APPENDIX 4B

ECONOMIC IMPACT MODEL

THE ECONOMIC IMPACT

OF THE

MARY RIVER PROJECT

ON NUNAVUT AND THE PROVINCES OF CANADA

prepared for

Knight Piésold Ltd.

by

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THE ECONOMIC IMPACT

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Executive Summary

The Mary River Project of the Baffinland Iron Mines Corporation will span a quarter of a century. Construction will begin in 2013 and operations in 2017. The last year of production is 2037, with decommissioning of the mine extending through 2040. The following dollar figures are all in 1997 constant dollars. Direct investment for the Mary River Project would be $4.1 billion for period 2011 through 2040. By comparison, total investment of all sorts, including government, residential, and mining made up $1.1 billion in Nunavut in 2008 (the latest year for which we have data). The Project would produce iron ore worth $22.997 billion. By comparison, total production by the mining sector in Nunavut was $0.2 billion in 2008. The Project would use $1.685 billion of labour inputs, providing 21,080 person years of employment. By comparison, total employment in the goods producing sector–which includes mining–was 1,383 person years in Nunavut in 2008. The Project would use $16.876 billion of nonlabour inputs.

These numbers make it clear that the project is large, however they leave out the aspect of the Mary River Project that will impact Nunavut the most. The Mary River iron mine is located on Inuit owned land. Consequently, $3.270 billion current dollars or $1.925 billion 1997 dollars in royalties paid over the period 2020-2037 would flow to Nunavut Tunngavik Incorporated (NTI) the corporation which represents Inuit under the Nunavut Land Claims Agreement. At the population level from the 2006 Census, royalty payments from the Mary River Project would amount to nearly eighty thousand dollars for every Inuit man woman and child. For a family of four, the amount would be nearly a third of a million 1997 dollars.

In addition, profits tax payments by Baffinland to the government of Nunavut are almost equal in size to the royalty payments. Over the life of the Project, in addition to the royalty payments and payroll taxes, Baffinland will pay $1.629 billion in 1997 dollars ($2.764 billion in nominal dollars) in profits taxes to the government of Nunavut. By comparison, the government of Nunavut's revenue from all sources was $1.336 billion in 2007. When the profits tax payments begin, government expenditure will increase notably, as will government employment.

This purpose of this report is to present estimates of the Nunavut and Canada-wide economic impact of the Mary River Project. The remainder of this executive summary will be a graphical summary of those effects.

Figure 1 shows the effect of the Mary River Project on real GDP in Nunavut. The vertical axis measures GDP in millions of 1997 dollars and the horizontal axis shows the year starting in 2011 through the completion of mine decommissioning in 2040. For 2011 and 2012, the impact of the Mary River Project is small as the only activities are preliminary development and ongoing exploration. Then GDP begins to increase during the construction phase, and increase further with operations. The dip in 2016 is caused by the construction stage slowing as it moves toward completion, but before operations have ramped up. The dip beginning in 2018 is caused by lagged effects of the end of the construction phase. Then, starting in 2020 royalty payments begin. This causes consumption to

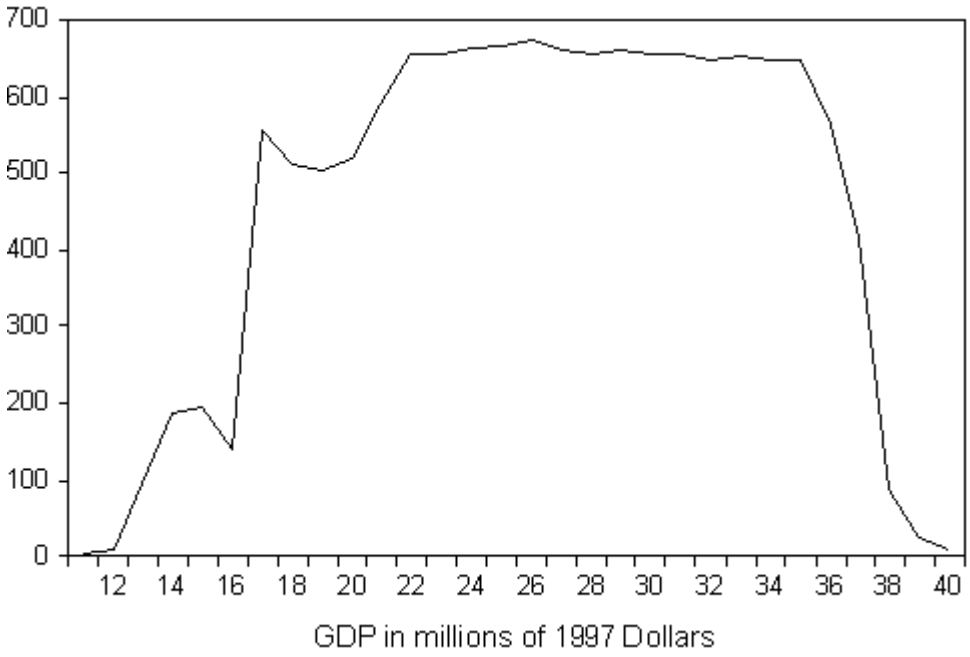

Figure 1. The Total Impact of the Mary River Project on Gross Domestic Product in Nunavut

be higher for the remainder of the life of the Mary River Project.[1] Then, as the mine is closed and decommissioned, the impact on GDP decreases toward zero.

Figure 2 shows the impact of the Mary River Project on employment in Nunavut. The vertical axis measures employment in number of person years. Employment is high during construction because–as is usually the case with resource projects–construction is more labour intensive than operation. Then, as resource royalties start, employment rises again to somewhat exceed its previous peak. Then, as the mine is closed and decommissioned, the impact on employment decreases toward zero.

Figure 2. The Total Impact of the Mary River Project on Employment in Nunavut

[1]The Nunavut income and product accounts, which provide the structure of the impacts in this report, follow the usual social income and product accounting practice of treating organizations like NTI as though they are individual people. NTI's revenue is treated as personal income and its expenditure is treated as personal consumption. Consequently, when that stream of royalties starts in 2020, personal consumption in Nunavut will boom like it never has before. With the boom in consumption, the economy of Nunavut will grow faster, and its employment and population will rise significantly.

Figure 3 shows the impact on personal income in Nunavut, measured in millions of 1997 dollars. The variable measures on the income of residents of Nunavut, so the incomes of nonresident workers are excluded. Personal income largely follows the pattern of variation in employment, though the increase in income is particularly notable when royalty payments start in 2017. Figure 3 shows that, at its height, the Mary River Project will increase personal incomes in Nunavut by over a quarter of a billion 1997 dollars per year. By comparison, total personal income in Nunavut, from all sources, was about a billion 1997 dollars in 2007.

