



Crown-Indigenous Relations and Northern Affairs Canada

**Development of Options for Consideration for Long Term Funding for
Giant Mine**

July 2019

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Acronyms

Acronym	Definition
BCOGC	British Columbia Oil and Gas Commission
CIRNAC	Crown-Indigenous Relations and Northern Affairs Canada
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPPIB	Canada Pension Plan Investment Board
DEW	Distant Early Warning
EPA	Environmental Protection Agency
FCSAP	Federal Contaminated Sites Action Plan
ICP	Institutional Control Program
GOCO	Government-Owned, Contractor-Operated
GMOB	Giant Mine Oversight Board
GNWT	Government of the Northwest Territories
LTCAP	Long-Term Capital Appreciation Pool
MRF	Mining Rehabilitation Fund
NAMRP	Northern Abandoned Mine Reclamation Program
NCSB	Northern Contaminated Sites Branch
NT	Northwest Territories
NFWA	Nuclear Fuel Waste Act
NWMO	Nuclear Waste Management Organization
O&M	Operating and Maintenance
OSRF	Orphan Site Reclamation Fund
PPP	Public-Private Partnership
PV	Present Value
SRC	Saskatchewan Research Council
STPCORP	Sydney Tar Ponds and Coke Ovens Remediation Project
UofT	University of Toronto

Executive Summary

Purpose

This report was prepared for Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) in order to address Measure 6 of the Mackenzie Valley Environmental Impact Review Board's Report of Environmental Assessment, which examined the activities required to remediate the human and environmental health and safety risks of Giant Mine in Yellowknife, Northwest Territories. Measure 6 requires that CIRNAC, as the project proponent, undertake the following:

- Investigate long-term funding options for the ongoing maintenance of the Giant Mine Remediation Project and for contingencies;
- 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 (Review Board, 2013).

In 2017, the Giant Mine Remediation Project Team commissioned a report on the long-term funding options to address Measure 6. Based on stakeholder feedback and discussions, the Federal Government retained Deloitte to conduct additional research, analysis, and options for consideration to fully address Measure 6.

Approach

In order to provide the Federal Government with additional research, analysis, and considerations on long-term funding options for the Giant Mine, Deloitte undertook the following:

- Reviewed existing reports related to Measure 6, including Taylor and Kenyon (2012) and Giant Mine Remediation Project Team (2017), as well as records of discussions, hearing transcripts, and meeting minutes related to long-term funding;
- Reviewed existing literature on the perpetual/long-term care of contaminated sites, including Kuyek (2011), as well as existing case studies on the relevance of funding programs to the case of Giant Mine;
- Investigated long-term funding options for the ongoing maintenance of the Giant Mine Remediation Project and for contingencies, including a trust fund with multi-year up front funding;
- Researched options and approaches in Canada and other jurisdictions for how long term funding options have been structured and organized to manage contaminated sites; and
- Reviewed public and relevant private sector examples to understand potential inhibitors and enablers for long term funding options, including discussions with project stakeholders.

This report is intended to supplement the existing literature on the long-term funding and care for Giant Mine, including reports from Amy Taylor and Duncan Kenyon of the Pembina Institute (2012), Dr. Joan Kuyek (2011), and the Giant Mine Remediation Project Team (2017). Additionally, this report will draw upon the case studies provided in the aforementioned reports in order to prioritize their relevance to the Giant Mine Remediation Project, as well as provide additional detail regarding some of the potential options. This report is not intended to provide recommendations on the selection of a long-term funding

option for the Giant Mine Remediation Project, but rather to enhance the discussion and consideration of long-term funding options by the Government of Canada when making future decisions with respect to the funding of the Giant Mine Project.

Section 1 of this report provides an overview of the background and context of Giant Mine and the Giant Mine Remediation Project.

Section 2 describes perspectives and concerns expressed by project stakeholders (including members of the Giant Mine Oversight Board, local First Nations, civil society groups, and technical advisors) regarding the funding of Giant Mine and how the long-term funding option evaluation criteria utilized by Deloitte addresses these concerns.

Section 3 provides a prioritization of case studies in their relevance and applicability to the case of Giant Mine in addition to a discussion of the long-term funding options analyzed by Deloitte.

Section 4 supplements the discussion of options in the previous section by providing a financial analysis of cost components of the program, and 20, 50, and 100 year projections for operational and maintenance and trust fund costs for the remediation of Giant Mine.

Section 5 provides concluding observations and considerations for improving the long-term funding of the Giant Mine Remediation Project.

1.0 Background

1.1 Report context

In August 2014, Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC, formerly Indigenous and Northern Affairs Canada), along with Environment Canada, Fisheries and Oceans, and the Government of the Northwest Territories (GNWT), approved the Mackenzie Valley Environmental Impact Review Board's (Review Board) Report of Environmental Assessment, which examined the activities required to remediate the human and environmental health and safety risks of Giant Mine in Yellowknife, Northwest Territories. During the environmental assessment, there was concern raised by project stakeholders (including local Yellowknife residents, First Nations, and members of Legislative Assembly of The Northwest Territories) around the need for a long-term and sustainable source of funding to ensure long-term care of the Giant Mine site. The Review Board issued Measure 6 of the Report of Environmental Assessment to accommodate this concern. Measure 6 requires "The Developer," or project proponent, to:

- Investigate long-term funding options for the ongoing maintenance of the Giant Mine Remediation 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 (Review Board, 2013).

CIRNAC's Northern Contaminated Sites Branch provided a draft report for public comment in July 2017. Based on discussions and feedback from stakeholders, more detailed research and analysis was expected and so CIRNAC engaged Deloitte to conduct further research and an options analysis to support the Government of Canada in meeting Measure 6 of the Report of the Environmental Assessment with respect to long-term funding options for the Giant Mine.

1.2 Brief Overview of Giant Mine and the Giant Mine Remediation Project

The Giant Mine was a mine and mineral processing plant that produced gold from ore containing arsenopyrite, which operated from 1948 to 1999 in Yellowknife, NT. A by-product of the roasting process required to extract the gold was arsenic trioxide, a known human carcinogen. In 1951, the mine operators began to capture and store some of the arsenic trioxide emissions underground. There are currently 237,000 tonnes of arsenic trioxide stored underground at Giant Mine (Review Board, 2013).

Giant Mine officially became a public liability in 1999 and is listed as a \$903 million liability in the public accounts of the Government of Canada (Review Board, 2013). The federal and territorial governments, acting as co-proponents, have developed a remediation plan for the Giant Mine, known as the Giant Mine Remediation Project, which aims to freeze the sequestered arsenic trioxide in situ. The primary objectives of the Giant Mine Remediation Project are to:

1. Minimize public and worker health and safety risks;
2. Minimize the release of contaminants from the site to the surrounding environment;
3. Remediate the site in a manner that instills public confidence; and
4. Implement an approach that is cost-effective and robust over the long term (CIRNAC, 2013).

In the Mackenzie Valley Environmental Impact Review Board's (Review Board) Report of Environmental Assessment (2013) the capital costs for the Giant Mine Remediation Project were estimated at \$480 million, with ongoing annual costs at \$1.9 million over the lifetime of the project, estimated to be 100 years. However, the periodic monitoring, maintenance and replacement of components on the site is expected to continue in perpetuity. Current estimates provided by CIRNAC for the post-closure costs are approximately \$6 million annually; however the long-term costs remain uncertain and more work is required to refine these estimates.

1.3 Federal responsibility for liability

Giant Mine was under the ownership of several companies during its lifetime. The Giant Yellowknife Mines, Ltd. owned the mine from 1948 to 1986. It was next owned by Pamour from 1986 to 1990, and then by Royal Oak Resources Ltd. By 1999, however, Royal Oak Mines Inc. went into receivership and the courts transferred Giant Mine to the Government of Canada (Canada), represented by CIRNAC. A 2005 Co-operation Agreement (renewed in 2015) defined the roles of the governments of Canada and the Northwest Territories as co-proponents of the Project. Canada is responsible for the overall site cleanup and the underground contamination, and the territory owns the surface lands. As a result, CIRNAC, representing the Government of Canada, became responsible for the site, including the stored arsenic trioxide, and Giant Mine officially became a federal contaminated site (CIRNAC, April 2018).

Federal contaminated sites must be managed in accordance with Canada's Treasury Board Policy on Management of Real Property (2006). This requires that federal real property be managed in a sustainable and financially responsible manner. The policy includes requirements to identify and manage site contamination including:

"6.1.12 Known and suspected contaminated sites are assessed and classified and risk management principles are applied to determine the most appropriate and cost-effective course of action for each site. Priority must be given to sites posing the highest human health and ecological risks. Management activities (including remediation) must be undertaken to the extent required for current or intended federal use. These activities must be guided by standards endorsed by the Canadian Council of Ministers of the Environment (CCME) or similar standards or requirements that may be applicable abroad. The costs of managing contamination caused by others must be recovered, when this is economically feasible.

6.1.13 The contamination of real property or negative impacts on the environment through the use or permitted third-party use of real property is avoided. In the event of contamination, immediate and reasonable action must be taken to protect the health and safety of persons and the environment, prior to assessing a future course of action."

For contaminated sites, this policy framework is supported by the Federal Contaminated Sites Action Plan (FCSAP) and now the Northern Abandoned Mine Reclamation Program (NAMRP), which provide departments with funding for, and guidance on, site assessment, remediation, and long-term monitoring.

1.4 Current funding processes

The Giant Mine Remediation Project was funded through the Federal Contaminated Sites Action Plan (FCSAP) from 2005 to 2019. FCSAP was a 15-year, \$4.54 billion program established by the Government of Canada and managed by the Treasury Board Secretariat and Environment Canada. The primary aim of the FCSAP program was to complete the assessment, remediation, and risk management of the highest-risk federal contaminated sites which consisted of 6,000 sites funded by the program, including Giant Mine.

In 2019, the Federal Government announced a long term plan for the remediation of contaminated sites under the Northern Abandoned Mine Reclamation Program (NAMRP). The NAMRP seeks to address the risks associated with the eight largest abandoned mines in the Yukon and the Northwest Territories, including the Giant Mine Remediation Project. Over 15 years, beginning in 2020/21, the NAMRP has been approved funding of \$2.2 billion, a portion of which will cover the implementation of the remediation phase at Giant Mine.

With respect to post-closure, the Giant Mine Remediation Project will need to revisit the funding process once the remediation is nearing completion and a more accurate estimate of the long term costs of site management and monitoring can be developed. Within the current understanding of the government funding process, the Northern Contaminated Sites Branch will undertake discussions on options for ongoing long term funding of the Giant Mine Site in approximately 10 years. The Northern Contaminated Sites Branch is responsible for securing funding for a portfolio of projects in the North, including Giant Mine, and will engage the appropriate Government of Canada officials on the long-term funding of the Giant Mine Site.

1.5 Assumptions

During the course of conducting the review of long-term funding options for the Giant Mine Remediation Project, Deloitte used the following assumptions:

- the Giant Mine Remediation Project will proceed as an interim solution for a maximum of 100 years;
- the liability of the Giant Mine site will fall under the jurisdiction of the Federal Government for the duration of the remediation project;
- funding options need to address the post-closure phase; and,
- funding for the Project will be entirely provided by government entities.

Assumptions made in calculating cost estimates for the Giant Mine Remediation Project are explained in detail in Section 4.3. In discussions with the Measure 6 Working Group including members of the Giant Mine Oversight Board, we examined these assumptions. We note that they are consistent with the conclusions of the Mackenzie Valley Environmental Impact Review Board report (June 2013) which states that “the Developer of this Project is the Giant Mine Remediation Directorate and is led by Aboriginal Affairs and Northern Development Canada (AANDC) and the Government of the Northwest Territories (GNWT).” It is within this context that Measure 6 of the Report of Environmental Assessment, and hence this report to support Measure 6, should be considered.

The current estimates of costs associated with the Giant Mine Remediation Project are based on high level estimates provided by the Project team. Deloitte did not audit these estimates and notes that there is uncertainty associated with them, as with all long-term estimates of this nature. In particular, due to the location of the Giant Mine site in Canada's north, climate change may affect both the nature and the cost of remediation activities. Other factors that have the potential to influence expected costs associated with this Project include changes in available technology or in technical regulatory standards for contaminated site management. We have not attempted to predict the annual post-closure costs as this was not part of the scope of this report. Section 4 of this report uses a value of approximately \$6 million annually in order to understand what total management costs associated with some of the long term funding options may be. The post-closure cost estimates are expected to be further refined in future work on the Giant Mine Remediation Project.

Within the various long term funding options considered by this report, many different types of delivery models can be used. This report does not limit the use of different delivery models to particular funding scenarios, and where possible indicates in the case studies considered what options have been used previously, such as a federal agency, within the government funding category or a government-owned-company-operated (GOCO) model, within the public-private partnership category.

2.0 Perspectives from project stakeholders

The remediation of Giant Mine is an extensive effort that has the potential to affect the health, safety, and livelihoods of stakeholder groups in surrounding areas, including residents of Yellowknife and local First Nations. The inclusion and consideration of stakeholder viewpoints is necessary to provide a balanced and well-considered perspective on the possible financing approaches for the Giant Mine remediation.

