



Draft Report

Crown-Indigenous Relations and Northern Affairs
Canada (CIRNAC)

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

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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
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 help 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, NT. 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).¹

In 2017, the Giant Mine 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 responses 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 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;
- Reviewed public and relevant private sector examples to understand potential inhibitors and enablers for long term funding options, including discussions with project stakeholders; and
- Reviewed potential new financial tools, instruments and mechanisms that may be emerging that can contribute to options for long term funding.

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 Giant Mine.

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

Section 2 lists the various 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.

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1.0 Background

1.1 Report context

In August 2014, 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, NT. 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 options analysis to demonstrate how the Government of Canada will meet Measure 6 of the Report of the Environmental Assessment with respect to long-term funding options for the Giant Mine. In order to meet Measure 6, Deloitte undertook the following:

- Reviewed existing responses 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 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;
- Reviewed public and relevant private sector examples to understand potential inhibitors and enablers for long term funding options, including discussions with project stakeholders; and
- Reviewed potential new financial tools, instruments and mechanisms that may be emerging that can contribute to options for long term funding.

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).

The capital costs for the Giant Mine Remediation project have been estimated at \$480 million, with ongoing annual costs at \$1.9 million over the lifetime of the project, which is estimated to be 100 years. However, the periodic monitoring, maintenance and replacements of components on the site is expected to continue in perpetuity.

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.

As a result, CIRNAC became a caretaker for the site, including the stored arsenic trioxide, and Giant Mine officially became an abandoned mine site (CIRNAC, April 2018).

1.4 Current funding processes

The Giant Mine Remediation Project has been funded through the Federal Contaminated Sites Action Plan (FCSAP) since 2005. FCSAP is 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 is to complete the assessment, remediation, and risk management of the highest-risk federal contaminated sites. Currently, there are 6,000 sites funded by the program, of which Giant Mine is one. As the FCSAP program will sunset in 2020, the Federal Government is seeking to identify long-term funding options for the remediation phase of the project as well as the long-term monitoring and maintenance of the site (CIRNAC, April 2013).

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 duration of the Giant Mine Remediation Project is 100 years,
- the liability and management of the Giant Mine site will fall under the jurisdiction of the Federal Government for the duration of the remediation project, 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**.

2.0 Concerns raised by project stakeholders

The remediation of Giant Mine is an extensive effort that will 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 perspectives is necessary to provide a balanced and well-considered perspective on the possible financing approaches for the Giant Mine remediation.

The discussion of long-term funding options will take into consideration project stakeholders' 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 plan has been revised to a 100-year timeframe, excluding ongoing and perpetual requirements to maintain the Giant Mine Site after the completion of the remediation project (Review Board, June 2013). Given that the funding will likely 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 plan, including long term monitoring of the site, and will have to be protected from shifts in public spending policy and any instances of economic downturns. Additionally, as it is expected that the Federal Government will be the project funder as it holds the liability for Giant Mine, there is concern that the ongoing and long-term costs associated with maintenance of Giant Mine will compete with other future governmental priorities as the liability of the Giant Mine is reduced through remediation efforts.
- 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, Deloitte has considered a set of long-term funding option criteria to ensure stakeholder concerns are reflected into the analysis. **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
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Security of funding	Duration	Funding is 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.

3.0 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 the 'art of the possible' by looking at novel or alternative funding mechanisms used elsewhere. 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 funding options for the mining industry and other extractive industries both domestically and internationally to fully capture a possible array of long-term funding options. The following funding options are discussed:

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

Section 3 presents fifteen example case study funds covering the above funding options (see map below for location of case studies). Some of the case studies researched for this report were also analyzed in depth in previous reports. 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. A representative case study for each funding option, as well as the most pertinent case studies, will be discussed in the body of the report. All other case studies are included in Appendix A.