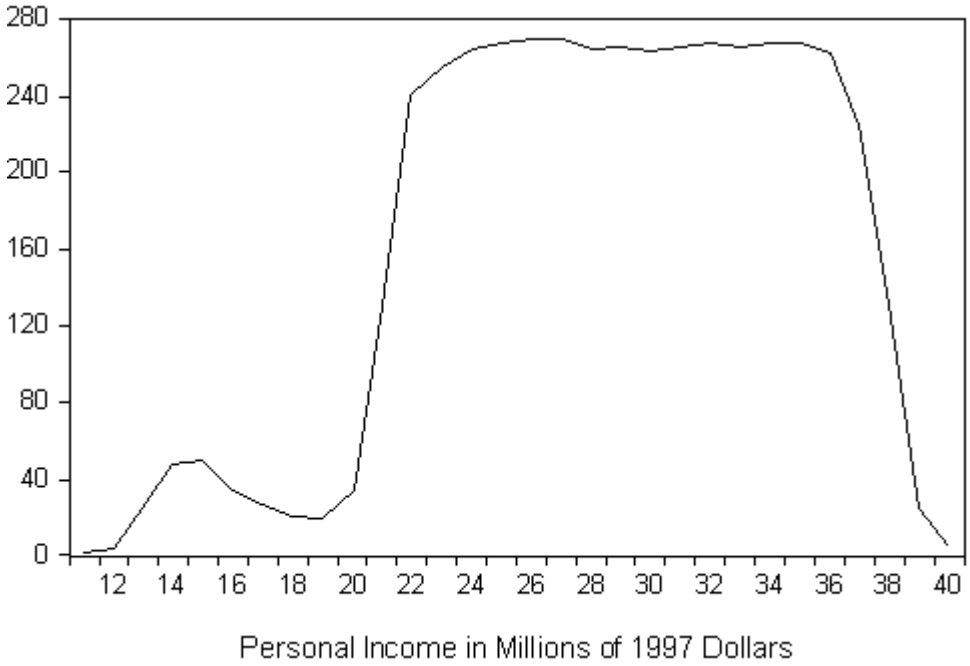

Figure 3. The Total Impact of the Mary River Project on the Personal Income of Residents of Nunavut

All three of the above figures show the impacts of the Mary River Project falling to zero by 2040. In reality, that will not happen. The surging world interest in resources in the Arctic will result in additional projects in Nunavut in the future. As noted in the Methodology section of this report, Baffinland's Mary River Project will result in an increase in the number of Nunavut residents who are skilled and have job experience, positioning Nunavut to receive further

benefits as the economy of the Arctic experiences resource-based growth from the projects that will follow–and accompany–the Mary River Project.

The total impact of the Mary River Project, cumulated over the length of the project, is shown in Table A, by province in terms of both GDP and employment. Thus, for example, Ontario's GDP is shown to increase by $2.3 billion 1997 Dollars. And Alberta's employment is shown to be higher by 15,157 person years

Table A. The Total, Cumulative Impact of the Mary River Project on GDP and Employment by Province

Province	Impact on GDP millions of 1997 Dollars	Impact on Employment person-years
Newfoundland and Labrador	244.1	861.8
Prince Edward Island	6.5	93.3
Nova Scotia	157.3	1,611.4
New Brunswick	51.5	450.4
Quebec	1,326.4	15,935.3
Ontario	2,319.0	23,947.4
Manitoba	336.1	5,203.4
Saskatchewan	271.8	4,911.0
Alberta	1,761.7	15,157.0
British Columbia	712.5	9,847.1
Total	7,186.9	78,018.0

Another benefit of the Mary River Project is to decrease economic instability in Nunavut. The recent economic instability in Nunavut has been a symptom of a relatively small number of mining projects in the Territory.

For example, Nunavut's recent *Fiscal and Economic Outlook* (Department of Finance, 2010) discusses the importance of increasing the number of ongoing mining projects in Nunavut in order to stabilize the Territorial economy. Real Gross Domestic Product in Nunavut is forecast to decrease in 2009 by almost ten percent–when the 2009 data become available–due to the

timing of the move from the construction to the operation phase of one gold mine (Meadowbank, on the western shore of Hudson Bay in Nunavut). In order to stabilize the economy of Nunavut, it is necessary to have a larger number of ongoing mining projects.

1. Introduction: The Mary River Project

This purpose of this report is to present estimates of the Nunavut and Canada-wide economic impact of the Baffinland Iron Mines Corporation's proposed Mary River Project. The Project is large, with construction beginning in 2013 and operations beginning in 2017. The last year of production would be 2037, with decommissioning of the mine extending through 2040. The following dollar figures are all in 1997 constant dollars. Direct investment for the Mary River Project would be $4.104 billion for period 2011 through 2040. By comparison, total investment of all sorts, including government, residential, and mining made up $1.1 billion in Nunavut in 2008. The Project would produce iron ore worth $22.997 billion. By comparison, total production by the mining sector in Nunavut was $0.2 billion in 2008. The Project would use $1.685 billion of labour inputs, providing 21,080 person years of employment. By comparison, total employment in the goods producing sector–which includes mining–was 1,383 person years in Nunavut in 2008. The Project would use $16.876 billion of nonlabour inputs.

These numbers make it clear that the Project is large and that the impact on the economy of Nunavut will be large. But the numbers leave out the aspects of the Mary River Project that will impact Nunavut the most. The Mary River iron mine is located on Inuit owned land. Consequently, $3.270 billion current dollars or $1.925 billion 1997 dollars in royalties paid over the period 2020-2037 would flow to Nunavut Tunngavik Incorporated (NTI) the corporation which represents Inuit under the Nunavut Land Claims Agreement.

How big is $1.925 billion? In the 2006 census, 24,915 of the people of Nunavut indicated that they are Inuit (as a single response). At that population level, royalty payments from the Mary River Project would amount to nearly eighty thousand dollars for every Inuit man woman and child. For a family of four, the amount would be nearly a third of a million 1997 dollars.[2]

[2]The point is made this way for comparison purposes only, since the Inuit population of Nunavut will certainly grow in the interim, somewhat reducing amounts per person. The amount

These royalty payments also represent an interesting complexity in interpreting the following results. The Nunavut income and product accounts, which provide the structure of the effects in this report, follow the usual social income and product accounting practice of treating organizations like NTI as though they are individual people. NTI's revenue is treated as personal income and its expenditure is treated as personal consumption. Consequently, in the following, when that stream of royalties starts in 2020, personal consumption in Nunavut will be seen to boom like it never has before. With the boom in consumption, the economy of Nunavut will grow faster, and its employment and population will rise significantly.

In addition, profits tax payments by Baffinland to the government of Nunavut are almost equal in size to the royalty payments. Over the life of the Project, in addition to the royalty payments and payroll taxes, Baffinland will pay $1.629 billion in 1997 dollars ($2.764 billion in nominal dollars) in profits taxes to the government of Nunavut. By comparison, the government of Nunavut's revenue from all sources was $1.336 billion in 2007. When the profits tax payments begin, government expenditure will increase substantially, as will government employment.

per person is illustrative of the effect of the Project. How the money is spent will be determined by NTI.

2. The Principal Investigator

Eric Howe received his B.A. (1973, *cum laude*) from Wittenberg University and Ph.D. (1982) from University of Maryland. He was a Graduate Fellow at University of Maryland, where his education included research experience with INFORUM, the Interindustry Forecasting Project. His formal education has been supplemented by extensive practical experience performing economic analyses, including employment by the Economic Research Service of the United States Department of Agriculture, the Applied Mathematics Division of the National Bureau of Standards, and the United States Agency for International Development. He has done research for Environment Canada, Transport Canada, the Government of the Northwest Territories, the Government of Saskatchewan, the Federation of Saskatchewan Indian Nations, the Prince Albert Grand Council, the General Council of the Métis Settlements of Alberta, SaskTel, PanCanadian Petroleum, Rawlco Communications, Kitikmeot Corporation, Nuna Logistics, Cameco, and others. In addition, he has provided expert testimony in several civil legal proceedings.

