The Business Case for a Northern Economic Infrastructure System

Prepared for:

The National Aboriginal Economic Development Board

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Executive Summary

Canada's North has vast resource wealth. This wealth has been long trapped because of an absence of economic infrastructure (transportation, energy, and telecommunications). Using information from eight proposed major resource projects in the North, this study finds that public investment in Northern economic infrastructure could lead to significant economic and fiscal returns:

1. Each dollar spent on Northern economic infrastructure has the potential to generate an estimated $11 of economic benefits for individuals and $11 of fiscal benefits for governments. We estimate the average major resource project in the North has expected economic benefits of $720 million in direct employment impact and $715 million in indirect and induced employment impacts; and anticipated fiscal benefits of $590 million in federal tax revenue, $390 million in territorial tax revenue, and $470 million in resource royalties.

2. The employment created by a major resource project in the North can contribute a fiscal premium to governments because it can generate at least $3 for government for every dollar government spends to provide public services to the people filling that employment. We estimate a major resource project, on average, can be expected to generate almost $1.4 billion in total fiscal premiums. This can pay for improved infrastructure, strong social programs, and contribute to the management of environmental risks.

3. The estimated fiscal cost of poverty is about $13,000 per low income Canadian, per year. We estimate the average major resource project can generate employment for previously unemployed Northern Aboriginal people that reduces the costs of poverty by about $50 million over 15 years.

4. These economic and fiscal returns to public investment in resource project infrastructure can create a potential Northern development virtuous circle, whereby Northern resource projects generate more government revenue to improve infrastructure and services, which improves the resource development investment climate and attracts even more investment. However, this study finds that maximum potential benefits are not being realized.

This study provides a strong economic and fiscal rationale for public investment in Northern infrastructure. Taken together, these four observations support the idea that: Public investment in Northern economic infrastructure that supports major resource projects could provide one of the highest rates of return of any public investment and could be fiscally self-sustaining if major resource fiscal premiums are invested wisely.

A key question is why is it so difficult to generate support for investment in Northern economic infrastructure? Among the possible reasons identified in this paper are:

- Costs are about 145% higher in the North;
- Economic infrastructure investments may not be coordinated and chosen to ensure the highest resource fiscal premiums and greatest reduction in fiscal costs of poverty;
- It is not clear that Aboriginal governments are receiving a reasonable share of the fiscal resource premium to ensure their support for resource development; and
- It is not clear that resource premium expenditures are coordinated among federal, territorial and Aboriginal governments to generate the conditions for a infrastructure investment virtuous circle.

Introduction

Investment in infrastructure required to support major resource development in the North is an excellent use of public funds with the potential to drive significant Northern economic growth for decades and secure Canada's future prosperity. In this study, undertaken by Fiscal Realities on behalf of the National Aboriginal Economic Development Board, four observations were made in support of this premise. The first three observations demonstrate that public investment in Northern economic infrastructure is an excellent use of public funds based on estimated economic and fiscal returns. The observations include:

1. major resource projects in the North have the potential to generate significant net economic and fiscal benefits;
2. a significant fiscal premium is potentially available to all governments from the employment created by proposed major resource projects in the North; and
3. northern resource development has the potential to generate employment that can significantly reduce costs to all governments associated with unemployed Northern residents.
4. We then illustrate how these economic and fiscal returns to public investment in Northern economic infrastructure could potentially drive economic growth in the North through a virtuous circle. This virtuous circle could contribute to significant economic growth in Canada's North and raise the Canadian standard of living. But, the study's fourth observation is the potential benefits of this virtuous circle are not currently being maximized.

These findings are based on research and analysis of the estimated costs and potential benefits for eight proposed major resource projects in the North, as well as Statistics Canada data and other research on all government expenditures.

Structure

There are four parts to this paper. The first section provides a brief background and a description of the policy context. The next section describes the methods used in this study. The third section builds the business case for public investment in Northern economic infrastructure by providing a detailed discussion on the four observations we made about major resource development and Northern infrastructure investment. The last section includes our conclusion, with some considerations for the design of a proposed Northern Economic Infrastructure System.

The paper also includes eight appendices; one for each of the major resource projects we looked at. Each appendix provides a brief project description, summarizes potential economic and fiscal impacts, and provides cost estimates for required infrastructure.

Background and Policy Context

In 2014, the NAEDB released a study by the Centre for the North (CFN) at the Conference Board of Canada entitled, *Study on Addressing the Infrastructure Needs of Northern Aboriginal Communities*.[1] This study focuses on economic development among Aboriginal communities within Canada's North. It notes that those communities, and Canada's North as a whole, are facing a significant infrastructure deficit that impedes economic growth. The study estimates the deficit to be as low as $50 billion and as high as $570 billion. Further, it recognizes that appropriate infrastructure is an important pre-requisite for economic development and the lack thereof hampers major resource development in the North.

Our study builds on the previous CFN study and compares cost estimates for transportation, energy, and telecommunications infrastructure required by a selection of proposed major resource projects in the North with potential economic and fiscal benefits that could be generated by these projects. In particular, we build a business case for greater public investment in Northern economic infrastructure that demonstrates:

i) a positive net economic and fiscal benefit for Northern infrastructure investment;

ii) a significant fiscal premium to all governments from major resource projects to pay for future Northern infrastructure in a potentially fiscally self-sustainable manner; and

iii) a reduction in the fiscal costs of poverty from resource project employment that further increases the fiscal premium from major resource projects.

[1] Centre for the North at the Conference Board of Canada, *Study on Addressing the Infrastructure Needs of Northern Aboriginal Communities*, Developed for the National Aboriginal Economic Development Board, December 2014.

Policy Context

The policy context for Northern economic infrastructure is characterized by the following four elements:

1. poor economic infrastructure hinders resource development;
2. resource development is more expensive in the North because of missing infrastructure;
3. northern governments have a unique transfer dependent fiscal relationship; and
4. there are infrastructure and possibly expenditure coordination issues among territorial, Aboriginal and federal governments.

Each of these elements is described briefly below.

Northern Economic Infrastructure

Major resource development is the North's economic advantage. It is the key private sector driver of employment and public revenues. Major resource development in the North can significantly contribute to the achievement of the economic development goals set out in Canada's Northern Strategy.[2] However, advancing major resource projects is hampered by significant infrastructure gaps, particularly transportation infrastructure deficiencies.[3]

[2] See Promoting Social and Economic Development in Canada's Northern Strategy here http://www.Northernstrategy.gc.ca/soc-dev/index-eng.asp.

[3] Prospectors & Developers Association of Canada, Mining is Integral to the Northern Economy. Available at http://www.pdac.ca/policy/budget-2015/infrastructure.

Northern infrastructure requirements were highlighted in the 2012 Economic Action Plan when the community infrastructure improvement fund was developed. But this fund was designed to support the improvement of *community* infrastructure, not *economic* infrastructure required to support major resource development. The 2015 Economic Action Plan states, "The need for a strong network of transportation infrastructure in the territories has intensified as a result of … investment in resource development projects. To help unlock the economic potential of the North, the Government of Canada will work with territorial governments and local municipalities to develop transportation infrastructure in the North… Canada's North is blessed with abundant natural resources, with the potential to fuel Northern economic and social development and secure Canada's future prosperity. But riches in the ground, on their own, do not guarantee economic success."[4] Federal investments in economic infrastructure are among the requirements to realize this potential.

High Costs of Northern Resource Development

A 2015 study by the Mining Association of Canada and others[5] found the cost to build a new mine in the North is as much as 2.5 times higher than the cost to build an equivalent mine in southern Canada.[6] Further, the study found that operating costs are 30% to 60% higher for mines in the North. The study found the increased cost to build and operate Northern mines is directly linked to the lack of critical infrastructure in the North (including power plants, winter and permanent roads, ports and airstrips).

[4] Canada's Economic Action Plan, Transportation Infrastructure in the North. Available at http://www.actionplan.gc.ca/en/initiative/transportation-infrastructure-North.

[5] Including the Prospectors & Developers Association of Canada, the Association of Consulting Engineering Companies – Canada, the NWT & Nunavut Chamber of Mines, and the Yukon Chamber of Mines.

[6] The Mining Association of Canada, Levelling the Playing Field, Apr 2015. Available at http://mining.ca/documents/levelling-playing-field.

Territorial Financing is Transfer Dependent

The cost of government in the North is much higher than in the rest of Canada. Total expenditures by federal, territorial and local governments per territorial resident are about 145% higher than all government expenditures per capita across all of Canada.[7] This reality means the territorial governments require large federal transfers. Major transfers include the Canada Social Transfer (CST) and the Canada Health Transfer (CHT), but the most significant transfer is Territorial Formula Financing (TFF).[8] Consider the following major transfers to the territorial governments in 2014/15:

- Yukon received $897 million in major transfers, accounting for about 74% of its revenues ($24,722 per capita allocation), including $851 million in TFF;
- Northwest Territories received $1.264 billion in major transfers, accounting for 68% of its revenues ($29,003 per capita allocation), including $1.209 billion in TFF; and
- Nunavut received $1.456 billion in major transfers, accounting for about 85% of its revenues ($39,839 per capita allocation), including $1.409 billion in TFF.

There is a sizeable discrepancy between provincial per capita allocations and those to Canada's three Northern territories. For comparison, consider per capita allocations provided to the provinces in 2014/15:

[7] This is based on population data from Cansim table 109-5335 for 2005 to 2009 (estimated population on July 1) and expenditure data from Cansim table 385-0001 for the same period (total expenditures by federal, provincial, territorial, and local governments; Financial Management System basis). Double counting was avoided by removing major transfers to the territories (including Canada Health Transfer, Canada Social Transfer, and Territorial Formula Financing) from federal expenditures. Data on major transfers was obtained from Department of Finance Canada's Federal Support to Provinces and Territories at http://www.fin.gc.ca/fedprov/mtp-eng.asp.

[8] TFF is an annual unconditional transfer from Canada to the three territorial governments that enables them to provide residents with public services comparable to those offered by provincial governments, at comparable levels of taxation. TFF helps territorial governments fund essential public services in the North, such as hospitals, schools, and social services. TFF recognizes the high cost of providing public services in the North as well as the challenges of providing services to small and isolated communities.

- Major transfers were $1,259 to $1,284 per capita in BC, AB, SK, and NL. These provinces received CHT and CST only; they did not receive equalization payments.[9]
- Major transfers among the remaining equalization receiving provinces (MB, ON, QC, NB, NS, and PE) ranged from $1,404 (ON) to $3,720 (PE) per capita.

We assert that a lack of infrastructure is a major contributing factor to large transfers required by the territorial governments.[10]

Infrastructure Coordination Issues

There is only limited evidence of infrastructure and expenditure coordination among Northern, Aboriginal, and federal governments to support resource development. This makes it difficult to determine the highest returns to Northern economic infrastructure investment. Further, there is currently no mechanism in place designed to achieve a public use component (in addition to a public benefit component) from Northern infrastructure projects proposed by private companies who need them to support resource operations.

[9] Equalization payments are based on a formula that calculates the difference between the per capita revenue yield that a particular province would obtain using average tax rates and the national average per capita revenue yield at average tax rates. Five major revenue sources are considered, including personal income taxes, business income taxes, consumption taxes, resource revenue, and property taxes. The objective of the program is to ensure that all provinces have access to per capita revenues equal to the potential average of all ten provinces.

[10] This paper will demonstrate that investment in Northern infrastructure that supports major resource development has the ability to significantly raise government revenues and dramatically reduce the cost of government.

The federal government addresses infrastructure requirements for major resource development in the North primarily through Infrastructure Canada's New Building Canada Fund and PPP Canada's P3 Canada Fund. These are public infrastructure programs that target provincial, territorial and municipal infrastructure, supporting the development of such assets as water distribution, wastewater and solid waste management, public transit, and transportation infrastructure. Their program designs provide the flexibility to support resource-related infrastructure where such projects are aligned with program objectives and meet terms and conditions, but support for major resource development is not the primary objective of the programs. Both the New Building Canada Fund and the P3 Canada Fund consider public use or public benefit a required component of proposed infrastructure projects. This can be a challenging criterion to meet.[11]

Large infrastructure projects required to support major resource development have an obvious public benefit. The projects they support generate employment, business activity, and public revenues including taxes and royalties. But, these proposed infrastructure projects often lack a public use component.[12]

[11] Should public use always be a required component for public investment in Northern economic infrastructure? Addressing this policy issue could result in much greater public investment in Northern economic infrastructure, and resulting benefits for Northern Aboriginal people and communities. If public use is required, consider the costs associated with the design and safety issues resulting from the public sharing a gravel highway intended to be travelled only by transport trucks hauling fuel and supplies to and mineral ore and concentrates from a mine site. Can infrastructure be designed and built with the capacity for safe shared use? What additional costs are involved? Given the remote locations of some mineral deposits and project sites, there are natural logistical and demographic limitations to the potential benefits of public use. Should the benefits specific to public use necessarily be required to exceed the additional costs in all cases? Are alternatives to traditional public use available? For example, can private infrastructure be converted for public use after project closure? Does this lower the additional costs involved? Or, can public ownership and limited or controlled public access qualify the public use criterion? How might additional costs be different in this case? Resolving this policy question could provide a much improved way forward.

[12] Appropriate infrastructure is so underprovided yet essential to project proponents they must build their own as opposed to waiting for the public sector to provide it. From Levelling the Playing Field, "Unlike many of their southern counterparts, companies operating in these remote areas need to invest in costly, but essential infrastructure like ports, power plants, winter and permanent roads and accommodation facilities."

As a result, project proponents often build and maintain their own transportation and energy infrastructure. However, this is private infrastructure without a public use component. All Northern governments and the federal government have to better coordinate the development of public economic infrastructure or the transition of private economic infrastructure to public infrastructure.

Methods

Sample – This study tabulates the costs and potential benefits for a sample of eight proposed major resource projects in the North, including:

1. Casino Mine Project – Gold mine; Yukon
   (Casino Mining Corp)
2. Back River Project – Gold mine; Nunavut
   (Sabina Gold & Silver Corp)
3. Jay Project – extension of Ekati Diamond Mine; Northwest Territories
   (Dominion Diamond Corp)
4. Thor Lake (Nechalacho) Project – Rare metals mine; Northwest Territories
   (Avalon Rare Metals Inc)
5. Gahcho Kué Project – Diamond mine; Northwest Territories
   (De Beers Canada Inc and Mountain Province Diamonds Inc)
6. NICO Project – Gold, cobalt, bismuth, copper mine; Northwest Territories
   (Fortune Minerals Ltd)
7. Mary River Project – Iron mine; Nunavut
   (Baffinland Iron Mines Corp)
8. Kiggavik Project – Uranium mine; Nunavut
   (AREVA Resources Canada)

Approach – Our analysis in this study uses cost-benefit methods, where average cost estimates are compared with average anticipated economic and fiscal benefit estimates. This approach provides a method to estimate net economic and fiscal benefits for a typical major resource project in the North. Averages are utilized to address possible estimation anomalies. We use three different cost benefit approaches:

   a. Infrastructure costs compared to fiscal and economic benefits from Northern economic infrastructure investment;

b. The fiscal costs compared to fiscal benefits from Northern major resource projects for previously employed persons; and

c. The fiscal costs compared to fiscal benefits from Northern major resource projects for previously unemployed persons.

Costs – The NAEDB's December 2014 study by the CFN, *Study on Addressing the Infrastructure Needs of Northern Aboriginal Communities*, found that investment in three types of infrastructure to be most strongly connected to economic development, including transportation, energy, and telecommunications. Therefore, our study tabulates cost estimates for required transportation, energy, and telecommunications infrastructure required by the selection of proposed major resource projects in the North.

Benefits – Our study considers two types of potential impacts, including economic and fiscal.

i) Economic benefits include direct, indirect, and induced employment created and supported by the proposed major resource projects in our sample:

- Direct Employment – This includes all of the jobs with the project's operator, both on-site and off-site, required for the construction and operation of the project. This is measured in person years of employment (PYE).[13] The economic impact of this directly generated employment is measured in the assumed wages and salaries earned by these employees.[14]

[13] As a simplified example, our methodology assumes that a project that directly creates ten full-time, full-year jobs annually for a period of five years, would generate an employment impact of 50 person years of direct employment.

[14] To continue with the simplified example, our methodology assumes that each of the ten full-time, full-year jobs created pays $60,000 annually, which generates a total economic impact of $3 million.

- Indirect Employment – This includes all of the jobs in the array of industries supplying goods and services to the project's operator that are required for the construction and operation of the project. Again, this is measured in PYE. The economic impact of this indirectly generated employment is measured in the assumed wages and salaries earned.
- Induced Employment – This includes all of the jobs supported by the spending associated with the directly and indirectly created employment, also measured in PYE. The economic impact of this induced employment is measured in the assumed wages and salaries earned.[15]

ii) Fiscal benefits include estimated tax revenues to federal and territorial governments and estimated resource royalties:

- Federal Tax Revenues – The large employment impact to be created by a major resource project will generate significant personal income tax revenues for the federal government. Further, the net income of a major resource project operator and all the businesses and contractors indirectly supported by the project will generate significant corporate income tax revenues for the federal government.
- Territorial Tax Revenues – Employment created by a project generates personal income tax revenue for territorial governments. The project operator's net income will generate territorial corporate income tax revenue. The business activity indirectly created by a project will yield an additional increase in net income subject to territorial corporate income tax as well.

[15] As a simplified example, our methodology assumes that a project that creates eight person years of indirect employment annually and seven person years of induced employment annually over a five year period, would generate an indirect and induced economic impact of $2.6 million (assuming $35,000 annually per indirectly created employment position and $35,000 annually per induced employment position).

- Resource Royalties – A resource royalty payment is made by the mine operator to the owner of the subsurface mineral rights. Companies are required to make these payments for the extraction of mineral ore. Royalties can be assessed as a percentage of the mine operator's profits. Depending on the specific circumstances in a particular case, resource royalties can be collected by the federal or territorial governments, and often subject to sharing provisions of various agreements to the benefit of Aboriginal governments.

Sources – The information, reports and studies informing our analysis were produced by project proponents or developed by professionals contracted by project proponents. We note that project proponents have an incentive to generate broad support for their projects and recognize the possibility this has impacted reported estimates. However, reports usually contain a statement of certification by the authors.[16] Fiscal Realities Economists did not verify any of these estimates.

Scope – In general terms, a major resource project will have five phases, including: (i) exploration / discovery, (ii) design / approval, (iii) construction, (iv) operations, and (v) closure / reclamation. This study focuses only on the impacts generated in two phases – construction and operations.

Appendices A to H contain all research sources and detailed explanations of assumptions.

[16] These statements usually provide a number of justifications as to the qualifications of the author, including professional associations, academic background, experience, etc.

The Case for Public Investment in Northern Infrastructure

Our research premise is that investment in infrastructure required to support major resource development in the North is an excellent use of public funds with the potential to drive significant Northern economic growth for decades and secure Canada's future prosperity. We present four broad observations to support our premise. The first three observations demonstrate that public investment in Northern economic infrastructure is an excellent use of public funds based on estimated economic and fiscal returns. We then illustrate how these returns from infrastructure investment could potentially drive economic growth in the North through a virtuous circle. Our fourth observation, however; is that the potential benefits available from this virtuous circle of Northern economic growth are not currently being maximized. We provide three possible reasons why maximum benefits of the virtuous circle are not being realized.