Figure 1: Map of case studies considered

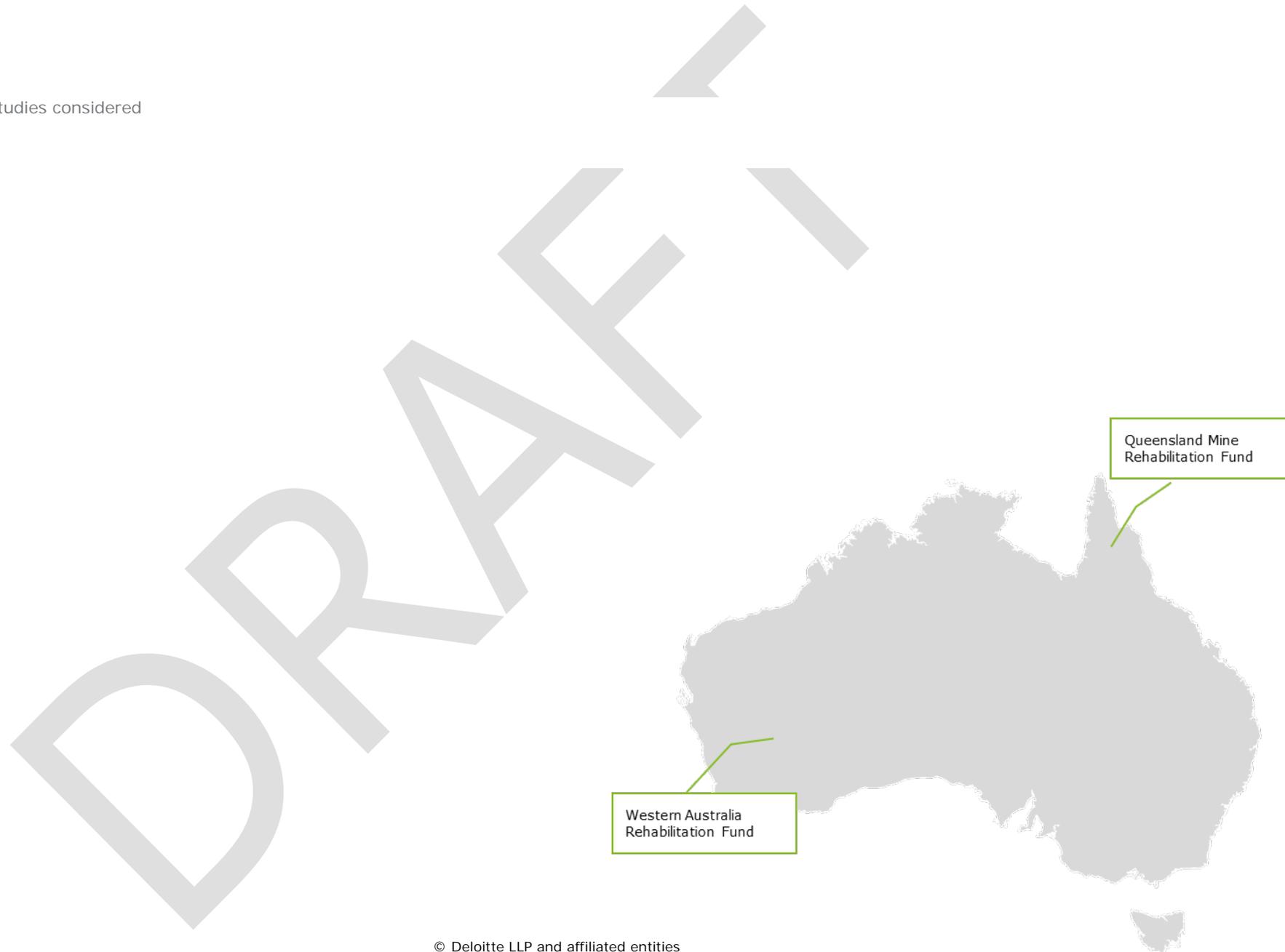


Table 2 below lists the fifteen example funds researched for this report and outlines the potential enablers and inhibitors that influence their relevance to Giant Mine.