This analysis of long-term funding options takes into consideration project stakeholders' perspectives and concerns raised through previous reports focused on the remediation of Giant Mine and through further stakeholder discussions conducted during the course of this engagement. Concerns presented to date include:

- a) Security of funding:** The duration of the Giant Mine remediation project has been revised to a 100-year timeframe, excluding ongoing and perpetual requirements to maintain the Giant Mine Site (Review Board, June 2013). Given that the funding will be publicly-sourced, concerns have been raised that changes to governmental policy could impact the ability to continually fund the ongoing care requirements of the site. Possible long-term funding options will have to be viable for the entire duration of the remediation project, including long term monitoring of the site, and protected from shifts in public spending policy and economic downturns.
- b) Contingency/emergency funding:** Concerns have been raised regarding the ability of a selected funding option to account for unforeseen circumstances and uncertainties during the lifecycle of the remediation plan in case the costs of remediation suddenly increase. The selected funding option will ideally be flexible enough to adjust the funding outside an annual budget cycle.
- c) Governance and transparency:** Stakeholders desire a transparent and inclusive process by which local communities, third party experts, and interest groups are involved in the funding and decision-making process for Giant Mine.
- d) Management and cost-effectiveness:** The long-term funding options will have to comply with CIRNAC's commitment "to managing contaminated sites in a cost-effective and consistent manner, to reduce and eliminate, where possible, risk to human and environmental health and liability associated with contaminated sites" (CIRNAC, September 2010).

In order to address these concerns, this report considers a set of long-term funding option criteria to ensure stakeholder concerns are reflected in the analysis. These criteria were discussed during a series of conference calls with the Giant Mine Remediation Project's Measure 6 Subcommittee working group, which includes representatives from the Giant Mine Oversight Board, the Yellowknives Dene First Nation, and Alternatives North. **Table 1** below demonstrates how each evaluation criteria reflects a specific concern.

Table 1: Evaluation criteria rationale

Stakeholder concerns	Evaluation criteria	How criteria addresses concern
Security of funding	Duration	Funding can be allocated for the full life cycle of the site.
	Stability	Funding is protected against swings in the economy and shifts in policy.
Contingency/emergency funding	Flexibility	Allows for the ability to lapse, re-profile, or re-allocate funds outside of an annual budget cycle, which will assist in managing uncertainties during project implementation or allocating funding in the event of emergency or other unforeseen circumstance.
Governance and transparency	Stakeholder involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.
	Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.
	Independence	Decision-making process for management and expenditure of existing funding is independent of influence from other priorities.
Management and cost-effectiveness	Managing and reporting efficiency	Optimize the resources required to seek, manage and report on funding.
	Public sector funded	Funding provided by the public sector in absence of any other source of funds.

These criteria were developed in discussion with the Giant Mine Measure 6 Subcommittee to align with prior discussions and previous work on this subject. These criteria are used to assess the various options for long term funding to understand what aspects could be useful for the Giant Mine Remediation Project. The analysis conducted did not weight or score these options, or attempt to provide a final recommendation. Rather the approach was to understand holistically how well certain options could apply to the Giant Mine remediation. For example, given the significant uncertainty associated with costs over the long term, as well as some degree of uncertainty year-to-year, the Project will require considerable flexibility in the overall amount of funding. Similarly, as for the foreseeable

future the vast majority of funding will come from the Federal Government, the option needs to be compatible with being public sector funded (i.e., does not require private funding sources). This does not mean that this analysis screened out examples that were privately funded; rather that the application of an option with private funding would need to take this into consideration and understand the potential compatibility with Giant Mine. Lastly, some of the funds subject to market volatility examined in this study had, and exercised, the option to withhold programmatic spending during economic downturns. As this would not be possible within the Giant Mine Remediation Project context, where annual spending is required to manage ongoing operations and to protect human and environmental health and safety, it is critical to understand the relative stability of the solutions presented in order to manage such risks.

3.0 Potential options and case studies examined

Potential options

In considering the long-term funding options for the Giant Mine Remediation Project, Section 3 examines both existing solutions to contaminated site remediation funding as well as novel or alternative funding mechanisms used elsewhere. To understand the applicability and relevance of the various options, we use the lens of the criteria described in Table 1. While few criteria are decisively met or not-met by a particular option, they inform our discussion of the relevance of that option. For example, an option that involves third-party management of funds will have nuanced advantages and disadvantages associated with this, depending on the specific circumstances. Our discussion attempts to identify the most relevant aspects of each feature of the various options for Giant Mine. Drawing upon previous reports on the Giant Mine specifically, and contaminated sites more generally, as well as stakeholder suggestions, the discussion of case studies also looks beyond examples from the mining industry and other extractive industries both domestically and internationally to include case studies illustrating the following options:

1. Government appropriations;
2. Public sector trust funds;
3. Private sector trust funds;
4. Public-private partnerships; and,
5. Hybrid funding approach.

Case studies

Section 3 presents fifteen case studies covering the above funding options (see Figure 1 below for geographic location of each case study). Some of the case studies researched for this report were also analyzed in depth in previous reports. Several of the case studies, particularly the examples of pension and endowment funds, were specific suggestions from the Measure 6 working group. As the intention of this report is not to re-perform research that has already been conducted, this section looks to identify the most pertinent case studies in the context of Giant Mine. The most relevant case studies for each of the funding options are discussed in the body of the report. All other case studies are included in Appendix A. As part of the discussions with the Measure 6 working group, we were asked to describe the “enablers” and “inhibitors” of each case study that informs their overall relevance. These are described in Table 2 below.

Figure 1: Map of case studies considered

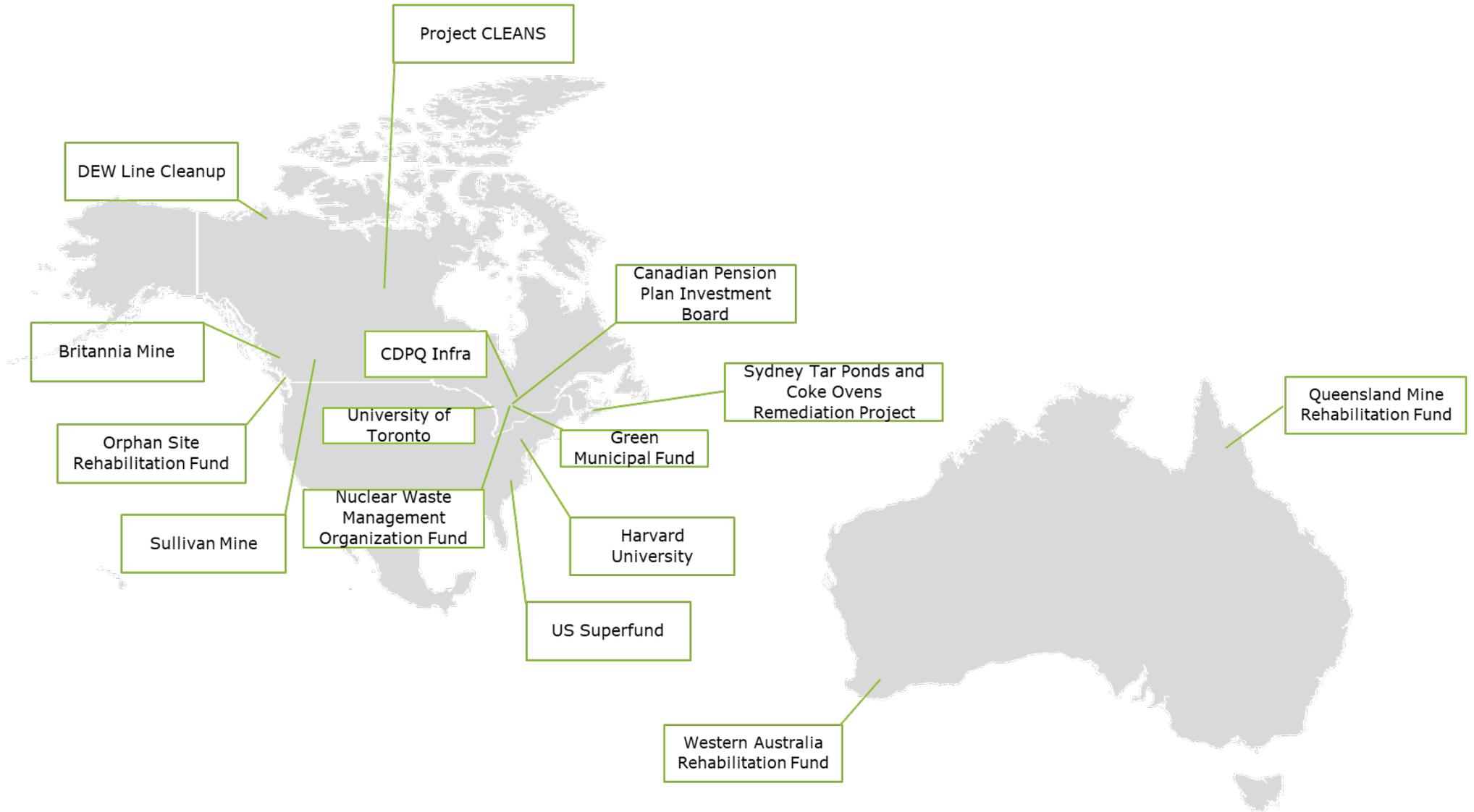


Table 2 below lists the fifteen case studies researched for this report and outlines the potential enablers and inhibitors with regards to their applicability to Giant Mine.

Table 2: Matrix of case study funds researched

Example	Description	Funding Type	Enablers	Inhibitors	Relevance
Green Municipal Fund	A public-sector trust fund established by the Government of Canada to provide long-term sustainable financing for municipal governments	Up-front multi-year funding / Public-sector trust fund	<ul style="list-style-type: none"> • Funding in perpetuity • Funding adjusted annually • Comparable level of funding (\$550 million) 	<ul style="list-style-type: none"> • Requires coordination with private sector • Used to facilitate a transfer of funds between different levels of government, i.e., between the federal and municipal governments 	<p>The Green Municipal Fund is a public-sector trust fund, with stable and long-term financing for its beneficiaries.</p> <p>Relevance: High</p>
Sydney Tar Ponds and Coke Ovens Remediation Project	A cost-share agreement lasting 10 years jointly funded by the federal government of Canada and the provincial government of Nova Scotia (PPPC, July 2014)	Government Appropriations	<ul style="list-style-type: none"> • A cost-share agreement ensures stable funding over the span of 10 years • A federal oversight committee provided independent management of the Project • The creation of a Community Liaison Committee involved stakeholders and represented community issues 	<ul style="list-style-type: none"> • Ownership and responsibility of long-term management and monitoring of the site transferred to provincial government in 2014 • Fixed-term of 10 years of funding does not account for any longer term remediation costs 	<p>The Sydney Tar Ponds and Coke Ovens Remediation Project was funded jointly by federal and provincial appropriations through a cost-share agreement.</p> <p>Relevance: High</p>

Example	Description	Funding Type	Enablers	Inhibitors	Relevance
The Cleanup of Abandoned Northern Sites (Project CLEANs)	Jointly funded by governments of Saskatchewan and Canada and managed by Saskatchewan Research Council (NRC)	Government Appropriations and Private-Sector Trust Fund	<ul style="list-style-type: none"> Public funding ensures long-term interest in site remediation Operational and project execution risks are transferred to SRC Includes a privately funded trust held for unforeseen future events 	<ul style="list-style-type: none"> Used to facilitate transfer of payments between the federal and provincial governments 	<p>Project CLEANs is a relevant application of the usage of public funds to remediate a complex contaminated site over the long-term.</p> <p>Relevance: High</p>
Britannia Mine	Funded jointly by private industry and the British Columbia (BC) provincial government. Remediation was provided by EPCOR Water Services through Partnerships BC	Public-Private Partnership	<ul style="list-style-type: none"> Operational and project execution risks were transferred from the provincial government to the private entity implementing remediation services Use of a private partner maintains independence from competing government interests, possibly allowing for more efficient management of funds 	<ul style="list-style-type: none"> Corporations that provided funding were absolved of all future liability, reducing long-term interest in remediation 	<p>The Britannia Mine is of medium relevance in the context of Giant Mine. It provides medium-term, stable funding, however, this case required significant time and resources to develop a relationship with a private sector partner.</p> <p>Relevance: Medium</p>

Example	Description	Funding Type	Enablers	Inhibitors	Relevance
Sullivan Mine¹	Jointly funded by Teck Resources, BC Innovative Clean Energy (ICE) Fund, and a loan to the City of Kimberly (Natural Resources Canada)	Public-Private Partnership	<ul style="list-style-type: none"> All expenses are recoverable through the generation of solar power on the remediation site, allowing greater flexibility in procuring funds 	<ul style="list-style-type: none"> Requires coordination with a large variety of stakeholders, including a majority vote of city residents Remediation site is conducive to solar energy, a recoverable revenue stream 	<p>The Sullivan Mine is of medium relevance in the context of Giant Mine. It provides long-term, stable funding. However, this case required significant coordination with local stakeholders for its implementation and included the potential for revenue generation</p> <p>Relevance: Medium</p>
DEW Line Cleanup	Funded by public monies, managed by the Department of National Defence (Department of National Defence, 2008)	Government Appropriations	<ul style="list-style-type: none"> Public funding ensures stable, long-term funding for site remediation Comparable level of funding (\$575 million) 	<ul style="list-style-type: none"> Challenges in stewardship, accountability, and fund management due to size, complexity, and geographic dispersion of sites. 	<p>The DEW Line Cleanup has low relevance in the context of Giant Mine as it relies on the transfer of payments from the Department of National Defence for funding.</p> <p>Relevance: Low</p>