Economic & Fiscal Returns to Infrastructure Investment

Public investment in Northern transportation and energy infrastructure in support of proposed major resource projects has considerable expected economic and fiscal returns. We demonstrate this in three ways:

(i) Infrastructure Costs versus Combined Economic & Fiscal Benefits;
(ii) Fiscal Cost versus Fiscal Benefit; and
(iii) Fiscal Cost Savings.

Infrastructure Costs versus Combined Economic & Fiscal Benefits

The first observation is based on estimated economic and fiscal impacts expected to be generated by the projects in our sample and estimated costs for transportation and energy infrastructure required by the projects. Major resource projects can generate significant net economic and fiscal benefits.

Potential Economic Impacts

The sample of eight proposed projects contains evidence that major resource projects in the North have the potential to generate significant economic benefits. These benefits would flow to Northern individuals and businesses as well as individuals and businesses in the rest of Canada. Aboriginal workers could be major beneficiaries of this potential economic impact.

The table below summarizes the estimated direct employment[17] expected to be generated by the eight major resource projects in our sample and provides the estimated economic impact in millions of dollars.

Table 1 – Direct Employment

Estimated Economic Impact (Direct Employment)								
Project	**All Northern Residents**		**Northern Aboriginal**		**All Other Canadians**		**Total**	
	PYE	**Potential Impact ($million)**	**PYE**	**Potential Impact ($million)**	**PYE**	**Potential Impact ($million)**	**PYE**	**Potential Impact ($million)**
Casino	8,278	$496.7	4,139	$248.3	12,416	$745.0	20,694	$1,241.6
Back River	2,773	$166.4	1,387	$83.2	4,160	$249.6	6,933	$416.0
Jay	3,165	$189.9	1,583	$95.0	4,748	$284.9	7,913	$474.8
Thor Lake	2,800	$168.0	1,400	$84.0	4,200	$252.0	7,000	$420.0
Gahcho Kué	3,160	$189.6	1,580	$94.8	4,740	$284.4	7,900	$474.0
NICO	1,113	$66.8	556	$33.4	1,669	$100.1	2,782	$166.9
Mary River	8,432	$505.9	4,216	$253.0	12,648	$758.9	21,080	$1,264.8
Kiggavik	8,768	$526.1	4,384	$263.0	13,152	$789.1	21,920	$1,315.2

The table summarizes estimated direct employment and economic impacts for three groups, including all Northern Residents, Northern Aboriginal (a component of all Northern Residents), and All Other Canadians (the rest of Canada, outside the North).

[17] Fiscal Realities did not estimate the person years of employment expected to be generated. These estimates were collected from a variety of secondary sources.

An important caveat is that each of the projects was considered in isolation from all other proposed projects. This includes all other projects in the North, not just those in our sample, and other proposed major resource projects in the rest of Canada as well. The number of major resource projects proceeding to construction and operations at any given time will have a dramatic impact on the demand for labour. If all the currently proposed major resource projects were to proceed, the demand for labour would exceed the whole country's supply of labour. We expect the number of projects proceeding simultaneously to significantly alter the assumed ratios of Northern residents and Northern Aboriginal people filling the generated employment opportunities.[18]

With this important caveat in mind, our findings demonstrate a representative major resource project in the North has the potential to directly create about 12,000 person years of employment and generate an economic impact of about $720 million. We also estimate a major resource project has the potential to directly create about 2,400 person years of employment for Northern Aboriginal people.[19] This is about 160 full time equivalents for the assumed 15 year project life for Northern Aboriginal people.

The table below summarizes the estimated indirect and induced employment[20] expected to be generated and supported by the eight major resource projects in our sample and the estimated economic impact of that employment in millions of dollars.

[18] It is for this reason we use an average project to report results. This allows net benefits to be reported before the point of diminishing returns when costs rise because of excess demand for labour from too many major resource projects proceeding simultaneously.

[19] According to Statistics Canada data on Labour Force Characteristics by Territory from April 2015, combined the territories have about 5,000 unemployed workers. The Aboriginal identity population in the three territories combined is just over 50% of the total population according to Statistics Canada Census data. Therefore, we assume the territories have about 2,500 unemployed Aboriginal workers combined. To put the estimated 2,400 person years of direct employment for Northern Aboriginal workers into perspective, this is about 160 jobs over an assumed 15 year project life. Indirect and induced employment for Northern Aboriginal workers is estimated to be about 6,500 per project. This is an average of 433 jobs over an assumed 15 year project life.

[20] Fiscal Realities did not estimate the PYE expected to be created by these projects. Existing estimates were simply collected from a variety of secondary sources.

Table 2 – Indirect & Induced Employment

Estimated Economic Impact (Indirect & Induced Employment)								
Project	**All Northern Residents**		**Northern Aboriginal**		**All Other Canadians**		**Total**	
	PYE	**Potential Impact ($million)**	**PYE**	**Potential Impact ($million)**	**PYE**	**Potential Impact ($million)**	**PYE**	**Potential Impact ($million)**
Casino	6,600	$231.0	3,300	$115.5	9,900	$346.5	16,500	$577.5
Back River	14,152	$495.3	7,076	$247.7	21,227	$742.9	35,379	$1,238.3
Jay	2,598	$90.9	1,299	$45.5	3,896	$136.4	6,494	$227.3
Thor Lake	6,790	$237.7	3,395	$118.8	10,185	$356.5	16,975	$594.1
Gahcho Kué	4,134	$144.7	2,067	$72.3	6,202	$217.1	10,336	$361.8
NICO	1,330	$46.6	665	$23.3	1,995	$69.8	3,325	$116.4
Mary River	22,775	$797.1	11,388	$398.6	34,163	$1,195.7	56,938	$1,992.8
Kiggavik	14,763	$516.7	7,382	$258.4	22,145	$775.1	36,908	$1,291.8

The above table summarizes estimated indirect and induced employment and economic impacts for the three groups. But, the caveat remains the same. Each of the projects was considered in isolation from all other proposed projects. The number of major resource projects proceeding to construction and operations at any one time will have a dramatic impact on the demand for labour and significantly alter the composition of the labour force filling that demand.

With this important caveat in mind, our findings demonstrate a representative major resource project in the North has the potential to create over 20,000 person years of indirect and induced employment and generate an economic impact of about $715 million.[21] Among these impacts, we estimate a major resource project can potentially create about 4,000 person years of indirect and induced employment for Northern Aboriginal people. This is about 270 full time equivalents for Northern Aboriginal people during the 15 years of a major resource project.

[21] Average among six projects, excluding NICO and Mary River (smallest and largest estimates).

Potential Fiscal Impacts

The sample of eight proposed projects contains evidence that major resource development in the North has the potential to generate significant fiscal benefits for governments. The table below summarizes the estimates of federal and territorial tax revenues and resource royalties generated by each project in our sample.[22] Our sample indicates that a major resource project in the North has the potential to generate an estimated $590 million in additional federal tax revenue, an additional $350 million in territorial tax revenue, and about $470 million in resource royalties.[23]

Table 3 – Federal & Territorial Tax Revenue and Resource Royalties

Estimated Fiscal Impacts			
Project	**Additional Federal Revenues ($million)**	**Additional Territorial Revenues ($million)**	**Resource Royalties ($million)**
Casino	$936	$572	$1,310
Back River	$317	$255	$238
Jay	$440	$318	$347
Thor Lake	$612	$370	$296
Gahcho Kué	$913	$314	$250
NICO	$33	$17	$11
Mary River	$4,000	$1,629	$1,925
Kiggavik	$334	$277	$400

This is an average contribution of almost $40 million annually in federal tax revenue, $23 million annually in territorial tax revenue, and $31 million annually in resource royalties for each of the 15 years of an average major resource project's life.

[22] Fiscal Realities did not perform the estimates described in this section. These estimates were collected from a variety of secondary sources.

[23] Average among six projects, excluding NICO and Mary River (smallest and largest estimates).

Infrastructure Cost Estimates

The table below summarizes cost estimates for transportation and energy infrastructure required for each project in our sample.[24] Our sample indicates that a representative major resource project in the North requires about $130 million in transportation and energy infrastructure.[25]

Table 4 – Infrastructure Cost Estimates

Infrastructure Cost Estimates			
Project	**Transportation ($million)**	**Energy ($million)**	**Total ($million)**
Casino	$123.0	$209.0	$332.0
Back River	$48.0	$31.5	$79.5
Jay	Existing	$10.0	$10.0
Thor Lake	$3.0	$17.4	$26.5
Gahcho Kué	$77.5	$21.2	$98.7
NICO	$10.2	$13.6	$23.8
Mary River	$2,000.0	$56.7	$2,056.7
Kiggavik	$191.5	$24.9	$216.4

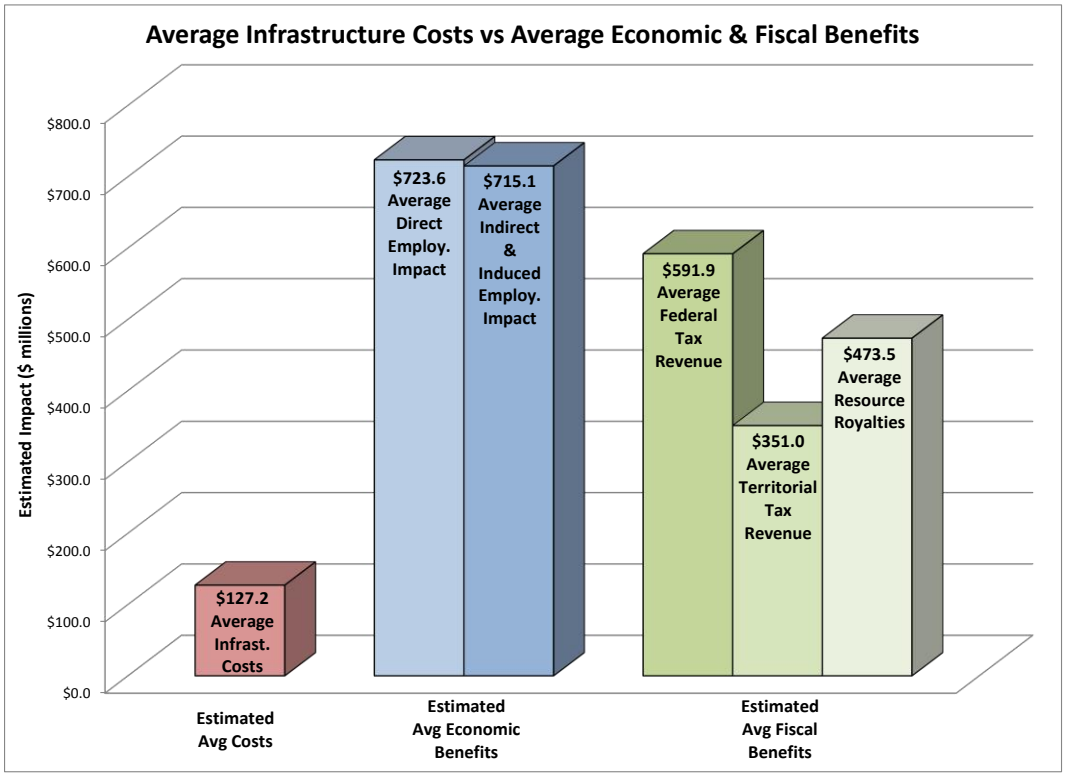
Returns to Northern Infrastructure Investment

The average estimated cost of required infrastructure per major resource project is about $130 million (transportation and energy infrastructure). The average estimated economic benefit per major Northern resource project is about $720 million (direct employment impact) and $715 million (indirect and induced employment impact), and the average estimated fiscal benefit is about $590 million (federal tax revenue), $350 million (territorial tax revenue), and $470 million (resource royalties). These are illustrated in the chart below.

[24] Fiscal Realities did not perform the estimates described in this section. These estimates were collected from a variety of secondary sources.

[25] Average among six projects, excluding NICO and Mary River (smallest and largest estimates).

Chart 1 – Estimated Cost versus Anticipated Benefits



The short red column on the left represents average estimated costs of transportation and energy infrastructure required by the proposed major resource projects in our sample. The tall blue columns in the middle represent average estimated economic benefits, and the green columns on the right represent average estimated fiscal benefits. Based on the cost and benefit estimates among the projects in our sample, we estimate that about $11 in economic benefit and about $11 in fiscal benefit can be generated for every one dollar invested in transportation and energy infrastructure.

Summary of Observation 1

Infrastructure Investment versus Combined Economic & Fiscal Benefits

Public investment in Northern economic infrastructure that supports major resource development will yield significant economic and fiscal returns.

- On average, there is an $11 economic return and an $11 fiscal return per dollar of Northern economic infrastructure investment.
- We estimate the average major resource project in the North has expected economic benefits of $720 million in direct employment impact and $715 million in indirect and induced employment impacts; and anticipated fiscal benefits of $590 million in federal tax revenue, $390 million in territorial tax revenue, and $470 million in resource royalties.

Fiscal Impacts to Aboriginal Governments

It is not clear how much fiscal benefit Aboriginal governments are receiving because these are contained in economic and other agreements. We observe that there could be a lot of variability between fiscal benefits among Northern Aboriginal governments. Our research on royalty sharing with Aboriginal governments is summarized in the table below.

This table demonstrates a divergence of fiscal benefits shared among Northern Aboriginal governments depending on the territory in which they are located.

Table 5 – Resource Royalty Sharing with Aboriginal Governments

Fiscal Benefits to Aboriginal Governments	
Project	**Sharing of Resource Royalties**
Casino, YK	• Project site is within Selkirk's traditional territory. Under their Final Agreement, Selkirk receives 50% of the first $2 million and 10% of remaining royalties collected by Yukon. • But, Yukon transfers 100% of royalties generated by the Minto Mine to Selkirk annually.
Back River, NU	• Properties are mostly located on IOL. But, these are grandfathered properties. • Royalty sharing provisions of the NLCA entitles Inuit to 50% of the first $2 million and 5% of remaining royalties collected by Canada annually.
Jay, NT	• Site is within the Tłı̨chǫ settlement area. But not within Tłı̨chǫ Lands. • The Tłı̨chǫ agreement entitles Tłı̨chǫ to 10.429% of the first $2 million and 2.086% of any additional royalties collected annually.
Thor Lake, NT	• Site is within the Tłı̨chǫ settlement area. But not within Tłı̨chǫ Lands. • The Tłı̨chǫ agreement entitles Tłı̨chǫ to 10.429% of the first $2 million and 2.086% of any additional royalties collected annually.
Gahcho Kué, NT	• Site is within the Tłı̨chǫ settlement area. But not within Tłı̨chǫ Lands. • The Tłı̨chǫ agreement entitles the Tłı̨chǫ Government to 10.429% of the first $2 million and 2.086% of any additional royalties collected annually.
NICO, NT	• Project site is surrounded by Tłı̨chǫ Lands. But, mineral claim grandfathered into Tłı̨chǫ Agreement (Tłı̨chǫ does not own the subsurface rights to the NICO deposit). • The Tłı̨chǫ Government is entitled to 10.429% of the first $2 million and 2.086% of any additional royalties collected annually.
Mary River, NU	• Site is located on IOL. But, mining leases predate the NLCA. • Under the NLCA, Inuit are entitled to 50% of the first $2 million and 5% of remaining royalties collected annually.
Kiggavik, NU	• One property is located on IOL. But leases predate the NLCA (grandfathered). And one property is located on Crown Land. • Under the NLCA, Inuit receive 50% of the first $2 million and 5% of the remaining royalties collected by Canada annually.

Fiscal Cost versus Fiscal Benefit

The second observation is based on a comparison of government expenditures on all Canadians and government revenues generated by workers filling the employment positions created by a selection of major resource projects in the North. We found that employment created by major resource projects contributes significantly more to government revenues than governments spend on the average Canadian. We call this the fiscal premium of major resource development.

Fiscal Cost Per Capita

We estimate current total expenditures by federal, provincial, territorial, and local governments to be about $21,400 per capita across all of Canada.[26] This is the amount government spends on every Canadian annually.

Potential Fiscal Benefit per Major Resource Worker

Based on a selection of four projects from our sample, we estimate the average person year of employment created by a major resource project in the North has the potential to generate about $64,400 in government revenues.[27] This is based on the following sample:

- MNP LLP has estimated the total government revenues generated over the life of the proposed Casino Project, including taxes to federal, provincial, territorial, and municipal governments, and resource royalties, will be $60,343 per PYE created by the project.[28]
- Dominion Diamond has estimated total government revenues generated over the life of the proposed Jay Project, including federal and territorial personal and corporate income taxes, other payroll taxes, taxes on products, and resource royalties, will be $87,173 per PYE created by the project.[29]

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[26] Based on Cansim table 385-0001, total expenditures by federal, provincial, territorial, and local governments for the period 2001 to 2009 (total government expenditure on a Financial Management System Basis) and Cansim table 109-5335 for the same period (estimated population on July 1). The average annual growth rate in all government expenditures per capita over this period was 3.26%. Projecting 2009 data (latest available) to 2015 with this growth rate yields an estimated $21,439 in all government expenditures per capita among all Canadians.

[27] This is likely an underestimate as project proponent estimation methodologies probably do not include all government revenues, like sales taxes, property taxes and smaller taxes and other small government revenues.

[28] In their document entitled Economic Impacts of the Casino Mine Project, March 2013 (Casino Mine Corporation, available at http://www.casinomining.com/_resources/pdfs/mnp_report.pdf) MNP LLP estimates the Casino project will create overall employment of 51,373 FTEs (direct, indirect and induced) in Canada and will generate $3.1 billion in taxes to federal, provincial/territorial and municipal governments across the country during the life of the mine.

[29] In the Developer's Assessment Report (Jay Project, Appendix 14A, Economic Impact Report, Oct 2014, available at http://www.reviewboard.ca/upload/project_document/EA1314-01_S_14A_Economic_Impact_Report.PDF), Dominion Diamond estimates the project will create 14,407 jobs and total government revenues of about $1.26 billion.