Table 2: Matrix of case study funds researched

Fund Example	Description	Type of Fund	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	Public-sector trust fund	<ul style="list-style-type: none"> Funding in perpetuity Funding adjusted annually 	<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) Non-comparable level of funding (\$550 million) 	<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 fixed trust fund lasting 10 years jointly funded by the federal and Nova Scotia government (PPPC, July 2014)	Public-sector trust fund	<ul style="list-style-type: none"> A lump-sum trust fund ensures stable funding over the span of 10 years Federal oversight committee provided independent accountability of fund management. The creation of a Community Liaison Committee ensured stakeholder involvement in the fund management process 	<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 Developed to facilitate a transfer of funds between different levels of government, i.e., between the federal and provincial governments 	<p>The Sydney Tar Ponds and Coke Ovens Remediation Project is a lump-sum public-sector trust fund providing stable funding for the sites' remediation.</p> <p>Relevance: High</p>

<p>The Cleanup of Abandoned Northern Sites (Project CLEANs)</p>	<p>Jointly funded by governments of Saskatchewan and Canada and managed by Saskatchewan Research Council (NRC)</p>	<p>Public-sector trust fund</p>	<ul style="list-style-type: none"> Public funding ensures long-term interest in site remediation Operational and project execution risks are transferred to SRC Usage of a private fund manager maintains independence from government competing interests 	<ul style="list-style-type: none"> Requires coordination of third-party funding manager, which may increase administrative costs 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>
<p>Britannia Mine</p>	<p>Funded by a combination of BC Government funding and industry funding. Remediation was headed by EPCOR Water Services (Partnerships BC)</p>	<p>Public-Private Partnership</p>	<ul style="list-style-type: none"> Operational and project execution risks and transferred from government to private implementing entity Usage 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 to the context of Giant Mine. It provides long-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>

<p>Sullivan Mine²</p>	<p>Jointly funded by Teck, BC Innovative Clean Energy Fund, and a loan to the City of Kimberly (Natural Resources Canada)</p>	<p>Public-Private Partnership</p>	<ul style="list-style-type: none"> • All expenses are recoverable through the creation of solar panels on the remediation site, allowing greater flexibility in procuring funds 	<ul style="list-style-type: none"> • Requires agreement from a large variety of stakeholders, including the majority vote of city residents • Remediation site is conducive to solar energy, a recoverable revenue stream 	<p>The Sullivan Mine is of medium relevance to the context of Giant Mine. It provides long-term, stable funding. However, this case required significant coordination with local stakeholders for its implementation.</p> <p>Relevance: Medium</p>
<p>DEW Line Cleanup</p>	<p>Funded by public money, managed by the Department of National Defense (Department of Natural Defense, 2008)</p>	<p>Government Appropriations</p>	<ul style="list-style-type: none"> • Public funds ensures stable, long-term funding for site remediation 	<ul style="list-style-type: none"> • Challenges in stewardship, accountability, and fund management due to size, complexity, and geographic dispersion of sites. • Comparable level of funding (\$575 million) 	<p>The DEW Line Cleanup has a low relevance to the context of Giant Mine as it relies on the transfer of payments from the Department of National Defense for funding.</p> <p>Relevance: Low</p>
<p>US Superfund</p>	<p>Initially funded by industry, funding has been primarily through tax-payer dollars after industry levy fund was exhausted (US EPA)</p>	<p>Private-sector trust fund</p>	<ul style="list-style-type: none"> • Government (US Environmental Protection Agency) holds complete accountability for management and allocation of funds. • Comparable level of funding (\$1.1 billion annually) 	<ul style="list-style-type: none"> • Changes in government policy and priorities affects level of money channeled to fund • Funded through private industry levies 	<p>US Superfund has a low relevance to the context of Giant Mine as it initially was a private-sector trust fund initially funded through a polluter tax.</p> <p>Relevance: Low</p>

² See Appendix A for further details on the Sullivan Mine

<p>British Columbia Oil and Gas Commission: Orphan Site Rehabilitation Fund</p>	<p>Funded by levies from the oil and gas industry in British Columbia (BCOGC)</p>	<p>Private-sector trust fund</p>	<ul style="list-style-type: none"> Maintains independence as 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 funds Fixed annual levy does not provide flexibility for a sudden increase in the number of orphan sites (i.e. Decommissioning of Terra Energy Corp increased the number of orphan sites from 45 to 175 sites in FY17) 	<p>The Orphan Site Rehabilitation fund has a low relevance to the context of Giant Mine due to its usage of a private industry levy.</p> <p>Relevance: Low</p>
<p>Nuclear Waste Management Organization Fund</p>	<p>Annual deposits paid into individual trust funds by nuclear energy corporations in Canada (Nuclear Waste Management Organization, 2018)</p>	<p>Private-sector trust fund</p>	<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 a low relevance to the context of Giant Mine due to its usage of a private industry levy.</p> <p>Relevance: Low</p>
<p>Western Australia Rehabilitation Fund³</p>	<p>Annual contributions from tenement holders (Government of Western Australia, 2017)</p>	<p>Private-sector trust fund</p>	<ul style="list-style-type: none"> Funding protected against changes in government policy Evoking 'polluter pays' principle might ensure 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 a low relevance to the context of Giant Mine due to its usage of a private industry levy.</p> <p>Relevance: Low</p>