Eric joined the University of Saskatchewan in 1979, where he is a professor of economics. His specialties are Aboriginal social policy research, economic forecasting, economic modelling, microeconomic theory, and the economies of Saskatchewan and the arctic. His research is documented in an extensive list of publications in professional journals, including articles in *Econometrica*, *Journal of Regional Science*, *Canadian Public Policy*, *Social Choice and Welfare*, *Journal of Theoretical Probability*, *Journal of Aboriginal Economic Development*, *Arctic*, and *American Journal of Agricultural Economics*. He has received numerous teaching awards.

In addition to his professional responsibilities, Eric enjoys attending theatre, cooking, backpacking, snowshoeing, canoeing, and being a grandfather.

3. Methodology

The methodology employed in this report utilized the Arctic Impact Model. AIM was used to compute the total (direct plus indirect) economic impact of the Mary River Project on the economy of Nunavut. AIM is a 44-equation macroeconometric simulation model of the economy of the Canadian Arctic. The structure of the model has been developed by the principal investigator in a sequence of projects since 1986. The model covers the Canadian Arctic and includes both Nunavut and the Northwest Territories. The computational core of AIM involves the determination of the major macroeconomic variables such as gross domestic product, consumption, investment, employment, and disposable income.[3] The model is designed both to forecast the future values of these variables and also compute the impact on them of public or private projects. When used for impact analysis, an additional component of the model links changes in Arctic economic activity through to the resulting changes in GDP and employment in each of the ten provinces in Canada using Statistics Canada's Interprovincial Input-Output Model. The large Canadian Arctic database that supports AIM was also extensively utilized in developing the current report.

As noted above, AIM uses Statistics Canada's Interprovincial Input-Output Model for computing impacts on each of the provinces in Canada. A great deal has been written about the input-output methodology; Miller and Blair (1985) is a readable classic. The specifics of Statistics Canada's Interprovincial Input-Output Model are discussed in Howe and Stabler (1989).

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[3]Discussion of the methodology of building macroeconometric simulation models can be found in Almon (1989), Pindyck and Rubinfeld (1998) and Fair (1984, 1994, and 2004), in increasing order of difficulty. A very readable discussion of several of the important methodological issues can be found in Fair (2002). An annotated list of some of the world's macroeconometric models can be found on the web at
http://www2.hsu-hh.de/uebe/modelle/titelseite.html

The Arctic Impact Model–as is usually the case for macroeconometric simulation models–has some nonlinear equations. Consequently, it was computationally necessary to prepare a base forecast for the economy of Nunavut which excludes the Mary River Project. The impact of the Mary River Project was obtained by computing an alternative forecast with the Mary River Project included, so that the impact of the Project was the difference between the base forecast and the alternative. The base forecast will not be discussed with care, since it is largely a computational device. Although AIM contains some nonlinear equations (e.g., the employment rate equals employment divided by the labour force population), the model is only mildly nonlinear. Consequently, reasonable variations in the base forecast, say by including the Canada Forces Base announced for Nanisivik (with the resulting increases in government current and capital expenditure), produce only small changes in the estimated economic impacts of the Mary River Project. These exogenous changes were usually only visible several decimal places beyond those employed in the tables of this report.

The methodology for computing the total economic impact of the Mary River Project is the following. First AIM is used to prepare the base forecast, discussed above, for the Arctic through 2040. The base forecast excludes the Mary River Project. Then an alternate forecast is computed which includes the Mary River Project. The total economic impact is the difference between the alternate and the base forecasts. Thus the impact analysis measures both direct and indirect impacts. AIM includes, for example, that the increase in employment causes an increase in population which causes an increase in residential construction, bringing about a further increase in employment. As a further example, AIM includes that the increase in wages causes an increase in consumption which causes an increase in retail employment which causes a further increase in wages. As yet another example, AIM includes that the increase in income causes an increase in tax receipts of the Territorial government which cause an increase in both government

current and capital spending. As a final example, AIM links higher wages to higher saving which in turn brings about higher wealth and higher interest income.[4]

In the preparation of this report, three full sets of the economic impact computations were done for the Mary River Project, corresponding to three scenarios. These high, medium, and low scenarios corresponded to different numbers of Inuit employed directly on the Mary River Project. The three scenarios were selected to give a range of possible impacts. However, the decision was made to only report the details of the medium scenario, which corresponds to the Mary River Project's workforce being 25% Inuit. The economic impacts computed by AIM in the high, medium, and low scenarios were quantitatively similar. Under all three scenarios, after all, Baffinland will make the same 1.925 billion (1997) dollar royalty payments and the same 1.629 billion (1997) dollar payments of profits taxes to the government of Nunavut and the impact of those payments are large enough that they dominate the results and consequently minimize the differences between the scenarios.

In any case, as the economy of the 21st Century moves forward, the principal economic differences between the three scenarios would actually be felt in Nunavut after 2040, after the Mary River Project is completed. The principal additional economic benefit to Nunavut of having a higher Inuit employment percentage–and hence the difference between the scenarios–will result from having more Inuit workers who are skilled and experienced at the end of the Project. Those workers will bring about further benefits to Nunavut in a Century when world interest in Arctic resources–and hence labour demand in the Arctic–is growing.

Consequently, only the medium scenario will be presented in this report.

[4]The books cited in the previous footnote also include discussions of the use and interpretation of the output of macroeconometric models.

4. The Economic Impact on Nunavut

This section will discuss the detailed effects on the economy of Nunavut.

Table 1 gives the impact on real GDP, measured in millions of 1997 dollars, by expenditure component. On the expenditure side of the accounts, GDP is obtained as consumption (personal expenditure in the table) plus government current expenditure plus fixed investment (gross fixed capital formation in the table) plus inventory investment plus exports minus imports plus statistical discrepancy.[5] Bear in mind that exports and imports are defined relative to Nunavut, so both include trade with the remainder of Canada.

The impacts shown in Table 1 are best understood in terms of five periods of time. In the first period, 2011-2012, preliminary development and ongoing exploration work is being done for the Mary River Project, so the effects are small. In 2013 construction begins, so investment increases steeply and then falls off as construction approaches completion. Then production begins–note the surge in exports in 2017. The economy continues ahead, with production occurring. The next major change is in 2020 with the mid-year start of royalty payments–though this period doesn't really get going until 2021 when royalty payments begin to last the entire year. Bear in mind the earlier comment that Nunavut Tunngavik Incorporated–the recipient of the royalties–is treated in the Territorial Income and Product accounts as though it is an individual person so its expenditures are part of personal expenditure. Note that starting in 2020, personal expenditure begins to increase steeply, though there are lags as plans are developed and executed for the expenditure of the royalty revenue. This next stage continues through the end of 2037, at which time the mine is closed. Then there are three years of decommissioning. During the

[5]Discussion of social income and product accounting can be found in any intermediate macroeconomics text, for example Mankiw and Scarth (2004), Chapter 2.