- G.S. Gislason and Associates Ltd has estimated total government revenues generated over the life of the proposed Thor Lake Project, including resource royalties and all government revenues from direct, indirect, and induced impacts, will be $61,356 per PYE created by the project.[30]
- Howe has estimated total government revenues generated over the life of the proposed Mary River Project, including resource royalties and tax revenues to all governments, will be $63,786 per PYE created by the project.[31]

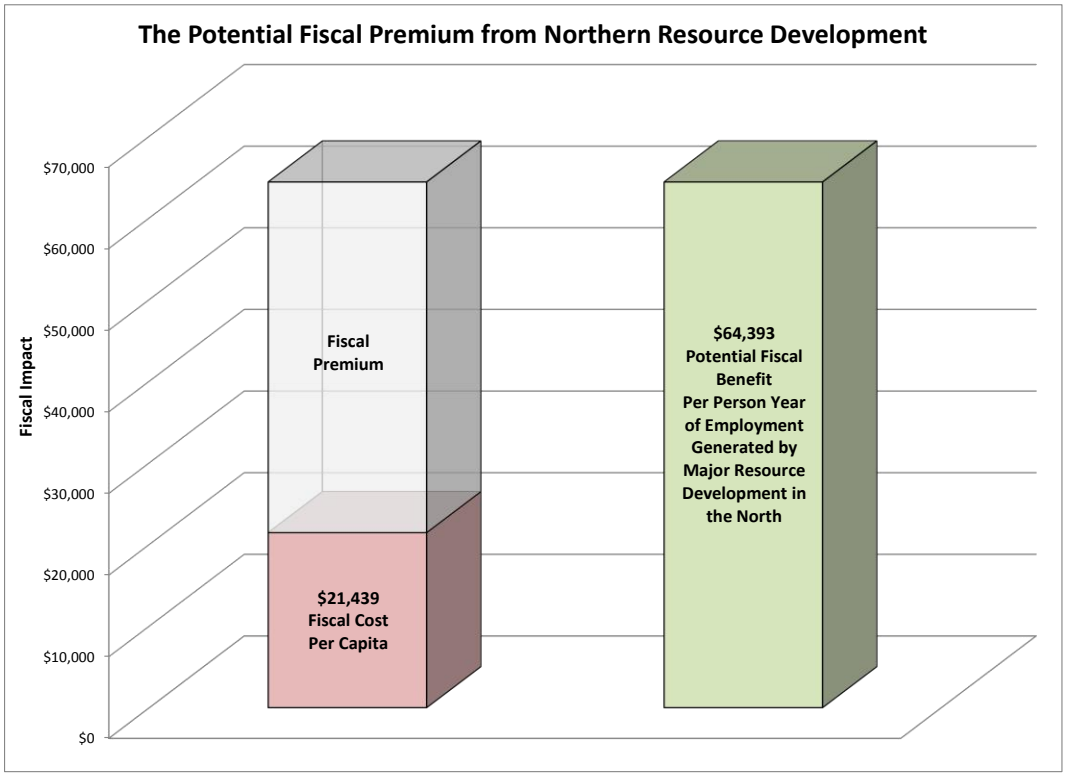
The Fiscal Resource Premium

The difference between all government revenue per person year of employment generated (about $64,400) and all government expenditure per capita per year (about $21,400) is the fiscal premium of resource development. This is shown in the chart below.

[30] In the Developer's Assessment Report (Thor Lake Project, Appendix K.1 Economic Impacts, Jan 2011, available at http://www.reviewboard.ca/upload/project_document/EA1011-001_Thor_Lake_Project_DAR_Appendix_K_GSGislason_Economic_Impact_Report_K_01.PDF), G.S. Gislason estimates the project will create 23,975 person years of employment and total government revenues of $1.47 billion.

[31] In the Environmental Impact Statement (Mary River Project, Appendix 4B, Economic Impact Model, Feb 2012 contains a study by Eric C. Howe, Dept of Econ, U of Sask, Sep 2010, available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/2-REVIEW/08-FINAL%20EIS/FEIS/Vol%2004/Appendices/120213-08MN053-FEIS%20App%204B-Ec%20Impact%20Model-IT3E.pdf), Baffinland estimates the project will create 78,018 person years of employment and total government revenues of $4.98 billion.

Chart 2 – Resource Fiscal Premium



The short red column on the left shows the estimated fiscal cost per capita. The tall green column on the right shows the estimated fiscal benefit per person year of employment generated by major resource projects. The difference between these two values is shown as the semi-transparent column stacked on top of the fiscal cost per capita. This is the fiscal premium, or the amount by which the estimated fiscal benefit exceeds the per capita cost.

Stated differently, proposed major resource projects in the North have the potential to generate employment that contributes at least $3 in government revenue per worker for every one dollar government spends to provide public services to the worker.[32] We estimated the fiscal premium to be about $43,000 per worker, per year. We estimate an average major resource project can generate almost $1.4 billion in total fiscal premium over its life.[33] This fiscal premium could be used to enhance Canadian social programs, improve physical infrastructure, and contribute to the management and mitigation of environmental risks.

Summary of Observation 2

Fiscal Cost versus Fiscal Benefit

Public investment in Northern economic infrastructure can lead to major resource employment that contributes a significant fiscal premium to governments.

- The employment created by a major resource project in the North can generate at least $3 for governments for every dollar government spends to provide public services to the people filling that employment.
- We estimate a major resource project, on average, can be expected to generate almost $1.4 billion total fiscal premiums. This can pay for improved infrastructure, strong social programs, and contribute to the management of environmental risks.

[32] We feel confident in this conclusion because the government revenue estimate is likely conservative (owing to missing data) and we included government expenditures on social programs that people working in major resource development would not receive. This methodology provides greater confidence for our conclusion.

[33] The annual fiscal premium is estimated to be $42,954. This is the difference between government revenues generated per person year of employment created by the average major resource project ($64,393) and all government expenditures per capita ($21,4439). The average major resource project can generate 32,492 person years of employment (direct, indirect and induced) over the project's life. Over an assumed 15 year life, this is about 2,166 jobs per year on average. Applying the annul fiscal premium generated for governments of $42,954 to the 2,166 jobs over a 15 year project life yields a total estimated fiscal premium of about $1,396,000,000.

It's not clear how much territorial or Aboriginal governments are receiving of this fiscal premium. Table 4 summarized our understanding of resource royalty sharing regimes applicable to the eight major resource projects in our sample. Based on the information in the table, it's not clear that all Aboriginal governments in the North are receiving a reasonable portion of the fiscal premium from resource development. Ensuring a fiscal benefit from resource development to all governments provides an important incentive to support resource development and an important source to contribute to financing further infrastructure improvements.

Fiscal Cost Savings

The third observation is based on potential fiscal savings from employment generated by major resource projects filled by otherwise unemployed workers. A weak investment climate limits government's ability to attract private investment. As a result, many communities suffer from underdevelopment. However, a weak investment climate doesn't just result in lost investment. It also results in lost employment opportunities, migration away from the community, poverty, and all the health, housing and social problems associated with poverty.

The Fiscal Costs of Poverty

Any Canadian's total income is comprised of two parts – an economic component and a fiscal component. Together, this is referred to as the economic and fiscal footprint.

- The economic component includes income from employment.
- The fiscal component includes public services such as health care, education, and local services.

The fiscal costs of poverty are significant. Depressed economies put fiscal pressure on all governments in terms of foregone tax revenues from reduced economic activity and higher social costs created by poverty. This applies to economies across all of Canada.

It is important that we point out this isn't specifically an Aboriginal issue. This is a poor Canadian issue. The concept is applicable to all poor Canadians. Poverty leads to higher expenditures, which are made on all poor Canadians. This is because of higher social, housing, health and education costs. For this paper we limit our analysis in this section to employment opportunities generated by major resource projects in the North filled by those Northern Aboriginal workers that would have otherwise been unemployed. The same analysis could easily be applied to any unemployed Canadian and the results would be the same.

Investment in Northern economic infrastructure that supports major resource development has the potential to reduce the fiscal costs of poverty among Northern Aboriginal people and other unemployed Canadians. When infrastructure investment provides resource project employment opportunities for otherwise unemployed Northern Aboriginal people it reduces the fiscal costs of their poverty.

The fiscal cost of poverty per low income Canadian is estimated to be about $13,000 annually.[34 and 35] If we assume that a major resource project could generate over 430 jobs annually (including direct, indirect and induced) for Northern Aboriginal people over a 15-year project life.

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[34] This estimate is based on a 2011 report from the National Council of Welfare (NCW) called The Dollars and Sense of Solving Poverty (available at http://publications.gc.ca/collections/collection_2011/cnb-ncw/HS54-2-2011-eng.pdf). This report estimated the direct cost of poverty in Canada in 2007 at $12.3 billion and cited an Ontario Association of Food Banks study that estimated the indirect cost of poverty in Canada in 2007 at $24.4 billion. Direct costs of poverty include income supports like social assistance and working income tax benefits, and services specifically for people in poverty. Indirect costs include the additional costs associated with higher use of emergency wards, police, courts, remedial education and other specialized services. These are both public expenditures and together make up the fiscal costs of poverty. The average fiscal cost was estimated using Cansim Table 202-0802 that states the number of persons in low income (the same measure used in the NCW report) in 2007 in Canada was 3,291,000. This yields an average fiscal cost of poverty for 2007 of $11,152. Accounting for inflation at an average annual rate of 2.0%, the estimated current fiscal cost of poverty is $13,066 per low income person.

[35] This estimate is consistent with our previous research (from The True Cost of First Nation Government, available at http://www.aadnc-aandc.gc.ca/eng/1100100014014/1100100014034) that estimated all government expenditures per Aboriginal person to be 60% higher than all government expenditures per non-Aboriginal person. Applying this cost differential to current all government expenditures per capita (among all Canadians) yields an estimated additional cost of about $13,000 as well. This provides very strong support for our assertion that the higher costs of Aboriginal government are largely a result of the higher costs of poverty.

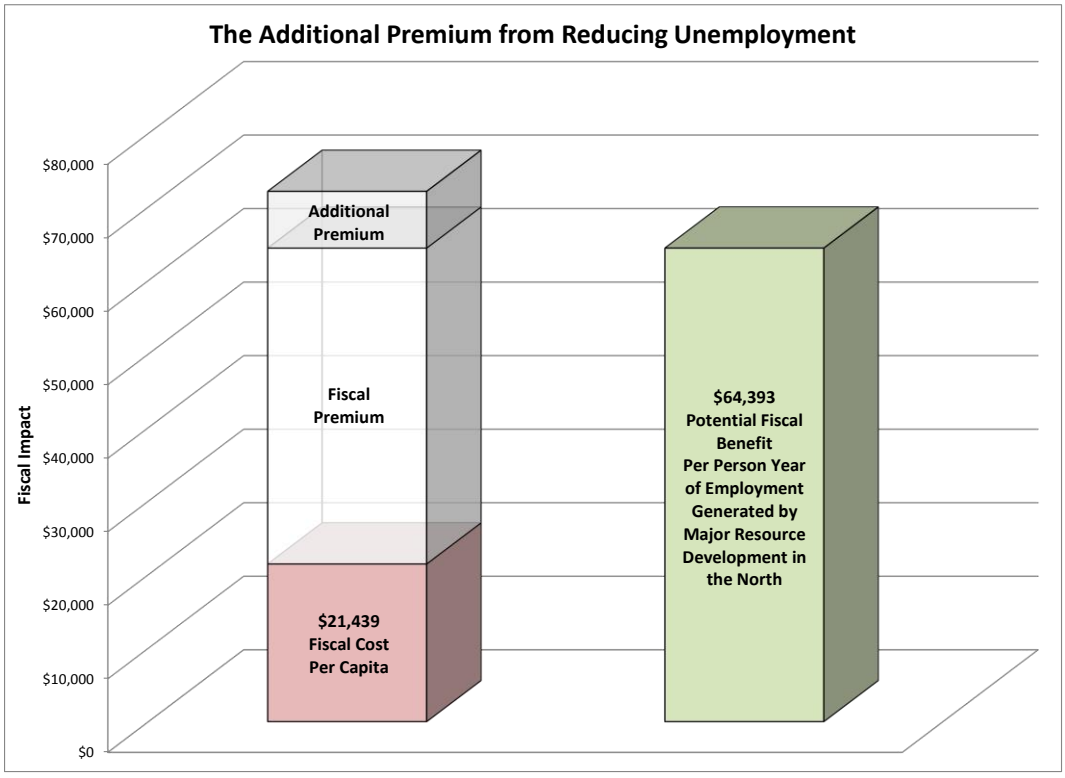
If 260 of those people were previously unemployed, we estimate the fiscal costs of poverty among Northern Aboriginal people could be reduced by about $50 million over 15 years.[36]

Reducing poverty reduces fiscal costs to all governments. This is important because raising the Northern Aboriginal standard of living to that of other Canadians through public resources would take a great deal more tax dollars from Canadian taxpayers than simply providing more employment opportunities for Northern Aboriginal Canadians.

This reduction in fiscal costs further accelerates the virtuous circle because it increases the fiscal premium from major resource development even further. This is especially true in the North where higher costs increase government expenditures dramatically. The chart below illustrates this additional premium from reducing unemployment.

[36] This methodology assumes the fiscal cost of poverty associated with the average low income Canadian is consistent with the fiscal cost of poverty associated with the average unemployed Northern Aboriginal person. In our methodology, the employment generated by a major resource project converts 260 unemployed Northern Aboriginal people (or low income people) into employed Northern Aboriginal people (or non-low income) people for a period of 15 years. At an average savings of $13,066 each, applied over a 15 year period, the total fiscal cost reduction associated with just one major resource project is estimated to be $50.9 million.

Chart 3 – Additional Fiscal Premium



This chart is simply an adjusted version of Chart 2. It includes the additional fiscal premium from reducing unemployment stacked onto the previously estimated fiscal premium from major resource development. This is estimated to be about $7,800.

This estimate, however, has a significant caveat. It assumes that in addition to Northern economic infrastructure that Aboriginal workers, businesses and managers receive the training and other supports to fully participate in resource development opportunities.

Summary of Observation 3

Fiscal Cost Savings

Public investment in Northern economic infrastructure can significantly reduce the fiscal costs of poverty associated with unemployed Northern Aboriginal people.

- The estimated fiscal cost of poverty is about $13,000 per low income Canadian, per year. The employment created by major resource development in the North can employ low income Canadians resulting in an estimated annual fiscal savings of $7,800 each.
- We estimate the average major resource project can generate employment for previously unemployed Northern Aboriginal people that reduces the costs of poverty by about $50 million over 15 years.

The Virtuous Circle of Northern Economic Development

Infrastructure investment in support of major resource development in the North can drive economic growth through a virtuous circle. Major resource projects have the potential to generate a fiscal premium, which can be used to pay for economic infrastructure, good health care and well trained workers. This creates an attractive resource development investment climate and attracts additional major resource investment. This generates a greater demand for labor and even more resource fiscal premiums to build infrastructure and further improve social and economic outcomes. Through this virtuous circle, the fiscal premium from major resource development can grow the Northern population and increase the Canadian standard of living. This is illustrated in the figure below.

Figure 1 – Virtuous Circle of Northern Economic Development

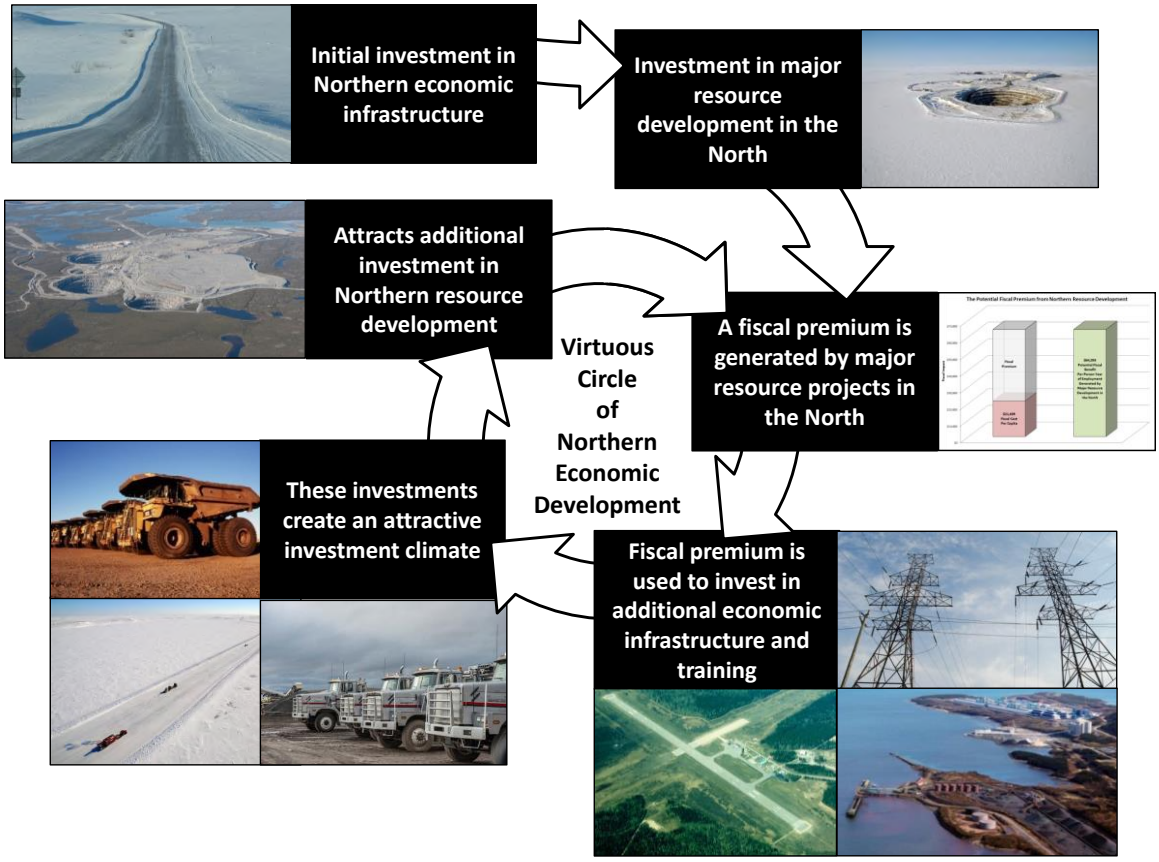


Figure 1 illustrates how an initial investment in economic infrastructure required to support Northern resource development can start the virtuous circle, generating a fiscal premium and leading to further infrastructure investment and additional major resource projects.

However, our fourth observation is the potential benefits available from this virtuous circle are not currently being maximized. We assert there may be three reasons for this.

1. Infrastructure Investment Coordination – Kick-starting the virtuous circle requires coordinated public investment that provides economic infrastructure and trained workers to those future resource projects that provide the highest fiscal premium. We did not observe a mechanism for coordinating Northern economic infrastructure investment and objectively identifying the highest fiscal rate of return.
2. Fiscal Premium Distribution – Successfully coordinated public infrastructure investments require appropriate sharing of the fiscal premium among governments. We did not observe a transparent method for sharing the resource project fiscal premium among governments. In particular we did not observe that Aboriginal governments are receiving a reasonable fiscal benefit from resource development. Ensuring a fiscal benefit from resource development to all governments provides an important incentive to support resource development and an important source to contribute to financing further infrastructure improvements.
3. Fiscal Premium Expenditure – Growing the Northern economy depends on making sound public investments in improved infrastructure and more productive workers. We did not observe that resource development fiscal premiums are being spent in a coordinated fashion by the three governments (federal, territorial and Aboriginal) to further improve the Northern resource project investment climate.

Summary of Observation 4

Potential Benefits of Virtuous Circle Aren't Maximized

Investment in economic infrastructure in support of major resource development can generate a fiscal premium capable of driving significant economic growth in the North through a virtuous circle. But, we assert there are at least three reasons why maximum economic and fiscal benefits potentially available from the virtuous circle are not currently being realized, including:

- Limited or absent infrastructure investment coordination;
- Potentially inappropriate or unreasonable distribution of fiscal premiums; and
- Less than ideal level of fiscal premium expenditures directed towards investment climate improvements.

Conclusion

This research provides a strong business case for public investment in Northern economic infrastructure that facilitates resource projects based on three observations.