³ See Appendix A for further details on the Western Australia Rehabilitation Fund

<p>Queensland Mine Rehabilitation Fund</p>	<p>Annual levy from resource companies, with level of contribution varying depending on risk level (Queensland Government, 2017)</p>	<p>Private-sector trust fund</p>	<ul style="list-style-type: none"> • Funding protected against changes in government policy • Evoking 'polluter pays' principle by mandating mine operators to contribute to fund might encourage greater participation in progressive remediation. • Usage of 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 a low relevance to the context of Giant Mine due to its usage of a private industry levy.</p> <p>Relevance: Low</p>
<p>University of Toronto</p>	<p>Canada's largest university endowment fund, financed by individual contributions to the fund (University of Toronto, 2017).⁴</p>	<p>University Endowment</p>	<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"> • Fiduciary responsibility to maximize returns over the long-term • Partially government and privately funded • Fund allocation occurs within an annual budget cycle • Subject to inflation and changes in economic policy 	<p>The University of Toronto endowment fund includes private sources of funding and exists to provide economic returns rather than fund projects.</p> <p>Relevance: Low</p>
<p>Harvard University</p>	<p>World's largest university endowment fund, funded by individual contributions to the fund. Managed by the independent Harvard Management Company (Harvard University, 2018)</p>	<p>University Endowment</p>	<ul style="list-style-type: none"> • Long-term investment horizon • Has a dedicated natural resources portfolio 	<ul style="list-style-type: none"> • Fiduciary responsibility to maximize returns over the long-term • Entirely privately funded • Fund allocation occurs within an annual budget cycle • Subject to inflation and changes in economic policy 	<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>

⁴ University of Toronto. *University endowment*, n.d. Retrieved from <https://finance.utoronto.ca/wp-content/uploads/2017/09/2017e.pdf>

<p>Caisse de dépôt et placement du Québec Infra</p>	<p>Funds and implements government-sanctioned major public infrastructure projects in Canada (CDPO, 2018)</p>	<p>Pension fund</p>	<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>
<p>Canada Pension Plan Investment Board</p>	<p>Invests in large-scale infrastructure businesses that provide essential services (CPPIB)</p>	<p>Pension fund</p>	<ul style="list-style-type: none"> • Stable long-term cash flow • Supported by regulatory regimes • Suffer fewer impacts from economic downturns • 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 	<p>The Canada Pension Plan Investment Board pension fund is entirely privately funded and is subject to economic volatility and risk.</p> <p>Relevance: Low</p>

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3.1 Government funding through appropriations

The funding that is currently provided to the Giant Mine Remediation project through FCSAP follows the Government of Canada's annual appropriation process. There are three types of programs that are a result of the appropriation process (Giant Mine Remediation Project, 2017).

1. Fixed Multi-Year Program

A Fixed Multi-Year program is established through a Cabinet submission by one or more federal departments with a defined start and end date organized by phases. Funds from a Fixed Multi-Year Program can be accessed through an annual budget appropriation and have the option to be renewed after the end date of the program has passed. FCSAP is an example of a Fixed Multi-Year Program.

2. Rolling Multi-Year Program

A Rolling Multi-Year Program is established through a Cabinet submission by one or more federal departments with a defined start date but no end date, organized by phases. The fund is reviewed and assessed at regular intervals, upon which changes to the fund are considered. Changes to fund allocations for a specific phase is granted before the start of the phase, and can contain conditions based on past fund performance.

3. Specific Program Envelope

A Specific Program Envelope is established through a Cabinet submission by a single department and could also require a submission to the Treasury Board.