Table 1. Impact on Real GDP by Component, millions of 1997 dollars

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Personal Expenditure	0.5	2.7	15.2	29.1	30.1	20.8	16.4	12.7	12.2
Government Current Expenditure	0.2	0.7	4.3	9.4	11.0	8.3	6.0	4.5	4.0
Gross Fixed Capital Formation	32.4	141.8	308.3	806.5	1014.0	1114.6	307.9	6.9	7.9
Inventory Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exports	0.0	0.0	0.0	0.0	0.0	0.0	1161.2	1148.5	1146.8
Imports	31.3	137.2	231.7	657.3	861.5	1004.3	935.7	662.4	669.5
Statistical Discrepancy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross Domestic Product	1.8	8.0	96.1	187.7	193.6	139.4	555.7	510.3	501.5
	2017	2021	2022	2023	2024	2025	2026	2027	2028
Personal Expenditure	30.3	100.7	167.1	176.6	182.7	185.1	186.4	185.5	182.8
Government Current Expenditure	24.6	73.8	111.1	118.9	119.9	121.1	121.9	121.3	119.5
Gross Fixed Capital Formation	8.4	63.2	86.7	41.3	36.9	32.2	44.3	62.9	52.5
Inventory Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exports	1145.7	1142.7	1120.8	1117.6	1117.4	1117.4	1117.4	1118.3	1118.3
Imports	689.5	789.3	830.1	799.3	792.8	790.4	797.5	827.7	818.4
Statistical Discrepancy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross Domestic Product	519.5	591.1	655.5	655.2	664.1	665.5	672.5	660.3	654.6
	2029	2030	2031	2032	2033	2034	2035	2036	2037
Personal Expenditure	183.1	182.4	183.9	185.0	184.1	185.4	185.2	179.1	149.0
Government Current Expenditure	119.2	118.5	118.3	118.5	118.2	118.3	118.3	111.6	90.1
Gross Fixed Capital Formation	71.1	56.0	41.4	51.5	41.5	35.8	32.0	31.1	29.0
Inventory Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Exports	1118.3	1118.3	1118.3	1117.5	1117.5	1117.5	1117.5	971.9	628.5
Imports	829.8	818.6	806.6	823.6	807.6	809.3	804.7	732.1	480.7
Statistical Discrepancy	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Gross Domestic Product	661.8	656.7	655.3	648.9	653.7	647.7	648.4	561.6	415.8
	2038	2039	2040	TOTAL					
Personal Expenditure	81.4	15.4	3.6	3255					
Government Current Expenditure	44.9	8.8	-1.3	2064					
Gross Fixed Capital Formation	44.1	35.7	31.4	4670					
Inventory Investment	0.0	0.0	0.0	0.0					
Exports	0.0	0.0	0.0	22997					
Imports	83.4	37.3	25.4	19385					
Statistical Discrepancy	0.0	0.0	0.0	0.0					
Gross Domestic Product	87.0	22.6	8.4	13600					

Source: Computed by the Arctic Impact Model
Columns and rows do not add to totals due to rounding

decommissioning period, the impact on personal expenditure comes down–with a lag, just as it increased with a lag–due to the decrease in economic activity as the Mary River Project moves toward completion. Imports are large throughout, due in part to imported physical capital during construction and then due to imported inputs during production.

Examining the Total column at the end of Table 1, the impact of the Mary River Project is to increase real GDP in Nunavut by $13.6 billion. Of that increase, consumption increases $3.3 billion, government current expenditure makes up $2.1 billion, fixed investment makes up $4.7 billion, exports make up $23.0 billion, and imports[6] make up $19.4 billion. Compare these values to the 2008 values for the entire economy of Nunavut.[7] Over its life, the Mary River Project–by itself–increases GDP by eleven times, consumption by six times, government current expenditure by two times, fixed investment by four times, exports by over one hundred times, and imports by thirteen times their values in 2008.

Continuing to examine Table 1, the year of maximal impact on the economy is 2026. In that year, the Mary River project by itself will cause Nunavut's GDP to be higher by over half (54% higher) compared to its value in 2008.

The conclusion from Table 1, is that the Mary River Project will cause a large increase in the overall size of the economy of Nunavut.

[6]As noted above, imports are subtracted to get GDP, so the impact on imports is subtracted to get the impact on GDP.

[7]As this report is written in August of 2010, 2008 is the most recent year for which Nunavut's Income and Product Accounts are available. The values for 2009 are expected to be available in November of 2010.

Table 2. Impact on Nominal GDP by Component, millions of dollars

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Personal Expenditure	0.7	3.3	18.9	36.9	38.9	27.5	22.0	17.4	17.1
Government Current Expenditure	0.2	1.0	6.0	13.4	15.9	12.3	9.0	7.0	6.3
Gross Fixed Capital Formation	37.3	166.7	369.8	986.6	1265.3	1418.6	399.7	9.1	10.7
Inventory Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5
Exports	0.0	0.0	0.0	0.0	0.0	0.0	2265.4	2285.6	2327.8
Imports	36.5	163.4	281.6	814.6	1089.0	1295.0	1230.7	888.6	9 16.1
Statistical Discrepancy	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-5.4	-5.4
Gross Domestic Product	1.6	7.5	113.1	222.3	231.2	163.4	1465.6	1425.7	1440.9
	2020	2021	2022	2023	2024	2025	2026	2027	2028
Personal Expenditure	43.3	146.8	248.5	267.9	282.7	292.1	300.0	304.6	3 06.1
Government Current Expenditure	39.3	120.1	184.3	201.2	206.9	213.2	218.8	222.3	2 23.3
Gross Fixed Capital Formation	11.6	88.8	124.2	60.4	55.1	49.0	68.8	99.6	84.7
Inventory Investment	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6
Exports	2372.0	2413.1	2414.3	2455.5	2504.3	2554.3	2605.4	2659.5	2712.7
Imports	962.3	1123.7	1205.5	1183.9	1197.8	1218.0	1253.6	1327.0	1338.4
Statistical Discrepancy	-5.5	-5.5	-5.6	-5.6	-5.7	-5.7	-5.8	-5.9	-5.9
Gross Domestic Product	1498.9	1640.1	1760.7	1796.1	1846.0	1885.5	1934.2	1953.6	1983.0
	2029	2030	2031	2032	2033	2034	2035	2036	2037
Personal Expenditure	312.7	317.8	326.7	335.3	340.4	349.7	356.3	351.5	2 98.2
Government Current Expenditure	227.1	230.4	234.5	239.7	243.9	248.8	253.9	244.2	2 01.1
Gross Fixed Capital Formation	117.1	94.1	70.9	90.0	73.9	65.1	59.4	58.7	55.9
Inventory Investment	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Exports	2767.0	2822.3	2878.7	2934.2	2992.9	3052.8	3113.8	2762.3	1822.1
Imports	1384.1	1392.8	1399.8	1457.9	1458.1	1490.5	1511.5	1402.7	9 39.5
Statistical Discrepancy	-6.0	-6.1	-6.1	-6.2	-6.3	-6.3	-6.4	-6.5	-5.8
Gross Domestic Product	2034.3	2066.4	2105.7	2135.8	2187.2	2220.2	2266.1	2008.2	1432.6
	2038	2039	2040	Total					
Personal Expenditure	166.2	32.0	7.6	5569					
Government Current Expenditure	102.3	20.4	-3.0	3944					
Gross Fixed Capital Formation	86.7	71.7	64.4	6214					
Inventory Investment	0.4	0.0	0.0	12					
Exports	0.0	0.0	0.0	54716					
Imports	166.3	75.8	52.7	30257					
Statistical Discrepancy	-3.9	-0.1	0.0	-122					
Gross Domestic Product	185.4	48.2	16.3	40076					