First, resource projects generate fiscal and economic benefits that far exceed the cost of infrastructure. Using a sample of eight proposed Northern resource projects, this research identified an average fiscal benefit of $11 and an average economic benefit of $11 for each dollar of infrastructure investment.

Second, we estimated the average government revenues generated per person year of employment created by a selection of proposed major resource projects in the North and compared this to the average expenditure by all governments per Canadian per year. We found that potential government revenues are three times the size of government expenditures per worker. The total fiscal premium (government revenues per worker greater than costs per worker) would be almost $1.4 billion per major resource project. We feel confident in this conclusion because we were purposely conservative in this estimate. This large divergence between government revenues generated from resource development and expenditures per Canadian represents a fiscal resource premium that provincial, territorial, local and federal governments use to provide the social and physical infrastructure that supports the Canadian standard of living.

Third, investment in Northern economic infrastructure provides the potential to reduce the fiscal costs of poverty (for both unemployed Aboriginal and non-Aboriginal people). Governments spend more on poor Canadians because of higher costs associated with health care, education, social programs and housing. It is estimated that the average cost for all governments per low income Canadian is about $13,000 annually. When infrastructure investment provides resource project employment opportunities for unemployed people it reduces the fiscal costs of poverty. We estimate that the fiscal costs of poverty could be reduced by about $50 million by employment for otherwise unemployed Northern Aboriginal people created by just one major resource project.

If maximized, these economic and fiscal returns could potentially form the basis of a virtuous circle where economic infrastructure, good health care and well trained workers are paid for by the fiscal premiums from major resource development. Within the virtuous circle, coordinated public investments could generate more resource investment and additional fiscal premiums to further improve social and economic outcomes and increase government revenues.

As the level of major resource development in the North rises, the fiscal costs of poverty can be lowered. This further accelerates the virtuous circle by generating an additional fiscal premium. This is especially true in the North where higher costs can increase average government expenditures by a factor of about 1.45. Stated differently, reducing the fiscal cost of Northern poverty could have a return 145% greater than the same reduction in poverty in the south.

Maximizing the benefits of the virtuous circle and resource development fiscal premiums is the key to resolving the Northern infrastructure gap and growing the Northern economy for the benefit of all Northern residents (both Aboriginal and non-Aboriginal).

Taken together these arguments provide a good fiscal and economic answer to the question – why should governments invest in Northern economic infrastructure? Public investment in Northern economic infrastructure provides a very high rate of social, fiscal and economic return. These arguments can be added to political ones about asserting Canadian Northern sovereignty and strengthening Canadian claims to Northern resources.

The next questions that are briefly addressed in the final section of this paper are:

1. How should Northern infrastructure investment be coordinated?
2. How can the returns to infrastructure investment hypothesized in this paper be realized?

Towards a Northern Economic Infrastructure System – Some Considerations

This paper is not the first to make a strong business case for Northern economic infrastructure. Investment in a number of Northern resource projects has been postponed or cancelled in part because of missing or inadequate public infrastructure. A strong business case alone is probably not sufficient to generate more public investment in Northern economic infrastructure.

It is assumed that one reason why Northern economic infrastructure is not being financed and built is that it cannot overcome the policy challenges identified in an earlier section of this paper. This section proposes five discussion ideas to overcome some of these challenges and support the development of a possible Northern Economic Infrastructure System.

1. **Coordinated Infrastructure** – The projects reviewed for this study have distinct infrastructure requirements. There has been little effort to coordinate infrastructure requirements among a number of projects. Such an effort could identify opportunities for infrastructure that supports multiple resource projects. This would significantly raise the returns to infrastructure investment and possibly generate a larger fiscal resource premium to finance even more infrastructure. Identifying opportunities for coordinating infrastructure should be conducted by a third party professional to ensure independence and accuracy. Additional coordination is required to determine the best way to incorporate public use into proposed infrastructure projects, either via a process to convert private infrastructure to public or a decision to build shared access infrastructure initially.

2. **Assessing Returns** – The research in this paper relied on fiscal and economic benefit estimates made by major resource project proponents. They have an economic interest to generate public support for their projects so benefit estimates may be inflated. This could cause potential issues when advocating for one infrastructure project or another. For example if choosing public infrastructure priorities was based on the highest fiscal resource premium it would be important that fiscal resource premiums were calculated by third parties using consistent data and methods.

3. **Fiscal Benefits to Territorial Governments** – Infrastructure financing requires fiscal capacity from supportive governments. Provinces and federal governments are able to secure infrastructure financing at favorable terms and interest rates because they have secure revenue streams as security. We found that there are potentially significant fiscal resource premiums from major resource projects. We were unable to easily the share of the premium collected by territorial governments. This is potentially important because not only would these revenues be helpful for financing infrastructure but also the territorial governments could work together to identify fiscal resource premium expenditures that increase fiscal benefits, improve training and address and mitigate environmental impacts.

4. **Fiscal Benefits to Aboriginal Governments** – There is a gap in economic and social outcomes between Northern Aboriginal residents and other Northern residents. Closing this gap requires at least more investment in education and training, Aboriginal community infrastructure, social programs and governance. In this regard, it would be useful to research the share of fiscal benefits received by Aboriginal governments from Northern resource projects. Depending on the results of such research, it may be helpful to consider a Northern Aboriginal resource tax to provide a secure revenue stream to these governments so they can finance community infrastructure and provide long term commitments to education, training, environmental management and social and economic development. This type of tax could also raise Aboriginal support for Northern resource projects because like other governments not only would their citizens receive an economic benefit from resource development but their communities would receive a fiscal benefit reflected in better infrastructure and services.

5. **Fiscal Premium Expenditure Plan** – The governments that share in the fiscal resource premium could develop an expenditure plan to ensure that the fiscal and economic benefits from Northern economic infrastructure investment are realized. As has been previously suggested this could involve at least long term commitments to training and community infrastructure programs that (a) support the virtuous circle of economic growth and (b) address unique challenges for program and infrastructure delivery.

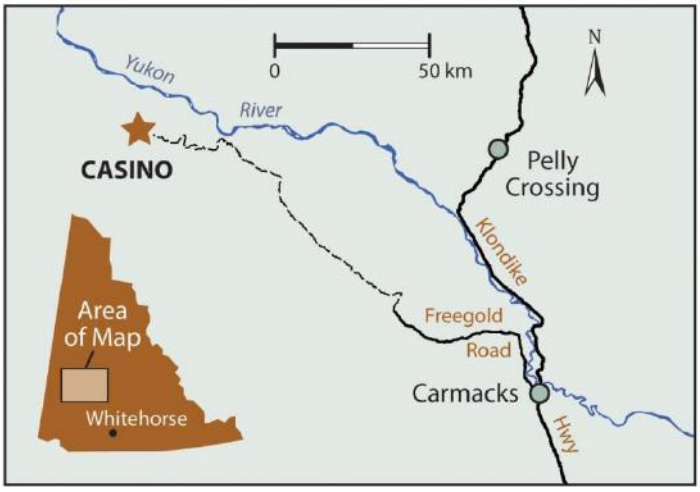
These five ideas and others could form the basis of a comprehensive Northern Economic Infrastructure System with the following objectives:

- Coordinated economic infrastructure investments to generate highest fiscal resource premiums and achieve the benefits of a public use component.
- Objective and consistent third party estimates of returns to Northern economic infrastructure investments to major resource projects.
- Distribution of fiscal resource premium tax room among territorial, federal and Aboriginal governments to generate support for resource development, provide secure infrastructure financing and improve training and services to Northern residents.
- Coordinated expenditures among Northern and Aboriginal governments to generate the maximum employment and business for Northern and Aboriginal residents.

Appendix A: Casino Project

Brief Project Overview

Casino is a gold, copper, molybdenum and silver deposit, located about 300 km Northwest of Whitehorse, in west-central Yukon.[37]



The Casino Mining Corporation proposes to mine the economically valuable material from the ground, by using a conventional open-pit, truck and shovel operation. CMC anticipates a mine life of 22 years (processing about 120,000 tonnes of ore per day).

[37] Graphic Source: Casino Mining Corporation, Project Overview. Available at http://www.casinomining.com/project/overview/.

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – MNP LLP has estimated that construction of the project will generate an estimated direct employment impact of 3,275 full-time equivalents (FTEs) in Yukon.[38] Further, MNP has estimated that construction of the project will generate a total employment impact (direct, indirect and induced) for the rest of Canada of 17,509 FTEs. If 20% of this is direct employment, the estimated impact is 3,502 FTEs. MNP has also estimated that during its 22-year operational life, the project will generate direct employment of 542 FTEs annually in Yukon. MNP estimated the project will generate 453 FTEs annually for the rest of Canada in direct, indirect, and induced employment. If 20% of this is direct employment, the estimated impact is 91 FTEs annually. Based on this data, Fiscal Realties estimates the project will generate a direct employment impact of 20,694 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 8,278 PYE.[39] If 50% of this is realized by Aboriginal workers, the potential employment impact is estimated to be 4,139 PYE.[40] At an assumed average salary of $60,000, this is a potential direct employment impact of $248.3 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	8,278 PYE	$496.7 million
Aboriginal	4,139 PYE	$248.3 million
All Other Canadians	12,416 PYE	$745.0 million
Total	20,694 PYE	$1.24 billion

[38] Casino Mining Corp, Project Proposal – YESAB Submission (Jan 2014), Volume 4 – Socio-Economic VCs, Part 13 – Employment and Income. Available at http://www.casinomining.com/_resources/YESAA_Project_Proposal/Volume4/13_Employment_and_Income.pdf.

[39] This estimate is in line with projections for several projects we looked at in terms of the portion of the generated employment impact flowing to territorial residents.

[40] A number of projects use an estimate consistent with this overall percentage of the anticipated employment impacted expected to benefit Northern Aboriginal workers.

Estimated Indirect and Induced Employment Impact – MNP has estimated that construction of the project will generate an estimated indirect and induced employment impact of 1,817 FTEs. Using MNP's estimate of 17,509 FTEs in total employment (direct, indirect and induced) generated by the project for the rest of Canada, we assume 80% of this is direct employment, or 14,007 FTEs. MNP has also estimated that during its 22-year operational life, the project will generate direct employment of 313 FTEs annually in Yukon. Using MNP's estimate of 453 FTEs annually in total employment generated for the rest of Canada, we assume 80%, or 362 FTEs annually are indirect and induced employment. Based on this data, Fiscal Realties estimates the project will generate an indirect and induced employment impact of 16,500 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 6,600 PYE. If 50% of this is realized by Aboriginal workers, the potential employment impact is estimated to be 3,300 PYE. At an assumed average salary of $35,000, this is a potential direct employment impact of $115.5 million for Aboriginal workers in the North.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	6,600 PYE	$231.0 million
Aboriginal	3,300 PYE	$115.5 million
All Other Canadians	9,900 PYE	$346.5 million
Total	16,500 PYE	$577.5 million

Potential Fiscal Impacts

Estimated Federal Tax Revenue – The construction of the project is estimated to generate about $234 million in tax revenues for the Government of Canada. Further, it is estimated that during its 22-year operational life, the project will generate about $32 million annually in tax revenues to the federal government.

Estimated Territorial Tax Revenue – The construction of the project is estimated to generate about $22 million in tax revenues to the Yukon Government. It is estimated that during its 22-year operational life, the project will generate about $25 million in annual tax revenues to the Yukon Government.[41]

Estimated Resource Royalties – MNP estimates over its 22-year operational life, the project will generate about $56 million annually in resource royalties. M3 estimates the project will generate $1.38 billion in Yukon mining royalties.[42]

Type	Estimated Fiscal Benefit
Federal Revenues	$936 million
Territorial Tax Revenues	$572 million
Resource Royalties	$1.23 - $1.38 billion

Potential Fiscal Benefits to Aboriginal Governments

Casino is located on Crown land that is administered by the Yukon Government. The project site lies within the Selkirk First Nation's traditional territory and the project's road access falls within the traditional territories of both the Selkirk First Nation and the Little Salmon / Carmacks First Nation. Under Selkirk's Final Agreement, the First Nation will receive 50% of the first $2 million and 10% of the remaining royalties collected by Yukon.[43]

However, the Yukon Government transfers 100% of resource royalties generated by the Minto Mine (an adjacent project also within Selkirk traditional territory) to the Selkirk First Nation annually.[44]

The Selkirk First Nation and the Little Salmon / Carmacks First Nation have signed cooperation agreements with Casino Mining Corp.[45]

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[41] Casino Mine Corporation, Economic Impacts of the Casino Mine Project, MNP LLP, Mar 2013. Available at http://www.casinomining.com/_resources/pdfs/mnp_report.pdf.

[42] M3 Engineering & Technology Corporation, Casino Project Technical Report, Feasibility Study, Jan 2013. Available at http://www.westerncopperandgold.com/_resources/CasinoNI43-101-Jan2013.pdf.

[43] AANDC, Selkirk First Nation Final Agreement, 1998. Available at https://www.aadnc-aandc.gc.ca/eng/1292957512644/1292957632654#toc.

[44] Government of Yukon, News Release #12–185, available at http://www.gov.yk.ca/news/12-185.html#.VWXtpvlVhBc.

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy, telecommunications.

Transportation Infrastructure

Currently, the mine site is accessed by small aircraft or by a combination of boat and vehicle via the Yukon River. The project will require several new and upgraded access components to provide safe, reliable and timely access to the mine site.

Freegold Road Upgrade and Extension – The Freegold Road is an existing gravel resource road that is 4.5 to 6 m wide with a posted speed of 40 km/h. The project will require the road to be upgraded to meet a 70 km/h design with an 8.2 m wide gravel surface. The road will also need to be extended 120 km to the project site.

Airstrip, Taxiway, Apron and Buildings – The existing airstrip was constructed for exploration use only and does not meet required design standards. The existing airstrip will be replaced with a facility that permits safe and efficient all season operations. The proposed airstrip will have a runway length of 1,600 m with 60 m overruns on either end. A number of other facilities will accompany the runway, including a taxiway, apron, parking area, maintenance building, small terminal for passengers and storage of luggage and supplies, and the access road starting point. The airstrip will also require the construction of a 14 km single lane access road to connect it to the project site.

Combined, the Freegold Road upgrade and extension and the Airstrip access road will require bridges to cross 27 major watercourses and short span bridges or culverts to cross 82 minor streams.

[45] Western Copper & Gold, Developing Canada's Premier Copper-Gold Mine, Mar 2015. Available at http://www.westerncopperandgold.com/_resources/presentations/WRN_March_2015.pdf.

Energy Infrastructure

Natural Gas Power Plant – Power is this project's biggest infrastructure challenge. The proposal includes a natural gas power plant. Liquefied natural gas will be imported by truck to the project site and gasified to provide natural gas to fuel the power generation plant. LNG will be the primary fuel supply for power generation and other ancillary uses. All LNG deliveries to the mine will be via truck. LNG storage is required at the mine to stockpile sufficient inventory to supply natural gas fuel needs during the period where road access is limited due to weather.

Telecommunications Infrastructure

The project's major infrastructure needs focus primarily on transportation and energy infrastructure.

Estimated Infrastructure Costs

Infrastructure costs related to the Casino project are estimated to be $332 million. This includes the following cost estimates: (i) $99 million for the Freegold Road upgrade and extension; (ii) $24 million for the Airstrip and related facilities; and (iii) $209 million for the natural gas power plant.[46]

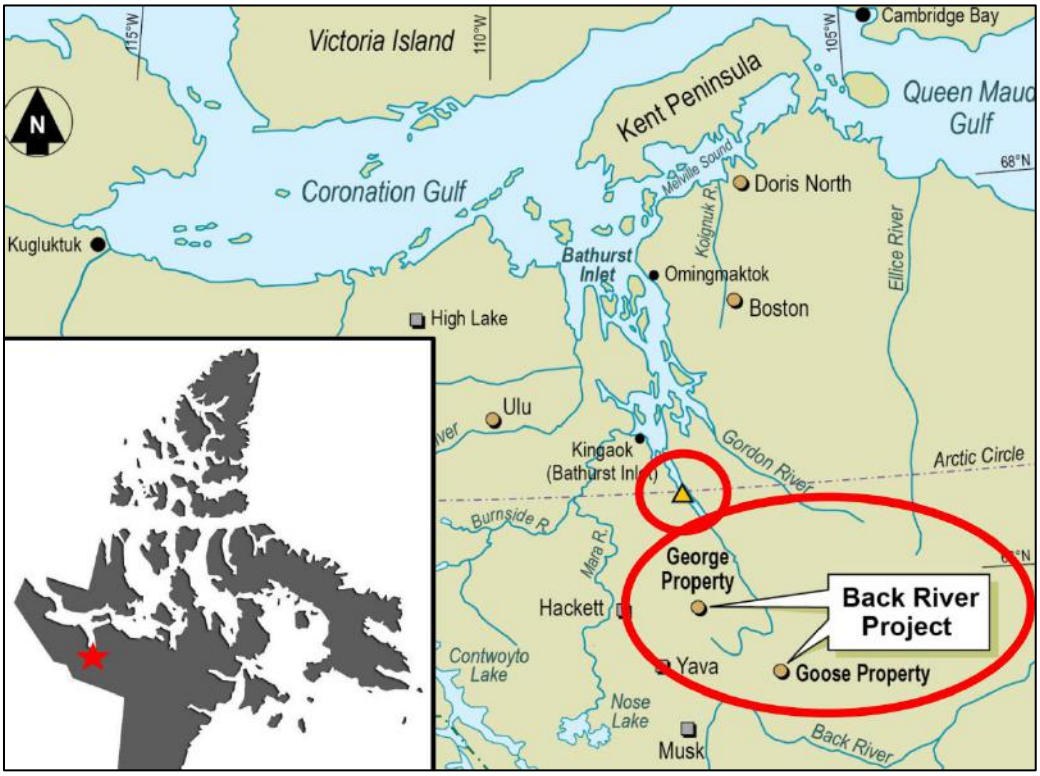
Type	Estimated Cost
Transportation Infrastructure	$123 million
Energy Infrastructure	$209 million
Telecommunications Infrastructure	-
Total	$332 million

[46] Western Copper and Gold, News, Western Copper and Gold Announces Positive Feasibility Study on Casino, Jan 2013. Available at http://www.westerncopperandgold.com/news/2013/index6b0d.html?&content_id=13.

Appendix B: Back River Project

Brief Project Overview

The Back River Project is a proposed gold mine owned by Sabina Gold & Silver Corp located about 400 km south of Cambridge Bay on the Nunavut mainland. The project will focus on the development of up to eight mineral deposits located within two areas known as the George Property and the Goose Property.[47]



The project will include up to seven open pit mines and one underground mining operation. The project's anticipated life is over 10 years, producing 300,000 to 400,000 ounces of gold annually. The Preliminary Economic Assessment is based on 3.68 million ounces of gold recovered in total.

[47] Graphic Source: Back River (Hannigayok) Project Update, Nunavut Mining Symposium, Sabina Gold & Silver Corp, Apr 2014. Available at http://static1.squarespace.com/static/527e42c4e4b0aea5e0569d9b/t/53555bfde4b02d9830e6b9b2/1398103037891/6-+Pickard+-+Sabina.pdf.