¹ See Appendix A for further details on the Sullivan Mine

Example	Description	Funding Type	Enablers	Inhibitors	Relevance
US Superfund	Initially funded by industry, funding has been primarily through tax-payer dollars after the industry levy fund was exhausted	Private-Sector Trust Fund	<ul style="list-style-type: none"> The United States Environmental Protection Agency holds complete accountability for management and allocation of funds. Very high level of funding (\$1.1 billion annually) 	<ul style="list-style-type: none"> Funded through private industry levies Changes in government policy and priorities affects the amount of money provided to the fund 	<p>The US Superfund has low relevance in the context of Giant Mine as it was a private-sector trust fund initially funded through a polluter tax.</p> <p>Relevance: Low</p>
British Columbia Oil and Gas Commission: Orphan Site Rehabilitation Fund	Funded by levies from the oil and gas industry in British Columbia	Private-Sector Trust Fund	<ul style="list-style-type: none"> Maintains independence as the fund is managed by another division within the BCOGC during the lifetime of a site remediation 	<ul style="list-style-type: none"> Funded by private sector Fixed annual levy does not provide flexibility for a sudden increase in the number of orphan sites (e.g., when decommissioning of Terra Energy Corp increased the number of orphan sites from 45 to 175 sites in 2017) 	<p>The Orphan Site Rehabilitation Fund has low relevance in the context of Giant Mine due to its reliance on a private industry levy.</p> <p>Relevance: Low</p>
Nuclear Waste Management Organization Fund	Annual deposits paid into individual trust funds by nuclear energy corporations in Canada (Nuclear Waste Management Organization, 2018)	Private-Sector Trust Fund	<ul style="list-style-type: none"> Governance under the Nuclear Fuel Waste Act ensures enforceability of fund dispersion and management Stable long-term cash flow 	<ul style="list-style-type: none"> Entirely privately funded 	<p>The Nuclear Waste Management Organization Fund has low relevance in the context of Giant Mine due to its reliance on a private industry levy.</p> <p>Relevance: Low</p>

Example	Description	Funding Type	Enablers	Inhibitors	Relevance
Western Australia Rehabilitation Fund²	Annual contributions from tenement holders (Government of Western Australia, 2017)	Private-Sector Trust Fund	<ul style="list-style-type: none"> Funding protected against changes in government policy Use of the “polluter pays” principle can encourage greater participation of tenement holders in progressive remediation 	<ul style="list-style-type: none"> Funding dependent on ability of stakeholders to pay Inconsistent reporting on funding and remediation data 	<p>The Western Australia Rehabilitation Fund has low relevance in the context of Giant Mine due to its reliance on a private industry levy.</p> <p>Relevance: Low</p>
Queensland Mine Rehabilitation Fund	Annual levy from resource companies, with level of contribution varying depending on assessed risk (Queensland Government, 2017)	Private-Sector Trust Fund	<ul style="list-style-type: none"> Funding protected against changes in government policy Use of the “polluter pays” principle by mandating mine operators to contribute to the fund can encourage greater participation in progressive remediation. Use of financial sureties to provide protection against defaults 	<ul style="list-style-type: none"> Inconsistent reporting on funding and remediation data Requires agreement across a broad spectrum of public and private sector entities 	<p>The Queensland Mine Rehabilitation Fund has low relevance in the context of Giant Mine due to its reliance on a private industry levy.</p> <p>Relevance: Low</p>

² See Appendix A for further details on the Western Australia Rehabilitation Fund

Example	Description	Funding Type	Enablers	Inhibitors	Relevance
University of Toronto	Canada's largest university endowment fund, financed by individual contributions to the fund (University of Toronto, 2017).	University Endowment	<ul style="list-style-type: none"> Long-term investment horizon Invests 98% of fund in long-term capital projects 	<ul style="list-style-type: none"> Partially government and privately funded Subject to market volatility that can preclude disbursements in any given year 	<p>The University of Toronto endowment fund includes private sources of funding and has the flexibility not to provide disbursements in years with poor market performance.</p> <p>Relevance: Low</p>
Harvard University	World's largest university endowment fund, funded by individual contributions to the fund. Managed by the independent Harvard Management Company (Harvard University, 2018)	University Endowment	<ul style="list-style-type: none"> Long-term investment horizon Independent management company 	<ul style="list-style-type: none"> Entirely privately funded Fund allocation occurs within an annual budget cycle Subject to economic volatility 	<p>The Harvard University endowment fund is entirely privately funded and exists to provide economic returns rather than fund projects.</p> <p>Relevance: Low</p>
Caisse de dépôt et placement du Québec Infra	Funds and implements government-sanctioned major public infrastructure projects in Canada (CDPQ, 2018)	Pension Fund/ Superannuation Fund	<ul style="list-style-type: none"> Stable long-term cash flow Public institution that returns benefit to Quebec 	<ul style="list-style-type: none"> Entirely privately funded Only undertakes projects with potential to generate returns Subject to inflation and changes in economic policy 	<p>The Caisse de depot et placement du Quebec pension fund is entirely privately funded and is subject to economic volatility and risk.</p> <p>Relevance: Low</p>

Example	Description	Funding Type	Enablers	Inhibitors	Relevance
Canada Pension Plan Investment Board	Invests in large-scale infrastructure businesses that provide essential services (CPPIB)	Pension Fund/ Superannuation Fund	<ul style="list-style-type: none"> • Stable long-term cash flow • Scale of investments ranges from \$500 million to several billion dollars 	<ul style="list-style-type: none"> • Entirely privately funded • Subject to inflation and changes in economic policy • Industry focus is on regulated networks, transportation, and energy • Little involvement of stakeholders in funding allocation process 	The Canada Pension Plan Investment Board pension fund is entirely privately funded and is subject to economic volatility and risk. Relevance: Low

3.1 Government funding through appropriations

The funding that is currently provided to the Giant Mine Remediation Project through FCSAP, and NAMRP beginning in 2020/21, follows the Government of Canada's annual appropriation process. This process begins with internal departmental planning and review that ultimately requires ministerial approval for initiatives. Once this is obtained, Cabinet approval is sought via a Memorandum to Cabinet (MC). In the rare case that an MC is not approved, it is sent back to the department to be refined. Once approved, funding is secured through a Treasury Board Submission. Treasury Board Submissions seek spending authority from Treasury Board ministers to carry out initiatives that have been approved by Cabinet. This funding can come from the Budget, existing government funds (known as the fiscal framework), internal reallocation or other means. It typically takes two to three months for a Treasury Board Submission to go from initial draft to approval (Scratch, 2008). Parliament's Estimates process grants the approval for the funds to flow to the department via the tabling of an Appropriation Bill. Funding can also be established as a rolling multi-year program through a Cabinet submission by one or more department(s) with a defined beginning but no end date.

Federal Contaminated Sites Action Plan

The Federal Contaminated Sites Action Plan (FCSAP) was a 15-year program the Government of Canada established in 2005. The program helped federal departments, agencies, and Crown corporations responsible for federal contaminated sites undertake remediation activities. Phases I and II of FCSAP (from 2005 to 2016) funded \$2.21 billion of remediation activities. CIRNAC and the Department of National Defence were responsible for most of the FCSAP projects that have planned project costs greater than \$10 million, many of which are located in the North.³

FCSAP Phase III invested \$1.35 billion over four years, including \$1.25 billion for remediation activities on the highest priority federal contaminated sites, including Giant Mine. Going forward, the Northern Abandoned Mine Reclamation Program (NAMRP) has been approved for \$2.2 billion funding for sites including Giant. The FCSAP program and NAMRP represent one approach to government funding. Below we examine government funded remediation programs that use alternative approaches in order to identify if there are superior options available.

Case Study: Sydney Tar Ponds and Coke Ovens Remediation Project

Background

The Sydney Tar Ponds site is located in the municipality of Sydney, Nova Scotia. The contamination at the site comes from the steel-making industry that operated in the vicinity until 1967 and affects more than 25,000 residents who live in the site's surrounding communities. In 1967, the Nova Scotia government assumed liability of the site when it bought the steel-making operations in the area.

From 1968 to 1973, the Federal Government, through the Cape Breton Development Corporation (a federal Crown corporation) owned and operated coke ovens in Sydney for which it assumed responsibility for the liability and cleanup. Over the years, the Sydney municipal landfill area also contributed contamination to the site. Contaminants found within and surrounding the areas include heavy metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), and raw sewage (Public Services and Procurement Canada, 2014).

³ Please note that estimating the costs associated with departmental funding requests, particularly as they are performed in aggregate with many departmental activities, is beyond the scope of this analysis.

Funding

The Sydney Tar Ponds and Coke Ovens Remediation Project (STPCORP) was a \$397.7 million remediation project jointly funded by the Federal Government of Canada and the Province of Nova Scotia. To achieve this, a Cost-Share Agreement between the two parties was established to remediate one of Canada's most contaminated sites (Public Services and Procurement Canada, 2014). The STPCORP spanned a period of ten years (2004-14) and was established in a Cost-Share Agreement, of which the Federal Government committed \$277.7 million and the provincial government \$120 million (Public Services and Procurement Canada, 2014). While the liability of the STPCORP fell entirely under the Federal Government, the remediation project was jointly funded and overseen by the federal and provincial governments. In 2004, Nova Scotia established the Sydney Tar Ponds Agency (STPA) to manage and implement the project.

Relevance

As the STPCORP's liability falls under the Federal Government, it can provide relevant insight into the design of Giant Mine's remediation and other large remediation projects which the government will be managing. Although the timescale of the STPCORP is significantly shorter than that of Giant Mine, this case study demonstrates how a cost-share agreement can facilitate funding being provided by different levels of government. Public Works and Government Services Canada (PWGSC) was tasked with ensuring that the project was delivered on time, on budget, and within scope. To carry out this role, PWGSC was provided with funding for the federal share of project implementation (remediation, and related costs) and for project oversight. The STPA was accountable to the Project Management Committee (co-chaired by federal and provincial representatives), which had ultimate decision-making authority for the project. The Operational Advisory Committee (overseeing implementation), Environmental Management Committee (advising on environmental issues), and the Community Liaison Committee (representing community issues) all reported to the Project Management Committee.

A 2014 evaluation of the project conducted by the Office of Audit and Evaluation of Public Works and Government Services Canada (PWSC, 2014) found that the remediation activities were completed on time and within the scope of the original budget. In addition, the project was found to have met socioeconomic benefit objectives particularly with respect to First Nations.

Case Study: Project CLEANS

Background

Project CLEANS is the ongoing remediation of the Gunnar Uranium Mine and Mill Site, Lorado Uranium Mill Site, and 35 other Satellite Mine Sites in northern Saskatchewan. The Government of Canada, represented by Natural Resources Canada signed a cost-share agreement to remediate the sites, with an estimated cost of \$47.9 million over a period of 17 years (Natural Resources Canada). As the property owner, the Province of Saskatchewan holds primary operational and legal liability for the project. The project is divided into three phases, with funding for the project allocated at the beginning of each phase. Project CLEANS is independently managed by the Saskatchewan Research Council (SRC), a provincial Crown corporation.

Funding

In 2007, the Federal Government of Canada entered an agreement with the Province of Saskatchewan to provide \$24.6 million to remediate 37 sites in Northern Saskatchewan. The funding increased to \$47.9 million in 2008 when the Lorado Mill site, the largest site

in Project CLEANS, was added to the project. In 2011, the Province of Saskatchewan put forth an additional \$36.2 million to the project, upon the identification of additional remediation work by the SRC and to address unforeseen project costs. The Federal Government of Canada funds the Province of Saskatchewan through annual transfer payments. The Province of Saskatchewan then pays SRC for costs associated with project management. The final liability for site maintenance will pass to the Province of Saskatchewan upon project completion under the Institutional Control Program (ICP) (Saskatchewan Research Council, 2014). The ICP includes a small, privately funded Monitoring and Maintenance Fund, which is used to fund long-term monitoring and maintenance, and an Unforeseen Events Fund, which provides funds for unexpected future events, very similar to the Pooled Funds example given in Section 3.2.2.1.

Relevance

While the liability of Project CLEANS falls under the provincial government and both the funding amount and timeframe is significantly lower than that of Giant Mine, this case study is a relevant application of the use of public funds to remediate a complex contaminated site. The funding agreement provides assurance that the funding will be available for the duration of the project lifecycle.

An overview of the evaluation of government appropriations as applied to the case of Giant Mine is presented in **Table 3** below:

Table 3: Evaluation of government appropriations

Evaluation Criteria	Description	Evaluation of Government Appropriations	Met?
Duration	Funding can be allocated for the full life cycle of site.	This criterion is met as, subject to Cabinet approval, government appropriations can be provided over multi-year timeframes that could account for the full life cycle.	✓
Public sector funded	Funding is derived from public sector.	This criterion is met as government appropriations are entirely publicly funded.	✓
Stability	Funding is protected against swings in the economy and shifts in policy.	This criterion is not met as, while the likelihood is low, government programs can be changed at any time to reflect changes in government policy.	
Flexibility	Allows for the ability to lapse, re-profile, or re-allocate funds outside of an annual budget cycle, which will assist in managing uncertainties during project implementation allocating funding in the event of emergency or other unforeseen circumstance.	This criterion is met as rolling multi-year programs are re-evaluated on an annual basis. Also the Supplementary Estimates process grants government appropriations the funds required to move forward in the event of unforeseen circumstances.	✓

Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	This criterion is met as government appropriations can be established with governance and project management structures that can efficiently manage and report on funding (e.g., FCSAP, STPCORP).	✓
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	This criterion is not met as, while stakeholders can be engaged and the resulting feedback built into the decision making process, they are not directly involved in funding decisions.	
Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.	This criterion is met as programs funded through government appropriations are managed through a well-documented and rigorous accountability framework.	✓
Independence	Decision-making process for management and expenditure of existing funding is independent of influence from other priorities.	This criterion is not met as there is a possibility of competing federal priorities with programs funded through government appropriations.	

Summary

If government appropriations through a program similar to FCSAP or NAMRP can be continued, it could be tailored to provide a stable source of funding for the Giant Mine Remediation Project. This option may be advantageous in terms of governance and implementation – as there is already precedent for program management and reporting requirements. Given the scale and duration of the remediation required, the program could be specific to Giant Mine and reflect its particular requirements, such as a rolling multi-year program designed to provide ongoing, long-term funding for water treatment and monitoring after the major reclamation activities were complete.

As noted in Table 3, the Supplementary Estimates process grants government appropriations the funds required to move forward in the event of an unforeseen circumstance outside of the regular budgeting cycle. FCSAP's public annual reports indicate that unspent funds can be brought forward for remediation activities in future years through:

- government re-profiling, approved by Treasury Board;
- carry-forward processes, which require internal approval from the custodian's finance group; or
- cash-management processes, which involve the custodian lending the unspent funds to another part of the organization, with the commitment that the funds be returned in the next fiscal year.

