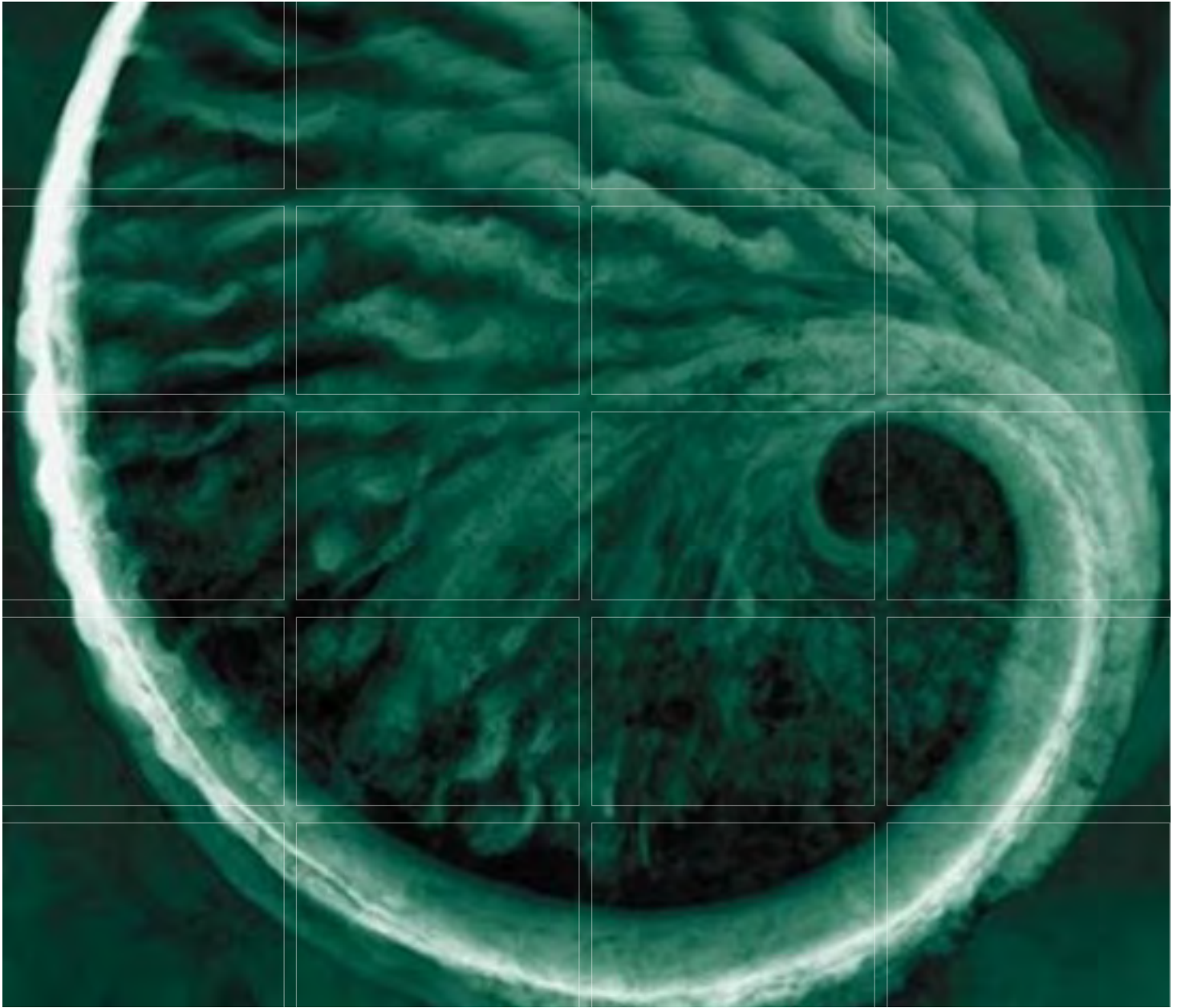


## ***Appendix 14-B***

*Murray River Coal Project: 2014 Economic Model Report*

MURRAY RIVER COAL PROJECT

**Application for an Environmental Assessment Certificate / Environmental Impact Statement**



*Prepared for:*



# MURRAY RIVER COAL PROJECT 2014 Economic Model Report

October 2014

**HD Mining International Ltd.**

MURRAY RIVER COAL PROJECT  
**2014 Economic Model Report**

**October 2014**

Project #0194106-0007

Citation:

ERM Rescan. 2014. *Murray River Coal Project: 2014 Economic Model Report*. Prepared for HD Mining International Ltd. by ERM Consultants Canada Ltd.: Vancouver, British Columbia.

**ERM Rescan**

Rescan Building, 15th Floor  
1111 West Hastings Street  
Vancouver, BC  
Canada V6E 2J3  
T: (604) 689-9460  
F: (604) 687-4277

ERM Rescan prepared this report for the sole and exclusive benefit of, and use by, HD Mining International Ltd. Notwithstanding delivery of this report by ERM Rescan or HD Mining International Ltd. to any third party, any copy of this report provided to a third party is provided for informational purposes only, without the right to rely upon the report.

# MURRAY RIVER COAL PROJECT

## 2014 Economic Model Report

### TABLE OF CONTENTS

Table of Contents .....	i
List of Figures .....	i
List of Tables .....	ii
1. Introduction .....	1-1
1.1 The Project .....	1-1
1.2 Economic Impact Analysis Scope.....	1-1
2. Methods .....	2-1
2.1 Background .....	2-1
2.2 Overview of Methods .....	2-1
2.3 Input Data.....	2-5
2.4 Model Caveats.....	2-7
3. Results.....	3-1
3.1 Construction.....	3-1
3.1.1 Employment and Income.....	3-1
3.1.2 Gross Domestic Product.....	3-5
3.1.3 Tax Revenue.....	3-5
3.2 Operation.....	3-7
3.2.1 Employment and Income.....	3-7
3.2.2 Gross Domestic Product.....	3-12
3.2.3 Tax Revenue.....	3-12
4. Summary .....	4-1
References .....	R-1

### LIST OF FIGURES

Figure 1.1-1. Location of the Murray River Coal Project .....	1-2
Figure 2.1-1. British Columbia Census Divisions .....	2-3

## LIST OF TABLES

Table 2.3-1. Project Direct Construction and Operation Expenditures in Canada, 2014 to 2042.....	2-5
Table 2.3-2. Project Construction and Operation Employment in Canada, 2014 to 2042 .....	2-6
Table 3.1-1. Annual Economic Impacts (Direct, Indirect and Induced) of Construction for Canada .....	3-2
Table 3.1-2. Total Economic Impacts (Direct, Indirect and Induced) of Construction by Province or Territory .....	3-3
Table 3.1-3. Total Employment and GDP Impacts of Construction by Province or Territory .....	3-3
Table 3.1-4. Annual Economic Impacts (Direct, Indirect and Induced) of Construction in British Columbia.....	3-4
Table 3.1-5. Total Employment, Personal Income and GDP Impacts of Construction by Census Division in British Columbia .....	3-6
Table 3.2-1. Annual Economic Impacts (Direct, Indirect and Induced) of Operation in Canada.....	3-8
Table 3.2-2. Total Economic Impacts (Direct, Indirect and Induced) of Operation by Province or Territory .....	3-9
Table 3.2-3. Total Employment and GDP Impacts of Operation by Province or Territory .....	3-9
Table 3.2-4. Annual Economic Impacts (Direct, Indirect and Induced) of Operation in British Columbia .....	3-10
Table 3.2-5. Employment, Income and GDP Impacts of Operation by Census Division in British Columbia.....	3-11

# 1. INTRODUCTION

## 1.1 THE PROJECT

The proposed Murray River Coal Project (the Project) is an underground coal mine located 12.5 kilometers southwest of Tumbler Ridge, British Columbia (Figure 1.1-1). HD Mining International Ltd. (HD Mining), the Proponent of the Project, holds 57 coal licences that comprise the 160 square kilometer Murray River property. The Project is situated on Crown land within the Peace River Regional District (PRRD) and the traditional territories of the Treaty 8 First Nations. The nearest communities include West Moberly, Sauleau, McLeod Lake, and the District of Tumbler Ridge.