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	Meets Requirement
Duration	Funding is allocated for the full life cycle of site.	The program has the option to be renewed, but is subject to Cabinet approval.	✓
Public sector funded	Funding is derived from public sector.	Appropriations are entirely government funded.	✓
Stability	Funding is protected against swings in the economy and shifts in policy.	While the likelihood is low, government programs can be changed at any time to address 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.	Budgets are typically allocated on an annual cycle, with the option of re-evaluation on an annual basis in the case of a Rolling Multi-Year Program. However, the Supplementary Estimates process	✓

		grants government appropriations the funds required to move forward in the event of an unforeseen circumstance.	
Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	As public monies are required to fund the Project, direct government appropriations using the existing governance structures, without additional layers of oversight and management, represent the most efficient option with respect to managing the funds.	✓
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	Stakeholder engagement can be built into the decision making process.	✓
Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.	Programs are administered by the government, under 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.	If the fund is managed by the government, there is a possibility of competing federal priorities.	

Summary

If government appropriations through a program similar to FCSAP can be continued past 2020, it could potentially 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, ideally, the program would 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.

There is enough flexibility in the appropriation process to build in some of the considerations required for the Giant Mine Remediation Process. Government appropriations could be modified to account for multi-year funding through the Supplementary Estimates process up to three times a

year in the case short-falls in annual Federal Government funding has led to gaps in maintaining the site or meeting environmental and human health and safety objectives. Additionally, stakeholder engagement can be built into the decision making process. Government programs also fall under a rigorous accountability framework, which could address stakeholder concerns around transparency.

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

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.

The following case studies illustrate a number of examples of public sector trust funds relevant to the Giant Mine Remediation Project.

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 within the municipal sector (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 an 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).

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 an in-perpetuity 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.

It must 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.

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 stems 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.

The Federal Government is also responsible for the cleanup of coke ovens at Sydney that were owned and operated from 1968 to 1973 by the Cape Breton Development Corporation, a Crown corporation. 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 Procurements Canada, 2014).

Funding

The Sydney Tar Ponds and Coke Ovens Remediation Project (STPCORP) was a \$397.7 million lump-sum trust fund jointly funded by the Federal Government of Canada and the Province of Nova Scotia in order to remediate one of Canada's most contaminated sites (Public Services and Procurements 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 Procurements 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. An independent Sydney Tar Ponds Agency managed all activities in the remediation project, with oversight from Public Services and Procurement Canada on behalf of the Government of Canada (Sydney Tar Ponds Agency).

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 the long-term security of a lump-sum trust fund when funding is being provided jointly by different levels of government. The STPCORP also shows the value of a third-party agency in the effective management and implementation of the project, particularly when project funders from multiple levels of government are involved.

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), which is 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. Funding is allocated through annual transfer payments from the Federal Government of Canada to the Province of Saskatchewan, who then pays SRC for project management based on their annual budget estimates (CLEANS).

Upon project completion, final liability for ongoing site maintenance will pass to the Province of Saskatchewan under the Institutional Control Program (ICP). While there is no public record of long-term funding allocated to the Northern Saskatchewan sites, the ICP has the Monitoring and Maintenance Fund, which is used to fund long-term monitoring and maintenance, and the Unforeseen Events Fund, which provides funds for unforeseen future events, which could be utilized for the long-term financing of Project CLEANS (Taylor and Kenyon, 2012).

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 usage of public funds to remediate a complex contaminated site. The guaranteed public funding agreement provides assurance that the funding will be available for the duration of the project lifecycle.

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	Meets Requirement
Duration	Funding is allocated for the full life cycle of site.	Public sector trust funds allow for the designation of a start and end date, and also have the option of existing in perpetuity.	✓
Public sector funded	Funding is derived from public sector.	Public sector trust funds are government funded.	✓
Stability / Security	Funding is protected against swings in the economy and shifts in policy.	The level of funding can be subject to government priorities and can be 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 an annual budget cycle, which will assist in managing uncertainties during project implementation allocating funding in the event of emergency or other unforeseen circumstance.	Funding is typically allocated on an annual cycle into the trust fund from the funding parties; however funding can be set aside in case of an emergency.	✓
Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	The usage of a third-party project manager with operational expertise in remediation can be an efficient way to manage funds.	✓
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	A stakeholder engagement process is typically conducted by the third party manager for comments on the budget allocation process.	✓
Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.	A third party institution can be 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.	A public sector trust fund is managed by a third party institution for the sole purpose of the project, ensuring independence from funding priorities.	✓