It is further noted that "these processes allow custodians flexibility in response to unpredictable circumstances, such as weather, that may affect expenditures on FCSAP-eligible sites" (FCSAP, 2015). For example, in 2015–2016, 72% of the FCSAP funding variance was re-profiled, 19% was carried forward, 6% was internally cash-managed and 3% was lapsed.

There is flexibility in the appropriation process to build in some of the considerations required for the Giant Mine Remediation Process. Government appropriations can be modified to account for multi-year funding through the Supplementary Estimates process up to three times a year in the event that short-falls in annual Federal Government funding has led to gaps in maintaining the site or meeting environmental and human health and safety objectives. The agency model used, for example in the Sydney Tar Ponds case study, demonstrates some of the flexibility contained within the government appropriation funding option. In that example, it facilitated collaboration, both financial and managerial, between the two governments involved, while continuing to be led and funded primarily by the Federal Government. In particular, given the uncertainties described in section 1.2 (e.g., climate change, technological innovation) any large change in the annual costs to maintain Giant Mine outside the scope of what has already been budgeted, would require a return to the original source of funding (i.e., the Federal Government).

We note that the Federal budget is prepared annually and that Parliament does not grant government permanent rights to spend money. In particular, the Office of the Auditor General of Canada's report *Placing the Public's Money Beyond Parliament's Reach* (2002) concludes that "advance funding also limits the flexibility of future parliaments and governments to respond to changing circumstances and priorities." Thus, as the Review Board report identifies that "parties and members of the public are concerned with having to rely on future governments to ensure that the Project has sufficient funds to keep people and the environment safe," these concerns need to be balanced with the needs of future Canadians, acknowledging, however, that the Government of Canada is bound by its own policy on real property "to protect the health and safety of persons and the environment" (see Section 1.3).

With regard stakeholder involvement, the House of Commons Standing Committee on Finance conducts pre-budget consultations from all Canadians (individuals or groups) that are tabled in the House of Commons in December and considered by the Minister of Finance as the federal budget is developed. More specifically, this Project is bound by the Giant Mine Remediation Project Environmental Agreement between the Government of Canada, the Government of the Northwest Territories, the Yellowknives Dene First Nation, the City of Yellowknife, Alternatives North, and the North Slave Metis Alliance. This agreement was established to facilitate collaboration among the parties for the remediation of the Giant Mine as well as provide for an independent oversight body (Giant Mine Oversight Body) providing a robust and enduring framework for specific stakeholder engagement.

3.2 Trust funds

Section 3.2 addresses a requirement in Measure 6, which establishes that the Developer will investigate long-term funding options for the ongoing maintenance of the Project and for contingencies, including a trust fund with multi-year up front funding. A trust fund is a financial vehicle that can be seeded from public government funds, or private funds from industry, levies, and/or non-governmental organizations. A trust agreement, in the form of a contract that defines the beneficiaries and parties involved, the powers and limitations of the trustees, and their reporting requirements, is required to establish a trust. The source of funding, referred to as settlor of the trust, provides funds to the trustee, typically a financial institution. The trustee is responsible for managing and disbursing trust funds to the beneficiaries. A trust allows its beneficiaries to either draw down any fund immediately or over an allocated period (Department of Finance Canada, 2012).

3.2.1 Public sector trust funds

A public sector trust fund is a financial vehicle used by the Government of Canada to provide funding to provinces and territories. The trust provides flexibility to the provinces or territory to either draw down any fund immediately or over an allocated period.

The trust is established through a trust agreement. As the settlor of the agreement, the Government of Canada provides funds to a financial institution (the trustee) who is responsible for setting up the trust account, receiving, managing, and disbursing the funds in accord with the terms of the trust or as directed by the beneficiaries (the provinces and territories).

Trusts have been established for a minimum of two years. The Government of Canada establishes a notional allocation profile for the lifespan of the trust, although beneficiaries maintain full flexibility over fund withdrawals over the lifespan of the trust. Government trusts in Canada involve the transfer of money between government departments and across different levels of government; they are typically used to finance short-term provincial priorities. Providing funding for more than five years is generally avoided to minimize risk in how funds are managed and spent against government priorities (Office of the Auditor General of Canada, 2008). With regard to transfer and management of funds, the government provides a lump sum amount to a third-party financial institution, for the use of an entity other than the Federal Government.

While most Federal Government trust funds operate for 2-5 years maximum, there are several examples of long term upfront multi-year funding being provided to initiatives that serve to provide financial support to a large number of beneficiaries (e.g., Green Municipal Fund, Sustainable Development Technology Canada). The example of the Green Municipal Fund is described below.

Case Study: Green Municipal Fund

Background

The Green Municipal Fund (GMF) was created by the Government of Canada to encourage investment in environmental municipal infrastructure. The objective of the fund is to improve the quality of life and health of Canadians through reducing greenhouse gas emissions, improving local air, water and soil quality and promoting renewable energy by supporting environmental studies and projects led by Canadian municipalities (Federation of Canadian Municipalities, 2018).

Funding

The GMF is a public-sector trust fund established by the Government of Canada (represented by Natural Resources Canada and Environment Canada) that endowed the Federation of Canadian Municipalities (FCM) with \$550 million to provide long-term sustainable financing for municipal governments and their partners. The GMF is a notable exception to most public sector trust funds in that it is funded into perpetuity. An additional \$125 million top-up to this endowment was also announced in Budget 2016 and was added to the Fund in 2017-18 (Federation of Canadian Municipalities, 2018). The amount of financing available to municipalities is directly related to the environmental, economic and social benefits of the projects undertaken. Grants of up to 50% to a maximum of \$175,000 are available for plans, studies and field tests. GMF can provide below-market financing for infrastructure projects up to 80% of costs to a maximum of \$10 million in loans combined with up to \$1 million in grants (up to a maximum of 20% of the loan amount) per project. Brownfield projects are eligible for below-market loans only, with no funding limit (Federation of Canadian Municipalities, 2018).

One significant difference between the Green Municipal Fund and the typical trust fund model is that GMF is a revolving fund in that it uses the bulk of its capital to not only provide grants but also to provide loans to municipalities in order to fund infrastructure projects. As such, the GMF is able to generate returns not only from market investments but also from the loans it provides.

Under the GMF agreement, the Government of Canada oversees the fund along with representatives from the public and private sectors, including municipal officials and technical experts, through a Peer Review Committee and an Advisory Council. The FCM manages the fund as a third party and approves projects based on the Council's recommendations.

Relevance

The GMF demonstrates the value and security that a long-term publicly-financed fund provides to its beneficiaries. The fund also is designed with flexibility to adjust the level of financing on an annual basis if the need arises. Notably, the GMF is a revolving fund where much of the fund's capital is loaned out at any given time to municipal projects. This is also where much of the fund's return is generated and hence very different from a trust fund to provide security against a mine's reclamation.

It must also be noted that unlike the Giant Mine Remediation Project, the beneficiary of this fund is a non-governmental organization, which develops partnerships with municipalities and the private sector to manage and implement projects that have a social and/or environmental impact. This type of funding mechanism is inconsistent with a long-term remediation project where the Federal Government holds the liability and is charged with executing the clean-up.

An overview of the evaluation of public sector trust funds as applied to the case of Giant Mine is presented in **Table 4** below:

Table 4: Evaluation of public sector trust funds

Evaluation Criteria	Description	Evaluation of Public-Sector Trust Funds	Met?
Duration	Funding can be allocated for the full life cycle of site.	This criterion is met as public sector trust funds, while they typically operate for 2-5 years, can be established in perpetuity (e.g., GMF)	✓
Public sector funded	Funding is derived from public sector.	This criterion is met as public sector trust funds are government funded.	✓
Stability / Security	Funding is protected against swings in the economy and shifts in policy.	This criterion is not met as the level of funding can be subject to government priorities and exposed to inflation risks or to swings in the economy.	
Flexibility / Contingency	Allows for the ability to lapse, re-profile, or re-allocate funds outside of	This criterion is met as, while funding is typically allocated into the trust on an annual cycle,	✓

	an annual budget cycle, which will assist in managing uncertainties during project implementation allocating funding in the event of emergency or other unforeseen circumstance.	dispersals from the trust can be made on a case-by-case basis potentially including in response to unforeseen circumstances.	
Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	This criterion is not met as additional costs are incurred with a third-party financial institution managing the fund, without necessarily improving upon public reporting or transparency.	
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	This criterion is met as a stakeholder engagement process can be established in the trust agreement along with governance structures providing involvement in the budget allocation process.	✓
Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.	This criterion is met as a specific entity is defined in the trust contract with the responsibility of managing the fund.	✓
Independence	Decision-making process for management and expenditure of existing funding is independent of influence from other priorities.	This criterion is met as public sector trust funds are typically managed by a third party institution, creating independence from funding priorities.	✓

Summary

As noted on the Government of Canada’s Department of Finance website “a third-party trust fund is a financial vehicle used by the Government of Canada to provide funding to provinces and territories.” While this model provides beneficiaries the flexibility to draw down allocated funds as needed, it also requires the introduction of a third party financial institution to manage and disperse the funds to the beneficiaries. This adds an additional layer of contractual and administrative fees, reducing the cost effectiveness of this option. Thus, the advantages of flexible transfer payments typically made to multiple beneficiaries (e.g., provinces and territories) must outweigh the additional costs associated with this option. As the Giant Mine Remediation Project is a single remediation project being funded directly by the Federal Government of Canada, there do not appear to be clear advantages associated with this funding method that would outweigh the additional costs (described in detail in Section 4). Furthermore, the IFC notes that trust funds also carry the risk of loss of value in the fund, as well as management and administration costs (World Bank, 2008). In addition, by definition up-front multi-year trust funds are less responsive to major shifts in funding requirements. For instance, if an extreme climate change scenario were to result in large changes at the Giant Mine site, beyond what has been budgeted

for, the fund would necessarily have to return to government appropriations for additional funding. While this challenge is not insurmountable, it is indicative that trust funds are better aligned with situations where the overall costs are more predictable than the management of a complex contaminated site. Given the critical nature of secure annual funding to the Giant Mine Remediation Project, these potential risks may not be tolerable to stakeholders given the need to protect human and environmental health. As per the direction given in Measure 6, please refer to Section 4 for further analysis of a trust fund scenario. While the challenges noted above pertain to the use of a trust fund for overall project funding, this does not preclude their use in specialized applications, i.e., for a specific activity with relatively known funding parameters such as water treatment. Similar to the use of an Unforeseen Events fund in Project CLEANs (section 3.1), a contingency fund of this nature could provide additional funding where shortfalls in overall project funding occur. Please see section 3.4 for a discussion of hybrid options.

It is also worth noting that public sector trust funds are typically financed through transfer payments between different levels of government, such as between the federal and municipal governments in the case of the GMF. Principal 2 of 'Policy of Transfer Funds' by the Treasury Board Secretariat of the Federal Government states that "[a] core service that departmental staff are mandated to provide directly should not be funded through a transfer payment" (Treasury Board Secretariat, 2002). Since CIRNAC is mandated to remediate the Giant Mine (either by using its own staff or issuing procurement contracts for other parties) transfer payments may not be permitted for the department to discharge their responsibilities, limiting the immediate applicability of public-sector trust funds to fund the Giant Mine Remediation Project.

3.2.2 Private sector trust funds

A private sector trust fund is financed through funds from industry, levies, and/or non-governmental organizations. A private institution, the settlor, establishes the trust through a contractual agreement identifying the beneficiary of the fund, as well as the trustee who will manage the fund. As in the case of the public sector trust fund, the beneficiary can have the option of withdrawing the funding as a lump-sum or over a period of time. A board of trustees either elected or appointed based on their expertise and experience, holds fiduciary responsibility for the funds, according to the provisions of the trust agreement. Trustees are typically required to act in the best interests of stakeholders with respect to management decisions. Whereas with public sector trust funds (section 3.2.1 above) funds are typically distributed to a multitude of beneficiaries, conversely private sector trust funds often are used to comingle different sources of funding (e.g., from separate private entities) in order to manage these joint funds in an independent and transparent manner.

Case Study: British Columbia Oil and Gas Commission's Orphan Site Reclamation Fund

Background

The British Columbia Oil and Gas Commission (BCOGC) is a Crown corporation established to regulate oil and gas activities and pipelines in the province of British Columbia (BC). In instances where the operators of wells, factories, pipelines and/or sites affected by oil and gas activities are insolvent or cannot be located, the BCOGC has the regulatory authority under Part 4 of the Oil and Gas Activities Act to designate these as orphan sites (BCOGC, 2017).

Once the BCOGC has designated a site as an orphan site, it may use its Orphan Site Reclamation Fund (OSRF) to decommission and rehabilitate the site to obtain a Certificate of Restoration. The Certificate of Restoration assures stakeholders that the site has been

remediated in accordance with regulatory requirements, and that all known environmental and public health risks or other hazards have been mitigated.

Funding

The OSRF is an example of a privately managed fund that is financed through an industry levy on production used to cover:

- The costs of abandonment and restoration of orphan wells, test holes, production facilities and pipelines;
- Any costs incurred when the BCOGC has to seek reimbursement for the above costs;
- The BCOGC's operational costs directly related to the fund; and
- Compensation paid to land owners on whose land the BCOGC spends money on an orphan site (Government of British Columbia).

The Asset Integrity and Retirement Branch acts as the trustee of the fund. Oil and gas producers are invoiced monthly for the orphan site reclamation tax. For oil producers, the monthly tax is \$0.06 per cubic metre of oil production; for gas producers, the tax is \$0.03 per 1000 cubic metres of marketable gas.

Relevance

The case of the OSRF demonstrates the value that a privately managed fund can bring in the long-term rehabilitation of abandoned sites and in funding the operational costs of managing such a fund. The funding of the OSRF is a transparent process and involves the input of community stakeholders (BCOGC, 2017).