Source: Computed by the Arctic Impact Model/Columns and rows do not add to totals due to rounding

Table 2 presents the same variables shown in Table 1, but measured in millions of nominal dollars. Consequently, the variables in Table 2 include the effects of inflation, which were excluded from Table 1. Consequently, the values shown in Table 2 are somewhat larger in magnitude. GDP, for example, increases by $13.6 billion measured in 1997 dollars, but increases by $40.1 billion measured in nominal dollars.[8]

Table 3 shows the increase in fixed investment measured in millions of 1997 dollars, divided up by components. The largest increase shown for Table 3 is in "other" investment, the category that contains direct investment in the Mary River Project itself. However, government investment increases due to the increase in government revenue brought about by the increase in economic activity, as well as directly due to tax payments by the Mary River Project. (Increased government revenue gets spent on both current and capital projects. The increase in capital spending is government investment.) The increase in residential investment results from both the increase in population which will occur with increased economic activity, as well as due to the increased prosperity of Nunavut.

[8]The inconsequentially small changes in nominal dollar statistical discrepancy and inventory investment in Table 2, whereas both show no increase in Table 1, occurs for technical reasons.

Table 3. Impact on Real Investment by Component, millions of 1997 dollars

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Government	0	0.1	0.7	1.6	2.1	1.9	1.5	1.1	0.9
Residential	0	0.1	0.4	0.9	1.2	1.2	1.5	1.8	2.2
Other	32.3	141.6	307.3	804	1010.7	1111.5	304.9	4	4.8
Gross Fixed Capital Formation	32.4	141.8	308.3	806.5	1014	1114.6	307.9	6.9	7.9
	2020	2021	2022	2023	2024	2025	2026	2027	2028
Government	3.8	11.7	19.6	23.4	24.7	25.4	25.7	25.7	25.5
Residential	2.8	3.8	4.7	5.3	5.8	6.3	6.8	7.3	7.9
Other	1.8	47.6	62.3	12.7	6.4	0.5	11.8	29.8	19.1
Gross Fixed Capital Formation	8.4	63.2	86.7	41.3	36.9	32.2	44.3	62.9	52.5
	2029	2030	2031	2032	2033	2034	2035	2036	2037
Government	25.4	25.2	25.1	25.1	25.1	25.1	25.1	24.1	20.8
Residential	8.4	9	9.5	10.1	10.7	7.3	5.1	3.6	2.5
Other	37.3	21.9	6.7	16.3	5.6	3.5	1.9	3.3	5.7
Gross Fixed Capital Formation	71. 1	56	41.4	51.5	41.5	35.8	32	31.1	29
	2038	2039	2040	Total					
Government	13. 3	5.7	1.7	437					
Residential	1.3	0.6	0.3	128					
Other	29. 5	29.5	29.5	4104					
Gross Fixed Capital Formation	44. 1	35.7	31.4	4669					

Source: Computed by the Arctic Impact Model
Columns and rows do not add to totals due to rounding

Table 4 shows the impact of the Mary River Project on employment measured in person years. The table also disaggregates the increase in employment into goods industries, service industries, and government (a part of service). Aggregate employment is measured by Statistics Canada in two fundamentally different ways: by surveying the employees (called the Labour Force Survey) or by surveying the employers (the Establishment Survey). The variables presented in Table 4 are measured on an establishment survey basis. Note that goods industry employment is highest during the construction of the Mary River Project, because construction is more labour intensive than production. Note that initially the employment increase is the greatest

for the goods industries, because the goods sector includes the Mary River Project. Then, however, with the payment of royalties, personal expenditure surges (as shown in Table 1), and with it service employment. Moreover, government revenue increases with payments of profits taxes, so government employment increases. Consequently, the increase in service employment exceeds the increase in goods industry employment during this period, even though the increase in goods industry employment increases by more over the entire 2011-2040 period. The increase in government employment occurs due to the increase in government revenue.

Table 4. Impact on Employment by Sector, person years

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Goods Industries	14	61	1029	1885	1823	1158	923	713	713
Service Industries	2	9	52	110	125	93	69	53	49
Government	1	5	31	68	80	60	43	33	29
Total Employment	16	70	1081	1995	1948	1251	992	767	762
	2020	2021	2022	2023	2024	2025	2026	2027	2028
Goods Industries	731	784	831	840	844	846	847	847	845
Service Industries	240	726	1110	1188	1204	1218	1226	1222	1204
Government	178	533	802	858	865	874	879	876	863
Total Employment	971	1511	1941	2028	2048	2064	2073	2069	2049
	2029	2030	2031	2032	2033	2034	2035	2036	2037
Goods Industries	845	845	845	846	846	845	844	838	814
Service Industries	1202	1197	1197	1200	1197	1196	1193	1129	917
Government	860	855	854	855	853	853	854	805	650
Total Employment	2047	2041	2042	2047	2043	2041	2038	1967	1731
	2038	2039	2040	Total					
Goods Industries	135	89	78	23604					
Service Industries	468	94	-5	20885					
Government	324	63	-9	14895					
Total Employment	603	184	74	44494					

Source: Computed by the Arctic Impact Model
Columns and rows do not add to totals due to rounding

Table 5 shows the increase in personal income in Nunavut, measured on a nominal dollar basis. Following standard social accounting practice, personal income is not measured in constant dollars, so the reader has to bear in mind that the impacts shown in Table 5 include the effects of inflation. Personal income is defined to include only the incomes of residents of Nunavut so, for example, the wages and salaries variable shows payments (including benefits) going to people who reside in Nunavut. In Table 5, note the surge in the transfers to persons category starting with the payments of royalties to NTI. The transfers from persons variable consists mostly of payments of personal income tax, and does not include Baffinland's payments of profit tax.