Summary

A public sector trust fund has the benefit of longevity and can be relied upon even if the entity responsible for remediation is insolvent. Additionally, a public sector trust fund can be designed to allow for contingencies, stakeholder participation, and reporting requirements. However, the implementation of this model to the Giant Mine Remediation Project would require the addition of a third party institution to manage and disperse the funds to the beneficiaries (i.e., CIRNAC). This would add an additional layer of contractual and administrative fees, reducing the cost effectiveness of this option. As per the direction given in Measure 6, please refer to Section 4 for further analysis of a trust fund scenario.

It is also worth noting that 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, and the federal and provincial governments in the case of Project CLEANs. Principal 2 of 'Policy of Transfer Funds' by the Treasury Board of the 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 of the 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 cannot be used to discharge their departmental 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.

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

Background

The BC Oil and Gas Commission (BCOGC) is a Crown corporation established to regulate oil and gas activities and pipelines in British Columbia. 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).

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. Furthermore, as the liability of the Giant Mine falls under the Federal Government, it is assumed that the government will be responsible for the management of its remediation, not the private sector. 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). 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 are a 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 (CDPQ) 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 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 CPP fund totaled \$303 billion (CDPQ, 2018).

The CPPIB 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 like that of Giant Mine's remediation, it holds little relevance Giant Mine as it is entirely privately funded and therefore can be subject to economy volatility. Additionally, their requirement to generate returns in perpetuity makes this form of pension fund not applicable to the case of Giant Mine.

University endowment funds are another type of private trust fund which contain money 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

Harvard University's endowment fund was established in 1974 and is the world's largest university endowment fund. The Harvard Management Company manages the 13,000 funds that constitute the endowment fund. The endowment supports faculty and students, professorships, financial aid, fellowships, and student life and activities. As of 2018, the endowment fund totaled \$37.1 billion USD.

Funding

The Harvard University endowment fund is comprised of donor gifts, student fees, and sponsored support public and private entities. A portion of the endowment is paid out annually to support the University's budget. 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.

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 strategic objectives (Harvard University, 2017).

Relevance

The Harvard University endowment fund hold little relevance Giant Mine as it is privately funded and therefore can be subject to economic volatility. Additionally, their requirement to generate returns in perpetuity and restrictions imposed by donors on how funding can be allocated make them not applicable to the case of Giant Mine.

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 are a way of blending 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 novel, 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 the risk profiles such as very low, low, and moderate. 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.

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.

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	Meets Requirement
Duration	Funding is allocated for the full life cycle of site.	Funding is typically allocated for the full life-cycle of site.	✓
Public sector funded	Funding is derived from public sector.	Funding is entirely privately sourced.	
Stability / Security	Funding is protected against swings in the economy and shifts in policy.	Privately sourced funds ensures funds are protected against changes in governmental policy, but not 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	Industry levies are typically a fixed percentage drawn annually, leading to a lack of flexibility in case of an unforeseen circumstance.	

	unforeseen circumstance.		
Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	The usage of a third-party project manager with operational expertise in remediation can be an efficient way to manage funds.	✓
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	Stakeholder consultation and third-party involvement can be built into the decision-making process.	✓
Accountability	A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.	A third party trustee to manage the fund is identified in the contractual agreement.	✓
Independent	Decision-making process for management and expenditure of existing funding is independent of influence from other priorities.	Fund management and fund expenditure can be kept separately.	✓

Summary

While pooled funds and other private sector trust funds are not immediately applicable to the Giant Mine Remediation Project due to the current necessity of the Federal Government funding the Project, this option provides an example of how value can be generated through private sector involvement. Private sector funds have been proven to be long-term sources of funding and can be efficiently managed by an independent third-party agency. Industry levies can be used to reduce burden on the taxpayer and reduce the rehabilitation liability of the government, as well as being protected from swings in public policy. 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 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) occurs when 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 unique benefit of the PPP model is that financial, technical, and operational risk is shared between the public and private sectors, minimizing 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. There is an opportunity for the development of innovative and efficient site remediation through the long-term collaboration between public and private sector.