The adoption of a similar approach in the case of Giant Mine would require significant regulatory and administrative costs in creating and enforcing an industry levy policy. An industry levy on mining activity in Canada to address abandoned contaminated mine sites could potentially be derived from existing mining revenues or a new industry levy (NOAMI, 2006) rather than establishing a new tax or royalty. One challenge in developing such an approach would be coordination of the different provincial, territorial, and federal jurisdictions in their oversight of mining activities.

Pension funds

Pension funds are another type of private trust fund paid for by employees, employers, or both, that generate money for employee retirement commitments. The model typically has a required contribution by the employer, and can have a voluntary investment component from an employee to contribute part of his/her current income into an investment plan. The employer can match this portion of the employee's contributions. The funds are managed by a third-party investor to generate returns for the employees. Some pension funds, such as Caisse de depot et placement du Quebec (CDPQ) invest in long-term capital infrastructure projects, such as ports, highways, and renewable energy farms, which have a similar time frame as some site remediation projects (CDPQ, 2018) Pension funds can be public, in that they are regulated by public sector law, or private.

Case Study: Caisse de depot et placement du Quebec Infra

Background

Established in 1965, Caisse de depot et placement du Quebec is an investment management company that manages pension and insurance programs in Quebec. CDPQ invests assets belonging to over 6 million Quebecers in 40 major retirement and insurance plans (CDPQ, 2018).

CDPQ's investment objective is to generate long-term value for the people of Quebec. CDPQ is a Crown corporation and maintains independence and accountability through federal and provincial regulations and legislations.

Funding

CDPQ is an example of a pooled pension fund. Almost all individuals who work in Quebec contribute a percentage of their earnings to CDPQ. Employers can match this percentage of the employee's contributions to the fund. As of 2018, the CDPQ fund totaled \$303 billion (CDPQ, 2018).

The CDPQ invests the fund domestically and globally into equity markets, private equity, real estate, infrastructure, and fixed assets to generate a return for the fund in order to ensure its long term sustainability. The fund is used to finance retirement pension, post-retirement benefits, disability income and other related benefits for Quebecers.

The CDPQ's infrastructure branch (CDPQ Infra) participates in long-term financing, structuring, and the development of major public infrastructure projects. CDPQ partners with the private sector to implement projects, making use of its expertise in infrastructure to complete projects in an efficient manner, to generate returns for the CDPQ fund. Costs and returns generated by CDPQ Infra are kept off the balance sheets of the government.

Relevance

While the CDPQ's infrastructure investment branch invests in stable, long-term capital projects, it holds limited relevance to Giant Mine as it is entirely reliant on private funding. While it is notionally possible that a similar fund could be established that would invest in large-scale capital and infrastructure projects (with the intent of providing funding to the Giant Mine remediation) much of the economic efficiencies and opportunities realized by CDPQ Infra come from its scale at over \$300 billion assets under management.

University endowment funds are another type of private trust fund that hold monies donated to universities for the purpose of growing the fund's principal and providing additional income for future investments in perpetuity. University endowment funds typically have strict guidelines on how assets are allocated in order to yield a targeted return. For example, 70% of Harvard University's endowed funds are subject to restrictions imposed by donors (Harvard University, 2018).

Case Study: Harvard University Endowment Fund

Background

At \$37.1 billion USD in 2018, Harvard University's endowment fund is the world's largest university endowment fund. In 1974, the Harvard Management Company (HMC) was established to manage the 13,000 funds that constitute the endowment fund. The endowment supports university operations, faculty and students, professorships, financial aid, and fellowships.

Funding

The Harvard University endowment fund is comprised of donor gifts many of which have specific requirements for how the funds are to be spent (e.g., for specific programs, dedicated scholarships, named professorships.) A portion of the endowment is paid out annually to support the University's budget when possible. Any funds in excess of this distribution is retained in the endowment and invested into equity markets and real assets so that it can appreciate and support future generations at Harvard.

Harvard targets an annual payout of approximately 5% of the current market value of the fund and notes that "there is a common misconception that endowments...can be accessed like bank accounts, used for anything at any time as long as funds are available...Harvard's flexibility in spending from the endowment is limited by the fact that it must be maintained in perpetuity and that it is largely restricted." (Harvard University, 2018). Endowment gifts are intended by their donors to benefit both current and future generations of students and scholars. As a result, Harvard is obligated to preserve the purchasing power of these gifts by spending only a small fraction of their value each year. Spending significantly more than that over time, for any reason, would "privilege the present over the future in a manner inconsistent with an endowment's fundamental purpose of maintaining intergenerational equity" (Harvard University, 2018).

70% of the University's funds are restricted to support specific programs, departments, or purposes and can only be spent in accordance with terms set by the donor. Unrestricted funds, which represent about 30 percent of Harvard's endowment, are more flexible in nature and used to support the University's operating expenses and strategic objectives (Harvard University, 2018).

Relevance

The Harvard University endowment fund holds little relevance Giant Mine as it is privately funded and its disbursements fluctuate with economic volatility. The fund is required to generate returns in perpetuity and includes restrictions imposed by donors on how funding can be allocated. This approach contrasts with the remediation of a single contaminated site, and hence is considered low relevance in the context of this report.

3.2.2.1 Pooled Funds

An innovative example of a private sector trust fund is a pooled fund, which is an aggregate of funds from many individual investors. Pooled funds can be used to blend private funding with public remediation efforts. Additionally, in an extractives context, industry levies can provide incentives for polluters to reduce their environmental impact by giving them the burden of cost to manage and prevent damage. While pooled funds are promising, they are complex and require the coordination of multiple private and public stakeholders and the creation of legislation to ensure compliance from industry.

Case Study: Queensland Mine Rehabilitation Fund

Background

In order to address the financial and environmental challenges of resource site rehabilitation, the Queensland Government commissioned a review of the financial assurance arrangements—the results of which have been used to develop proposed reform areas to improve rehabilitation outcomes for Queensland.

The new framework (drafted in 2017) recommended a six-element integrated mined land management that will deliver better environmental outcomes and decrease the State's risk of financial exposure for abandoned mines. These include introducing:

- Life-of-mine plans for all site-specific mines;
- Regular monitoring, assessment and reporting;
- Enforceable requirements for progressive rehabilitation;
- Clear completion and sign-off requirements;
- Performance based incentives; and
- Good quality data to inform policy and regulator implementation (Queensland Government, 2017).

The financial assurance framework requires the holder of a site-specific environmental authority or an environmental authority for mining and petroleum leases to submit a plan of operations prior to commencing mining activities. The plan of operations outlines how the resource company intends to meet the conditions set out in the environmental authority, including rehabilitation requirements, over the subsequent one to five years (depending on the term of the plan).

Funding

The Queensland Mine Rehabilitation Fund represents a "pooled funds" approach where private-sector surety for individual liabilities provide risk-based financial assurance for both specific mine rehabilitation liabilities as well as potential funding for cleanup of liabilities that have reverted to institutional control (Queensland Government, 2017). Resource companies are allocated with risk profiles (e.g., very low, low, and moderate) based on size of operations and measures of financial stability. Companies with estimated rehabilitation cost of less than \$500 million are classified as "representative resource entities" and will contribute to a Rehabilitation Fund. The amount of the contribution is calculated by multiplying the estimated rehabilitation cost with a "prescribed percentage" for that authority. The financial risk of a resource company will be determined by a credit ratings agency or, if a rating has not been obtained by the company, by assessing the financial data provided by the resource company.

Relevance

As a new model for collectively funding mine liabilities, this example demonstrates the value of a pooled approach: funds, as well as interest earned, can be directed toward reducing the state's rehabilitation liability and expanding the Queensland Abandoned Mine Lands Program. The initiative would also help support innovative research and development programs or programs that provide incentives to the private sector to commercialize abandoned mines with residual resources.

CIRNAC and the Mackenzie Valley Land and Water Board (MVLWB) have specific roles set out in the Mackenzie Valley Resource Management Act (MVRMA) and the Northwest Territories Water Act (NWTWA) in regard to the security deposit amount and form for closure and reclamation requirements. MVLWB is responsible for setting the amount of the

financial security deposit held against a project and CIRNAC is responsible to approve the form of security and administer the security deposit on behalf of the federal Crown. MVLWB ensures that an appropriate security deposit amount and rationale are established as conditions of the water license and/or land use permit authorizations, to ensure that the cost of reclamation, which includes shutdown, closure, and post-closure are borne by the proponent rather than the Crown.

The International Finance Corporation (World Bank Group, 2008) guidance suggests that:

"Minimum considerations [for financial surety] should include the availability of all necessary funds, by appropriate financial instruments, to cover the cost of closure at any stage in the mine life, including provision for early, or temporary closure. Funding should be by either a cash accrual system or a financial guarantee. The two acceptable cash accrual systems are fully funded escrow accounts (including government managed arrangements) or sinking funds. An acceptable form of financial guarantee must be provided by a reputable financial institution."

An oft-cited disadvantage of the more secure options for financial surety (e.g., a cash deposit) is that significant capital is tied up for the duration of the mine life (World Bank Group, 2008). One of the primary advantages of this model is that pooled funds can be used to remediate abandoned sites such as in the Queensland case study. As CIRNAC is identified as responsible to administer the deposit on behalf of the Crown, the notion of creating a common pooled fund across sites on federal Crown lands presents advantages toward future remediation of contaminated sites.

It must be noted that this is a new, proposed initiative and adopting a similar model in Canada would be a significant undertaking and require agreement across a broad spectrum of public and private sector entities. As the Pooled Funds are privately funded, the example is illustrative of the art of the possible in mine rehabilitation but not immediately applicable to the Giant Mine context. Particularly given the magnitude of the Giant Mine Remediation Project, a pooled fund such as this would be readily exhausted by the annual funding requirements.

An overview of the evaluation of public sector trust funds as applied to the case of Giant Mine is presented in **Table 4** below:

Table 5: Evaluation of private sector trust funds

Evaluation Criteria	Description	Evaluation of Private Sector Trust Funds	Met?
Duration	Funding can be allocated for the full life cycle of site.	This criterion is met as funding can be allocated for the full life-cycle of the site.	✓
Public sector funded	Funding is derived from public sector.	This criterion is not met as funding is privately sourced.	
Stability / Security	Funding is protected against swings in the economy and shifts in policy.	This criterion is not met because private sector trust funds are not protected against swings in the economy.	

Flexibility / Contingency	Allows for the ability to lapse, re-profile, or re-allocate funds outside of an annual budget cycle, which will assist in managing uncertainties during project implementation allocating funding in the event of emergency or other unforeseen circumstance.	This criterion is met because private sector trust funds can be designed to be able to lapse, re-profile, re-allocate and disperse funds on a flexible basis.	✓
Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	This criterion is met because, as private sector trust funds typically blend multiple funding sources, the use of a third-party fund manager, while introducing additional costs, provides necessary independence and transparency to seek, manage and report on funding.	✓
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	This criterion is met as a stakeholder engagement process can be established in the trust agreement along with governance structures providing involvement in the budget allocation process.	✓
Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.	This criterion is met as a specific entity is defined in the trust contract with the responsibility of managing the fund.	✓
Independent	Decision-making process for management and expenditure of existing funding is independent of influence from other priorities.	This criterion is met as public sector trust funds are typically managed by a third party institution, creating independence from funding priorities.	✓

Summary

While private sector trust funds and pooled funds, which mingle private funding sources and can be used to remediate abandoned sites, are not immediately applicable to the publically funded Giant Mine Remediation Project, this option provides an example of how value can be generated through private sector involvement. Private sector funds have proven themselves as long-term sources of funding that effectively and transparently balance competing needs of different stakeholders (e.g., private enterprise and the public) through independent third-party management. Well-managed industry levies can play a role within a financial surety framework and be used to reduce burden on the taxpayer as well as reduce the rehabilitation liability of the government. Such a private sector source of funding for contaminated site cleanup need not necessarily require a new financial burden on Canada's mining industry. One possibility is directing existing mining related revenue streams into an account dedicated to the cleanup of abandoned mines, diverting

either royalties or mining taxes to a dedicated fund (NOAMI, 2006). With increasing impetus from civil society toward updating and integrating the various financial surety frameworks within Canada, a harmonized approach to managing private sector funds as well as institutional liabilities may represent an opportunity for improved outcomes both environmental and financial over the longer term (Ecofiscal Commission, 2018). Given the overlapping responsibilities between provincial, territorial and federal governments in Canada, this approach will require a large degree of political coordination.

3.3 Public-private partnerships

A public-private partnership (PPP) is a contract between public and private sector partners to provide services, such as to design, build, finance, maintain, or operate an asset over the length of the contract. The forms of PPP in Canada include: build-operate-transfer (BOT), company-owned-government-operated (COGO), and government-owned-company-operated (GOCO) (Barker, 2007). In a PPP, the financial cost of a project is shared between the government and industry. In most instances, the private sector partner recovers its investment into the project through an external revenue stream, such as electricity sold from the addition of solar power cells to a site. PPPs are often used for long-term capital projects for which performance can be measured through quantitative metrics (Export Development Canada). A 2014 review of Partnerships British Columbia, the Crown corporation created in 2002 to manage P3s in the province, notes that a typical PPP contract lasts 30 years (BC Ministry of Finance, 2014). A key distinction between conventional public procurement and the PPP approach is that PPP arrangements serve to distribute the financial, technical and operational risk between both the private and public sector partners (Office of the Auditor General of British Columbia, 2012).