Project construction will take approximately four years, beginning in 2014 and ending in 2017, with production commencing in 2018. The mine is expected to produce 6 million tonnes of metallurgical coal per year over 25 years of operation. The Project will be the deepest underground coal mine in North America and will be the only one in Canada utilizing longwall mining technology.

A Bulk Sample Permit for the Project was issued by the Province of British Columbia in March 2012. Surface work commenced in the fall of 2012. Bulk sampling is expected to be completed in late 2014. To date HD Mining has invested a total of \$91 million in the Project and expects to spend a further \$480 million in capital expenditures (excluding labour) to complete the bulk sample and bring the mine into production in 2018.

The mine and accompanying surface infrastructure will include the following main components:

- A decline shaft for conveyor access;
- Two vertical shafts, one for equipment and staff access and one for ventilation;
- Two longwall mining units;
- Centralized underground production control; and
- A six kilometre tunnel containing a conveyor system to transport the raw coal from the mine to the heated wash plant and loading facility at the CN rail head.

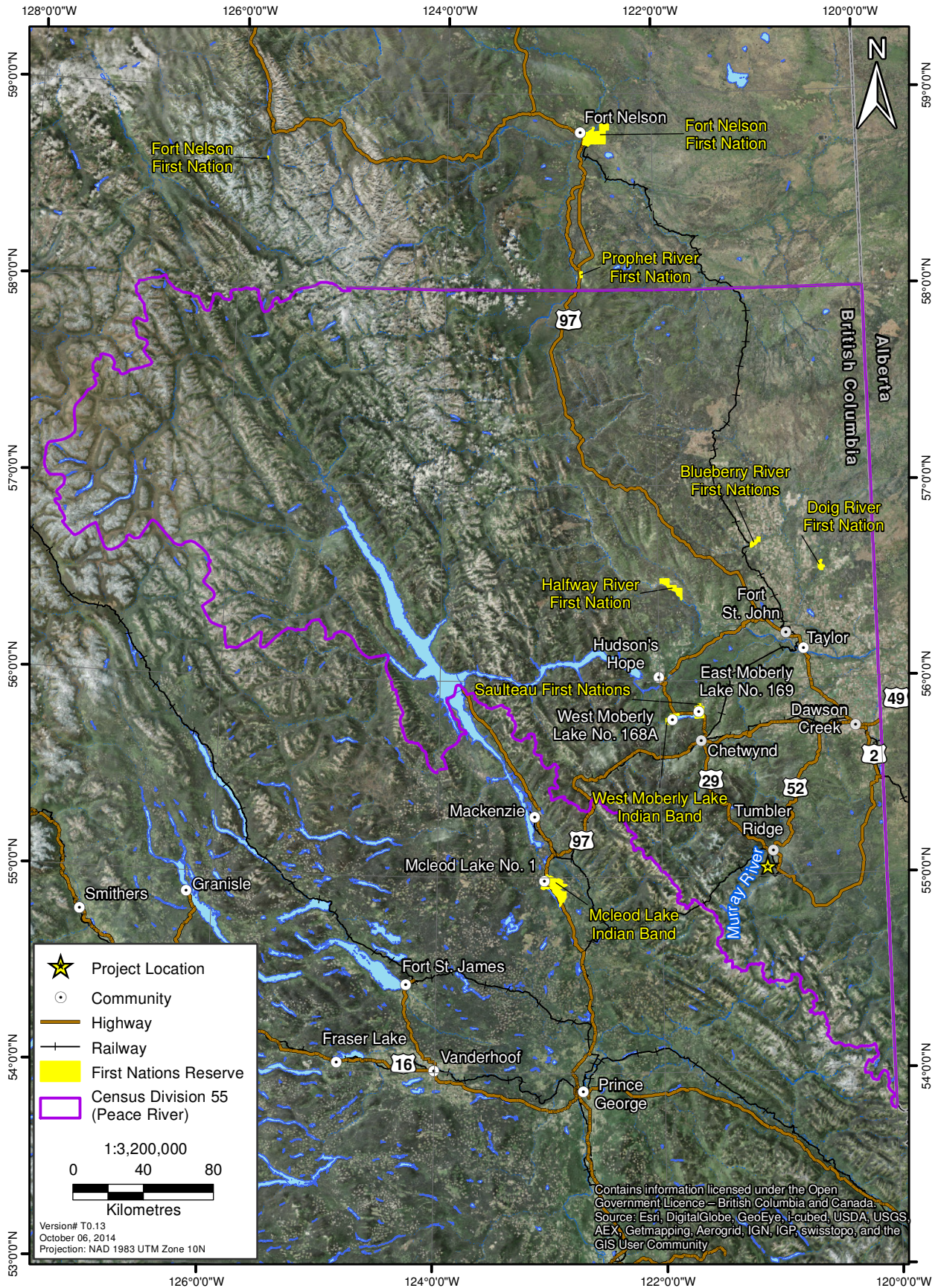
Produced coal will be transported by rail from Tumbler Ridge to Ridley Island in Prince Rupert where it will be loaded on bulk carriers for ocean transport to customers overseas.

## 1.2 ECONOMIC IMPACT ANALYSIS SCOPE

The Application Information Requirements (AIR) for the Project (dated September 3, 2013) require that the Application include an estimation of the expected Project expenditures and workforce requirements. Using this data as input, the indirect and induced employment, income, GDP, and government revenue effects are to be predicted. Estimation of this information requires a detailed economic impact analysis, the results of which are included as part of the Application/Environmental Impact Statement (EIS) for the Project. The purpose of this report is to summarize the results of economic impact modelling. The analysis includes both the Construction and Operation phases of the Project.

Figure 1.1-1

Location of the Murray River Coal Project



For the Murray River Coal Project, the economic impact model was developed by EcoTec Consultants based on methods of input-output modelling. PwC compiled the input data for the economic impact analysis (PwC 2014) and provided direction on the modelling approach. The proprietary economic model employed by EcoTec Consultants has the ability to: 1) adjust the model structure to be more specific to the Project rather than being based on general statistical averages from secondary data sources; 2) with the use of econometric modules, incorporate dynamic model behaviour rather than relying strictly on a linear, static input-output structure; and 3) generate estimates at the sub-provincial level (i.e., Regional District or Census Division) rather than only at the provincial level. This approach has been used successfully in over 250 projects across Canada, including many mining, oil and gas, forestry, and fisheries sector projects.



## 2. METHODS

### 2.1 BACKGROUND

The model uses the 2008 dataset of Statistics Canada’s Input-Output model, enhanced with data from various sources dating from 2008 to 2011. The core of the model operates at a level of aggregation consisting of 476 commodities and 117 industries. Both open and closed versions of the model were run for the Project. The open version is used to estimate indirect effects (effects from inter-industry purchases of goods and services), while the closed version is used to estimate induced effects (effects from spending resulting after-tax household income, primarily from wages and salaries, taking into account the propensity to save).