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

Funding for this project was secured through a \$30 million legal settlement between the Province of British Columbia and four mining companies that were held liable for the contamination, in addition to \$69 million provided directly by the British Columbia government. Through the settlement, the province assumed responsibility for the site (Taylor and Kenyon, 2012).

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 the water treatment plant.

Relevance

The Britannia Mine provides an example of the 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 would provide certainty that one of the potentially most 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 (NAOMI, 2015). As such, while this option may provide efficiencies and some level of increased certainty, it does not provide absolutely certainty. We note that this option would require significant time and resources to develop a relationship with a private sector partner, as well as structure a governance model for the project.

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	Meets Requirement
Duration	Funding is allocated for the full life cycle of site.	There is no guarantee that funding is allocated for the full-life cycle.	
Public sector funded	Funding is derived from public sector.	Funding is jointly derived from public and private sectors.	
Stability / Security	Funding is protected against swings in the economy and shifts in policy.	The distribution of financial risk between public and private sectors protects funding against economic downturns.	✓
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.	There is flexibility in how a PPP can be structured, allowing a contingency fund to be set aside.	✓
Managing and Reporting Efficiency	Optimize the resources required to seek, manage and report on funding.	Collaborating with private sector partners has the potential to provide efficient management of funding.	✓
Stakeholder Involvement	Stakeholder involvement (e.g., local stakeholders, third party experts) in funding process and associated decisions.	Stakeholders can be utilized in the funding and decision-making process.	✓

<p>Accountability</p>	<p>A specific entity is identified as accountable for the proper management and expenditure of funds for their intended purpose.</p>	<p>The private sector partner typically is responsible for the management and expenditure of funds.</p>	<p>✓</p>
<p>Independence</p>	<p>Decision-making process for management and expenditure of existing funding is independent of influence from other priorities.</p>	<p>Private sector management of the fund ensures independence from governmental funding priorities.</p>	<p>✓</p>

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 offer several advantages for a site remediation project, especially in terms of cost and risk reduction for the government. Moreover, this model is flexible enough to incorporate stakeholder involvement and the establishment of a contingency fund. As funding can be contingent on the ability of the private sector partner to produce demonstrable results, this model could also improve the management efficiency of funds.

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 true costs for remediation) a hybrid solution containing elements of funding options discussed in this section, 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. Deloitte notes 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, government appropriation is likely the most efficient and reliable source of major project funding. Nevertheless, opportunities exist for collaboration with the private sector using 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 other value-adds in terms of specific design suggestions (Public Services and Procurement Canada, 2014). Additionally, the GOCO model ensures transparency and accountability through adherence with government stakeholder engagement and reporting protocol. For the Nuclear Waste Management Fund, the Crown-corporation Atomic Energy Canada Ltd. is mandated to hold public hearings in local communities and webcast meeting 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 limited trust fund. This 'Partnership Capacity Fund' would align with the suggested points of improvement to the FCSAP post-2020 in term 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. Further more, 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 a potential option to be considered.

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 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 described by Taylor and Kenyon (2012), 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 make possible regular review, 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 pose significant 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 unpredictable environmental conditions and many 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. Funding shortfalls have been a problem at many other long-term care sites, and have resulted in impacts on the ground, and the Board expects this to be no less likely 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 publicly available information for the remediation project and on Deloitte's experience auditing reclamation liabilities. 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 \$15 million in ten years) and decreasing over the long run;
- Infrastructure – includes overall repairs and replacement in infrastructure; this cost includes major replacements in infrastructure (costing more than \$15 million each) every ten years over the life of the project.
- 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.
- 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.
- Engineering costs – includes geotechnical inspections, and major reviews and design modifications; Includes periodical costs of around \$250,000 to \$500,000 every fifteen years.

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

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

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 4 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 4 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 \$170 million (see figure 4 below), annual management fees of 1% paid to the trust administrator / financial institution would be calculated at \$1.7 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). 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	(2.00%) 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) is presented on the table below, assuming an annual rate of return of 3.0% as a base case.