A benefit of the PPP model is that financial, technical, and operational risk is shared between the public and private sectors, potentially reducing the risk of a site not having funding for its full lifecycle. Additionally, the public sector partner can harness the efficiencies and expertise that the private sector partner can bring to the management implementation of the project. While realizing private sector efficiency and cost-effectiveness are commonly described drivers in the use of PPP, their value has been questioned. A 2018 review of 17 infrastructure projects in BC using public-private partnerships suggested they were overall 25% more costly than delivery through traditional government procurement processes (Columbia Institute, 2018). Similarly, the Auditor General of British Columbia noted that in some cases, any efficiency gains “can be more than offset by a combination of several costs” including a risk premium to compensate the private partner, as well as higher financing and transaction costs (Office of the Auditor General of British Columbia, 2012).

Case Study: Britannia Mine

Background

Operational from 1904 to 1963, the Britannia Mine was one of the world’s largest copper producers. Currently, the mine has the potential to be one of the largest metal pollution sources in North America, depositing up to 600 kilograms of metals into British Columbia’s Howe Sound daily, if left untreated (Partnerships British Columbia).

Funding

A \$30 million legal settlement between the Province of British Columbia and four mining companies held liable for the contamination, in addition to further funding by the Province of British Columbia, provided the total remediation funding for the site. Following the

settlement, the Province took ownership of the Britannia Mine lands (Azavedo and O’Hara, 2007).

As part of the site’s remediation, the Ministry of Agriculture and Lands and Environment Canada partnered with EPCOR Water Services to develop a water treatment plant on the abandoned mine site. EPCOR covered the initial capital cost of \$15.5 million and receives payment from the provincial government based on the ability of the plant to meet environmental regulations (Partnerships British Columbia). The construction of the water treatment plant has a fixed term of 20 years and is expected to cost the public sector \$27.2 million, which is an estimated \$12.5 million less if the public sector had decided to build the project alone (Partnerships British Columbia). The water treatment plant has the overall objectives to minimize potential environmental liabilities to the Province of British Columbia and to protect taxpayers from inefficient management and costs related to water treatment.

Relevance

The Britannia Mine provides an example of the potential cost and time efficiencies gained through the partnership with a private sector expert, as well as the reduction of financial and operational risk for the public sector. Additionally, this case study highlights the potential that innovative remediation solutions can provide in creating long-term value for the communities surrounding Britannia Mine.

A PPP model could be considered for the water treatment aspect of Giant Mine. A long-term contract of that nature could provide comfort that one of the more costly aspects of the Project would be managed efficiently and for the long-term, given the precedence of the Britannia Mine water treatment plant, which is expected to take 21 years to complete (Partnerships British Columbia). Where the Federal Government is contractually obligated with a private sector service provider, cancellation of such a contract would entail risk of lawsuit. However, private sector entities also sometimes fail to meet their contractual obligations and are at higher risk of insolvency than public sector entities (NOAMI, 2015). As such, while this option may provide efficiencies and some level of increased certainty, it does not provide absolutely certainty.

An overview of the evaluation of the PPP model as applied to the case of Giant Mine is presented in **Table 6** below:

Table 6: Evaluation of public-private partnerships

Evaluation Criteria	Description	Evaluation of Public-Private Partnerships	Met?
Duration	Funding can be allocated for the full life cycle of site.	This criterion is met as the PPP contract can be established to allocate funding for the full life-cycle of the site.	✓
Public sector funded	Funding is derived from public sector.	This criterion is not met as funding is jointly derived from public and private sectors and can require revenue generation capability.	

Stability / Security	Funding is protected against swings in the economy and shifts in policy.	This criterion is not met as insolvency is of greater likelihood in the private sector than the public sector.	
Flexibility / Contingency	Allows for the ability to lapse, re-profile, or re-allocate funds outside of an annual budget cycle, which will assist in managing uncertainties during project implementation allocating funding in the event of emergency or other unforeseen circumstance.	This criterion is met as financial management is typically transferred to the private sector entity which can provide the flexibility required to manage funds.	✓
Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	This criterion is met as collaborating with private sector partners has the potential to enable more efficient fund management.	✓
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	This criterion is met as stakeholders can be engaged in the funding and decision-making process.	✓
Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.	This criterion is met as the private sector partner typically is responsible for the management and expenditure of funds.	✓
Independence	Decision-making process for management and expenditure of existing funding is independent of influence from other priorities.	This criterion is not met as private sector management, while relatively independent from government, may be influenced by other competing priorities.	

Summary

In the case of the Giant Mine Remediation Project, a PPP model for some aspects of the remediation could be considered, such as for water treatment, as in the case of Britannia Mine. PPPs may offer specific advantages for a site remediation project, potentially in terms of cost and risk reduction for the government. As funding can be contingent on the ability of the private sector partner to produce demonstrable results, this model could also improve the efficiency of fund management.

3.4 Hybrid funding approach

Given the uniqueness of the Giant Mine liability (long-term project timeline, complex social, technical and environmental challenges, uncertainty regarding the ultimate costs for remediation) a hybrid solution containing elements of different funding options, tailored to the specific program, may prove of the greatest value to project stakeholders including First Nations, civil society, as well as the Canadian taxpayer. We note that the funding options available do not necessarily need to be considered entirely in isolation.

As Federal Government funding, at least for the foreseeable future, remains the only source of monies for the Giant Mine Remediation Project, the long term funding solution must be compatible with this source, i.e., not be dependent on private funding sources. In addition, the solution must have the requisite flexibility to respond to changing conditions. As noted in section 1.2, climate change, technological innovations, and other drivers have the potential to alter the funding requirements for Giant Mine over the long term. As a result, the final long term solution may need to consider a variety of funding options. Noting that the Review Board “accepts that the government will have the means, willingness and ability to manage the site over a 100-year period,” the question arises as to what is the most satisfactory and efficient use of site funding. Opportunities exist for collaboration with the private sector using a PPP or a government-owned-contractor-operated (GOCO) model for the management of specific aspects of the Giant Mine Remediation Project, such as on-site water treatment and monitoring. With a GOCO model, the commercial operator can be a private sector third party, as per the Britannia Mine and Sydney Tar Ponds case studies, or a Crown corporation as in the Nuclear Waste Management Fund case study (see Appendix A for the detailed description).

The advantage of this approach is in the cost-effectiveness of working with a private company with expertise in water treatment services. In the case of the Sydney Tar Ponds remediation, the inclusion of an independent engineering contractor contributed to cost savings on the project and additional value in terms of specific design suggestions (Public Services and Procurement Canada, 2014). Additionally, the GOCO model establishes transparency and accountability through adherence with government stakeholder engagement and reporting protocols. For the Nuclear Waste Management Fund, the Crown corporation Atomic Energy Canada Ltd. is mandated to hold public hearings in local communities and webcast meetings and proceedings on their website (Canada Nuclear Safety Commission, 2018). Also, this approach can provide certainty that costs are known for the duration on the contract. For example, the Britannia Mine case study highlighted the security and efficiency gained in engaging a private sector entity to provide water treatment services through a long-term contract. While entering a contractual agreement with a private entity provides some additional level of certainty, due to the risk of lawsuit resulting from a breach of such a contract, private companies also come with a greater risk of insolvency. As a result, the GOCO model represents only a limited option for use in long-term contaminated site management.

Another option for a hybrid approach is engaging in an arrangement with First Nations and/or other Indigenous groups in the planning and implementation of some aspects of the Giant Mine Remediation Project. The establishment of a contracting working group outlining economic provisions, First Nations and/or other Indigenous group employment, and training, reporting, and enforcement could involve greater local stakeholder participation in the remediation. The DEW Line Cleanup is an example of how the Department of National Defence partnered with the Inuit community for the long-term

remediation and monitoring of the DEW Line sites (see Appendix A for the detailed case study). A supplementary source of funding to facilitate partnerships between the Federal Government and First Nations and/or other Indigenous governments could potentially be provided through the use of a trust fund. Such a partnership capacity-building fund would align with the suggested points of improvement to the FCSAP/NAMRP post-2020 in terms of local engagement, Indigenous employment, and capacity training (Anglesey and Truax, 2018). For example, this fund could be used to train First Nations and Indigenous communities in the long-term monitoring of remediation sites. Furthermore, the fund could be used to develop mechanisms for First Nations and/or other Indigenous groups to be involved in the RFP development and procurement process, which was a point of improvement for the FCSAP identified in the Federal Contaminated Sites National Workshop (June 2018). The final decision on whether a trust fund model could provide the flexibility to address supplementary capacity and outreach funding, would require a more fulsome discussion with Canada's Department of Finance and Treasury Board Secretariat, however it remains an option to be considered.

Lastly, many of the stakeholder concerns expressed in the Review Board's Report of Environmental Assessment are not unique to the Giant Mine: they run through the literature on contaminated sites in general (Kuyek, 2011; Union of British Columbia Indian Chiefs, 2016). The example of the Giant Mine highlights weaknesses in the limited financial surety framework in place at the time of Giant's permitting and development. Many of the suggestions such as establishment of a trust to fund remediation of contaminated sites could be more relevant to, and have precedent within, the context of state/provincial or national financial surety frameworks for extractive industries (e.g., Western Australia's and Queensland's Pooled Fund). Operating the Giant Mine Remediation Project and the Federal Contaminated Sites Action Plan alongside a national financial surety framework that collected industry funds and put them to work remediating abandoned sites could help provide greater transparency and comfort to the public that resources are being managed and the environment is being protected in an effective manner. Such an approach, where a myriad of projects were being managed comprehensively would lend itself to a funding solution that included a contingency fund such as considered by the Saskatchewan Research Council for Project CLEANS (see section 3.1) For details on an up-front, multi-year trust fund, please see section 4.0 below.

4.0 Funding scenarios through the establishment of a trust fund

4.1 Overview and limitations

Measure 6 establishes that the Developer will investigate long-term funding options for the ongoing maintenance of the Project and for contingencies, including a trust fund with multi-year up front funding. In this section we assess different costing scenarios for multi-year up front funding of the Project through the establishment of a trust fund. In addition, Taylor and Kenyan (2012) included a specific recommendation in their report to conduct additional research to assess the feasibility of a trust fund in the context of the perpetual care of the Giant Mine site. As they describe in their report, trust funds can provide funds for the life cycle of a project and are protected from economic swings. One of the advantages of trust funds is a robust governance process, which has the potential to include third-party expert and stakeholder engagement. As well, trust funds are compatible with regular review cycles, reporting and verification of costs, revenues, liabilities and contingencies as highlighted in section 3.0 of this report.

The establishment of a trust fund has the potential to provide a stream of revenue for the life cycle of the Project. However, due to the long-term characteristic of the proposed care and maintenance of up to 100 years, a number of risks emerge that present uncertainty on the estimated funding needed.

On the quantitative side, there may be risks associated with the availability of monies, and uncertainties in assessing the actual costs such as unforeseen environmental conditions and other unpredictable remediation events that can occur, as well as market risks such as volatility of inflation, interest rates, and insolvency risks of the trust.

For example, cost components of this Project that require ongoing maintenance or periodic replacement such as thermosyphons, pumps and the water treatment plant will depend on the ongoing funding that makes their maintenance and replacement possible. The Review Board notes that actual costs of managing other long term care sites have varied widely beyond initial predictions and the Developer has acknowledged to the Treasury Board that the Project cost could increase. Therefore, actual ongoing costs could be much higher than originally predicted (Review Board, 2013).

On the qualitative side, some of the risk factors involved may be the ability and motivation of the government to provide funds, as well as the ability of members of the community and fund administrators to manage the funds in the future. The Board highlights that without a suitably reliable long-term funding mechanism, there is a likelihood of significant adverse impacts over the 100 year duration of the Project. Stakeholders have suggested that funding shortfalls have presented problems at other long-term care sites, and have resulted in impacts on the ground, and the Board suggests that this is a risk for this Project (Review Board, 2013).

4.2 Methodology

Funding will be needed to support two major types of costs associated with the Project:

- Costs of operating, maintaining and repairing the property over the long term (“O&M costs”); and
- Costs related to the Trust Fund setup and management over the long term (“Trust fund costs”).

(A) O&M costs

We have assumed three different timeline scenarios for the property maintenance and operation over the long run: 25 years, 50 years, and 100 years. The three different scenarios are to provide sensitivity as to the amount of funding needed for a different number of years other than 100 years. We estimated total O&M costs for each of the three scenarios based on internal and external sources. Further, we calculated the present value (PV) of the expected cash outflows for the three different timeline scenarios. Discount rates applied were based on assumptions for the average annual rate of return of the trust fund, which are discussed below in section 4.3.

(B) Trust fund costs

We estimated setup costs and management fees based on market averages for existing trust funds obtained from internal and external sources. We estimated the average annual balance of the funds invested based on the costing scenario assumed in (A) and different interest rates scenarios. We then calculated the present value of the expected cash outflows for the three (3) timeline scenarios.

The sum of the PVs of (A) and (B) is the funding amount needed to cover all expected future costs, in today’s dollars. We applied sensitivities as to variances in interest rates due to market, inflation, insolvency risks of the fund for each different scenario of number of years required.

4.3 Assumptions

O&M costs

The table below presents total estimated O&M cost breakdown for the three different timeline scenarios – nominal costs (inflation has not been factored in the costs, but is factored in the discount rate used to present value the cash outflows, discussed below). The costing estimate is based on Deloitte’s experience auditing reclamation liabilities, and on publicly available information related to the Giant Mine Oversight Board (GMOB) component. We have calculated two different scenarios – a scenario including GMOB costs and a scenario without GMOB costs, for the purposes of assessing the funding needed without the impact of GMOB oversight. Many of the O&M costing estimates assume that costs are not linear over time, as some can be higher in the beginning, as well as major costs for replacements can be incurred from time to time over the long run. Total O&M costs comprise five major cost components:

- O&M – includes overall annual costs of operating and maintaining the site property; this cost component includes O&M costs related to the long-term environmental monitoring plan which are forecasted to be higher in the first ten years (beginning at \$2 million per year for a total of \$20 million in ten years) and decreasing gradually over the long run, mainly due to the assumption that the long-term environmental monitoring plan costs will be higher in the beginning of the project;
- Infrastructure – includes overall repairs and replacement in infrastructure; this estimate includes major replacements in infrastructure (costing more than \$16

million each) every ten years over the life of the project, along with a cost of \$40 million every 50 years estimated to replace the water treatment infrastructure.