In addition to the model’s ability to simulate the dynamic nature of the economy, its other key characteristic is its ability to estimate the distribution of the effects by Census Division (“CD”) within a province (Figure 2.1-1). The model does this through a mathematical allocation that takes into account the characteristics of existing industries and business within each CD, current economic structures and supplier relationships, and employment and skill-base profiles.

The model’s economic impact output statistics include estimates for the following:

- Employment;
- Personal income (wages and salaries, supplementary labour income, and mixed income);
- Gross Domestic Product (“GDP”); and
- Government tax revenues (from personal income tax, corporate profit tax, and sales tax).

### 2.2 OVERVIEW OF METHODS

Economic impact simulations begin with a shock to the economy as represented by Construction and Operation expenditures. The main algorithm allocates the expenditures on each good and service purchased for the Project to the producing industries. These suppliers, in turn, purchase the goods and services required to produce the items being purchased for the Project.

The core of the model operates with a standard input-output algorithm. When expenditures first enter the model they are applied, for this Project, primarily to the construction, machinery, and equipment sectors. Import coefficients are applied to account for the leakage of expenditures for items that are not produced in British Columbia. Purchases within British Columbia are allocated to the producing industries. Each of these industries will, in turn, purchase goods and services to produce what they sell to the Project as determined by their technology mix and use of factors of production (labour and capital). For purchases outside of British Columbia, an interprovincial trade flow matrix is used to allocate production by industry and province.

The model continues to iterate until all expenditures have dissipated (i.e., imports, taxes, and savings are all leakages that eventually reduce the amount of money available for purchases to

zero). At this point, the model is stopped and the total effects as measured by gross production (sales) by industry are summed for all iterations. Using the estimate of gross production, industry-specific employment coefficients, and data on salaries by industry, employment numbers are estimated. GDP is estimated by subtracting the primary input components from gross production, also determined by industry-specific coefficients. The primary input components include indirect taxes, subsidies, salaries and benefits for employees, profits, and depreciation.

Tax revenue from personal income tax, corporate profit tax, and indirect tax (predominantly sales tax) is calculated with coefficients derived from Statistics Canada and Canada Revenue Agency information. The amount of money collected by governments is subtracted from wages and salaries and profits at each round of expenditures. Within the model, 26 federal and provincial personal income tax coefficients are used to account for different income tax brackets.

To calculate the distribution of economic impacts by CD, regional weights are calculated and used to allocate expenditures. The mathematics used to allocate by CD take into account:

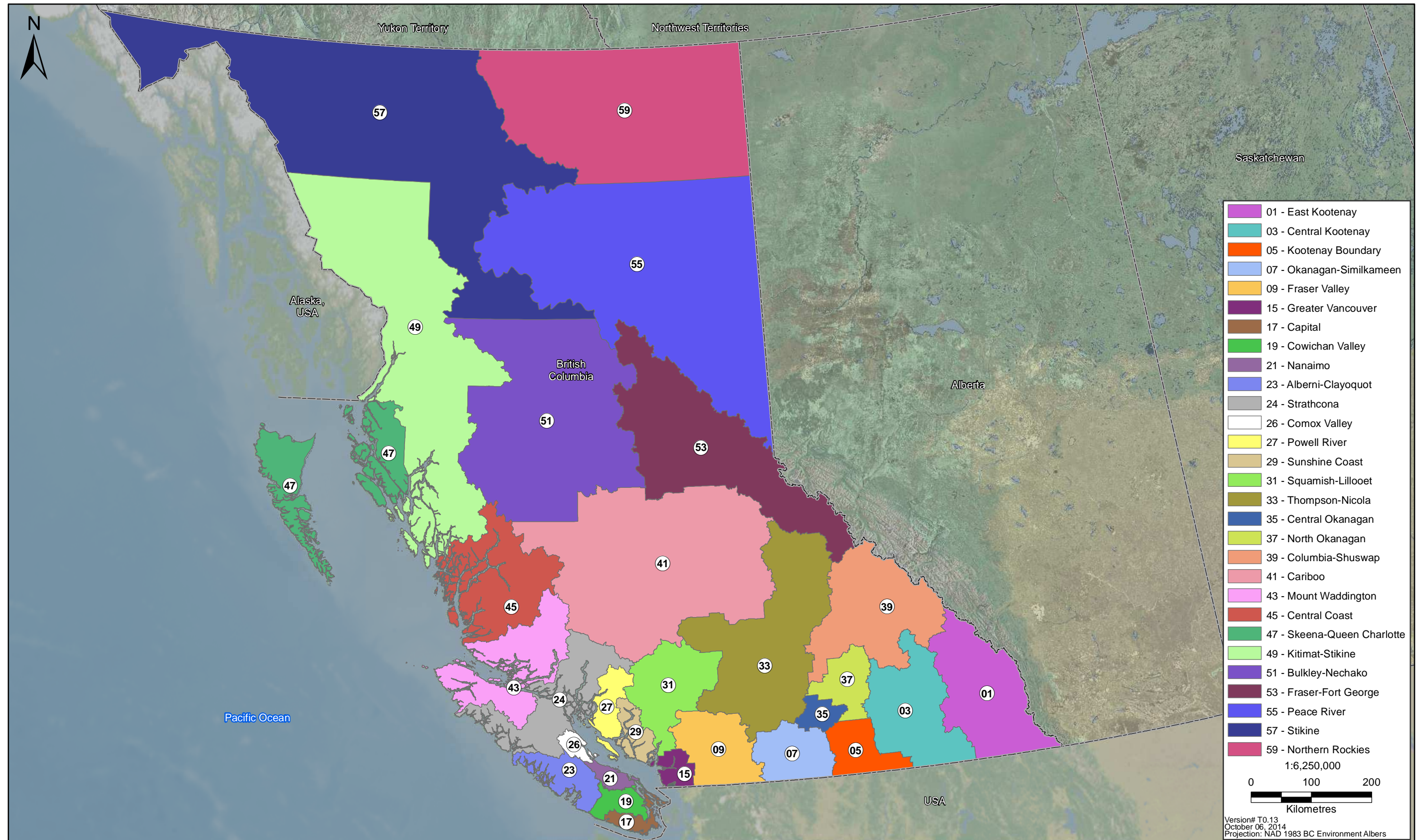
- The nature of the industry and whether or not the purchased good or service is likely to be supplied by local firms or by firms from elsewhere;
- Distance from the supplier (which can be more important for some industries than others);
- The regional economic structure (industries with a strong presence in a given region are likely to be suppliers);
- The size of the local economy (a local labour supply and market for goods and services supports the development of local business); and
- Transportation networks (a region well-served by air, road, and rail transportation will be in a better position to be a regionally important supplier).

The model calculates the economic impact of the Project for the years 2014 to 2050 which can be broken down as follows:

- Bulk Sampling (2014);
- Construction of the mine (2015 to 2017);
- Operation (2018 to 2042); and
- Indirect and induced benefits after the cessation of Operation expenditures in 2042.

For the economic impact analysis, Bulk Sampling is modelled as part of Construction (i.e., 2014 to 2017), and Decommissioning and Reclamation expenditures at the end of mine life are included as part of Operation.

Figure 2.1-1  
British Columbia Census Divisions



## 2.3 INPUT DATA

Input data and major assumptions for the economic impact analysis are from PwC (2014). All costs are forecasted in current Canadian dollars.