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – SRK Consulting (Canada) Inc has estimated the project's direct employment impact to be 6,933 person years of employment (PYE) over the life of the mine.[48] This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 2,773 PYE. If 50% of this is realized by Aboriginal workers, the potential employment impact is estimated to be 1,387 PYE. At an assumed average salary of $60,000, this is a potential direct employment impact of $83.2 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	2,773 PYE	$166.4 million
Aboriginal	1,387 PYE	$83.2 million
All Other Canadians	4,160 PYE	$249.6 million
Total	6,933 PYE	$416.0 million

[48] Preliminary Economic Assessment Report for the Back River Gold Project, SRK Consulting (Canada) Inc, Jun 2012. Available at http://www.sabinagoldsilver.com/i/pdf/BackRiver_PEA_Report_2CS031%20000_Sabina_JY_20120629.pdf.

Estimated Indirect and Induced Employment Impact – Further, SRK has estimated indirect and induced employment generated by the project at 35,379 PYE over the life of the mine.[49] Again, this includes both construction phase and operations phase impacts. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 14,152 PYE. If 50% of this is realized by Aboriginal workers, the potential employment impact is estimated to be 7,076 PYE. At an assumed average salary of $35,000, this is a potential indirect and induced employment impact of $247.7 million for Aboriginal workers in the North.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	14,152 PYE	$495.3 million
Aboriginal	7,076 PYE	$247.7 million
All Other Canadians	21,227 PYE	$743.0 million
Total	35,379 PYE	$1.24 billion

Potential Fiscal Impacts

Estimated Federal Tax Revenue – Sabina estimates the construction of the project will generate in $52.8 million federal tax revenue and $263.7 million in federal tax revenue will be generated during the operational phase.[50]

[49] Preliminary Economic Assessment Report for the Back River Gold Project, SRK Consulting (Canada) Inc, Jun 2012. Available at http://www.sabinagoldsilver.com/i/pdf/BackRiver_PEA_Report_2CS031%20000_Sabina_JY_20120629.pdf.

[50] Sabina Gold & Silver Corp, Draft Environmental Impact Statement: Main Volume. Available at ftp://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/12MN036-SABINA-BACK%20RIVER/02-REVIEW/05-DRAFT%20EIS%20&%20CONFORMITY%20REVIEW/02-DEIS%20JAN%202014/Vol%201-Main%20Volume/140120-12MN036-Vol%201%20Pt%205-Main%20Vol-IT6M.pdf.

Estimated Territorial Tax Revenue – Sabina estimates construction of the project will generate $44.4 million in provincial and territorial revenues and $255.4 million in provincial and territorial revenues will be generated during the operational phase.[51] If 85% of this is territorial tax revenue, the fiscal impact is estimated to be $254.8 million.

Estimated Resource Royalties – SRK estimates the project will generate $238.2 million in resource royalties for Nunavut.[52]

Type	Estimated Fiscal Benefit
Federal Revenues	$316.5 million
Territorial Revenues	$254.8 million
Resource Royalties	$238.2 million

[51] Sabina Gold & Silver Corp, Draft Environmental Impact Statement: Main Volume. Available at ftp://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/12MN036-SABINA-BACK%20RIVER/02-REVIEW/05-DRAFT%20EIS%20&%20CONFORMITY%20REVIEW/02-DEIS%20JAN%202014/Vol%201-Main%20Volume/140120-12MN036-Vol%201%20Pt%205-Main%20Vol-IT6M.pdf.

[52] Preliminary Economic Assessment Report for the Back River Gold Project, SRK Consulting (Canada) Inc, Jun 2012. Available at http://www.sabinagoldsilver.com/i/pdf/BackRiver_PEA_Report_2CS031%20000_Sabina_JY_20120629.pdf.

Potential Fiscal Benefits to Aboriginal Governments

In Nunavut, where a single comprehensive land claim has been settled, the agreement contains royalty revenue sharing for mining on Crown Lands within the settlement area.[53] Some of the lands selected by the Inuit, Inuit Owned Lands, include ownership of surface and subsurface rights. Where subsurface rights are owned, Inuit receive the full royalty. The Goose and George properties are mostly located on Inuit Owned Land (where Inuit own both surface and subsurface rights).[54] However, these are grandfathered properties, subject to the royalty regime under the Nunavut Mining Regulations[55] and the royalty sharing provisions of the Nunavut Land Claims agreement, where Inuit receive 50% of the first $2 million and 5% of remaining royalties collected by Canada annually.[56]

Sabina has stated that an Impact Benefit Agreement will be negotiated with the Kitikmeot Inuit Association.[57]

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy, telecommunications.

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[53] AANDC, FAQ about Mining Royalty in Nunavut and the Northwest Territories. Available at https://www.aadnc-aandc.gc.ca/eng/1331039455218/1331039516621.

[54] Sabina Gold & Silver Corp, Abandonment & Reclamation Plan for Site Preparation Work, 2013. Available at ftp://ftp.nwb-oen.ca/1%20PRUC%20PUBLIC%20REGISTRY/8%20MISCELLANEOUS/8B/8BC%20-%20Construction/8BC-BRP----%20Sabina/3%20TECH/10%20A%20and%20R/141020%208BC-BRP----%20Part%2013%20Contains%20AR%20Plan-IMLE.pdf.

[55] MarketWatch, Press Release, Sabina Gold & Silver Announces Positive Feasibility Study on Back River Gold Project, Nunavut, May 2015. Available at http://www.marketwatch.com/story/sabina-gold-silver-announces-positive-feasibility-study-on-back-river-gold-project-nunavut-2015-05-20-14173622.

[56] A Plain Language Guide to the Nunavut Land Claims Agreement. Available at http://www.tunngavik.com/documents/publications/2004-00-00-A-Plain-Language-Guide-to-the-Nunavut-Land-Claims-Agreement-English.pdf.

[57] Preliminary Economic Assessment Report for the Back River Gold Project, SRK Consulting (Canada) Inc, Jun 2012. Available at http://www.sabinagoldsilver.com/i/pdf/BackRiver_PEA_Report_2CS031%20000_Sabina_JY_20120629.pdf.

Transportation Infrastructure

Airstrip and Road – An all-weather airstrip and apron capable of landing Hercules C-130 freight aircraft, and Boeing 737 Combi commercial jets will be located about 5 km due south of the Goose facilities. An all-weather road will link the airstrip to the project's Goose Property.

Port and Road – Annual resupply of the project will be via sealift with a proposed port on the southwest shore of Bathurst Inlet. The port facilities will be linked to the project area by a 97 km winter road that will be used for seasonal resupply.

Energy Infrastructure

Power Generation Facilities – The project will utilize 100% on-site diesel generated power at Goose, George and Bathurst Inlet. The project proposes a 16 MW power generation facility for the Goose Property, a 4 MW power generation facility for the George Property, and a 1 MW power generation facility at Bathurst Inlet.

Telecommunications Infrastructure

The project's major infrastructure needs focus primarily on transportation and energy infrastructure.

Estimated Infrastructure Costs

The estimated costs of the port facility, airstrip, and external roads are $21 million, $3 million, and $24 million, respectively.[58] These estimates are standalone estimates, and do not account for related future infrastructure projects, including the Bathurst Inlet Port Road (BIPR) project. BIPR is a proposed deep water port at Bathurst Inlet and an all-weather road connecting at least two mines (Back River and Hackett River) with the port and existing ice roads that serve the Ekati and Diavik mines. Previous cost estimates for the BIPR project range between $220 and $500 million.[59]

Yukon Energy estimates the capital costs of diesel generation plants to be about $1 million per MW.[60] If this guide is consistent with the Back River project, estimated energy infrastructure costs could be $21 million for the required power plants. There would also be some connection and distribution infrastructure required, which could be $10.5 million.[61]

Type	Estimated Cost
Transportation Infrastructure	$48 million
Energy Infrastructure	$31.5 million
Telecommunications Infrastructure	-
Total	$79.5 million

[58] Sabina Gold & Silver Corp, News, Sabina Gold & Silver Announces Positive Preliminary Feasibility Study on Back River Gold Project, Nunavut, Oct 2013. Available at http://www.sabinagoldsilver.com/s/news.asp?ReportID=607398.

[59] Nunatsiaq Online, Nunatsiaq News, Bathurst Inlet Port-Road Scheme Still the Stuff of Dreams, Western Nunavut Transportation Project Delayed Once Again, Feb 2015. Available at http://www.nunatsiaqonline.ca/stories/article/65674bathurst_inlet_port-road_scheme_still_remains_the_stuff_of_dreams/.

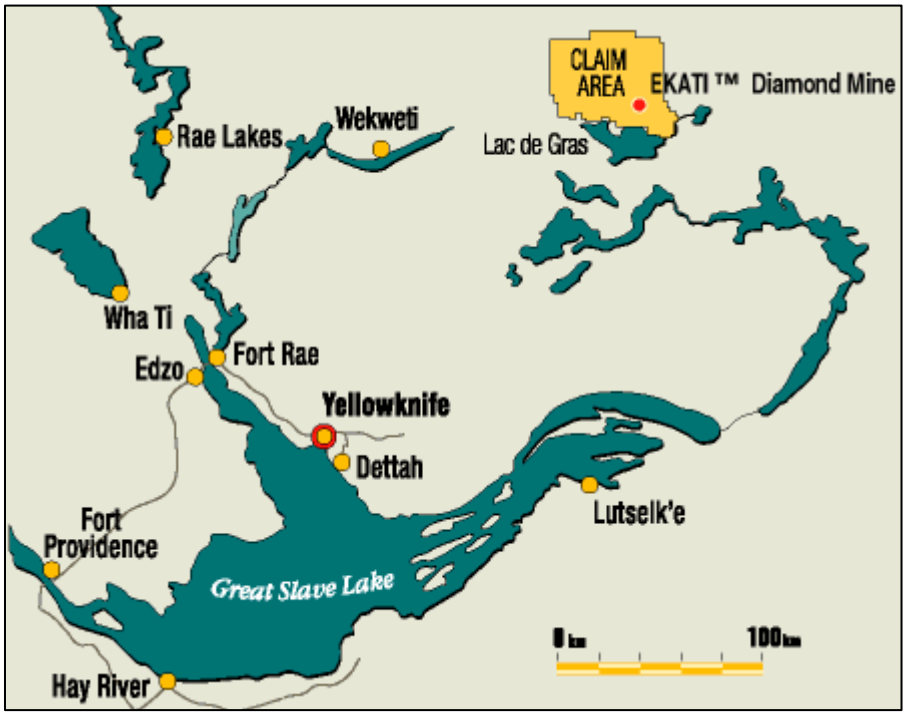
[60] Diesel & Thermal Electricity Generation Options, Background Paper, Yukon Energy Company, 2011. Available at http://www.yukonenergy.ca/media/site_documents/charrette/docs/papers/THERMAL_YEC_Background_Paper.pdf.

[61] Based on half the capital cost of the estimated power plant costs.

Appendix C: Jay Project

Brief Project Description

The Ekati Diamond Mine began production in 1998 and is Canada's first surface and underground diamond mine. It is located approximately 200 km south of the Arctic Circle and about 310 km Northeast of Yellowknife, NT. The project area includes five kimberlite pipes owned by Dominion Diamond Corp, including Misery, Pigeon, Lynx, and Jay open pits, and Koala underground operations.



Jay is the most significant undeveloped deposit at Ekati and has the potential to extend the mine life approximately 11 years beyond the current projected closure in 2020. The proposed project is an extension to the existing Ekati operation. Development of Jay will rely on the mining infrastructure located at the existing Misery site and will provide feed to the processing plant at the Ekati mine site. The Jay kimberlite pipe is located in the southeastern portion of the Ekati Mine property about 25 km from the main facilities and approximately 7 km to the Northeast of the Misery pit.

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – Dominion Diamond estimates that construction of the project will generate direct employment of 442 FTEs.[62] Further, Dominion estimates that the project operations will generate direct and indirect employment of 1,132 FTEs annually over the 11 years of anticipated production. If 60% of this is direct employment, the estimated impact is 679 FTEs annually. Based on this data, Fiscal Realities estimates the direct employment impact of the project to be 7,913 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 3,165 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 1,583 PYE. At an assumed average annual salary of $60,000, this is a potential direct employment impact of $95.0 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	3,165 PYE	$189.9 million
Aboriginal	1,583 PYE	$95.0 million
All Other Canadians	4,748 PYE	$284.9 million
Total	7,913 PYE	$474.8 million

[62] Dominion Diamond, Developer's Assessment Report – Jay Project, Appendix 14A Economic Impact Report, Oct 2014. Available at http://www.reviewboard.ca/upload/project_document/EA1314-01_S_14A_Economic_Impact_Report.PDF.

Estimated Indirect and Induced Employment Impact – Dominion Diamond estimates that construction of the project will generate indirect employment of 157 FTEs and induced employment of 36 FTEs.[63] Further, Dominion estimates that project operations will generate direct and indirect employment of 1,132 FTEs annually over the 11 years of anticipated production. If 40% of this is indirect employment, the estimated impact is 453 FTEs annually. Dominion also estimates induced employment during the 11 year operations phase at an additional 120 FTEs annually. Based on this data, Fiscal Realities estimates the indirect and induced employment impact of the project to be 6,494 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 2,598 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 1,299 PYE. At an assumed average annual salary of $35,000, this is a potential indirect and induced employment impact of $45.5 million for Aboriginal workers in the North.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	2,598 PYE	$90.9 million
Aboriginal	1,299 PYE	$45.5 million
All Other Canadians	3,896 PYE	$136.4 million
Total	6,494 PYE	$227.3 million

Potential Fiscal Impacts

Estimated Federal Tax Revenue – Dominion estimates Canada will collect an additional $356 million over the life of the mine in corporate income taxes and $84 million in personal income taxes associated with the project.

Estimated Territorial Tax Revenue and Royalties – Dominion estimates the Northwest Territories will collect an additional $273 million corporate income taxes and $45 million in personal income taxes associated with the project.

[63] Dominion Diamond, Developer's Assessment Report – Jay Project, Appendix 14A Economic Impact Report, Oct 2014. Available at http://www.reviewboard.ca/upload/project_document/EA1314-01_S_14A_Economic_Impact_Report.PDF.

Estimated Resource Royalties – Dominion estimates it will pay resource royalties of $347 million over the life of the project.

Type	Estimated Fiscal Benefit
Federal Revenues	$440 million
Territorial Revenues	$318 million
Resource Royalties	$347 million

Potential Fiscal Benefits to Aboriginal Governments

The proposed project is an extension of the existing Ekati Mine and will rely on the mining infrastructure located at the existing Misery site and will provide feed to the processing plant at the Ekati Mine site. These facilities are within the Wek'èezhìi area.[64] The Wek'èezhìi area is the management area of the Tłı̨chǫ settlement area (traditionally defined as the Mǫwhì Gogha Dè Nı̨ı̨tłèè area), established by the Tłı̨chǫ Agreement.[65] This agreement provides the Tłı̨chǫ with ownership of a single block of 39,000 sq km of land, called Tłı̨chǫ Lands.[66] This ownership includes subsurface resources.

Although within the Tłı̨chǫ settlement area; the proposed Jay project site appears to be outside the Tłı̨chǫ Lands (those for which the Tłı̨chǫ Government would be entitled to 100% of royalties). However, the three settled land claim agreements in the Northwest Territories contain royalty revenue sharing for mining on Crown lands within settlement areas.[67] Under Chapter 25 of the Tłı̨chǫ agreement, Tłı̨chǫ is entitled to 10.429% of the first $2 million of mineral royalties collected, and 2.086% of any additional royalties collected annually.[68]

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[64] Draft Terms of Reference for the Environmental Assessment of Dominion Diamond Ekati Corp's Jay – Cardinal Project. Available at http://www.reviewboard.ca/upload/project_document/EA1314-01_Project_Description_App_2A_-_draft_Terms_of_Reference_.PDF.

[65] AANDC, Wek'eezhii Area. Available at https://www.aadnc-aandc.gc.ca/eng/1100100026707/1100100026709.

[66] Government of Northwest Territories, Aboriginal Affairs and Intergovernmental Relations, Tlicho Land Claims and Self-Government Agreement. Available at http://www.daair.gov.nt.ca/_live/pages/wpPages/Tlicho.aspx.

[67] AANDC, FAQ about Mining Royalty in Nunavut and the Northwest Territories. Available at https://www.aadnc-aandc.gc.ca/eng/1331039455218/1331039516621.

[68] AANDC, Tlicho Agreement. Available at https://www.aadnc-aandc.gc.ca/eng/1292946895091/1292947490154#chp25.

The Ekati Mine operates under Impact Benefit Agreements (IBAs) with Łutselk'e Dené First Nation, Yellowknives Dené First Nation, Tłı̨chǫ First Nation, Akaitcho Treaty 8, Hamlet of Kugluktuk, Kitikmeot Inuit Association; and North Slave Metis Alliance. Dominion's engagement program for the Jay Project has focused on these groups with existing Ekati IBAs.[69]

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy, telecommunications.

Transportation Infrastructure

The current airstrip and road will be used for the Jay Project.[70]

Energy Infrastructure

Power Line – The Ekati Mine powerhouse currently has seven 4.4 MW diesel generators for a total installed generating capacity of 30.8 MW. In 2014, a power distribution line was built from the powerhouse to the Misery camp and facilities at a cost of $9 to $10 million. Jay Project activities are estimated to require only about 3 MW of power during dewatering period and 2 MW during operations. The existing powerhouse has capacity to provide this power to the Jay Project in addition to existing power requirements. Therefore, no powerhouse upgrades are anticipated to accommodate the Jay Project. The only infrastructure required would be to connect the Misery power line to the necessary locations in the Jay Pit area.[71]

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[69] Dominion Diamond, Project Description, Jay Project, Section 3 Human and Biophysical Environment, Oct 2013. Available at http://www.ddcorp.ca/docs/default-source/default-document-library/jay-cardinal-project-description-report.pdf?sfvrsn=2.

[70] Dominion Diamond Corp, Jay Project, Project Overview, Dec 2014. Available at http://www.reviewboard.ca/upload/project_document/EA1314-01_01_-_Jay_Project_-_Overview_Presentation_-_Dec8.PDF.

[71] Developer's Assessment Report, Information Request Responses, Appendix F Power Supply, Apr 2015. Available at http://www.reviewboard.ca/upload/project_document/EA1314-01_App_F_Power_Supply_IR_responses_Dominion_7_April_2015.PDF.

Telecommunications Infrastructure

As an extension of the existing operation, telecommunications infrastructure for the Jay project does not appear to be a significant requirement.

Estimated Infrastructure Costs

The Developer's Assessment Report states there is a "very minimal capital cost associated with construction of a Jay Pit power line to connect the Misery power line."[72] This connection cost could be consistent with the prior cost to connect the Misery camp with the power house.

Type	Estimated Cost
Transportation Infrastructure	existing
Energy Infrastructure	$10 million
Telecommunications Infrastructure	-
Total	$10 million

[72] Dominion Diamond Corp Announces Jay Project Pre-Feasibility Study Results, Jan 2015. Available at http://www.ddcorp.ca/investors/news-single?id=2010736.