- Water Treatment – includes costs associated with the treatment and purification of water on site to regulatory standards; this cost is estimated to be around \$3 million per year in the first ten years and around \$2 million per year after the tenth year. This 33% decrease in water treatment costs after the tenth year is a conservative estimate consistent with Deloitte’s experience in other mine reclamation projects where water treatment needs and processes stabilize over time.
- Giant Mine Oversight Board (GMOB) – includes salaries, office space, R&D, and public updates costs; estimates include \$650,000 per year for operating costs and \$250,000 per year for R&D and public updates, throughout the life of the project. This cost is included in scenario 1 and excluded in scenario 2 below at the request of the Measure 6 Subcommittee.
- Engineering costs – includes geotechnical inspections costs of \$100,000 per year in the first ten years and \$100,000 every five years after the tenth year, and major reviews and design modifications - periodical costs of around \$250,000 to \$500,000 every fifteen years.

Scenario 1

CAD\$			
Cost component	25 years	50 years	100 years
O&M	22,675,000	25,800,000	32,050,000
Infrastructure	38,275,000	115,575,000	229,675,000
Water Treatment	60,000,000	110,000,000	210,000,000
GMOB	22,500,000	45,000,000	90,000,000
Engineering	2,050,000	3,050,000	5,050,000
TOTAL	145,500,000	299,425,000	566,775,000

Scenario 2 – without GMOB costs

CAD\$			
Cost component	25 years	50 years	100 years
O&M	22,675,000	25,800,000	32,050,000
Infrastructure	38,275,000	115,575,000	229,675,000
Water Treatment	60,000,000	110,000,000	210,000,000
GMOB	-	-	-
Engineering	2,050,000	3,050,000	5,050,000
TOTAL	123,000,000	254,425,000	476,775,000

Figure 2: Estimates of cost components at 25, 50, and 100 years for Scenarios 1 and 2

Trust fund costs

We estimate that the setup of a trust fund would involve two different types of one-time costs:

- Community engagement costs of approximately \$100,000 are budgeted for costs related to travel, meetings and discussions with all community stakeholders and other parties involved in the setup and administration of the trust. This assumption is based on Deloitte’s experience in setting up similar types of trust funds for aboriginal communities. We note that this cost can vary significantly depending on

the funding structure adopted, however as a one-time cost we understand that it has a minimal impact on the overall present value of the total fund trust costs (estimated as between \$30 million to \$52 million per figure 6 below); and

- Legal fees of approximately \$50,000 to write and develop the legal framework for this type of trust, given the trust fund size and complexity. This assumption is based on Deloitte’s experience on setting up similar types of trust funds for aboriginal communities. We note that these costs can vary significantly depending on the funding structure adopted, however as a one-time cost we understand that it has a minimal impact on the overall present value of the total fund trust costs (estimated as between \$30 million to \$52 million per figure 6 below)

On-going costs of a trust fund relate to management fees charged annually over the balance of the fund. These will be applied throughout the life of the trust (25, 50, 100 years) and are estimated at 1% per year. Based on market averages, which range between 0.5% to 2.0% depending on trust size and lifetime, and on Deloitte’s experience on setting up similar trust fund facilities, we believe that a management fee of 1% is a conservative assumption and allows for contingencies. Management fees include annual audit costs, trustee honoraria, travel expenses related to community and stakeholder engagement, consulting fees, and investment management fees. For example, assuming a scenario where the balance of funds invested in the trust fund is around \$179.3 million (see figure 6 below), annual management fees of 1% paid to the trust administrator / financial institution would be calculated at \$1.8 million in the first year. This assumes that the funding needed for the Project is fully allocated upfront in a trust fund account. Management fees of 1% are applied every year over the average balance of the fund, and since the fund is fully loaded upfront and the balance will decrease over time, the dollar amount of the management fee is higher in the first year. In the Scenario 1 below, \$179.3 million is allocated upfront and the average balance of the fund account over 100 years is calculated at \$145 million per year. Therefore, trust fund costs average \$1.45 million per year (1% of \$145 million) over 100 years for a total cost of \$145.5 million and a present value of \$51.8 million.

Trust fund costs are summarized on the table below.

Cost	Type	Amount
Setup		
Community engagement	One-time	100,000
Legal fees	One-time	50,000
Mgmt fee %	Annually	1.0%

Figure 3: Estimate of trust fund costs

Annual real rate of return

Historically, market averages of rates of return for federal trust funds have varied depending on a number of factors such as size of the fund, market interest rates, and investment portfolio policy. Based on Deloitte’s experience, average rates of return for similar types of trust funds that are currently operating have ranged from 5.7% (real estate portfolio) to 6.2% (government bonds) to 10.9% (global equities). The historical time period of the funds referenced range from July 31, 2009 to September 30, 2018. As a baseline comparison, the risk-free annual rate of return, generally attributed to yields on Government of Canada bonds of over 10 years, is 2.23% as of July 20, 2018 (Bank of Canada, 2018). We believe that a conservative estimate for the average nominal annual rate of return for this type of trust fund, for the long term, is of approximately 5.0%. Adjusted for an inflation rate of 2.0% as per the Bank of Canada mid-point inflation control target, which ranges from 1% to 3%, the estimated annual real rate of return is approximately 3.0% as presented on figure 3 below. The inflation control target agreement between the Bank of Canada and the Minister of Finance has been renewed several times since 1991, and the most recent agreement expires in 2021 (Bank of Canada, 2018).

Our baseline scenario assumes an annual real rate of return of 3.0%. Sensitivities have been applied in section 5.3 below, where we consider a range from 1.0% to 4.0% for the annual real rates of return of the trust fund, to account for long-term risks such as market risks, interest rate risk, inflation risk, and insolvency risk of the trustee. These rates have also been applied to present value the cash outflows of the estimated costs (discount rate) for each scenario.

We are assuming a scenario before income tax is paid and we understand that a trust fund, if settled by the Federal government, is tax-exempt. However, if the fund is a private trust, income taxes would have to be paid on the interest earned annually on the fund balance. Tax rates for private trust funds typically have the highest income tax brackets, depending on the province that the trust is settled.

Rate of return	Description
Long-term rate of return	5.00% Average rate of return of Trust Funds
Inflation	<u>(2.00%)</u> Mid point of inflation target per Bank of Canada
Rate of return (real)	3.00%

Figure 4: Annual rate of return in real dollars

It is noted that trust funds can have an investment portfolio that allocate a portion of the funds in the fixed income market, such as government bonds which bare a low risk in terms of average rates of return, and another portion on the equity market which involves a much higher risk. The investment strategy and rules should be settled by the trustee and management at the moment of setting up the trust fund. The sensitivities on the rates of return presented below are to provide the reader with an understanding of the wide range of results that can be achieved depending on which assumptions are used.

4.4 Estimated funding

The estimated funding needed for each timeframe scenario (present value) and for Scenarios 1 and 2 is presented on the table below, assuming an annual rate of return of 3.0% as a base case.

Scenario 1

PV scenarios - assuming annual rate of return of 3%

CAD\$ million	Number of years		
	25	50	100
<i>O&M costs</i>	145.5	299.4	566.8
<i>Trust fund costs</i>	42.1	84.0	145.5
(A) PV - O&M costs	104.4	151.4	179.3
(B) PV - Trust fund costs	30.0	44.1	51.8
(A) + (B) PV - Funding needed	134.4	195.5	231.1

Scenario 2 – without GMOB costs

PV scenarios - assuming annual rate of return of 3%

CAD\$ million	Number of years		
	25	50	100
<i>O&M costs</i>	123.0	254.4	476.8
<i>Trust fund costs</i>	35.2	70.3	122.2
(A) PV - O&M costs	89.0	128.8	151.7
(B) PV - Trust fund costs	25.1	36.9	43.4
(A) + (B) PV - Funding needed	114.1	165.8	195.1

Figure 5: Present value estimated funds required for Scenarios 1 and 2

For any given scenario, O&M costs represent approximately 78% of total costs, while trust fund costs represent 22% of total costs. As noted previously, the funds are assumed to be fully allocated upfront, which drives management fees higher in the first year. We understand that there could be more cost-efficient ways of managing the allocation of funds into the trust account, given that a full upfront allocation can generate higher fund administration costs.

4.5 Sensitivities

We have selected a range from 1.0% to 4.0% for the annual rates of return to apply sensitivity scenarios and account for various risks. Below are the sensitivity analyses for Scenarios 1 and 2.

Scenario 1

		Number of years		
		25	50	100
CAD\$ million		Funding needed		
Annual rate of return	1.0%	201	350	507
	1.5%	178	296	403
	2.0%	161	255	328
	2.5%	146	222	273
	3.0%	134	196	231
	3.5%	124	174	199
	4.0%	116	157	175

Scenario 2 – without GMOB costs

		Number of years		
		25	50	100
CAD\$ million		Funding needed		
Annual rate of return	1.0%	169	296	426
	1.5%	151	251	339
	2.0%	136	216	276
	2.5%	124	188	230
	3.0%	114	166	195
	3.5%	106	148	169
	4.0%	99	133	148

Figure 6: Level of funding required with sensitivities for Scenarios 1 and 2

The numbers inside the above matrix represent the PV of the sum of both O&M costs and trust fund costs for each different timeframe and interest rate scenario (in millions of CAD dollars).

Depending on the timeframe scenario and risks affecting rates of return, as shown in the tables above, the funding required can vary significantly based on the following ranges:

- 25 years: From CAD\$116 million to \$201 million for Scenario 1, and from CAD\$99 million to \$169 million for Scenario 2
- 50 years: From CAD\$157 million to \$350 million for Scenario 1, and from CAD\$133 million to \$296 million for Scenario 2
- 100 years: From CAD\$175 million to \$507 million for Scenario 1, and from CAD\$148 million to \$426 million for Scenario 2

5.0 Summary and opportunities for improvement

Finding the ideal long-term funding option for the Giant Mine Remediation Project poses a challenge due to the magnitude of the liability of Giant Mine, the long time horizon for the remediation process, and the uncertainties associated with the costs of activities over the long term. Currently, the Giant Mine Remediation Project is funded by annual governmental appropriations through the Federal Contaminated Sites Action Plan program. Beginning in the 2020/21 Fiscal Year, the Project will be funded through the Northern Abandoned Mine Reclamation Program and in 2019 this program received approval for \$2.2 billion to fund a further 15 years. Estimates of the annual post-remediation care, maintenance, and monitoring costs have ranged from \$1.9 million per year (Review Board, 2013) to the \$6 million estimate used in this report (including costs such as the Giant Mine Oversight Board not contemplated in the Review Board report). More work is required to refine an accurate projection of the Project costs over the long term.

The basic uncertainty of long term cost forecasting for remediation projects of this scope and scale is further compounded by risk factors suggested through discussions with the Measure 6 Subcommittee working group, such as climate change and technological innovation. These uncertainties in the magnitude of initial funding required of an up-front, multi-year solution, such as the trust fund considered in section 4, mean that additional government appropriations would be required should other options prove insufficient.

In order to inform decision-making on the funding mechanism, Deloitte reviewed a number of long-term funding options using a case study approach of both Canadian and international examples, spanning the following categories: government appropriations, public-sector trust funds, private-sector trust funds, public-private partnerships, university endowments, and pension funds. Each category of long-term funding option was examined through a set of criteria reflecting stakeholder concerns on the Giant Mine Remediation Project.

Using a funding approach outside of government appropriations may be applicable if the new option is considerably more appropriate or a better fit for the circumstances of Giant Mine. Options that made use of funding from the private-sector, such as private-sector trust funds, university endowments, and pension funds, had very limited applicability to the case of Giant Mine due to the Government of Canada acting as the single payer, and ultimate liability holder for the Giant Mine Remediation Project. Additionally, privately-sourced funds are susceptible to economic risk and volatility, compromising the stability criterion for the Giant Mine Remediation Project. In particular, this review noted that examples from the private-sector had risk tolerances informed by a flexibility that is not present in a project with such a high potential for negative impacts to the environment and human health. In the cases of university endowment funds, we observed that the returns generated came with increased volatility that resulted, in some cases, in years where no funding was available for projects. Such a situation would be a critical failure in the context of the Giant Mine where ongoing funding is required to treat water and maintain the site.

We also observed that many of the concerns described in the literature and by stakeholders were not unique to Giant Mine but common to contaminated sites within Canada and around the world. Many of the notable examples, including Giant Mine, arise

from weaknesses or gaps within the existing or historical financial surety framework used for resource development. Some of the greatest promise for a way forward is suggested in the pooled fund approaches taken in Western Australia and in Queensland (Section 3.2.2.1). Creating a dedicated fund for remediation of abandoned mine sites would be dependent upon directing existing government revenue streams (i.e., mining taxes and/or royalties) or establishing new industry levies (NOAMI, 2006).

Options that made use of public-funding administered by a third-party, such as public-sector trust funds and public-private partnerships were more appropriate to the case of Giant Mine, but would require significant coordination with public and private sector stakeholders to set up the governance structures required to facilitate these funding options. Additionally, the establishment of a trust fund would add administrative costs to the project; as outlined in Section 4 of this report, the costs required to establish a trust fund could add up to an estimated 22% of total project costs to the project. In addition, funding options that utilize transfer payments, such as public-sector trust funds could prove a challenge to use in the case of Giant Mine, since transfer payments cannot typically be used to discharge departmental responsibilities (Treasury Board Secretariat, 2002) such as CIRNAC's responsibility to manage the Giant Mine Remediation Project.

Although none of the case study funds met all the long-term funding option criteria, there are attributes of some of the funding options that could add value to Giant Mine's long-term funding.