Table 5. Impact on Nominal Personal Income, millions of dollars

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Wages and Salaries	0.9	4.5	25.6	49.9	52.6	37.0	29.5	23.2	22.8
Unincorporated Business Income	0.1	0.6	3.4	6.7	7.1	5.0	4.0	3.2	3.1
Interest and Dividends	0.0	0.0	0.1	0.3	0.5	0.6	0.7	0.6	0.6
Transfers to Persons	0.1	0.4	2.3	4.4	4.4	2.9	2.3	1.7	1.7
Personal Income	1.1	5.5	31.4	61.3	64.6	45.5	36.4	28.8	28.2
Transfers from Persons	0.2	0.8	4.8	9.3	9.8	6.9	5.5	4.4	4.3
Personal Disposable Income	0.9	4.6	26.6	52.0	54.7	38.6	30.9	24.4	24.0
	2020	2021	2022	2023	2024	2025	2026	2027	2028
Wages and Salaries	37.6	84.1	136.4	161.6	170.0	175.7	181.0	185.0	187.3
Unincorporated Business Income	7.9	26.7	45.1	48.7	51.4	53.1	54.5	55.3	55.6
Interest and Dividends	0.5	0.5	1.0	1.7	2.4	2.9	3.4	3.8	4.1
Transfers to Persons	3.0	79.7	175.4	174.5	185.0	190.8	195.6	198.2	195.9
Personal Income	49.1	191.1	358.0	386.5	408.7	422.5	434.5	442.3	442.9
Transfers from Persons	7.4	28.7	53.6	57.8	61.0	62.9	64.6	65.6	65.6
Personal Disposable Income	41.7	162.4	304.4	328.8	347.8	359.6	369.9	376.7	377.3
	2029	2030	2031	2032	2033	2034	2035	2036	2037
Wages and Salaries	190.5	194.2	198.3	203.1	207.6	211.8	216.0	213.7	191.0
Unincorporated Business Income	56.8	57.7	59.4	60.9	61.8	63.5	64.7	63.9	54.2
Interest and Dividends	4.3	4.5	4.7	4.9	5.0	5.1	5.3	5.4	5.5
Transfers to Persons	201.4	202.9	209.3	216.3	216.6	224.6	228.0	232.6	197.7
Personal Income	453.1	459.3	471.7	485.3	491.0	505.0	514.0	515.5	448.4
Transfers from Persons	67.0	67.8	69.5	71.4	72.1	74.1	75.3	75.4	65.5
Personal Disposable Income	386.1	391.5	402.1	413.9	418.9	431.0	438.8	440.2	383.0
	2038	2039	2040	Total					
Wages and Salaries	109.5	41.4	8.1	3549.9					
Unincorporated Business Income	30.2	5.8	1.4	1011.8					
Interest and Dividends	5.4	4.8	3.9	82.5					
Transfers to Persons	124.2	-0.2	-1.2	3470.5					
Personal Income	269.3	51.9	12.3	8115.2					
Transfers from Persons	39.3	7.6	1.8	1200.0					
Personal Disposable Income	230.0	44.3	10.5	6915.6					

Source: Computed by the Arctic Impact Model
Columns and rows do not add to totals due to rounding

Table 6 shows the impact of the Mary River Project on several miscellaneous variables. All are measured in millions of current dollars except for real personal disposable income which is measured in millions of 1997 dollars. The wages variable in Table 6 measures payments of wages and salaries to all who work in Nunavut regardless of their residence, so it would include payments to workers who live elsewhere in Canada. The wages variable in Table 5, on the other hand, only included payments to Nunavut residents.

Table 6. Impact on Miscellaneous Variables. millions of dollars

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Personal Saving	0.3	1.3	7.6	14.6	15.2	10.6	8.5	6.7	6.6
Capital Consumption Allowance	1.0	6.7	21.3	58.0	117.6	185.9	226.3	225.1	213.1
Wages, part of GDP	1.3	6.7	92.4	175.8	178.3	119.8	96.5	76.0	76.2
Territorial Government Revenue	0.5	2.0	12.4	23.4	23.4	15.3	12.1	9.3	9.2
Real Personal Disposable Income	0.8	3.8	21.4	41.0	42.3	29.2	22.9	17.8	17.1
	2020	2021	2022	2023	2024	2025	2026	2027	2028
Personal Saving	-1.8	15.3	54.6	58.5	62.6	64.9	67.1	69.3	68.4
Capital Consumption Allowance	201.8	193.3	188.5	183.1	176.1	169.2	163.0	158.6	154.9
Wages, part of GDP	99.1	169.1	247.8	286.1	299.5	308.9	317.8	324.7	329.1
Territorial Government Revenue	82.4	224.6	294.6	296.5	308.1	316.2	324.6	327.9	328.6
Real Personal Disposable Income	29.1	111.4	204.7	216.8	224.8	227.9	229.8	229.5	225.3
	2029	2030	2031	2032	2033	2034	2035	2036	2037
Personal Saving	70.5	70.8	72.4	75.5	75.4	78.0	79.2	85.3	81.3
Capital Consumption Allowance	151.9	149.3	145.6	142.0	138.6	134.8	130.7	126.7	122.8
Wages, part of GDP	334.9	341.3	348.5	356.8	364.5	371.8	379.3	377.0	344.5
Territorial Government Revenue	336.7	339.8	347.4	355.0	360.3	368.6	375.6	350.7	267.6
Real Personal Disposable Income	226.0	224.7	226.3	228.3	226.6	228.5	228.1	224.4	191.4
	2038	2039	2040	Γ otal					
Personal Saving	60.7	10.7	2.6	1292.7					
Capital Consumption Allowance	120.0	117.7	114.9	4238.5					
Wages, part of GDP	169.5	68.4	19.1	6680.7					
Territorial Government Revenue	90.6	-0.9	-6.2	5796.3					
Real Personal Disposable Income	112.7	21.3	4.9	4038.8					

Source: Computed by the Arctic Impact Model
Columns and rows do not add to totals due to rounding

The reader will have noticed small negative impacts in 2039 and 2040 in a few of the variables in Tables 1 through 6 as the Mary River Project winds down. Those negative impacts deserve comment even though they are trivially small. They are a consequence of the significant decrease in population toward the end of the Project as Nonaboriginal people leave to get jobs elsewhere. In reality, Nunavut will not actually experience those small negative impacts. The surging world interest in resources in the Arctic will result in more projects. As noted in the Methodology section of this report, Baffinland's Mary River Project will result in an increase in the number of Nunavut residents who are skilled and have job experience, positioning Nunavut to receive further benefits as the economy of the Arctic experiences resource-based growth from the projects that will follow Mary River.

6. The Economic Impact on the Provinces of Canada

The Arctic Impact Model includes a component which uses results from Statistics Canada's Interprovincial Input-Output Model to predict the impact of a project on the provinces of Canada. That impact is measured for all ten provinces, both in terms of GDP (measured in millions of 1997 dollars) and employment (measured in person years). These impacts are large, reflecting both the size of the Mary River Project and the import intensity of the economy of Nunavut.

Table 7 shows the impact of the Mary River Project on the economy of Canada in terms of increased GDP by province. The largest single increase is for Ontario, with an increase of $2.3 billion over the life of the Project. The second largest is for Alberta, $1.8 billion, due to its large provincial industry which produces inputs for the mining industry. Across the ten provinces, real GDP increases by $7.2 billion.

Table 8 shows the impact of the Mary River Project on the economy of Canada in terms of employment, measured in person years. Again, Ontario has the largest increase, 1,709.0 person years, followed by Alberta with 1,516.9. Across the ten provinces, employment increases 5,433.6 person years.

The employment impacts shown in Table 8 follow a similar pattern to the GDP impacts shown in Table 7, allowing for provincial differences. For example, Tables 7 and 8 show that, for the Mary River Project, the average worker in Ontario creates ($2,319,000,000 / 23,947 =) $96,838 of GDP whereas the average worker in Quebec creates ($1,326,400,000 / 15,935 =) $83,238 of GDP. This variation is mostly caused by different inputs being sourced in different provinces. The Ontario inputs are disproportionately in the manufacturing sector, where labour productivity is relatively high. The Quebec inputs are disproportionately in the service sector, where labour productivity is relatively low.