Estimates of total annual Construction and Operation expenditures and expected employment by job category for the years 2014 through 2042 are provided in Table 2.3-1 and 2.3-2. For modeling purposes, only direct expenditures and employment in Canada are considered.

**Table 2.3-1. Project Direct Construction and Operation Expenditures in Canada, 2014 to 2042**

Year	Annual Expenditures (Million Current Canadian Dollars)		
	Construction	Operation	Total
2014	\$34.1	\$7.3	\$41.4
2015	\$85.5	\$18.2	\$103.7
2016	\$142.2	\$26.7	\$168.9
2017	\$38.7	\$27.9	\$66.6
2018	\$21.5	\$247.5	\$269.0
2019	\$7.9	\$344.7	\$352.5
2020	\$6.2	\$350.2	\$356.5
2021	\$5.7	\$361.9	\$367.6
2022	\$3.0	\$370.4	\$373.4
2023	\$2.6	\$378.0	\$380.6
2024	\$2.1	\$395.2	\$397.3
2025	\$1.5	\$405.2	\$406.7
2026	\$1.2	\$405.5	\$406.7
2027	\$1.1	\$409.6	\$410.7
2028	\$1.1	\$408.0	\$409.1
2029	\$33.2	\$413.1	\$446.3
2030	\$1.8	\$411.7	\$413.5
2031	\$1.8	\$407.8	\$409.7
2032	\$1.1	\$425.8	\$426.9
2033	\$1.1	\$423.3	\$424.5
2034	\$1.1	\$405.8	\$406.9
2035	\$1.1	\$404.3	\$405.4
2036	\$1.1	\$412.7	\$413.8
2037	\$1.1	\$418.2	\$419.3
2038	\$1.1	\$415.7	\$416.8
2039	\$1.1	\$421.9	\$423.0
2040	\$1.1	\$419.3	\$420.4
2041	\$1.1	\$420.4	\$421.5
2042	\$9.2	\$403.9	\$413.1
<b>TOTAL</b>	<b>\$411.6</b>	<b>\$9,960.1</b>	<b>\$10,371.6</b>

**Table 2.3-2. Project Construction and Operation Employment in Canada, 2014 to 2042**

Year	Construction Contractor Workforce	Operation			Total
		HD Mining Hourly Employees	HD Mining Management Employees	Total HD Mining	
2014	151	45	15	60	211
2015	363	125	25	150	513
2016	612	200	20	220	832
2017	164	200	30	230	394
2018	65	200	70	270	335
2019	30	242	70	312	342
2020	25	284	70	354	379
2021	24	332	70	402	426
2022	14	380	97	477	491
2023	13	428	120	548	561
2024	11	462	143	605	616
2025	8	508	162	670	678
2026	8	546	162	708	716
2027	7	582	162	744	751
2028	7	582	162	744	751
2029	132	582	162	744	876
2030	10	582	162	744	754
2031	10	582	162	744	754
2032	7	582	162	744	751
2033	7	582	162	744	751
2034	7	582	162	744	751
2035	7	582	162	744	751
2036	7	582	162	744	751
2037	7	582	162	744	751
2038	7	582	162	744	751
2039	7	582	162	744	751
2040	7	582	162	744	751
2041	7	582	162	744	751
2042	39	582	162	744	783
<b>TOTAL</b>	<b>1,766</b>	<b>13,264</b>	<b>3,646</b>	<b>16,910</b>	<b>18,673</b>

For the initial Construction period of 2014 to 2017, the Project involves a total capital investment (including Bulk Sample) of approximately \$659.9 million, of which about \$411.6 million is expected to be direct expenditures in Canada. Mine capital expenditures associated with Bulk Sample total \$98.6 million. Some Construction expenditures will continue over the Operation of the Project,

where in 2029 approximately \$33.2 million will be spent as a result of the Construction of the western shaft (Table 2.3-1).

Operating expenditures are estimated to be initially \$247.5 million in 2018, increasing to a high of \$425.8 million in 2032 and thereafter decreasing to \$403.9 million by 2042. Direct Project spending through Construction and Operation will total to an estimated \$10.4 billion in Canada (Table 2.3-1).

Direct employment of Canadian workers for Construction of the Project is estimated at 1,766 person-years, starting from a total employment of 151 workers in 2014, to 363 workers in 2015, to 612 workers in 2016 and 164 workers in 2017 (full-time equivalents). A smaller amount of direct Canadian employment associated with Construction works will extend into the Operation phase. These jobs are expected to be mainly filled by contractors (Table 2.3-2). Additionally, 660 person-years of employment will be created by HD Mining during the Construction phase with 60 jobs in 2014, 150 jobs in 2015, 220 and 2030 jobs in 2016 and 2017; these HD Mining employees are understood to be mainly associated with preparations for the start of Operation and, thus, are included in the model as part of the Operation phase.

Direct employment for the Operation phase from 2018 to 2042 is predicted to be approximately 16,250 person-years. For the first year of Operation, the average Project employment is estimated at 270 person-years for Canadian workers; this will increase to 744 person-years of employment by 2027, as the use of Temporary Foreign Workers is decreased over the first 10 year of Operation<sup>1</sup>. Thereafter, direct employment is expected to remain steady at 744 person-years of employment per year for Canadian workers until the end of the Operation phase in 2042.

Total direct Project employment is approximately 18,673 person-years for the Construction and for Operation phases (Table 2.3-2).

## 2.4 MODEL CAVEATS

As is the case with the use of any analytical model, there are caveats and limitations associated with its use. The main caveats associated with the economic impact modelling are:

- The structure of the economy is assumed to be largely as it was in 2008, the baseline data year for the Input-Output model. Any substantive structural changes in the economy, including changes in the use of factors in production, changes in technology, and/or changes in inter-industry purchase patterns, will result in a loss of model accuracy.
- Production technologies are assumed to be uniform and consistent. In estimating the distribution of economic impacts within the province, the model is not able to account for any differences in the technologies used by industries within the same sector.
- Because the model operates at a macro level, it is not able to predict how economic impacts may be distributed or differ between socio-economic segments of society. For example, a

---

<sup>1</sup> A training and transition program will be implemented to transfer employment from Temporary Foreign Workers to local Canadian workers by 10 percent per year over 10 years from the commencement of Operation.

distinction cannot be made between employment or income benefits to First Nations peoples and the wider community.

- The model is not able to take into account economies of scale. The presence of economies of scale means both that the proportional use of factors of production by the Project and inter-industry relationships may change.
- It is assumed that the Project will have no measurable, permanent impact on wage levels, productivity or consumer behaviour, in aggregate. In other words, the model is not able to account for substantive changes in the structure or behaviour of the provincial economy as a result of the impacts of the Project.
- The model assumes no limits to growth. All factors of production, including labour and capital, are assumed to be available for use, and there are no other exogenous factors that may affect economic production.
- The estimation of GDP impacts by the model does not include direct business operating profit from the Project. This component of GDP is excluded from all reported direct and total GDP figures. The direct GDP estimated by the model is principally labour expense. The estimates of indirect and induced GDP do include all components of GDP.
- The estimation of government tax revenues by the model consists mainly of personal income tax, indirect corporate profit tax, and sales tax. It does not include direct taxes on the profit of the Project, property taxes, or any royalties paid by the Project. Typically, these latter sources of government revenue are Project-specific and, if required, best estimated using other methods.

### 3. RESULTS

For the Murray River Coal Project, employment, personal income, and GDP statistics were estimated at the following levels:

- national (Canada);
- by province and territory; and
- Census Division (28 CDs in British Columbia)<sup>2</sup>.