If government appropriations can be committed for the long-term, for instance through an expanded and updated NAMRP with a longer time horizon, it could provide a stable source of funding for the Giant Mine Remediation Project. Acknowledging that the Review Board "accepts that the government will have the means, willingness and ability to manage the site over a 100-year period", improvements to the NAMRP program could include:

- Alignment to the 20 year program review cycle recommended for Giant Mine by the Review Board;
- Creation of a funding stream specific to Giant Mine;
- Establishing a project contingency trust fund; and
- Formalizing, and building explicit funding for, an external stakeholder engagement process for the long-term monitoring of the site.

This option could be advantageous in terms of governance and implementation since there is already precedent for program management and reporting requirements. NAMRP could be modified to account for possible opportunities in its current structure, through the provision of long-term multi-year funding through the appropriation process, the inclusion of external stakeholder involvement through public consultations into the RFP development and procurement process, Indigenous employment, and capacity training programs.

In addition, there exists potential to build a hybrid approach incorporating the strongest attributes of a number of long-term funding options as applicable to particular aspects of the long-term requirements for Giant Mine (e.g., water treatment, contingency/emergency fund). As discussed in section 3.4, securing a long-term contract with a private sector partner (i.e., in a Public Private Partnership similar to that employed at the Britannia Mine) has benefits of both relying on private sector cost effective management, as well as providing the relative certainty of a long-term contractual relationship. While over the long term (> 20 years) there exists a risk of private partner insolvency, the 20 year periodic review period recommended in the Review Board (2013) aligns with the duration of contract used in the Britannia Mine example. As such, 20 year contracts, aligning with the periodic review of the Giant Project could present an optimum balance of stability and

flexibility. Additionally, entering partnerships with First Nations and/or other Indigenous communities would bolster local stakeholder engagement and participation into the remediation process. A supplementary partnership capacity-building fund could be established to facilitate greater stakeholder engagement and participation of First Nations and/or other Indigenous groups.

Overall, the experiences gained over the course of over 15 years of managing the Federal Contaminated Sites Action Plan, the stakeholder feedback captured through the Review Board report, as well as consultation conducted through the research for this report, present an opportunity to better align the future long term funding solution for Giant Mine to the specific needs of the Giant Mine Remediation Project as well as address the concerns of many of the Project stakeholders.

Appendix A: Additional case studies

Government Appropriations

Case Study: DEW Line Cleanup

Background

During the 1950s, North America used radar networks to provide an early warning of airborne attacks inbound over the North Pole. Radar stations were built in the North American Arctic to serve this purpose.

The Distant Early Warning (DEW) Line was the northernmost of the radar networks. While the DEW Line was planned, built, and primarily funded by the United States, 42 sites were located within Canadian borders. In the 1960s, 21 of these sites were decommissioned and became the responsibility of the Canadian Federal Government, represented by Aboriginal Affairs and Northern Development Canada (Department of National Defence, 2014).

The DEW Line sites did not meet environmental standards at the time they were decommissioned and an environmental impact assessment found traces of polychlorinated biphenyls and lead in the soil. A remediation project led by the Canadian Department of National Defence was established in 2005 and ended in 2014.

Funding

The 19-year remediation plan cost the Federal Government \$595 million. The remediation was financed through government appropriations through an agreement with the Inuvialuit in the Northwest Territories and the Inuit in Nunavut concerning economic provisions for the clean-up of radar sites in the respective territories. The agreements stipulated long-term monitoring for 25 years after cleanup.

The United States also contributed \$100 million USD towards the remediation of four of the 21 sites, with payments made over ten years.

Relevance

The DEW Line Cleanup is an example of how government appropriations have ensured stable, long-term funding for site remediation. However, the size, complexity, and geographic dispersion of the sites inhibit the case study's relevance to Giant Mine. Furthermore, as the remediation of the DEW Line relies on the transfer of payments from the Department of National Defence to Inuit and Inuvialuit companies and people, its governance and project management are of limited applicability to the case of Giant Mine.

Private Sector Trust Funds

Case Study: Nuclear Waste Management Fund

Background

The Nuclear Waste Management Organization (NWMO) is responsible for designing and implementing Canada's plan for the long-term management of used nuclear fuel. The NWMO was established in 2002 in accordance with the Nuclear Fuel Waste Act (NFWA). The founding members of the NWMO are Ontario Power Generation, New Brunswick Power Corporation, and Hydro-Quebec. These three members along with Atomic Energy of Canada Limited are mandated under the NFWA to fund the NWMO's operations (NWMO, 2018).

Funding

Each member of the NWMO is required to establish a trust fund and make annual contributions to the fund as stipulated in the NFWA. Each fund is managed by a third party trustee who prepares an annual report of contributions that is posted on the NWMO website.

Contributions to the fund are based on the average cost of managing used nuclear fuel and increase over time so that the fund will eventually cover the expected costs of managing waste by 2035. As of the end of 2017, the balance of the fund is \$4.2 billion (NWMO, 2018).

The NFWA built in explicit provisions around the usage of the funds for their intended purpose; the NWMO may only have access to the funds for the purpose of implementing the long-term nuclear waste management approach selected by the Government (NWMO, 2018).

Relevance

The NWMO is an example of how a pooled industry levy can create a long-term and stable cash flow if supported by legislation that ensures the enforceability of fund dispersion and management. However, since the Federal Government will assume the financial burden and management of the Giant Mine Remediation Project, the NWMO has low relevance in the context of Giant Mine due to its reliance on a private industry levy.

Case Study: Superfund

Background

The United States Superfund Cleanup Program was established by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) in response to the threat of hazardous waste sites requiring long-term remediation in instances where a polluter could not be identified. This law was enacted in the wake of public backlash to the discovery of toxic waste at sites such as the Love Canal in New York and Valley of the Drums in Kentucky (US EPA, 2018).

CERCLA gives the US Environmental Protection Agency (EPA) authority to address releases or threatened releases of hazardous substances that may endanger public health or the environment. Additionally, CERCLA created a polluter tax on the chemical and petroleum industries. Under CERCLA, the US EPA:

- Established remediation requirements concerning closed and abandoned hazardous waste sites;
- Established liability of persons responsible for releases of hazardous waste at these sites; and,
- Created a trust fund to provide for cleanup when no responsible party could be identified (US EPA, 2018).

Funding

Initially, Superfund was funded through industry taxes on chemical and petroleum industry of the United States; by 1995, Superfund had accumulated almost \$4 billion. However, the authorization to tax the chemical and petroleum industries for the purposes of the fund had ended that year and were not reauthorized by Congress. Since then, Superfund has been funded through government appropriations of approximately \$1.1 billion a year; however, this budget will be cut by 30% due to changes in governmental policy (US EPA, 2018).

Relevance

Despite the large endowment into Superfund, the trust fund's success rate has been low. Out of the 1,200 sites falling under Superfund's legislation, less than half had received any remediation action (US EPA, 2018). Analyses of Superfund's inefficiency point towards the transaction costs related to the administration and legislation of the fund: litigation and transaction costs to enforce Superfund have averaged 88% of total expenses for remediation efforts (Stroup and Townsend, 1993). This case study is an example of the significant administrative and legal costs associated with the creation and implementation of a trust fund.

Case Study: University of Toronto

Background

The University of Toronto (UofT) was established in 1827 and is Canada's largest university. Since the University of Toronto's founding, its alumni and other donors have played a fundamental role in building a permanent financial foundation for UofT by donating endowed gifts. Endowed gifts enable UofT to offer financial support to students, attract professors and researchers, and create programs. At April 30, 2017, UofT endowments totaled \$2.4 billion and included over 6,000 individual endowment funds (UofT, 2017).

Funding

UofT endowments are managed in an investment pool by the University of Toronto Asset Management Corporation. Almost all of the University's endowments hold units in this investment pool, named the Long-Term Capital Appreciation Pool (LTCAP). Each endowment account holds units in LTCAP that reflect the number of dollars contributed and the unit value on the dates of contribution.

To ensure that endowments will fund UofT in the future, the University adopted a policy that grows the capital value of the endowment while allowing spending to increase over time as a percentage of the original donation. In years where funds exceed spending, funds in excess of the spending allocation are set aside and reinvested. This builds up a contingency fund for years when investment markets are poor.

To protect the fund against inflation over time, the University established an investment return target of a 4% real investment return after inflation and net of investment fees and expenses with a risk tolerance of 10% over 10 years (UofT, 2017).

Relevance

The University of Toronto endowment fund holds little relevance Giant Mine as it is privately funded and necessarily adapts its funding of projects and initiatives in response to economic conditions: in years of poor economic performance, the fund does not allocate any spending in order to maintain its capital. Given this would be an unacceptable scenario for Giant Mine, this case is of limited applicability.

Case Study: Canada Pension Plan Investment Board

Background

The Canada Pension Fund Investment Board (CPPIB) is a professional investment management organization that invests the pooled assets of over 20 million Canadians to help ensure the sustainability of the Canada Pension Plan (CPPIB, 2018).

CPPIB's investment objective is to "maximize returns without undue risk of loss" (CPPIB, 2018). CPPIB is mandated to act in the best interests of contributors and beneficiaries and take into account the factors that affect the financial obligations of the CPP.

While the Canada Pension Plan is a federal social insurance program, the CPPIB maintains independence by operating independently from the government, while also being held strictly accountable through policies, regulations and legislations.

Funding

The CPP fund is an example of a pooled fund. Almost all individuals who work in Canada, earn more than \$3,500 annually, and work outside of Quebec contribute a percentage of their earnings to the fund. If the individual has an employer, they contribute half the required contribution while their employer contributes the other half. If the individual is self-employed, they contribute the entire required amount. As of March 2018, the CPP fund totaled \$356 billion.

The CPPIB invests the fund globally into private equity, real assets, active equities, and capital markets to generate a return for the fund in order to ensure its long term sustainability. The fund is used to finance retirement pension, post-retirement benefits, disability income and other related benefits for Canadians.

Relevance

While the CPPIB invests in long term real assets, it holds little relevance Giant Mine as it is entirely privately funded.

Case Study: Western Australia Rehabilitation Fund

Background

In 2012, the Government of Western Australia enacted a Mining Rehabilitation Fund to replace previous legislation covering the rehabilitation of abandoned mines, which did not account for the true cost of rehabilitation and imposed a significant financial impact on the mining industry (Government of Western Australia). The Mining Rehabilitation Fund Act 2012 established the Mining Rehabilitation Fund (MRF), which is a pooled fund to which Western Australian mining operators contribute for the purpose of rehabilitating abandoned mines. The MRF does not absolve mining operators from their current and ongoing legal obligations to rehabilitation work on their tenements. The fund is intended to enhance Western Australia's capacity to manage abandoned mines and improve environmental and public health outcomes.

Funding

The MRF is funded through an annual levy from all tenement holders with a liability above \$50,000. There are approximately 22,000 tenements across Western Australia; under the MRF all tenement holders are required to disclose disturbance data to the State. This data is used to calculate the annual MRF levy (Government of Western Australia). Money in the MRF is available to rehabilitate abandoned mines across Western Australia in cases where the tenement holder fails to meet rehabilitation obligations. Interest earned on fund contributions will fund the MRF's administration as well as fund the rehabilitation of legacy mine sites throughout Western Australia.

The MRF is considered a special purpose account under the Financial Management Act of 2006, and therefore must be spent in accordance with purposes stated in the MRF legislation (Government of Western Australia). The MRF account balance and levy percentage is monitored on an ongoing basis by the Government of Western Australia in order to ensure the fund is effectively managed to meet current and future liabilities as well as cover current and future administrative costs.

Relevance

The case of MRF demonstrates the value that a pooled fund can bring to the management and rehabilitation of legacy and current mine rehabilitation sites. The initiative ensures stable and long-term financing of rehabilitation efforts in Western Australia.

Adopting this type of pooled fund approach in Canada would require a significant legal and regulatory undertaking to draft the necessary framework for either drafting a new industry levy or repurposing existing funds, however could be aligned with existing financial surety frameworks and royalty regimes.

Public-Private Partnerships

Case Study: Sullivan Mine

Background

The Sullivan Mine in Kimberly, BC, was one of the largest lead and zinc producers in the world. During its lifetime, the mine produced 17 million tonnes of zinc and lead and more than 285 million ounces of silver. The Sullivan Mine closed in 2001 after 92 years of operation. As the mine employed over 3,500 of the city's residents, the City of Kimberly was concerned about the economic loss the closure of the mine would bring (estimated at \$2 million annually).

Funding

In order to address the economic loss, the City of Kimberly partnered with Teck Resources Limited to develop a \$70 million transition plan, shared among both parties, to both rehabilitate the site and transform it into one that generates revenue (FCM, 2016). The partnership consulted local stakeholders to collaboratively develop a remediation and development plan that harnessed the area's natural resources. The project underwent an extensive community outreach process; the Sullivan Mine Public Liaison Committee was created as a way to disseminate information about closure plans and address community stakeholder concerns about environmental issues related to the site's remediation (FCM, 2016).

As a part of this plan, the City of Kimberley and Teck collaborated with the EcoSmart Foundation to develop a one-megawatt solar power plant on the former Sullivan Mine site. The project, SunMine, will provide Kimberley with a long-term source of revenue from the sale of energy upon its completion. The \$5.3 million project began in 2014, with \$2 million sourced from Teck, who provided the land and site infrastructure for the project, and \$1 million from British Columbia's Innovative Clean Energy Fund (Teck, 2016).

Relevance

The Sullivan Mine example provides an example of the innovative potential a partnership with the private sector can bring to a mine remediation project in generating revenue for a municipality. In addition, this case is a successful example of the involvement of community stakeholders in the creation of the remediation plan.

While a revenue-generating option has not yet been identified for Giant Mine, a PPP model could be considered for certain aspects of the Giant Mine's remediation plan, such as water treatment from the site, or potentially exhuming the arsenic trioxide dust stored and detoxifying while extracting residual gold. This option would involve extensive consultation and collaboration with both public and private sector actors.

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