Table 7. Impact on Real GDP by Province in Canada, millions of 1997 Dollars

	Nfld. & Labrador	P.E.I.	Nova Scotia	New Bruns.	P.Q.	Ont.	Man.	Sask.	Alta.	B. C.	Total
2011	0.1	0.0	0.1	0.2	1.5	3.0	0.4	0.2	2.9	0.8	9.1
2012	0.4	0.1	0.3	0.7	6.7	13.2	1.6	0.7	12.7	3.5	39.9
2013	0.9	0.2	0.8	1.6	15.2	29.7	3.7	1.6	28.3	7.9	89.9
2014	2.2	0.5	2.0	4.2	39.1	76.5	9.5	4.1	73.3	20.3	231.8
2015	2.7	0.7	2.5	5.3	48.7	95.6	11.9	5.2	91.7	25.4	289.6
2016	2.9	0.7	2.6	5.8	52.7	103.7	12.9	5.6	99.8	27.5	314.2
2017	11.3	0.3	7.2	2.6	58.1	103.5	14.9	12.5	80.2	31.5	322.3
2018	10.5	0.2	6.4	1.0	43.5	75.0	11.4	10.9	52.9	23.9	235.6
2019	10.4	0.2	6.4	1.0	43.5	74.9	11.4	10.9	52.8	23.9	235.3
2020	10.6	0.2	6.6	1.1	45.3	77.9	11.8	11.1	55.1	24.8	244.4
2021	11.3	0.2	7.1	1.5	53.6	92.4	13.7	12.1	67.1	29.0	288.1
2022	11.6	0.2	7.4	1.8	59.1	101.7	15.0	12.7	74.6	31.8	315.9
2023	11.6	0.2	7.4	1.6	57.7	98.8	14.7	12.5	71.5	31.1	307.0
2024	11.6	0.2	7.4	1.6	57.9	99.0	14.7	12.6	71.6	31.2	307.6
2025	11.6	0.2	7.4	1.6	57.8	98.9	14.7	12.6	71.4	31.2	307.2
2026	11.6	0.2	7.4	1.6	58.5	100.1	14.8	12.6	72.6	31.5	311.1
2027	11.7	0.2	7.4	1.7	59.3	101.7	15.0	12.7	74.2	31.9	316.0
2028	11.6	0.2	7.4	1.7	58.6	100.4	14.9	12.6	73.0	31.6	312.0
2029	11.7	0.2	7.5	1.8	59.5	102.1	15.1	12.7	74.6	32.0	317.2
2030	11.6	0.2	7.4	1.7	58.7	100.7	14.9	12.7	73.2	31.6	312.7
2031	11.6	0.2	7.4	1.6	58.1	99.4	14.8	12.6	72.0	31.3	309.0
2032	11.6	0.2	7.4	1.7	58.6	100.4	14.9	12.6	73.0	31.6	312.0
2033	11.6	0.2	7.4	1.6	58.1	99.4	14.8	12.6	72.0	31.3	308.9
2034	11.6	0.2	7.4	1.6	57.9	99.0	14.7	12.6	71.6	31.2	307.8
2035	11.6	0.2	7.4	1.6	57.7	98.7	14.7	12.6	71.2	31.1	306.7
2036	10.2	0.2	6.5	1.4	51.7	88.3	13.1	11.1	63.9	27.8	274.3
2037	6.9	0.1	4.4	1.0	36.4	62.2	9.2	7.6	45.3	19.5	192.6
2038	0.7	0.0	0.6	0.4	8.3	14.4	2.0	1.0	11.7	4.3	43.5
2039	0.2	0.0	0.2	0.2	2.8	5.2	0.7	0.3	4.6	1.5	15.8
2040	0.1	0.0	0.1	0.2	1.6	3.1	0.4	0.2	2.9	0.8	9.4
Total	244.1	6.5	157.3	51.5	1326.4	2319.0	336.1	271.8	1761.7	712.5	7187

Source: Computed by the Arctic Impact Model
Columns and rows do not add to totals due to rounding

The economic impacts of the Mary River project are seen in Tables 7 and 8 to be remarkably large for a single project in a country with an economy the size of Canada's. Take,

Table 8. Impact on Employment by Province in Canada, person-years

	Nfld. & Labrador	P.E.I.	Nova Scotia	New Bruns.	P.Q.	Ont.	Man.	Sask.	Alta.	B. C.	Total
2011	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2014	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2015	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2016	2.8	1.0	3.4	7.2	57.9	97.1	15.4	5.1	88.0	31.1	309.0
2017	43.9	4.9	81.8	24.0	812.9	1223.8	265.1	248.6	779.5	501.7	3986.3
2018	43.5	4.9	81.0	23.9	804.9	1211.9	262.4	246.0	772.2	496.7	3947.3
2019	43.4	4.9	80.9	23.8	803.8	1210.2	262.0	245.6	771.2	496.0	3942.0
2020	43.4	4.9	80.8	23.8	803.1	1209.2	261.8	245.4	770.6	495.5	3938.5
2021	43.0	4.7	80.3	22.8	795.1	1195.6	259.5	244.3	758.5	491.1	3894.8
2022	42.2	4.6	78.8	22.5	781.0	1174.6	254.8	239.7	745.7	482.3	3826.3
2023	42.1	4.6	78.6	22.5	779.0	1171.6	254.1	239.1	743.8	481.0	3816.3
2024	42.1	4.6	78.6	22.5	778.9	1171.5	254.1	239.0	743.7	481.0	3816.0
2025	42.1	4.6	78.6	22.5	778.9	1171.5	254.1	239.0	743.8	481.0	3816.0
2026	43.0	5.0	79.7	24.9	798.1	1203.6	259.2	240.7	772.9	491.2	3918.3
2027	43.1	5.0	79.8	24.9	799.5	1205.7	259.6	241.0	774.3	492.1	3925.1
2028	43.1	5.0	79.8	24.9	799.6	1205.8	259.6	241.1	774.4	492.1	3925.4
2029	43.1	5.0	79.8	24.9	799.6	1205.8	259.6	241.1	774.4	492.1	3925.5
2030	43.1	5.0	79.8	24.9	799.6	1205.8	259.6	241.1	774.4	492.2	3925.5
2031	41.0	4.2	77.2	19.3	755.5	1131.5	247.8	237.2	706.7	468.5	3688.9
2032	40.1	3.9	76.2	17.4	737.8	1102.3	243.1	235.4	680.8	458.8	3595.6
2033	39.8	3.8	75.8	16.7	731.7	1092.3	241.5	234.8	672.0	455.6	3563.9
2034	39.7	3.7	75.7	16.5	729.7	1088.9	240.9	234.6	669.1	454.4	3553.1
2035	39.6	3.7	75.6	16.4	729.0	1087.8	240.7	234.5	668.0	454.1	3549.5
2036	34.5	3.2	65.8	14.3	634.4	946.6	209.4	204.0	581.3	395.1	3088.7
2037	22.4	2.1	42.6	9.3	411.8	614.4	135.8	132.1	377.5	256.4	2004.4
2038	0.3	0.0	0.3	0.2	4.5	6.6	1.1	0.5	4.7	2.4	20.6
2039	0.3	0.0	0.3	0.2	4.5	6.6	1.1	0.5	4.7	2.4	20.5
2040	0.3	0.0	0.3	0.2	4.5	6.5	1.1	0.5	4.7	2.4	20.4
Total	861.8	93.3	1611.4	450.4	15935.3	23947.4	5203.4	4911.0	15157.0	9847.1	78018.0

Source: Computed by the Arctic Impact Model
Columns and rows do not add to totals due to rounding

for example, Ontario. The total cumulative increase in GDP in Ontario is shown to be $2.319 billion, compared to the value of GDP in 2008 for Ontario of just above $501.667 billion 1997

dollars. The total increase in employment for Ontario is 23,947.4 person-years, compared to the value of employment in 2009 for Ontario of about 6,541.1 thousand person-years. Thus the Mary River Project, by itself, increases GDP in Ontario by an amount which is half of one percent of the value in 2008, and employment by a third of one percent.