Appendix D: Thor Lake (Nechalacho) Project

Brief Project Overview

Avalon Rare Metals Inc is in the advanced planning stage of the development of a rare metals mine from the Nechalacho deposit at Thor Lake in the Northwest Territories. The mineral deposit will be developed to serve the growing world demand for rare metals which have a myriad of uses in advanced technologies. The mine and mill will be located approximately 5 km from the Northern shore of Great Slave Lake, about 100 km southeast of Yellowknife.[73]

Hydrometallurgical processing will occur near the historic Pine Point mine approximately 8.5 km from the southern shore of Great Slave Lake, approximately 90 km east of Hay River.

[73] Graphic Source: Avalon Rare Metals, Nechalacho Overview. Available at http://www.avalonraremetals.com/nechalacho/nechalacho_overview/#location.

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – G.S. Gislason and Associates Ltd estimated construction of the project will generate a direct employment impact of 880 PYE.[74] Further, Gislason estimated the operational phase of the project will generate direct employment of 6,120 PYE. Combined this represents a direct employment impact of 7,000 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 2,800 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 1,400 PYE. At an assumed average annual salary of $60,000, this is a potential direct employment impact of $84.0 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	2,800 PYE	$168.0 million
Aboriginal	1,400 PYE	$84.0 million
All Other Canadians	4,200 PYE	$252.0 million
Total	7,000 PYE	$420.0 million

[74] Avalon Rare Metals Inc, Developer's Assessment Report, Appendix K Gsgislason Economic Impact Report, May 2011. Available at http://www.reviewboard.ca/upload/project_document/EA1011-001_Thor_Lake_Project_DAR_Appendix_K_GSGislason_Economic_Impact_Report_K_01.PDF.

Estimated Indirect and Induced Employment Impact – Gislason estimated construction of the project will generate indirect employment of 1,585 PYE and induced employment of 1,280 PYE. Further, Gislason estimated the 18 year operational phase of the project will generate indirect employment of 7,750 PYE and induced employment of 6,360 PYE. Combined, this represents an indirect and induced employment impact of 16,975 PYE. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 6,790 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 3,395 PYE. At an assumed average annual salary of $35,000, this is a potential direct employment impact of $118.8 million for Aboriginal workers in the North.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	6,790 PYE	$237.7 million
Aboriginal	3,395 PYE	$118.8 million
All Other Canadians	10,185 PYE	$356.5 million
Total	16,975 PYE	$594.1 million

Potential Fiscal Impacts

Estimated Federal Tax Revenue – Gislason estimates the project will generate $166 million in personal income tax and $446 in corporate income tax for Canada.

Estimated Territorial Tax Revenue – Gislason estimates the project will generate $27 million in personal income tax and $343 million in corporate income tax for the territorial government.

Estimated Resource Royalties – Gislason estimates the project will generate a total mining royalty of $296 million over the 18 year production phase.[75]

[75] Avalon Rare Metals Inc, Developer's Assessment Report, Appendix K Gsgislason Economic Impact Report, May 2011. Available at http://www.reviewboard.ca/upload/project_document/EA1011-001_Thor_Lake_Project_DAR_Appendix_K_GSGislason_Economic_Impact_Report_K_01.PDF.

Type	Estimated Fiscal Benefit
Federal Revenues	$612 million
Territorial Revenues	$370 million
Resource Royalties	$296 million

Potential Fiscal Benefits to Aboriginal Governments

The proposed mine site is located within the Tłı̨chǫ settlement area (traditionally defined as the Mǫwhì Gogha Dè Nı̨ı̨tłèè area), established by the Tłı̨chǫ Agreement. Note that the mine site is outside Tłı̨chǫ Lands (the lands for which the Tłı̨chǫ Government has ownership of subsurface resources and is entitled to 100% of resource royalties generated). Under Chapter 25 of the Tłı̨chǫ agreement, Tłı̨chǫ is entitled to 10.429% of the first $2 million of mineral royalties collected annually, and 2.086% of any additional royalties collected annually.[76]

The proposed processing facility at Pine Point will be located outside the Tłı̨chǫ settlement area, on federally owned Crown land.[77]

Avalon has entered into Negotiation Agreements with the Lutsel K'e Dene First Nations (LKDFN), the Yellowknives Dene First Nation (YKDFN) and the Deninu Kué First Nation (DKFN).[78] As of March 2013, Avalon has finalized Accommodation Agreements with the DKFN. Negotiations are ongoing with the LKDFN and the YKDFN. In the Pine Point area, negotiation agreements have been signed with the Northwest Territories Métis Nation (NWTMN).

[76] AANDC, Tlicho Agreement. Available at https://www.aadnc-aandc.gc.ca/eng/1292946895091/1292947490154#chp25.

[77] Micon International Ltd, Avalon Rare Metals, Technical Report, May 2013. Available at http://avalonraremetals.com/_resources/projects/may_2013_ni43_report.pdf.

[78] Micon International Ltd, Avalon Rare Metals Inc, Technical Report, Disclosing the Results of the Feasibility Study on Nechalacho Rare Earth Elements Project, May 2013. Available at http://avalonraremetals.com/_resources/projects/may_2013_ni43_report.pdf.

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy, telecommunications.

Transportation Infrastructure

The Thor Lake project will consist of two sites in the Northwest Territories, including Nechalacho and Pine Point, and one site in Geismar, Louisiana. The flotation concentrate produced at the Nechalacho site will be barged along the eastern side of Great Slave Lake to the Pine Point site. There it will be upgraded to a mixed rare earth precipitate and shipped by rail to the Geismar site for leaching and separation of rare earths.

Nechalacho Airstrip Upgrade – There is no permanent road connecting the Nechalacho site with nearby communities and there are no plans to construct one. The site is accessible by barge during the summer months and year-round by aircraft using an existing airstrip. In 2010, Avalon built a 305 m airstrip which allowed Twin-Otter-sized aircraft service from Yellowknife throughout the year. As part of the project, this airstrip will need to be upgraded and extended to a length of 1,000 m to accommodate a Dash 8 or Buffalo type of aircraft for light freight and personnel movement.

The Pine Point site is accessible year-round from Hay River via Highways 5 and 6 and an access road from Highway 6 to the site.

Energy Infrastructure

Nechalacho Power Plant – All site power is planned to be generated by diesel generators.[79] Power will be generated using a new modular power supply system designed by Finning and based on the Caterpillar 3516HD diesel generators. The power plant will consist of six to eight 1.45 MW units.[80]

Primary power for Pine Point site will be provided via the existing Northwest Territories Hydro Corporation (NTHC) substation located at the former Pine Point mine site. Standby power requirements for critical loads will be supplied by a diesel generator.

Telecommunications Infrastructure

The project's major infrastructure needs focus primarily on transportation and energy infrastructure.

Estimated Infrastructure Costs

If the estimated cost of the airstrip required for the Back River project is consistent with the cost of the airstrip required for this project, a cost of $3 million can be assumed.[81]

[79] Avalon Rare Metals Inc, Project Description, Thor Lake Project, Apr 2010. Available at http://avalonraremetals.com/_resources/PDF-Exec-Summary.pdf.

[80] Scott Wilson, Avalon Rare Metals Inc, Technical Report on the Thor Lake Project, Jul 2010, available at http://avalonraremetals.com/_resources/Avalon_Thor_Lake_43-101_July_2010.pdf and Avalon's Developer's Assessment Report, May 2011, available at http://www.reviewboard.ca/upload/project_document/EA1011-001_11_Thor_Lake_Project_DAR_Closure_and_Reclamation__931-950_.PDF.

[81] The Back River airstrip will be an all-weather airstrip and apron capable of accommodating a Boeing 737. The estimated cost of $3 million includes a 5 km all-weather road connecting the airstrip to the project. The planned Thor Lake airstrip will accommodate Dash 8 size aircraft.

Yukon Energy estimates the capital costs of diesel generation plants to be about $1 million per MW.[82] If this guide is consistent with the Thor Lake project's modular design, estimated energy infrastructure costs could be $11.6 million for the required units. There would also be some connection and distribution infrastructure required, which could be $5.8 million.[83]

Scott Wilson Mining estimated the infrastructure capital costs at just $26.5 million.[84] The Scott Wilson document states that this estimate includes all roads, yards, airstrip, camp, power and storage for the project. Unfortunately, the specific costs associated with transportation infrastructure and energy infrastructure are not broken out separately.

Type	Estimated Cost
Transportation Infrastructure	-
Energy Infrastructure	$17.4 million
Telecommunications Infrastructure	-
Total	$26.5 million

[82] Diesel & Thermal Electricity Generation Options, Background Paper, Yukon Energy Company, 2011. Available at http://www.yukonenergy.ca/media/site_documents/charrette/docs/papers/THERMAL_YEC_Background_Paper.pdf.

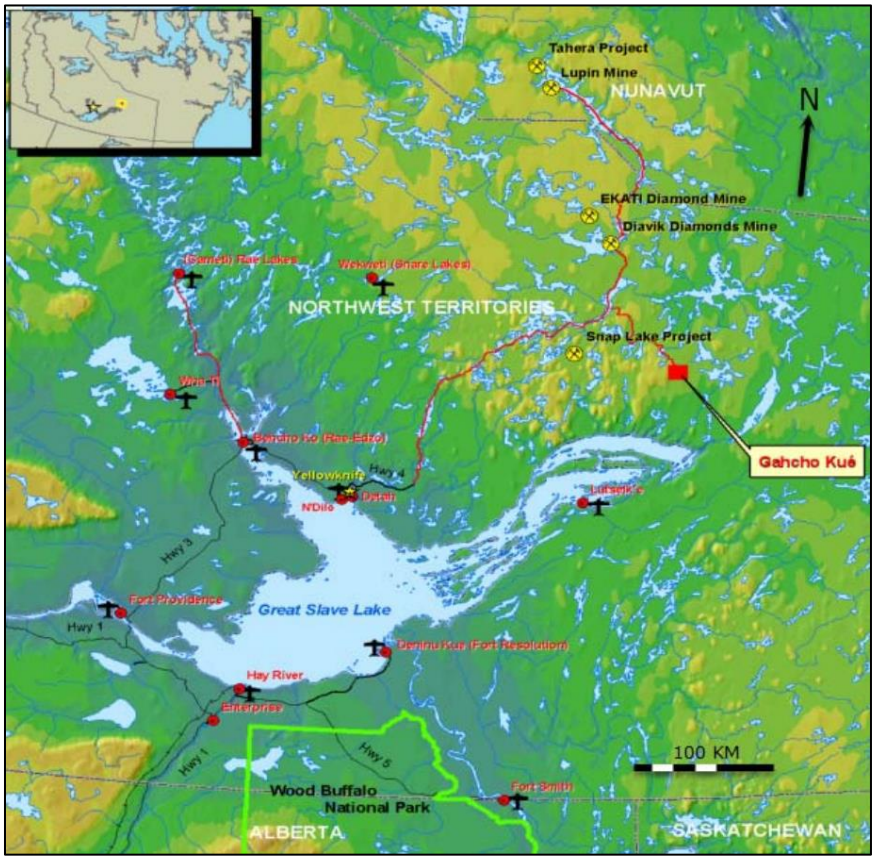
[83] Based on half the capital cost of the estimated power plant costs.

[84] Avalon Rare Metals Inc, Technical Report on the Thor Lake Project, Scott Wilson Mining, Jul 2010. Available at http://avalonraremetals.com/_resources/Avalon_Thor_Lake_43-101_July_2010.pdf.

Appendix E: Gahcho Kué Project

Brief Project Overview

The Gahcho Kué Project is a joint venture diamond mine between De Beers Canada Inc (51%) and Mountain Province Diamonds Inc (49%). The Gahcho Kué deposit is located at Kennady Lake, approximately 280 km Northeast of Yellowknife and 80 km southeast of Snap Lake Mine in the Northwest Territories.[85]



Exploration has determined that three kimberlite deposits currently have potential to be mined. The project will involve the extraction and processing of over 31 million tonnes of ore and the recovery of 49 million carats of diamonds from 2017 to 2027.

[85] Graphic Source: JDS Energy & Mining Inc and Hatch Ltd, Gahcho Kué Project 2014 Feasibility Study NI 43-101 Technical Report, May 2014. Available at http://www.mountainprovince.com/files/3214/0140/9697/MPV_GK_2014_Technical_Report_May_28_2014.pdf.

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – Schlenker Consulting Ltd estimated the project's 3-year construction phase will generate a direct and indirect employment impact of 3,128 PYE.[86] Further, Schlenker estimated the project's 11-year operational phase will generate a direct and indirect employment impact of 10,038 PYE. If 60% of this is direct employment, the estimated impact is 7,900 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 3,160 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 1,580 PYE. At an assumed average annual salary of $60,000, this is a potential direct employment impact of $94.8 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	3,160 PYE	$189.6 million
Aboriginal	1,580 PYE	$94.8 million
All Other Canadians	4,740 PYE	$284.4 million
Total	7,900 PYE	$474.0 million

Estimated Indirect and Induced Employment Impact – Based on the breakdown between direct and indirect employment assumed above, the Schlenker estimates yield an indirect employment impact of 1,251 PYE and 4,015 PYE for the 3-year construction phase and the 11 year operations phase respectively. Further, Schlenker estimates the project will generate an induced employment impact of 1,162 PYE and 3,908 PYE associated with the construction and operations phases. Combined, this represents an indirect and induced employment impact of 10,336 PYE. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 4,135 PYE. If

[86] Evaluation of the Economic Impacts of the Gahcho Kué Diamond Project, Schlenker Consulting Ltd, Sep 2011. Available at http://www.reviewboard.ca/upload/project_document/EIR0607-001_GNWT_Economic_Impact_Analysis_Submission_May_2012.PDF.

50% of this is realized by Aboriginal workers, the potential impact is estimated to be 2,067 PYE. At an assumed average annual salary of $35,000, this is a potential direct employment impact of $72.4 million for Aboriginal workers in the North.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	4,134 PYE	$144.7 million
Aboriginal	2,067 PYE	$72.4 million
All Other Canadians	6,202 PYE	$217.1 million
Total	10,336 PYE	$361.8 million

Potential Fiscal Impacts

Estimated Federal Tax Revenue – Schlenker estimates the project will generate $84 million and $829 in federal revenues associated with the construction and operation of the project.

Estimated Territorial Tax Revenue – Schlenker estimates the project will generate $13 million and $301 million in territorial revenue associated with the construction and operation of the project.

Estimated Resource Royalties – Schlenker estimates the project will generate $250 million in resource royalties over its 11-year operational phase.

Type	Estimated Fiscal Benefit
Federal Revenues	$913 million
Territorial Revenues	$314 million
Resource Royalties	$250 million

Potential Fiscal Benefits to Aboriginal Governments

The proposed project site is located within the Mǫwhì Gogha Dè Nıı̨tłèè (the Tłı̨chǫ settlement area).[87] However, the site is outside Tłı̨chǫ Lands (the lands for which the Tłı̨chǫ Government has ownership of subsurface resources and is entitled to 100% of resource royalties generated). Under Chapter 25 of the Tłı̨chǫ agreement, Tłı̨chǫ is entitled to 10.429% of the first $2 million of mineral royalties collected annually, and 2.086% of any additional royalties collected annually.[88]

De Beers, as Operator of the Gahcho Kué Project, has entered into an Impact Benefit Agreement (IBA) with the Tłı̨chǫ Government for the proposed Gahcho Kué Mine.[89]

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy, telecommunications.

Transportation Infrastructure

Winter Road – The project site will need a 120 km winter road constructed annually to connect it to the Tibbitt-Contwoyto winter road.

[87] Tlicho Government, News, Gahcho Kue Joint Venture and Tlicho Government Sign IBA, Jan 2014. Available at http://tlicho.ca/news/gahcho-ku%C3%A9-joint-venture-and-t%C5%82%C4%B1%CC%A8cho%CC%A8-government-sign-iba.

[88] AANDC, Tlicho Agreement. Available at https://www.aadnc-aandc.gc.ca/eng/1292946895091/1292947490154#chp25.

[89] Tlicho Government, News, Gahcho Kue Joint Venture and Tlicho Government Sign IBA, Jan 2014. Available at http://tlicho.ca/news/gahcho-ku%C3%A9-joint-venture-and-t%C5%82%C4%B1%CC%A8cho%CC%A8-government-sign-iba.

Airstrip – The current aerodrome is an ice runway on Kennady Lake, open from Jan to Apr each year. But, the project will require the construction of a permanent airstrip located about 1 km from the plant site. The 1,620 m airstrip and apron will be constructed from crushed, screened and compacted layers of mine rock.[90] Initially, the airstrip will be built to accommodate propeller aircraft up to a Hercules in size. But a runway extension to accommodate 737 aircraft will be possible in the future given the orientation.[91]

Energy Infrastructure

Power Plant – Electric power will be provided by a stand-alone modular diesel generating plant. The power system will consist of five 2,825 Kw diesel-powered generators.

Telecommunications Infrastructure

The project's major infrastructure needs focus primarily on transportation and energy infrastructure.

Estimated Infrastructure Costs

JDS estimates the cost of site development and road works to be $10.3 million.[92] Presumably this includes the construction of the permanent airstrip.

[90] Gahcho Kué Project, Environmental Impact Statement, Plain Language Summary, Nov 2012. Available at http://www.reviewboard.ca/upload/project_document/EIR0607-001_Plain_Language_Summary_English.PDF.

[91] De Beers Group of Companies, Exploration, Gahcho Kué. Available at https://www.canada.debeersgroup.com/Exploration/Gahcho-Kue/.

[92] JDS Energy & Mining Inc and Hatch Ltd, Gahcho Kué Project 2014 Feasibility Study NI 43-101 Technical Report, May 2014. Available at http://www.mountainprovince.com/files/3214/0140/9697/MPV_GK_2014_Technical_Report_May_28_2014.pdf.

The 120 km winter road will need to be constructed annually. The winter road will connect to the Tibbitt-Contwoyto winter road, for which there are associated usage fees. The Feasibility Study estimates the average annual cost of winter road construction and maintenance to be about $3.6 million and the average annual cost of Tibbitt-Contwoyto road fees to be about $2.0 million.[93] This is an estimated cost of infrastructure of about $77.5 million.

Yukon Energy estimates the capital costs of diesel generation plants to be about $1 million per MW.[94] If this guide is consistent with the Gahcho Kué project, estimated energy infrastructure costs could be $14.1 million for the required units. There would also be some connection and distribution infrastructure required, which could be $7 million.[95]

Type	Estimated Cost
Transportation Infrastructure	$77.5 million
Energy Infrastructure	$21.2 million
Telecommunications Infrastructure	-
Total	$98.7 million

[93] JDS Energy & Mining Inc and Hatch Ltd, Gahcho Kué Project 2014 Feasibility Study NI 43-101 Technical Report, May 2014. Available at http://www.mountainprovince.com/files/3214/0140/9697/MPV_GK_2014_Technical_Report_May_28_2014.pdf.

