management



Making it Work:

Integrating DAR Commitments into the EMS:
Evaluation of Environmental Performance - Oversight

- The EMS will be incorporated into the organizational structure for the Project
- Regulatory oversight includes:
 - a) Regulatory inspections
 - b) Routine Reporting to MVLWB
 - c) Relicensing activities
- Submissions to the MVLWB are publicly available and provide transparency to Project activities and performance




Making it Work:

Integrating DAR Commitments into the EMS: Evaluation of Environmental Performance - Monitoring

- As detailed in Section 14.2 of the DAR, a wide array of monitoring initiatives will be integrated into the GMRP. Components that will be monitored include:

a) Frozen ground conditions	h) Sediments
b) Minewater	i) Aquatic vegetation
c) Groundwater	j) Terrestrial vegetation and soil
d) Treated effluent	k) Wildlife
e) Surface water	l) Air quality
f) Fish	m) Physical conditions (e.g., dams)
g) Benthic invertebrates	n) Cumulative effects



Making it Work:

Adaptive Management: Key Concepts

- a) **Significance Threshold** – a magnitude of environmental change that would result in a significant environmental effect
- b) **Action Level** – a magnitude of environmental change, below the significance threshold, that triggers a management action
- c) **Management Action** – initiated to assist in better understanding and/or mitigating an observed environmental change. May include special studies, operational changes, or implementing mitigation strategies to reverse or stabilize a change in environmental conditions

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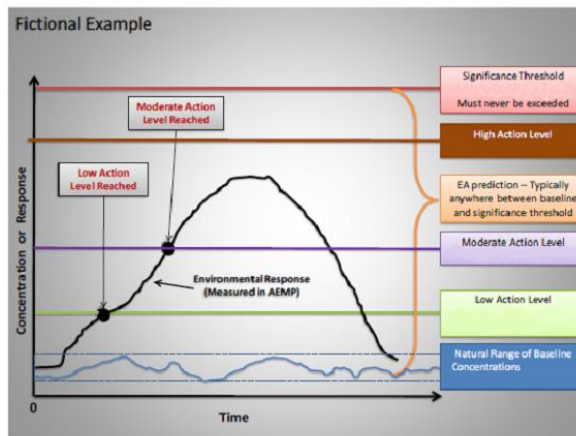


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Making it Work:

Adaptive Management: Key Concepts

Adapted from: DRAFT Guidelines for Adaptive Management – A Response Framework for Aquatic Effects Monitoring, Wek'èezhìi Land and Water Board



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Making it Work:

Integrating DAR Commitments into the EMS: Evaluation of Environmental Performance - Monitoring

- Some of the mechanisms that will be used to disseminate the monitoring information include:
 - a) *Regulatory Filings* – as prescribed by regulatory authorizations (e.g., Water Licence)
 - b) *Annual Reports* - prepared annually to summarize and review all operational and environmental data collected in the one-year reporting period
 - c) *Status of the Environment (SOE) Reports* - prepared every three years during the initial 15-year remediation period and every five years thereafter, to summarize, review and interpret the data collected and to provide recommendations for modifications to the monitoring program or site operations
 - d) *Postings to the Remediation Website*

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Making it Work:

**Integrating EMEF Commitments into the EMS:
Adaptive Management and EMS – A Natural Fit**

Adaptive Management	EMS Element(s)
Predict	4.3.1 Identification of Significant Aspects (with input from DAR) 4.3.3 Objectives, Targets and Programs
Implement and Mitigate	4.4.2 Training/Awareness 4.4.6 Operational Controls 4.4.6 Contractor/Supplier Management 4.4.7 Emergency Preparedness & Response
Monitor	4.5.1 Monitoring and Measuring 4.5.2 Evaluation of Compliance (Internal, Regulators and MVLWB) 4.5.4 Internal Audit
Adapt	4.5.4 Nonconformity, Corrective/Preventive Action 4.6 Management Review

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Making it Work:

**Adaptive Management:
Forms of Adaptive Management**

- The Adaptive Management Approaches that will be applied by the Giant Mine Remediation Project fall into two broad categories:
 - a) **Environmental Monitoring (that informs) Adaptive Management**
 - The Long-term Monitoring Program will detect and characterize any negative trends that may be attributable to the GMRP
 - Where such effects are found to occur, management actions will be implemented to stabilize or reverse negative trends
 - b) **“Built-in” Adaptive Management of Project Components**
 - Staged implementation, monitoring and modification of Project components to ensure they perform as intended

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Making it Work:

Adaptive Management:

“Built-In” Adaptive Management – Case Study: Frozen Block Method

- Excellent example of how “built-in” adaptive management will be applied to the Remediation Project
 - a) Clearly defined performance criteria have been established for the Frozen Block Method
 - b) The on-going Freeze Optimization Study (FOS) will provide feedback that will be used to modify technical designs such that performance criteria are met
 - c) Following completion of the FOS, arsenic trioxide chambers will be frozen in a staged process, beginning with those areas that are considered “simpler” in terms of technical complexity
 - This will facilitate the refinement of all steps required to meet the performance criteria

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Moving Forward:

Initial Steps

- Develop Project Environmental Policy establishing overall direction for environmental management for the Remediation Project
- Complete internal EMS “Gap Analysis” (common first step in formalizing management practices)
 - A project-wide assessment of current processes, procedures and documentation to determine the Project’s initial conformance with ISO 14001 and DAR commitments



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Moving Forward:

Initial Steps

- Develop EMS Implementation Plan based on results of Gap Analysis and stakeholder engagement
 - a) Plan will comprise the Framework for implementing the EMS
 - b) Plan will include scheduled dates, identified resources, timelines, and organizational responsibilities for implementing a Project-wide EMS consistent with the Giant Mine Remediation Project EMS policy




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Moving Forward:

Project Schedule

- Gap Analysis and detailed work plan to begin in the winter of 2011/12
- EMS development completed by water licence hearing
- Implementation prior to initiation of full Remediation Plan



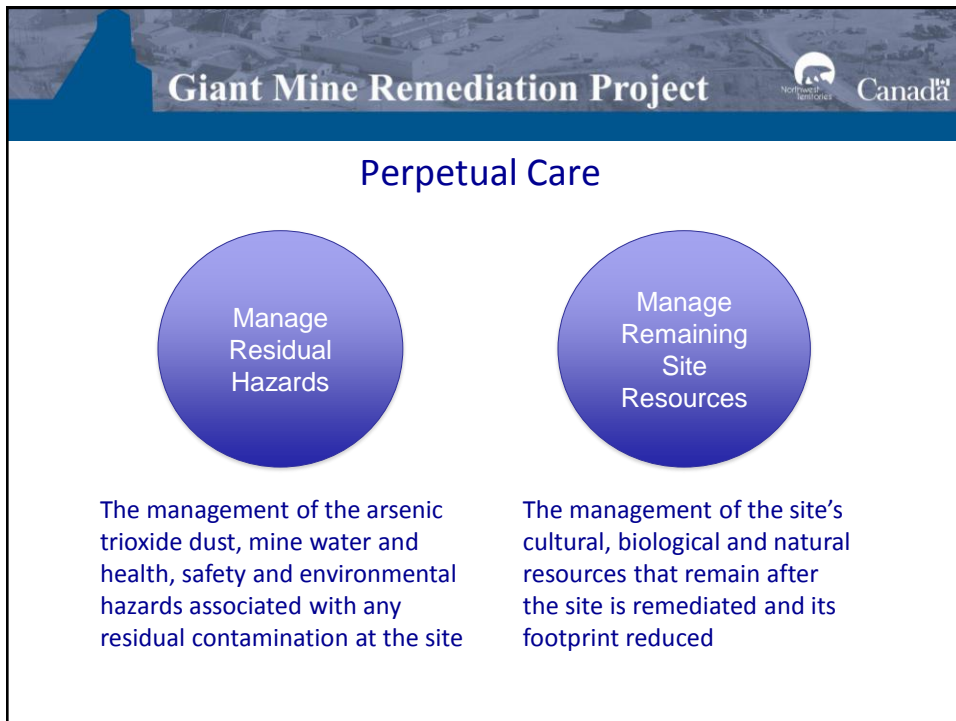
Closing Comments:

An Integrated Approach to Environmental Management

- The Environmental Management of the Giant Mine Remediation Project will be effectively governed by the implementation of an environmental management system
- Adaptive Management is a integral component of the environmental management system
- The environmental management system and its components will be developed with public participation
- The results of monitoring and auditing will be freely available to ensure transparency in the progress, results and long-term management of the Giant Mine site



4. PERPETUAL CARE AND AN INVITATION TO THE PARTIES





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- Freezing system

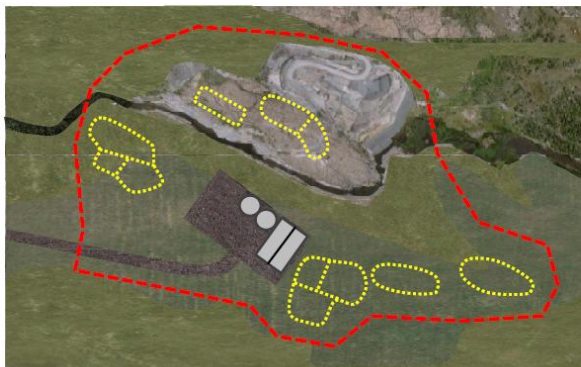


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- Fence around freeze & water treatment areas



- Single fence option
 - B1 & B2 pits
 - Reach 4
- Multiple fence option





The header of the slide features a blue silhouette of a mountain on the left, followed by the text "Giant Mine Remediation Project" in white. To the right of the text are the Northwest Territories and Canada logos.

- Pits
 - Fencing to prevent accidents around pit walls

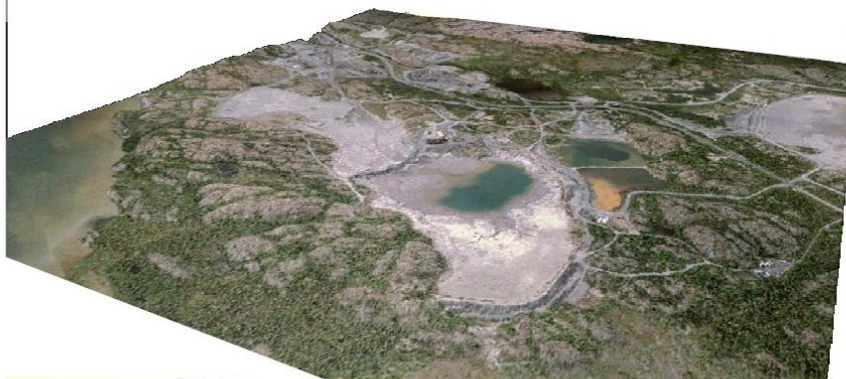
Below the list, there are two photographs showing the implementation of safety measures. The left photograph shows a large, deep, and steep-sided pit with a chain-link fence running along its edge. The right photograph shows a similar pit with a chain-link fence, and a dirt road or path leading towards the pit.

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- Covered tailings
 - Very large areas available for other uses



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- Covered tailings examples elsewhere:
 - Community amphitheatre, shooting range, golf course, ranching & hay production, natural reclamation



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- Summary of land use restrictions required to implement the Remediation Plan (approximate only)
 - Freeze system, WTP and Pits
 - Fenced and restricted usage
 - Covered tailings areas
 - Some restrictions on usage
 - Other areas

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- The Giant Mine Remediation Project
 - Is an environmental remediation, not a resource development undertaking
 - Is being executed within a robust governance and oversight regime
 - Addresses a site with high risks and old infrastructure
 - Is large and complex
- Let's, therefore, find ways to work together in a spirit of cooperation that respects mandated roles and processes, in order to stabilize, remediate and transition the site to perpetual care, thereby ensuring public and environmental safety today and in the future