The non temporal aspect of the input-output methodology must be born in mind when examining the results in Tables 7 and 8. The Input-Output methodology uses quantitative "menus" to produce each distinct output, and those menus do not have a temporal dimension. For example, the increase in Ontario's GDP of $103.7 million shown for the specific year 2016 is for Ontario's share of the inputs utilized at the site in 2016. However, due to the nature of transportation in the Arctic, much of that $103.7 million increase in GDP will have occurred in Ontario prior to 2016. Thus, the cumulated totals shown in Tables 7 and 8 over the entire project are correct, but the year in which they occur will vary.[9] So, for example, the impact of the Mary River Project on Ontario's GDP will be to increase it by $2.3 billion, though not precisely in the years shown.

[9]There are many good references to input-output modelling. As noted above, a well written, accessible, classic is Miller and Blair (1985).

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Appendix: Road Haulage

In addition to the project as detailed in the preceding pages, plans are being developed at this writing to supplement the project by trucking some of ore down the Milne Inlet Tote Road and loading onto ships in Milne Inlet. Although the Mary River Project–as presented in the preceding report–utilizes Milne Inlet and the Milne Inlet Tote road to transport some material inputs to the project, the road haulage option would add to that use. The Tote Road would be used to transport ore to Milne Inlet for loading onto ships for export in quarter III (mostly) and quarter IV (somewhat) of each year.

Road haulage would start up with partial production beginning in the quarter III of 2013 and full production beginning by quarter IV of that year, four years before the rail line will begin to carry ore to the coast for export. The data utilized for the analysis reported in this appendix assumed that the road haulage option would end in 2024. Nonetheless, it seems possible that the road haulage option would be re-activated after that as an instrument to increase exports in response to any future upward spikes in world iron prices. If that proves to be the case, the economy of Nunavut will benefit by more than the impacts shown below.

The road haulage option as currently envisioned–with the operation ending in 2024–is notably large. Total investment in the road haulage option is $566.9 million 2010 dollars, which represents another 11.1% of total investment in the Mary River Project without the road haulage option. Total operating costs of the road haulage option are $1,232.0 million 2010 dollars, which is 7.1% of total operating costs for the Mary River Project without the road haulage option. The Nunavut Corporate Income tax payments for the road haulage option would be $220.5 million 2010 dollars, which is 10.9% of total payments of the Nunavut Corporate Income Tax for the Mary River Project without the road haulage option. Ore production of the road haulage option is 36,136 thousand metric tonnes, which is 8.7% of total production for the Mary River Project without the road haulage option.

The output of the economic impact analysis presented in the body of this report was used in the economic impact estimation of the Road Haulage option. First the size of the Road Haulage option was measured as a relative proportion of the Mary River Project without the Road Haulage option. The economic impact of the road haulage option was computationally obtained by applying that same proportion times the economic impact as presented in the body of this report. In this way, the unique aspects of economic impacts of the Mary River Project, which had already been incorporated in the results shown in the body of the report, were applied to the economic impact analysis for the Road Haulage option.

The impact on real GDP is shown in the figure to the right. The solid line shows the effect on GDP of the Mary River Project without the Road Haulage option. The dashed line adds Road Haulage.

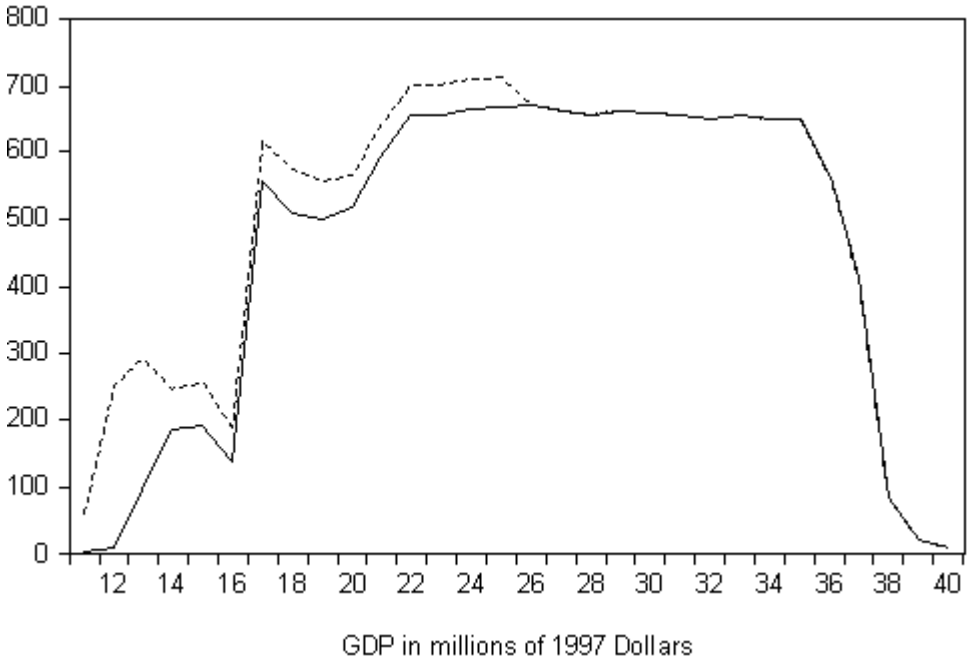

Figure 4. The Total Impact of the Mary River Project–with and without the Road Haulage option–on Gross Domestic Product in Nunavut

Note that real GDP begins to show notable increases faster under the Road Haulage option. This is because production gets going four years earlier. Also, note that the brief period in the above figure when the solid line is close to the dashed line is deceptive because it is just connecting the impacts in 2016 to

substantially higher impacts in 2017, so the lines appear to come together as 2016 is connected to 2017.

Summing the impacts shown in the above figure shows that the road haulage option increases real GDP in Nunavut by $1,182.1 million 1997 dollars, an amount which approximately equals Nunavut's annual value of Gross Domestic Product.

In order to produce that amount of GDP, employment will increase substantially. For the Truck Haulage option, the increase in employment, measured on an establishment survey basis, will be 3,868 person years. an amount which equals about one third of annual employment in Nunavut. The reason that the Truck Haulage option can have such a much larger proportional impact on GDP than on employment, is that the employment is disproportionately in higher-productivity sectors of the economy.

Table 9. Impact of the Road Haulage Option on Several Macroeconomic Variables for Nunavut, millions of dollars

	Total
Personal Expenditure, 1997 $	$282.9
Government Current Expenditure, 1997 $	$179.4
Gross Domestic Product, 1997 $	$1,182.1
Wages and Salaries, current $	$308.6
Personal Disposable Income, current $	$601.1

Source: Computed from output of the Arctic Impact Model

Table 9 shows the impact of the Truck Haulage option on several macroeconomic variables for Nunavut. Personal expenditure is increased by over one billion 1997 dollars; government current expenditure by over four billion 1997 dollars, wages and salaries by almost six billion current dollars, and personal disposable income by over four billion current dollars.