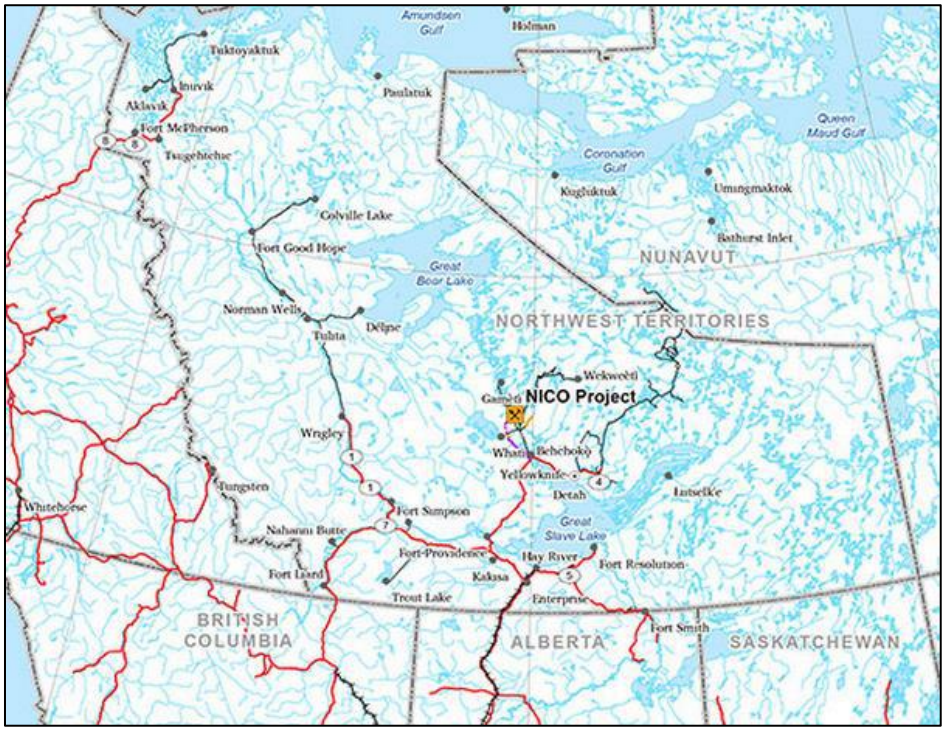
[94] Diesel & Thermal Electricity Generation Options, Background Paper, Yukon Energy Company, 2011. Available at http://www.yukonenergy.ca/media/site_documents/charrette/docs/papers/THERMAL_YEC_Background_Paper.pdf.

[95] Based on half the capital cost of the estimated power plant costs.

Appendix F: NICO Project

Brief Project Overview

NICO is a gold, cobalt, bismuth, and copper project located about 160 km Northwest of Yellowknife, NT, and 50 km Northeast of the Tłı̨chǫ Aboriginal community of Whati.[96]



The NICO deposit was discovered by Fortune Minerals Ltd in 1996. The proposed project will include mining and concentrating ores in the Northwest Territories, and transportation of the metal concentrate to a refinery for further processing to high value products.[97] The anticipated operational life of the project is 20 years, and will include underground and open pit operations.

[96] Graphic Source: Fortune Minerals, Our Assets, Locations. Available at http://www.fortuneminerals.com/assets/nico/nico-location/default.aspx.

[97] Fortune Minerals Ltd, Developer's Assessment Report, Appendix 16.I Economic Report for the NICO Project. Available at http://www.reviewboard.ca/upload/project_document/EA0809-004_Appendix_16_I_Economic_Impact_Report.PDF.

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – SJ Research Services estimated the direct employment impact of project construction to be 230.8 PYE.[98] Further, SJ Research estimated the direct employment impact associated with the operational phase to be 2,550.9 PYE. Combined, this is an estimated direct employment impact of 2,782 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 1,113 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 556 PYE. At an assumed average annual salary of $60,000, this is a potential direct employment impact of $33.4 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	1,113 PYE	$66.8 million
Aboriginal	556 PYE	$33.4 million
All Other Canadians	1,669 PYE	$100.1 million
Total	2,782 PYE	$166.9 million

Estimated Indirect and Induced Employment Impact – SJ Research estimated the project will also generate an indirect and induced employment impact of 3,325 PYE. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 1,330 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 665 PYE. At an assumed average annual salary of $35,000, this is a potential direct employment impact of $23.3 million for Aboriginal workers in the North.

[98] Fortune Minerals Ltd, Developer's Assessment Report, Appendix 16.I Economic Report for the NICO Project. Available at http://www.reviewboard.ca/upload/project_document/EA0809-004_Appendix_16_I_Economic_Impact_Report.PDF.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	1,330 PYE	$46.6 million
Aboriginal	665 PYE	$23.3 million
All Other Canadians	1,995 PYE	$69.8 million
Total	3,325 PYE	$116.4 million

Potential Fiscal Impacts

Estimated Federal Tax Revenue – SJ Research estimated the construction phase of the project will generate $4.4 million in personal income tax. Further, SJ Research estimated the operational phase will generate federal revenues of $16.4 million in personal income tax and $12.2 million in corporate income tax.

Estimated Territorial Tax Revenue – SJ Research estimated the construction phase of the project will generate $1.9 million in personal income tax. Further, SJ Research estimated the operational phase will generate territorial revenues of $8.8 million in personal income tax and $6.4 million in corporate income tax.

Estimated Resource Royalties – SJ Research estimated the project will generate about $10.8 million in resource royalties over its operational life.

Type	Estimated Fiscal Benefit
Federal Revenues	$33.0 million
Territorial Revenues	$17.1 million
Resource Royalties	$10.8 million

Potential Fiscal Benefits to Aboriginal Governments

The proposed project site is surrounded by Tłı̨chǫ Lands (the 39,000 sq km of land owned in fee simple by the Tłı̨chǫ Government) established by the Tłı̨chǫ Agreement. The NICO mineral claim has been grandfathered into the Tłı̨chǫ Agreement.[99] This means that the Tłı̨chǫ Government's Land Use Plan Law applies to Fortune's access to the site. But, it also means that Tłı̨chǫ does not own the subsurface rights to the NICO deposit. Under Chapter 25 of the Tłı̨chǫ agreement, Tłı̨chǫ is entitled to 10.429% of the first $2 million of mineral royalties collected annually, and 2.086% of any additional royalties collected annually.[100]

Fortune Minerals continues to negotiate with the Tłı̨chǫ Government for an Impact Benefit Agreement with respect to the NICO project. A press release indicates the agreement is focused on employment and business opportunities.[101]

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy, telecommunications.

[99] Fortune Minerals Press Release, Fortune Minerals Receives Tlicho Land Access Permit, Jul 2013. Available at http://www.fortuneminerals.com/news/press-releases/press-release-details/2013/Fortune-Minerals-Receives-Tlicho-Land-Access-Permit/default.aspx.

[100] AANDC, Tlicho Agreement. Available at https://www.aadnc-aandc.gc.ca/eng/1292946895091/1292947490154#chp25.

[101] Fortune Minerals, News, Press Releases, Fortune Minerals Provides Corporate Update and Announces Third Quarter Financial Results, Nov 2014. Available at http://www.fortuneminerals.com/news/press-releases/press-release-details/2014/Fortune-Minerals-provides-corporate-update-and-announces-third-quarter-financial-results/default.aspx.

Transportation Infrastructure

Access Spur Road – The proposed mine is about 85 km North of the highway to Edmonton. Fortune Minerals has proposed the construction of an all-weather road required to truck concentrates to the railhead at Hay River.[102] The proposed road will also serve nearby Tłı̨chǫ Aboriginal communities.[103] Once operational, the road would connect communities otherwise isolated as a result of limited access provided by winter roads. As such, the proposed road, in coordination with a hydroelectric grid expansion project, is expected to spur economic development in the region. It is proposed that Fortune's contribution to the initiative is the development of the legacy road.[104]

[102] CN operates a railway that terminates at Hay River on the south shore of Great Slave Lake, 450 km south of NICO and provides a rail link for haulage of the concentrate that will be produced at the mine site.

[103] The road will be a spur off another all-weather road currently under consideration by the Tlicho and territorial governments.

[104] Fortune Minerals Ltd, Sustainability, Aboriginal Relations & Community Outreach, Social Contribution; and Fortune Minerals Ltd, News, Press Releases, Fortune Minerals Announces Receipt of NICO Project Interim Land Use Permit for Early Construction and Staging. Available at http://www.fortuneminerals.com/sustainability/social-contribution/default.aspx and http://www.fortuneminerals.com/news/press-releases/press-release-details/2014/Fortune-Minerals-Announces-Receipt-of-Nico-Project-Interim-Land-Use-Permit-for-Early-Construction-and-Staging/default.aspx.

Energy Infrastructure

Power – The project could rely on the Northwest Territories Power Corporation (NTPC) for hydro power. NTPC's Snare / Yellowknife grid (North of Great Slave Lake) is located approximately 22 km from the mine site. However, the grid does not have enough surplus power to meet additional requirements and must be connected with the Talston grid (south of Great Slave Lake) where there is surplus hydro power. A 2013 power system plan concluded that an economic case can be made for connecting new mines (including NICO) to the grid when they are within about 250 km of the existing system, and there is sufficient surplus energy available.[105] Fortune Minerals is working towards an agreement with NTPC on a long-term contract with firm rates.[106]

Telecommunications Infrastructure

The project's major infrastructure needs focus primarily on transportation and energy infrastructure.

[105] NT Energy, A Vision for the NWT Power System Plan, Dec 2013. Available at https://www.ntpc.com/docs/default-source/default-document-library/psp-december-10_2013.pdf?sfvrsn=0.

[106] Fortune Minerals Ltd, News, Press Releases, Fortune Minerals Announces Receipt of NICO Project Interim Land Use Permit for Early Construction and Staging, Jan 2014. Available at http://www.fortuneminerals.com/news/press-releases/press-release-details/2014/Fortune-Minerals-Announces-Receipt-of-Nico-Project-Interim-Land-Use-Permit-for-Early-Construction-and-Staging/default.aspx.

Estimated Infrastructure Costs

In the 2014 Feasibility Study, Fortune estimates the pre-production direct capital cost of the mill and related infrastructure to be $170 million.[107] This includes the access spur road to the site and the power substation.[108] However, the estimate also includes a number of other capital expenses.[109] The fraction of this cost estimate representing only the access spur road and the power substation is unknown. This estimate was based on a 2012 Front-End Engineering & Design study conducted by Aker Solutions Canada Inc and Jacobs Minerals Canada Inc.[110] This 2012 study shows capital cost estimates for sitework of $10.2 million and electrical of $13.6 million. Presumably this includes the estimated capital cost of the access spur road and the power substation.

Type	Estimated Cost
Transportation Infrastructure	$10.2 million
Energy Infrastructure	$13.6 million
Telecommunications Infrastructure	-
Total	$23.8 million

[107] Micon International Ltd, Technical Report on the Feasibility Study for the NICO Gold Cobalt Bismuth Copper Project, May 2014. Available at http://www.fortuneminerals.com/files/doc_downloads/1335%20Nico%20Technical%20ReportLM.pdf.

[108] The Feasibility Study includes capital expenditure estimates make provision for Fortune to fund 33 km of spur road connection to the project site, but Fortune may agree to contribute to the cost of an additional 18 km of road.

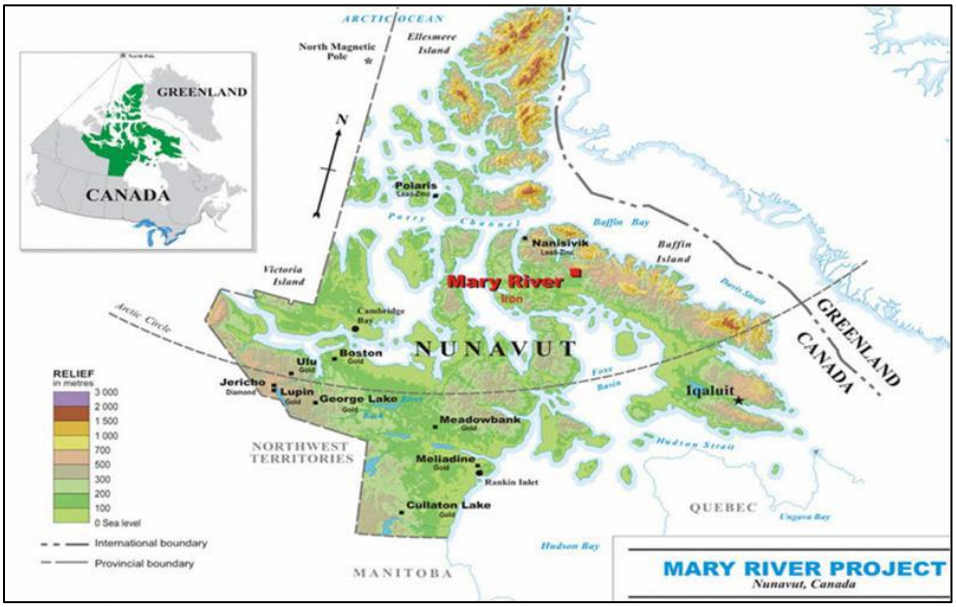
[109] Other capital expenses include site development and site roads; power distribution network; crushing plant; fine ore storage; grinding circuit, concentrate thickening, filtration, and loadout; tailings thickener; mill building; main control system; water and compressed air supply, reagent preparation area, co-disposal facility, permanent accommodation complex, plant mobile equipment, fuel storage facility, sewage treatment plant, incinerator, and gate house.

[110] Available at http://www.fortuneminerals.com/files/doc_downloads/FINAL%20Technical%20Report.pdf.

Appendix G: Mary River Project

Brief Project Overview

The Mary River Project is a proposed iron mine owned by Baffinland located on North Baffin Island, about 1,000 km Northwest of Iqaluit, in the Qikiqtani Region of Nunavut. The project will focus on mining iron ore from a reserve known as Deposit No. 1.[111]



The project's anticipated operating life is 21 years with the construction phase estimated to be carried out over a 4 year period. The Preliminary Economic Assessment is based on 18 million tonnes of iron ore recovered annually.

[111] Graphic Source: Baffinland, Location and Project History, 2015. Available at http://www.baffinland.com/the-project/location-and-project-history/?lang=en.

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – Howe has estimated the project's cumulative employment impact to be 78,018 PYE over the life of the mine.[112] This includes both construction phase and operations phase employment. Further, it has been estimated that the direct employment impact is 21,080 PYE. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 8,432 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 4,216 PYE. At an assumed average annual salary of $60,000, this is a potential direct employment impact of $253.0 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	8,432 PYE	$505.9 million
Aboriginal	4,216 PYE	$253.0 million
All Other Canadians	12,648 PYE	$758.9 million
Total	21,080 PYE	$1.3 billion

[112] Howe, E.C., The Economic Impact of the Mary River Project on Nunavut and the Provinces of Canada, 2010. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/2-REVIEW/08-FINAL%20EIS/FEIS/Vol%2004/Appendices/120213-08MN053-FEIS%20App%204B-Ec%20Impact%20Model-IT3E.pdf

Estimated Indirect Employment Impact - Howe has estimated the project's cumulative employment impact to be 78,018 PYE over the life of the mine.[113] Again, this includes both construction phase and operations phase impacts. Further, it has been estimated that the indirect and induced employment impact is 56,938 PYE. If 40% of this is realized by Northern Residents, the potential employment impact is estimated to be 22,775 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 11,388 PYE. At an assumed average annual salary of $35,000, this is a potential indirect and induced employment impact of $398.6 million for Aboriginal workers in the North.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	22,775 PYE	$797.1 million
Aboriginal	11,388 PYE	$398.6 million
All Other Canadians	34,163 PYE	$1.2 billion
Total	56,938 PYE	$2.0 billion

Potential Fiscal Impacts

Estimated Federal Tax Revenue – Baffinland expects the mine to generate between $3 and $5 billion in federal revenue during the life of the project.[114] As such, the average of $4 billion in federal revenue was used as the estimate for this project.

Estimated Territorial Tax Revenue – According to Howe an estimated $1.629 billion will be generated in taxes for the government of Nunavut during the project's life.[115]

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[113] Howe, E.C., The Economic Impact of the Mary River Project on Nunavut and the Provinces of Canada, 2010. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/2-REVIEW/08-FINAL%20EIS/FEIS/Vol%2004/Appendices/120213-08MN053-FEIS%20App%204B-Ec%20Impact%20Model-IT3E.pdf.

[114] Isuma, Socioeconomic impacts, uncertain benefits in Mary River's second day of hearings, 2012. Available at http://www.isuma.tv/fr/ashleigh-gaul/socioeconomic-impacts-uncertain-benefits-in-mary-river%E2%80%99s-second-day-of-hearings.

[115] Howe, E.C., The Economic Impact of the Mary River Project on Nunavut and the Provinces of Canada, 2010. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/2-REVIEW/08-FINAL%20EIS/FEIS/Vol%2004/Appendices/120213-08MN053-FEIS%20App%204B-Ec%20Impact%20Model-IT3E.pdf.

Estimated Resource Royalties – Howe estimates the project will generate $1.925 billion in resource royalties during operations for Nunavut Tunngavik Incorporated (NTI).[116]

Type	Estimated Fiscal Benefit
Federal Revenues	$4 billion
Territorial Revenues	$1.629 billion
Resource Royalties	$1.925 billion

Potential Fiscal Benefits to Aboriginal Governments

In Nunavut, where a single comprehensive land claim has been settled, the agreement contains royalty revenue sharing for mining on Crown Lands within the settlement area. Under Article 25, Inuit receive 50% of the first $2 million and 5% of the remaining royalties collected by Canada annually.[117]

Some of the lands selected by the Inuit, Inuit Owned Lands, include ownership of surface and subsurface rights. Where subsurface rights are owned, Inuit receive the full royalty. But, the mining leases at Mary River predate the Nunavut Land Claims Agreement.[118] In this case, Inuit will be entitled to a share of royalties in accordance with the sharing provisions of the Nunavut Land Claims Agreement (50% of the first $2 million and 5% of remaining royalties collected annually).[119]

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[116] Baffinland, Mary River Project – Environmental Impact Statement – Appendix 4B Economic Impact Model, 2012. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/2-REVIEW/08-FINAL%20EIS/FEIS/Vol%2004/Appendices/120213-08MN053-FEIS%20App%204B-Ec%20Impact%20Model-IT3E.pdf.

[117] A Plain Language Guide to the Nunavut Land Claims Agreement. Available at http://www.tunngavik.com/documents/publications/2004-00-00-A-Plain-Language-Guide-to-the-Nunavut-Land-Claims-Agreement-English.pdf.

[118] Baffinland, Environmental Impact Statement, Dec 2010, Section 15.0 – Land Tenure and Approvals Required for Development. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/2-REVIEW/05-DRAFT%20EIS/02-DEIS%20SUBMISSION/Vol%2001/110121-08MN053-Section%2015-Land%20Tenure%20and%20Approvals%20Required%20for%20Development-IEDE.pdf.

[119] A Plain Language Guide to the Nunavut Land Claims Agreement. Available at http://www.tunngavik.com/documents/publications/2004-00-00-A-Plain-Language-Guide-to-the-Nunavut-Land-Claims-Agreement-English.pdf.

Mary River operates under an Inuit Impact and Benefit Agreement with the Qikiqtani Inuit Association (QIA). The agreement provides for (non-resource) royalty payments made by Baffinland to QIA during commercial operations. As an agreement-based royalty, not a statutory royalty, payments are based upon an agreed percentage of net sales revenues.[120] These would be in addition to the resource royalty impact estimated above.