Government tax revenue statistics are provided at the national and provincial levels only.

#### 3.1 CONSTRUCTION

The Project consists of a Bulk Sample phase in 2014 (and extending into 2015) and a Construction phase for the main Project site of three years from 2015 to 2017. For the purposes of the economic impact analysis these two activities have been examined on a combined basis referred to as Construction.

##### 3.1.1 Employment and Income

In Canada, total employment (direct, indirect and induced) is estimated at 6,483 person-years of employment for the Construction phase (Table 3.1-1). Employment is expected to increase from approximately 353 person-years in 2014 to a high of 1,712 person-years at the peak of Construction in 2016, and 1,023 person-years of direct, indirect and induced employment in 2017. Some direct construction employment (Table 2.3-2) as well as indirect and induced employment will extend into the Operation phase peaking in 2029 at 333 person-years of employment as a result of the construction of the western shaft<sup>3</sup>.

As expected, the Province of British Columbia benefits substantially from the Project; however, Ontario, Alberta and Quebec also receive strong employment benefits (Table 3.1-2). As set out in Table 3.1-3, approximately 60% of direct, indirect and induced employment is anticipated to be from British Columbia. Direct employment is also generated in Ontario and to a lesser extent Alberta. In general, British Columbia is expected to benefit in 4,055 person-years of direct, indirect and induced employment, of which an estimated 1,354 person-years of employment will be related to direct on-site construction jobs (Table 3.1-3). Total employment in British Columbia is expected to peak in year 2016 at 1,118 person-years of employment and later in year 2029 at 310 person-years of employment (Table 3.1-4).

---

<sup>2</sup> Comox Valley and Strathcona are aggregated together.

<sup>3</sup> Employment, GDP, and tax revenue impacts dissipate, approaching zero from 2042 through 2050, because the expenditure and employment associated with the initial Construction phase are no longer being felt in the economy. In each year following a direct Project expenditure, a proportion of money is removed from the provincial economy mainly through savings and purchased made by individuals and businesses outside of the province.



**Table 3.1-1. Annual Economic Impacts (Direct, Indirect and Induced) of Construction for Canada**

Year	Employment (Person-years)	GDP (Millions of Dollars)	Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
2014	353	\$29.7	\$2.9	\$2.5	\$5.4
2015	901	\$74.6	\$7.3	\$6.2	\$13.5
2016	1,712	\$140.6	\$13.1	\$11.2	\$24.3
2017	1,023	\$87.6	\$8.1	\$6.9	\$15.0
2018	530	\$46.3	\$4.4	\$3.8	\$8.2
2019	290	\$25.5	\$2.4	\$2.0	\$4.4
2020	180	\$15.7	\$1.4	\$1.2	\$2.6
2021	126	\$10.8	\$1.0	\$0.8	\$1.8
2022	81	\$6.8	\$0.6	\$0.5	\$1.1
2023	59	\$4.9	\$0.4	\$0.4	\$0.8
2024	45	\$3.8	\$0.3	\$0.3	\$0.6
2025	35	\$2.9	\$0.2	\$0.2	\$0.4
2026	29	\$2.3	\$0.2	\$0.2	\$0.4
2027	26	\$2.1	\$0.2	\$0.2	\$0.4
2028	23	\$2.1	\$0.3	\$0.3	\$0.6
2029	333	\$27.1	\$2.4	\$2.1	\$4.5
2030	176	\$15.5	\$1.4	\$1.2	\$2.6
2031	90	\$7.7	\$0.7	\$0.6	\$1.3
2032	53	\$4.6	\$0.4	\$0.3	\$0.7
2033	38	\$3.2	\$0.3	\$0.2	\$0.5
2034	31	\$2.5	\$0.2	\$0.2	\$0.4
2035	27	\$2.2	\$0.2	\$0.2	\$0.4
2036	26	\$2.1	\$0.2	\$0.1	\$0.3
2037	25	\$2.0	\$0.1	\$0.1	\$0.2
2038	24	\$2.0	\$0.2	\$0.2	\$0.4
2039	23	\$1.9	\$0.2	\$0.1	\$0.3
2040	22	\$1.8	\$0.2	\$0.1	\$0.3
2041	22	\$1.8	\$0.2	\$0.2	\$0.4
2042	100	\$8.1	\$0.7	\$0.6	\$1.3
2043	45	\$4.0	\$0.4	\$0.3	\$0.7
2044	18	\$1.7	\$0.3	\$0.2	\$0.5
2045	9	\$0.8	\$0.1	\$0.1	\$0.2
2046	4	\$0.4	\$0.0	\$0.0	\$0.0
2047	2	\$0.2	\$0.0	\$0.0	\$0.0
2048	2	\$0.1	\$0.0	\$0.0	\$0.0
2049	0	\$0.0	\$0.0	\$0.0	\$0.0
2050	0	\$0.0	\$0.0	\$0.0	\$0.0
<b>Total</b>	<b>6,483</b>	<b>\$545.4</b>	<b>\$51.0</b>	<b>\$43.5</b>	<b>\$94.5</b>

**Table 3.1-2. Total Economic Impacts (Direct, Indirect and Induced) of Construction by Province or Territory**

Province or Territory	Employment (Person-years)	GDP (Millions of Dollars)	Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
Newfoundland and Labrador	3	\$0.3	\$0.0	\$0.0	\$0.0
Prince Edward Island	3	\$0.2	\$0.0	\$0.0	\$0.0
Nova Scotia	11	\$0.9	\$0.1	\$0.1	\$0.2
New Brunswick	9	\$0.8	\$0.1	\$0.1	\$0.2
Quebec	386	\$31.0	\$2.7	\$3.6	\$6.3
Ontario	1,381	\$116.5	\$10.4	\$9.9	\$20.3
Manitoba	59	\$5.1	\$0.4	\$0.5	\$0.9
Saskatchewan	34	\$3.5	\$0.3	\$0.3	\$0.6
Alberta	527	\$56.2	\$6.7	\$3.8	\$10.5
British Columbia	4,055	\$329.5	\$30.2	\$25.1	\$55.3
Territories	15	\$1.4	\$0.1	\$0.1	\$0.2
<b>Total</b>	<b>6,483</b>	<b>\$545.4</b>	<b>\$51.0</b>	<b>\$43.5</b>	<b>\$94.5</b>

**Table 3.1-3. Total Employment and GDP Impacts of Construction by Province or Territory**

Province or Territory	Employment (Person-years)				GDP (Millions of Dollars)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Newfoundland and Labrador	0	1	2	3	\$0.0	\$0.1	\$0.2	\$0.3
Prince Edward Island	0	1	2	3	\$0.0	\$0.1	\$0.1	\$0.2
Nova Scotia	0	4	7	11	\$0.0	\$0.3	\$0.6	\$0.9
New Brunswick	0	3	6	9	\$0.0	\$0.3	\$0.5	\$0.8
Quebec	0	131	255	386	\$0.0	\$10.4	\$20.6	\$31.0
Ontario	321	443	617	1,381	\$21.7	\$38.8	\$56.0	\$116.5
Manitoba	0	24	35	59	\$0.0	\$2.0	\$3.1	\$5.1
Saskatchewan	0	14	20	34	\$0.0	\$1.5	\$2.0	\$3.5
Alberta	91	220	216	527	\$7.1	\$23.3	\$25.8	\$56.2
British Columbia	1,354	1,415	1,286	4,055	\$86.9	\$120.3	\$122.3	\$329.5
Territories	0	9	6	15	\$0.0	\$0.8	\$0.6	\$1.4
<b>Total</b>	<b>1,766</b>	<b>2,265</b>	<b>2,452</b>	<b>6,483</b>	<b>\$115.7</b>	<b>\$197.9</b>	<b>\$231.8</b>	<b>\$545.4</b>
<i>British Columbia as % total</i>	63%	60%	59%	58%	59%	63%	60%	59%