PV scenarios - assuming annual rate of return of 3%

CAD\$ million	Number of years		
	25	50	100
O&M costs	145.5	299.4	566.8
Trust fund costs	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

Figure 5: Present value estimated funds required

For any given scenario, O&M costs represent approximately 78% of total costs, while trust fund costs represent 22% of total 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.

CAD\$ million		Number of years		
		25	50	100
Annual rate of return	Funding needed			
	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

Figure 6: Level of funding required with sensitivities

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 table above, the funding required can vary significantly based on the following ranges:

- 25 years: From CAD\$116 million to \$201 million
- 50 years: From CAD\$157 million to \$350 million
- 100 years: From CAD\$175 million to \$507 million

5.0 Summary and opportunities for improvement

Finding an appropriate long-term funding option for the Giant Mine Remediation Project poses a challenge due to the magnitude of the liability of Giant Mine and longevity of the remediation process. Currently, the Giant Mine Remediation Project is funded by annual governmental appropriations through the Federal Contaminated Sites Action Plan program; however, this program will sunset in 2020, creating a need for renewed funding. It has been estimated that post-remediation care, maintenance, and monitoring costs are estimated to be \$1.9 million per year over a period of 100 years (Review Board, 2013).

In order to inform decision-making on the source of funding post-2020, Deloitte reviewed a number of long-term funding options using a case study approach of both Canadian and international funds, 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 evaluated through a set of criteria addressing 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. Creating a dedicated fund for remediation of abandoned mine sites would likely be dependent upon directing existing government revenue streams (i.e., mining taxes and/or royalties) or establishing new industry levies (NOAMI, 2006). Additionally, privately-sourced funds are susceptible to economic risk and volatility, compromising the stability criterion for the Giant Mine Remediation Project. 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. Also, 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 CIRNAC's departmental responsibilities (Treasury Board of the Secretariat, 2002). If project governance and management shifted to an agency model, similar to that used for the Sydney Tar Ponds Remediation Project, this option may be more feasible.

Although none of the case study funds were a better match to Giant Mine in terms of relevancy than a modified approach to the status quo (i.e., renewal of a government program such as FCSAP or establishment of a Rolling Multi-Year funding program), or 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 FCSAP program with a longer time horizon (it could provide a stable source of funding for the Giant Mine Remediation Project). Updates to the FCSAP program could include:

- Alignment to the 20 year program review cycle recommended for Giant Mine by the Review Board;
- Creation of a Rolling Multi-Year funding program specific to Giant Mine; and
- Formalizing, and building explicit funding for, an external stakeholder engagement process to establish a community of practice 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. FCSAP could be modified to account for possible opportunities in its current structure, through the provision of 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). For instance, while funding the totality of the remaining Giant Mine Remediation Project through a trust fund would arguably be prohibitively expensive (and therefore not meet the criteria of being cost-effective), a hybrid option could address specific challenges through specific solutions. As discussed in section 3.4, securing a long-term contract with a private sector partner (i.e., in a GOCO Public Private Partnership similar to that employed at the Britannia Mine, Sydney Tar Ponds, and the Nuclear Waste Management Fund) 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 very 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 Fund' could be established to facilitate stakeholder engagement and participation of First Nations and/or other Indigenous groups.

Overall, the experiences gained over the course of 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 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 Defense, 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 Defense 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 Defense to Inuit and Inuvialuit companies and people, its governance and project management cannot be applied 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 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 a low relevance to the context of Giant Mine due to its usage of 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 emergency and 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 transactions 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 hold little relevance Giant Mine as it is privately funded and therefore can be subject to economy volatility unless policies for funding reinvestment in favourable years are undertaken. Additionally, their requirement to generate returns in perpetuity make them not applicable to the case of Giant Mine.

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 belonging to 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 and therefore can be subject to economy volatility. Additionally, their requirement to generate returns in perpetuity makes this form of pension fund not applicable to the case of Giant Mine.

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, as well as the interest earned on the fund, can be utilized in 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.

However, adopting this type of pooled funds approach in Canada would require a significant legal and regulatory undertaking to draft the necessary framework for enforcing an annual levy. The effort would also require mass coordination across tenement holders across Canada.

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 \$2 million economic loss the closure of the mine would bring.

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 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 the municipality. In addition, this case is a successful example of the involvement of community stakeholders in the discussion 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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