The IIBA also establishes requirements for contracting and employment opportunities, training and education and housing assistance.

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy and telecommunications.

Transportation Infrastructure

Currently, the mine site is accessed by fixed wing aircraft using a gravel airstrip. Access is also available by float or ski plane on nearby lakes. Baffinland currently operates a regular charter service to the site to move personnel and supplies.[121]

[120] Plain Language Guide – Inuit Impact and Benefit Agreement between Qikiqtani Inuit Association & Baffinland Iron Mines Corporation, 2013. Available at http://www.miningNorth.com/_rsc/site-content/best-practices/PlainLanguageGuide-MaryRiver-IIBA.pdf.

[121] Baffinland, Development Project Proposal for Mary River Project, 2008. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/1-SCREENING/01-APPLICATION/080320-08MN053-Development%20Proposal%20for%20the%20Mary%20River%20Project.pdf.

Mine to Port Railway – The project will require a 143 km railway from mine to Steensby port. It is designed to accommodate production rates well in excess of the initial production requirements, with only six trains per day, 300 days per year, required to deliver 18 million tonnes per year to the port. It is intended to be used to transfer operating supplies, personnel and equipment from Steensby Inlet to Mary River operations. The rail line will cost about $1.2 billion and take four years to build.[122 and 123]

Airstrip Improvement – Without road access, the mine can only be accessed year round by air, so a runway capable of landing jet aircraft or turbopop aircraft will be required. There is an existing airstrip, but it requires upgrades. Based on these requirements, the runway must have a minimum length of 1,829 m. In addition to the length, other improvements to the airstrip will include aircraft warning, obstruction, runway and approach lighting conforming to the requirements of the Aeronautics Act.

Tote Road Upgrade – The existing approximately 100-km road (Tote Road) is a public access road to Milne Inlet.[124] Upgrades are required to support ore haul trucks (all-weather) and include road widening, engineered fills, replacement of existing culvert and barrel-culverts, installation/replacement of culverts at water crossings and construction of turnout/passing areas along the route. It was to be upgraded in stages with gradual improvement up to the commencement of bulk sample haulage.

Steensby Inlet Port – One ore carrier berth and two service berths are planned for Steensby Inlet. Other facilities at Steensby Inlet include a diesel fuel tank farm, diesel power generation, camp, general warehousing and the railway maintenance yard and facilities. It is designed to accommodate cape-sized ore carriers for 12 months each year. The Steensby Site is estimated to cost $706 million.

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[122] Waldie, P., A railway to Arctic riches: economic boom, environmental threat?, 2011. Available at http://www.theglobeandmail.com/report-on-business/industry-news/energy-and-resources/a-railway-to-arctic-riches-economic-boom-environmental-threat/article4259449/?page=2.

[123] Baffinland, Baffinland announces exceedingly robust economics for the Mary Fiver direct-shipping iron ore project, 2008. Available at http://www.infomine.com/index/pr/PA595880.PDF.

[124] Baffinland, Mary River Project – Proposed Bulk Sampling Program, 2006. Available at ftp://ftp.nwb-oen.ca/1%20PRUC%20PUBLIC%20REGISTRY/2%20MINING%20MILLING/2B/2BB%20-%20Bulk%20Sampling/2BB-MRY1421/1%20APPLICATION/2006%20Amendment%20Bulk/060822%202BE-MRY0406%20Bulk%20Sample%20Presentation-IMLE.pdf.

Construction and operation of the railway at Steensby Inlet and the port at Steensby Inlet are to be delayed beyond 2015, Baffinland also states that they are still committed to the development of a railway and a Steensby Port.[125]

Energy Infrastructure

Power Generation Facilities – The mine site will utilize a centralized power plant designed to service the entire mine site. It is designed to accommodate five diesel generators to provide enough capacity to meet the estimated power demands of 15.8 MW. Annual energy consumption is estimated at 114,000 MWh.[126] At any one time, three generators will be in operation, one will be on standby, and one will be spare.

The Steensby Port will utilize a centralized 22 MW power plant designed to service the entire port. The running load is estimated at 11 MW and annual energy consumption is estimated at 120,000 MWh.[127]

Telecommunications Infrastructure

The project's major infrastructure needs focus primarily on transportation and energy infrastructure.

Estimated Infrastructure Costs

The estimated costs of the railway, the Tote Road upgrade, the Steensby Port facility are $1.2 billion, $85.2 million, and $706 million, respectively.[128] This equates to about $2 billion in transportation infrastructure.

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[125] Baffinland, Project Proposal Summary – PHASE 2 Proposal, 2008. Available at http://www.nunavut.ca/files/CD/BIMC%20Phase%202%20Project%20proposal%20summary.pdf.

[126] Baffinland, Development Project Proposal for Mary River Project, 2008. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/1-SCREENING/01-APPLICATION/080320-08MN053-Development%20Proposal%20for%20the%20Mary%20River%20Project.pdf.

[127] Baffinland, Development Project Proposal for Mary River Project, 2008. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/1-SCREENING/01-APPLICATION/080320-08MN053-Development%20Proposal%20for%20the%20Mary%20River%20Project.pdf.

Yukon Energy estimates the capital costs of diesel generation plants to be about $1 million per MW.[129] If this guide is consistent with the Mary River project, estimated energy infrastructure costs could be $15.8 million at the mine site and $22 million at the Steensby Port. There would also be some connection and distribution infrastructure required, which could be an additional $18.9 million.[130]

Type	Estimated Cost
Transportation Infrastructure	$2 billion
Energy Infrastructure	$56.7 million
Telecommunications Infrastructure	-
Total	$2.06 billion

[128] Baffinland, Development Project Proposal for Mary River Project, 2008. Available at http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/08MN053-BAFFINLAND%20MARY%20RIVER/1-SCREENING/01-APPLICATION/080320-08MN053-Development%20Proposal%20for%20the%20Mary%20River%20Project.pdf.

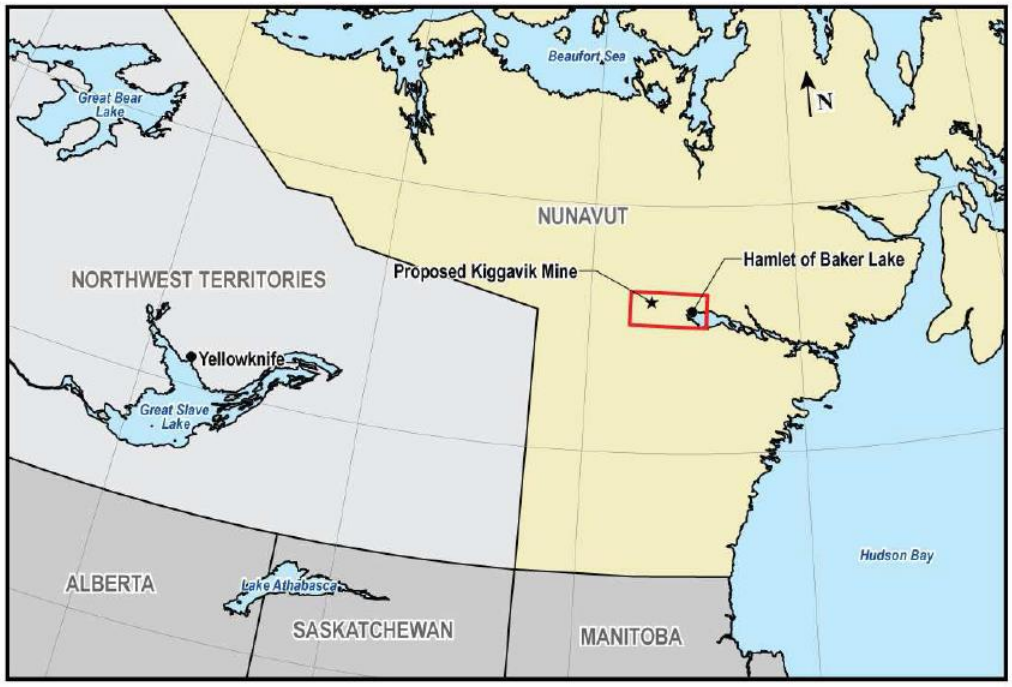
[129] Diesel & Thermal Electricity Generation Options, Background Paper, Yukon Energy Company, 2011. Available at http://www.yukonenergy.ca/media/site_documents/charrette/docs/papers/THERMAL_YEC_Background_Paper.pdf.

[130] Based on half the capital cost of the estimated power plant costs.

Appendix H: Kiggavik Project

Brief Project Overview

The Kiggavik Project is a proposed uranium mine owned by AREVA Resources Canada Inc. located about 80 km west of Baker Lake on the Nunavut mainland. The project will focus on the development of three open pit mines at Kiggavik, and both an open pit mine and an underground mine at the Sissons site (Andrew Lake) southwest of the Kiggavik site.[131]



The project's anticipated life is 3-4 four years of construction and 14 years of operation, producing between 2,000 and 4,000 tonnes of uranium annually.

In early 2015, a ruling by the Nunavut Impact Review Board suggested that the proposed Kiggavik uranium mine "should not proceed at this time" as a result of the project proponent, AREVA Resources Canada Inc.'s inability to provide a definite start date or development schedule for the project, an accurate assessment of future

[131] AREVA Resources Canada Inc. (2008). The Kiggavik Project – Project Proposal. http://kiggavik.ca/download/Kiggavik-ProjectProposal.pdf

environmental and social impacts at this time. However, AREVA is still planning to move ahead with the project, as AREVA spokesperson Barry McCallum noted, "We have been mining uranium in Canada for decades and [Kiggavik] is in our plans."[132]

Potential Economic and Fiscal Impacts

Potential Economic Impacts

Estimated Direct Employment Impact – AREVA estimates that construction of the project will generate direct employment of 611 FTEs annually.[133] Further, AREVA estimates that the project operations will generate direct and indirect employment of 2,705 FTEs annually over the 12 years of anticipated production. If 60% of this is direct employment, the estimated impact is 1,623 FTEs annually. Based on this data, Fiscal Realities estimates the direct employment impact of the project to be 21,920 PYE. This includes both construction phase and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 8,768 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 4,384 PYR. At an assumed average annual salary of $60,000, this is a potential direct employment impact of $263.0 million for Aboriginal workers in the North.

Type	Direct Employment Estimate	Estimated Direct Employment Impact
All Northern Residents	8,768 PYE	$526.1 million
Aboriginal	4,384 PYE	$263.0 million
All Other Canadians	13,152 PYE	$789.1 million
Total	21,920 PYE	$1.3 billion

[132] Nunatsiaq Online, Nunavut Review Board says no to Kiggavik uranium mine, 2015. Available at http://www.nunatsiaqonline.ca/stories/article/65674breaking_nunavut_review_board_says_no_to_kiggavik_uranium_mine/.

[133] AREVA, Kiggavik Project – Environmental Impact Statement: Tier 2 Volume 9; Part 1 – Socio-Economic Environment, 2011. Available at ftp://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/09MN003-AREVA%20KIGGAVIK/2-REVIEW/06-DRAFT%20EIS%20&%20CONFORMITY%20REVIEW/02-DEIS%20SUBMISSION/Vol%2009/111220-09MN003-DEIS%20Volume%209-Part%201-Socio-Economic%20Env-IEDE.pdf.

Estimated Indirect and Induced Employment Impact – AREVA estimates that construction of the project will generate indirect employment of 2,158 FTEs and induced employment of 817 FTEs annually. Further, AREVA estimates that project operations will generate direct and indirect employment of 2,705 FTEs annually over the 12 years of anticipated production. If 40% of this is indirect employment, the estimated impact is 1,082 FTEs annually. AREVA also estimates induced employment during the 12 year operations phase at an additional 1,002 FTEs annually. Based on this data, Fiscal Realities estimates the indirect and induced employment impact of the project to be 36,908 PYE. This includes both construction and operations phase employment. If 40% of this is realized by Northern residents, the potential employment impact is estimated to be 14,763 PYE. If 50% of this is realized by Aboriginal workers, the potential impact is estimated to be 7,382 PYE. At an assumed average annual salary of $35,000, this is a potential indirect and induced employment impact of $258.4 million for Aboriginal workers in the North.

Type	Indirect and Induced Employment Estimate	Estimated Indirect and Induced Employment Impact
All Northern Residents	14,763 PYE	$516.7 million
Aboriginal	7,382 PYE	$258.4 million
All Other Canadians	22,145 PYE	$775.1 million
Total	36,908 PYE	$1.3 billion

Potential Fiscal Impacts

Estimated Federal Tax Revenue – It is estimated that the project will generate $334 million in corporate income tax. Estimates for personal income tax were not available.

Estimated Territorial Tax Revenue – Construction is slated to generate $2.5 million annually in personal and corporate income, payroll and production taxes for the government of Nunavut. Further, it is estimated that the operational phase will generate $267 million in corporate income tax for Nunavut. Estimates for personal income tax were not available.

Estimated Resource Royalties – It is estimated that $248 million in resource royalties will flow to Nunavut Tunngavik Incorporated[134] as a result of subsurface (mineral) rights to Inuit-owned land. It has also been estimated that the project will generate an additional $16 million in resource royalties off Crown land to Nunavut Tunngavik Incorporated and $136 million to the federal government.[135]

Type	Estimated Fiscal Benefit
Federal Revenues	$334 million
Territorial Revenues	$277 million
Resource Royalties	$400.0 million

Potential Fiscal Benefits to Aboriginal Governments

In Nunavut, where a single comprehensive land claim has been settled, the agreement contains royalty revenue sharing for mining on Crown Lands within the settlement area. Under Article 25, Inuit receive 50% of the first $2 million and 5% of the remaining royalties Canada collects annually.

Some of the lands selected by the Inuit, Inuit Owned Lands, include ownership of surface and subsurface rights. Where subsurface rights are owned, Inuit receive the full royalty. The Sissons property is located on Inuit Owned Land. However, the leases predate the Nunavut Land Claims Agreement. As a result, subsurface rights for these parcels are grandfathered and are administered by AANDC.[136] The associated resource royalties flow to Nunavut Tunngavik Incorporated.

The Kiggavik property is located on Crown Land within the Kivalliq Region of Nunavut. These revenues are subject to the resource royalty sharing provisions of Article 25 of the Nunavut Land Claims Agreement.

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[134] Nunavut Tunngavik Incorporated is the legal representative of the Inuit of Nunavut for the purposes of treaty rights and treaty negotiation.

[135] AREVA, Kiggavik Project Environmental Impact Statement – Tier 1 Volume 1; Main Document, 2011. Available at http://us.areva.com/home/liblocal/docs/Operations/Mining/Kiggavik%20Project%20Tier%201%20Volume%201%20Main%20Document.pdf.

[136] AREVA, Kiggavik Project Environmental Impact Statement – Tier 2 Volume 2; Project Description & Assessment Basis, Dec 2011. Available at http://kiggavik.ca/wp-content/uploads/2013/04/Volume-2-Project-Description-and-Assessment-Basis_sm.pdf.

AREVA has stated that an Inuit Impact Benefit Agreement will be negotiated with the Kivalliq Inuit Association.[137] An IIBA will include agreements related to employment and contracting opportunities, education and training, and workforce management.[138]

Infrastructure Needs

Based on the findings from the NAEDB's December study by the CFN, this section will focus on three types of infrastructure, including transportation, energy, telecommunications.

Transportation Infrastructure

Currently, the mine site is accessed by helicopter, fixed wing aircraft, float plane or overland winter travel via a winter trail. The project will require some new and upgraded access components to provide safe, reliable and timely access to the mine.

Road Access – The project will require a number of road upgrades and additions. This will include a 99 km winter road from the Kiggavik site to Baker Lake Port (developed) and a potential 114 km all-season road that will facilitate the transport of supplies between a dock facility at Baker Lake and Kiggavik. There are two options proposed for this type of all-season road; a Northern and a Southern alternative. There is an expectation that some Project infrastructure could be of benefit to nearby communities. There is high interest in public use of a Project access road.

Port Facility – A dock facility will be constructed near the community of Baker Lake to receive and store supplies shipped via marine transport to support the Kiggavik Project.

Airstrip – An airstrip will be constructed and operated at the mine site for transportation of personnel and yellowcake (uranium concentrate powder).

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[137] AREVA, Kiggavik Project – Presentation to Greenland Uranium Mining Mission to Canada, 2010. Available at http://vintage.nanoq.gl/Emner/Landsstyre/Departementer/R%C3%A5stofdirektoratet/Nyheder%20fra%20direktoratet/Nyhed_raastof/2010/12/~/media/78706062274B4A5F8E7D01A20A490BF7.ashx.

[138] AREVA, Kiggavik Project – Environmental Impact Statement: Tier 2 Volume 9; Part 1 – Socio-Economic Environment, Dec 2011. Available at ftp://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/09MN003-AREVA%20KIGGAVIK/2-REVIEW/06-DRAFT%20EIS%20&%20CONFORMITY%20REVIEW/02-DEIS%20SUBMISSION/Vol%2009/111220-09MN003-DEIS%20Volume%209-Part%201-Socio-Economic%20Env-IEDE.pdf.

Energy Infrastructure

Power Supply – Due to unavailability of electrical power service from a public utility, project site power will be generated locally by on-site diesel-fueled powerhouses. Two power generation systems will be used to generate power at both the Kiggavik (12.5 MW) and Sissons (4.1 MW) sites.[139] Four to six internal combustion diesel engine generators with heat recovery steam generators will be required at the Kiggavik site.

Telecommunications Infrastructure

The project's major infrastructure needs focus primarily on transportation and energy infrastructure.

Estimate infrastructure Costs

The estimated cost of the all-season road is $161.4 million (Northern Road Alternative) and about $7.8 million for the winter road. The estimated cost for the airstrip is $22.3 million.[140] The estimated cost for the port facility was unavailable. This equates to about $191.5 million in transportation infrastructure.

If the Yukon Energy rule of thumb for diesel generator costs is used, estimates the estimated cost of the power generation systems at Kiggavik and Sissons is $16.6 million plus.[141] There would also be some connection and distribution infrastructure required, which could be an additional $8.3 million.[142]

Type	Estimated Cost
Transportation Infrastructure	$191.5 million
Energy Infrastructure	$24.9 million
Telecommunications Infrastructure	-
Total	$216.4 million

[139] AREVA Resources Canada Inc, Kiggavik Project – Technical Meetings Introduction, 2012. Available at http://kiggavik.ca/wp-content/uploads/2013/12/Presentation-Technical-Meeting-May-2013.pdf.

[140] AREVA, Kiggavik Project – Tier 3 Technical Appendix 2O; Mine Site Airstrip Report, 2014. Available at http://ftp.nirb.ca/02-REVIEWS/ACTIVE%20REVIEWS/09MN003-AREVA%20KIGGAVIK/2-REVIEW/09-FINAL%20EIS/03-FEIS/03-TECH%20APPENDICES-Teir%203/141001-09MN003-Vol%202-2O%20Mine%20Site%20Rpt-IA2E.pdf.

[141] Diesel & Thermal Electricity Generation Options, Background Paper, Yukon Energy Company, 2011. Available at http://www.yukonenergy.ca/media/site_documents/charrette/docs/papers/THERMAL_YEC_Background_Paper.pdf.

[142] Based on half the capital cost of the estimated power plant costs.