**Table 3.1-4. Annual Economic Impacts (Direct, Indirect and Induced) of Construction in British Columbia**

Year	Employment (Person-years)	GDP (Millions of Dollars)	Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
2014	241	\$19.6	\$1.9	\$1.6	\$3.5
2015	594	\$48.3	\$4.7	\$3.9	\$8.6
2016	1,118	\$89.6	\$8.2	\$6.8	\$15.0
2017	623	\$51.0	\$4.6	\$3.8	\$8.4
2018	269	\$22.4	\$2.1	\$1.7	\$3.8
2019	124	\$10.5	\$0.9	\$0.8	\$1.7
2020	73	\$6.1	\$0.5	\$0.4	\$0.9
2021	50	\$4.1	\$0.3	\$0.3	\$0.6
2022	33	\$2.7	\$0.2	\$0.2	\$0.4
2023	26	\$2.0	\$0.2	\$0.1	\$0.3
2024	23	\$1.8	\$0.1	\$0.1	\$0.2
2025	20	\$1.6	\$0.1	\$0.1	\$0.2
2026	19	\$1.5	\$0.1	\$0.1	\$0.2
2027	17	\$1.3	\$0.1	\$0.1	\$0.2
2028	17	\$1.6	\$0.3	\$0.2	\$0.5
2029	310	\$25.0	\$2.3	\$1.9	\$4.2
2030	120	\$10.2	\$0.9	\$0.8	\$1.7
2031	52	\$4.2	\$0.4	\$0.3	\$0.7
2032	29	\$2.4	\$0.2	\$0.2	\$0.4
2033	22	\$1.8	\$0.1	\$0.1	\$0.2
2034	19	\$1.5	\$0.1	\$0.1	\$0.2
2035	18	\$1.4	\$0.1	\$0.1	\$0.2
2036	18	\$1.4	\$0.1	\$0.1	\$0.2
2037	18	\$1.4	\$0.1	\$0.1	\$0.2
2038	18	\$1.4	\$0.1	\$0.1	\$0.2
2039	17	\$1.3	\$0.1	\$0.1	\$0.2
2040	16	\$1.3	\$0.1	\$0.1	\$0.2
2041	16	\$1.3	\$0.2	\$0.1	\$0.3
2042	91	\$7.2	\$0.7	\$0.5	\$1.2
2043	29	\$2.5	\$0.2	\$0.2	\$0.4
2044	11	\$0.7	\$0.2	\$0.1	\$0.3
2045	3	\$0.3	\$0.0	\$0.0	\$0.0
2046	1	\$0.1	\$0.0	\$0.0	\$0.0
2047	0	\$0.0	\$0.0	\$0.0	\$0.0
2048	0	\$0.0	\$0.0	\$0.0	\$0.0
2049	0	\$0.0	\$0.0	\$0.0	\$0.0
2050	0	\$0.0	\$0.0	\$0.0	\$0.0
<b>Total</b>	<b>4,055</b>	<b>\$329.5</b>	<b>\$30.2</b>	<b>\$25.1</b>	<b>\$55.3</b>

For the CD that defines the economic study region in which the Project is located – Peace River (CD 55) – direct employment is estimated to total approximately 406 person-years, indirect 98 and induced 183, for a total of approximately 687 person-years for Construction (Table 3.1-5).

Further, as a result of the Construction phase, the Province of British Columbia will receive substantial income benefits. That is, the total personal income effects (direct, indirect, and induced) are estimated at \$213.5 million for British Columbia, of which \$37.3 million will benefit the Peace River Regional District (CD 55; Table 3.1-5). Other CDs that will derive substantial employment and income benefits of the Project include Greater Vancouver, Fraser-Fort George, Fraser Valley and Cariboo (Table 3.1-5).

### **3.1.2 Gross Domestic Product**

The total GDP impact of Project Construction is estimated at \$545.5 million. GDP increases from approximately \$29.7 million in 2014 to \$140.6 million in 2016. Thereafter, GDP increases in 2029 and 2030 as a result of the construction of the western shaft, and thereafter it largely dissipates (Table 3.1-1).

The Province of British Columbia benefits substantially from the Project Construction (\$329.5 million); however, Ontario, Alberta and Quebec also receive strong GDP benefits (Table 3.1-2). In British Columbia, GDP impacts increase from approximately \$19.6 million in 2014 to approximately \$89.6 million in 2016. Thereafter, GDP increases in 2029 and 2030 as a result of the construction of the western shaft, and the impacts largely dissipate thereafter (Table 3.1-4). An estimated 60% of direct, indirect and induced GDP impacts in Canada are to be felt in British Columbia (Table 3.1-3).

The strength of the economic benefits to the other provinces can be attributed to two main factors: 1) construction workers will come from those provinces, and 2) those provinces are expected to play a role in providing goods and services purchased by the Project. Businesses based in Alberta and Ontario, in particular, are expected to be important suppliers to the Project.

As expected, GDP impacts of Construction within British Columbia are to be most strongly felt within the CD 15 covering the Greater Vancouver area and CD 55 covering the Peace River area (Table 3.1-5). The Fraser-Fort George, Fraser Valley and Cariboo CDs also stand out as receiving slightly higher proportions of total GDP impacts than other regions.

### **3.1.3 Tax Revenue**

In addition to employment and GDP benefits of the Construction phase, government revenues are expected to increase primarily as a result of Project-related direct, indirect and induced contributions to personal income tax, indirect corporate profit tax and sales tax. The total government revenue of Project Construction is estimated at \$94.5 million, with \$51.0 million projected to be generated for the federal government and \$43.5 million for the provincial governments (Table 3.1-1). As with employment and GDP, government tax revenue is expected to peak in 2016 at \$24.3 million and later in 2029 at \$4.5 million (Table 3.1-1).

**Table 3.1-5. Total Employment, Personal Income and GDP Impacts of Construction by Census Division in British Columbia**

Census Division	Employment (Person-years)				Personal Income (Millions of Dollars)				GDP (Millions of Dollars)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
01 (East Kootenay)	17	35	26	78	\$1.0	\$2.0	\$1.0	\$4.0	\$1.1	\$3.0	\$2.3	\$6.4
03 (Central Kootenay)	11	16	14	41	\$0.6	\$0.9	\$0.6	\$2.1	\$0.7	\$1.4	\$1.4	\$3.5
05 (Kootenay Boundary)	7	21	15	43	\$0.4	\$1.2	\$0.6	\$2.2	\$0.4	\$1.8	\$1.4	\$3.6
07 (Okanagan-Similkameen)	11	29	24	64	\$0.6	\$1.6	\$1.0	\$3.2	\$0.7	\$2.4	\$2.2	\$5.3
09 (Fraser Valley)	55	93	62	210	\$3.2	\$5.2	\$2.7	\$11.1	\$3.5	\$8.2	\$5.9	\$17.6
15 (Greater Vancouver)	166	550	381	1,097	\$9.7	\$30.6	\$16.5	\$56.8	\$10.9	\$46.2	\$36.1	\$93.2
17 (Capital)	22	67	57	146	\$1.3	\$3.7	\$2.5	\$7.5	\$1.4	\$5.5	\$5.2	\$12.1
19 (Cowichan Valley)	14	25	19	58	\$0.8	\$1.4	\$0.8	\$3.0	\$0.9	\$2.1	\$1.6	\$4.6
21 (Nanaimo)	11	40	30	81	\$0.6	\$2.3	\$1.3	\$4.2	\$0.7	\$3.4	\$2.7	\$6.8
23 (Alberni-Clayoquot)	0	7	11	18	\$0.0	\$0.4	\$0.4	\$0.8	\$0.0	\$0.6	\$0.8	\$1.4
24&26 (Comox-Strathcona)	17	29	23	69	\$1.0	\$1.6	\$0.9	\$3.5	\$1.1	\$2.4	\$2.0	\$5.5
27 (Powell River)	2	12	11	25	\$0.1	\$0.7	\$0.4	\$1.2	\$0.1	\$1.0	\$1.0	\$2.1
29 (Sunshine Coast)	6	17	14	37	\$0.3	\$1.0	\$0.6	\$1.9	\$0.4	\$1.5	\$1.3	\$3.2
31 (Squamish-Lillooet)	17	30	27	74	\$1.0	\$1.7	\$1.1	\$3.8	\$1.1	\$2.6	\$2.3	\$6.0
33 (Thompson-Nicola)	22	51	36	109	\$1.3	\$2.9	\$1.5	\$5.7	\$1.4	\$4.4	\$3.4	\$9.2
35 (Central Okanagan)	33	67	49	149	\$1.9	\$3.8	\$2.1	\$7.8	\$2.1	\$5.8	\$4.7	\$12.6
37 (North Okanagan)	11	30	26	67	\$0.6	\$1.7	\$1.1	\$3.4	\$0.7	\$2.5	\$2.3	\$5.5
39 (Columbia-Shuswap)	30	36	32	98	\$1.8	\$2.0	\$1.4	\$5.2	\$2.0	\$3.1	\$3.1	\$8.2
41 (Cariboo)	135	25	47	207	\$7.9	\$1.4	\$2.0	\$11.3	\$8.6	\$2.2	\$4.9	\$15.7
43 (Mount Waddington)	0	5	9	14	\$0.0	\$0.3	\$0.4	\$0.7	\$0.0	\$0.5	\$0.7	\$1.2
45 (Central Coast)	1	1	4	6	\$0.1	\$0.0	\$0.2	\$0.3	\$0.1	\$0.1	\$0.4	\$0.6
47 (Skeena-Queen Charlotte)	2	4	9	15	\$0.1	\$0.2	\$0.4	\$0.7	\$0.1	\$0.4	\$0.7	\$1.2
49 (Kitimat-Stikine)	14	10	12	36	\$0.8	\$0.6	\$0.5	\$1.9	\$0.9	\$0.8	\$1.1	\$2.8
51 (Bulkley-Nechako)	68	16	27	111	\$4.0	\$0.9	\$1.1	\$6.0	\$4.3	\$1.3	\$2.6	\$8.2
53 (Fraser-Fort George)	271	63	106	440	\$15.9	\$3.6	\$4.6	\$24.1	\$17.3	\$5.3	\$10.4	\$33.0
55 (Peace River)	406	98	183	687	\$23.8	\$5.6	\$7.9	\$37.3	\$25.9	\$8.6	\$18.6	\$53.1
57 (Stikine)	0	6	10	16	\$0.0	\$0.3	\$0.4	\$0.7	\$0.0	\$0.4	\$0.8	\$1.2
59 (Northern Rockies)	5	31	23	59	\$0.3	\$1.8	\$1.0	\$3.1	\$0.3	\$2.8	\$2.6	\$5.7
<b>Total</b>	<b>1,354</b>	<b>1,414</b>	<b>1,287</b>	<b>4,055</b>	<b>\$79.1</b>	<b>\$79.4</b>	<b>\$55.0</b>	<b>\$213.5</b>	<b>\$86.7</b>	<b>\$120.3</b>	<b>\$122.5</b>	<b>\$329.5</b>

Of the total tax benefit of Construction, the majority of the revenue will come from impacts in British Columbia (\$55.3 million) and Ontario (\$20.3 million; Table 3.1-2). Further, tax revenues to the Government of British Columbia are estimated to total approximately \$25.1 million, with an additional \$30.2 million to the federal government (Table 3.1-2).

In Table 3.1-1, total employment includes direct contractor employment from Table 2.3-2

## **3.2 OPERATION**

The Project is expected to be in Operation for an estimated 25 years, commencing in year 2018 and ceasing all Operation activities in 2042.

### **3.2.1 Employment and Income**

During Operation, the Project is estimated to result in a total of 124,349 person-years of direct, indirect and induced employment across Canada (Table 3.2-1). As set out in Table 3.2-1, within Canada, total annual employment is estimated to rise from approximately 1,630 persons-years in 2018 to a high of 5,387 person-years in 2037. Following, there is an expected drop in total employment impacts for the period of 2038 to 2050. Total employment effects drop dramatically from 2043 to 2050 when mine Operation ceases and the impact is only from indirect and induced effects of residual spending as estimated by the economic impact model.

The total economic impacts of Operation by province or territory are shown in Table 3.2-2. British Columbia is predicted to realize the majority of employment and income benefits, with total employment of approximately 72,053 person-years for the phase. In general, British Columbia is expected to benefit in 16,910 person-years of direct employment, 28,836 person-years of indirect employment and 26,307 person-years of induced employment (Table 3.2-3). Total annual employment estimates for Operation increase from approximately 1,032 person-years to a high of 3,148 person-years by 2037 (Table 3.2-4). After British Columbia and Ontario also benefits substantially from Project Operation, followed by Quebec and Alberta (Table 3.2-2)

Direct employment and, consequently, direct personal income impacts are predicted for British Columbia only, with indirect and induced impacts predicted for other provinces and territories.

The total economic impacts of Operation by British Columbia Census Division are shown in Table 3.2-5. Employment and personal income benefits are predicted to predominantly occur within the Greater Vancouver (CD 15) and Peace River (CD 55) regions. In CD 55, the location of the Project (Figure 1.1-1), total employment impacts (direct, indirect and induced) are estimated at 17,811 person-years (Table 3.2-5).

Personal income effects as a result of Project Operation are estimated at \$4.1 billion for Canada; of that, \$1.2 billion is predicted for Peace River and \$1.2 billion for Greater Vancouver (Table 3.2-5). Other CDs to receive personal income benefits as a result of the Operation phase include Fraser-Fort George, Fraser Valley, Skeena-Queen Charlotte, Central Okanagan and Columbia-Shuswap (Table 3.2-5).

**Table 3.2-1. Annual Economic Impacts (Direct, Indirect and Induced) of Operation in Canada**

Year	Employment (Person-years)	GDP (Millions of Dollars)	Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
2014	84	\$10.4	\$1.1	\$0.9	\$2.0
2015	223	\$25.9	\$2.3	\$2.0	\$4.3
2016	346	\$39.3	\$3.3	\$2.9	\$6.2
2017	387	\$43.5	\$3.8	\$3.3	\$7.1
2018	1,630	\$188.2	\$15.9	\$14.0	\$29.9
2019	3,044	\$333.8	\$26.3	\$23.1	\$49.4
2020	3,809	\$406.0	\$32.6	\$28.8	\$61.4
2021	4,219	\$445.1	\$36.0	\$31.7	\$67.7
2022	4,511	\$474.3	\$38.1	\$33.6	\$71.7
2023	4,726	\$496.7	\$39.5	\$34.8	\$74.3
2024	4,927	\$518.1	\$41.0	\$36.2	\$77.2
2025	5,113	\$535.1	\$40.9	\$36.0	\$76.9
2026	5,091	\$542.3	\$47.2	\$41.6	\$88.8
2027	5,088	\$539.5	\$47.5	\$41.8	\$89.3
2028	4,862	\$518.6	\$45.4	\$40.0	\$85.4
2029	4,815	\$514.6	\$45.1	\$39.8	\$84.9
2030	4,934	\$525.1	\$46.1	\$40.6	\$86.7
2031	5,141	\$542.8	\$41.8	\$36.8	\$78.6
2032	5,291	\$556.7	\$43.2	\$38.2	\$81.4
2033	5,357	\$562.5	\$43.8	\$38.6	\$82.4
2034	5,351	\$561.5	\$43.7	\$38.5	\$82.2
2035	5,341	\$560.7	\$43.6	\$38.4	\$82.0
2036	5,358	\$562.4	\$43.8	\$38.6	\$82.4
2037	5,387	\$562.4	\$42.7	\$37.6	\$80.3
2038	5,266	\$559.7	\$48.8	\$43.0	\$91.8
2039	5,194	\$549.4	\$48.5	\$42.8	\$91.3
2040	4,949	\$526.8	\$46.2	\$40.8	\$87.0
2041	4,873	\$520.0	\$45.6	\$40.2	\$85.8
2042	4,939	\$522.5	\$44.8	\$39.5	\$84.3
2043	2,231	\$205.5	\$19.4	\$17.1	\$36.5
2044	984	\$88.2	\$8.7	\$7.7	\$16.4
2045	459	\$40.8	\$4.1	\$3.6	\$7.7
2046	219	\$19.4	\$2.0	\$1.7	\$3.7
2047	105	\$9.3	\$1.0	\$0.8	\$1.8
2048	51	\$4.5	\$0.5	\$0.4	\$0.9
2049	25	\$2.2	\$0.2	\$0.2	\$0.4
2050	19	\$1.7	\$0.2	\$0.1	\$0.3
<b>Total</b>	<b>124,349</b>	<b>\$13,115.5</b>	<b>\$1,084.7</b>	<b>\$955.7</b>	<b>\$2,040.4</b>

**Table 3.2-2. Total Economic Impacts (Direct, Indirect and Induced) of Operation by Province or Territory**

Province or Territory	Employment (Person-years)	GDP (Millions of Dollars)	Total Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
Newfoundland and Labrador	194	\$22.8	\$1.7	\$2.0	\$3.6
Prince Edward Island	81	\$7.4	\$0.5	\$0.7	\$1.3
Nova Scotia	737	\$80.9	\$6.5	\$7.0	\$13.4
New Brunswick	486	\$54.5	\$4.3	\$4.8	\$9.1
Quebec	16,034	\$1,462.9	\$110.0	\$137.6	\$247.6
Ontario	19,996	\$2,040.3	\$173.9	\$161.8	\$335.7
Manitoba	2,455	\$244.5	\$16.8	\$20.3	\$37.0
Saskatchewan	1,468	\$154.6	\$11.7	\$11.9	\$23.5
Alberta	9,786	\$1,345.5	\$148.0	\$81.4	\$229.4
British Columbia	72,053	\$7,591.7	\$603.6	\$523.9	\$1,127.5
Territories	1,059	\$110.4	\$7.7	\$4.3	\$11.9
<b>Total</b>	<b>124,349</b>	<b>\$13,115.5</b>	<b>\$1,084.5</b>	<b>\$955.6</b>	<b>\$2,040.1</b>

**Table 3.2-3. Total Employment and GDP Impacts of Operation by Province or Territory**

Province or Territory	Employment (Person-years)				GDP (Millions of Dollars)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Newfoundland and Labrador	0	118	76	194	\$0.0	\$15.3	\$7.5	\$22.8
Prince Edward Island	0	38	43	81	\$0.0	\$4.0	\$3.4	\$7.4
Nova Scotia	0	439	298	737	\$0.0	\$53.9	\$27.0	\$80.9
New Brunswick	0	277	209	486	\$0.0	\$35.5	\$19.0	\$54.5
Quebec	0	8,603	7,431	16,034	\$0.0	\$851.9	\$611.0	\$1,462.9
Ontario	0	9,864	10,132	19,996	\$0.3	\$1,120.4	\$919.6	\$2,040.3
Manitoba	0	1,436	1,019	2,455	\$0.0	\$153.7	\$90.8	\$244.5
Saskatchewan	0	917	551	1,468	\$0.0	\$100.3	\$54.3	\$154.6
Alberta	0	5,894	3,892	9,786	\$0.0	\$876.3	\$469.2	\$1,345.5
British Columbia	16,910	28,836	26,307	72,053	\$2,174.9	\$2,946.0	\$2,470.8	\$7,591.7
Territories	0	820	239	1,059	\$0.0	\$86.6	\$23.8	\$110.4
<b>Total</b>	<b>16,910</b>	<b>57,242</b>	<b>50,197</b>	<b>124,349</b>	<b>\$2,175.2</b>	<b>\$6,243.9</b>	<b>\$4,696.4</b>	<b>\$13,115.5</b>
<i>British Columbia as % total</i>	<i>100%</i>	<i>50%</i>	<i>52%</i>	<i>58%</i>	<i>100%</i>	<i>47%</i>	<i>53%</i>	<i>58%</i>



**Table 3.2-4. Annual Economic Impacts (Direct, Indirect and Induced) of Operation in British Columbia**

Year	Employment (Person-years)	GDP (Millions of Dollars)	Tax Revenue (Millions of Dollars)		
			Federal	Provincial	Total
2014	81	\$10.0	\$1.1	\$0.9	\$2.0
2015	212	\$24.7	\$2.2	\$1.9	\$4.1
2016	323	\$37.0	\$3.2	\$2.7	\$5.9
2017	354	\$40.2	\$3.5	\$3.0	\$6.5
2018	1,032	\$117.5	\$10.7	\$9.3	\$20.0
2019	1,785	\$191.3	\$14.8	\$12.8	\$27.6
2020	2,156	\$225.1	\$17.4	\$15.1	\$32.5
2021	2,357	\$244.7	\$18.8	\$16.3	\$35.1
2022	2,534	\$263.5	\$19.9	\$17.2	\$37.1
2023	2,684	\$279.9	\$20.7	\$17.9	\$38.6
2024	2,825	\$295.8	\$21.6	\$18.7	\$40.3
2025	2,965	\$308.5	\$21.0	\$18.3	\$39.3
2026	3,042	\$327.1	\$28.9	\$25.1	\$54.0
2027	2,951	\$313.4	\$27.8	\$24.1	\$51.9
2028	2,854	\$304.8	\$27.0	\$23.4	\$50.4
2029	2,841	\$303.8	\$26.9	\$23.4	\$50.3
2030	2,874	\$306.6	\$27.2	\$23.6	\$50.8
2031	3,026	\$319.2	\$22.3	\$19.4	\$41.7
2032	3,115	\$327.3	\$23.1	\$20.1	\$43.2
2033	3,145	\$329.8	\$23.3	\$20.3	\$43.6
2034	3,140	\$329.0	\$23.3	\$20.2	\$43.5
2035	3,135	\$328.7	\$23.2	\$20.2	\$43.4
2036	3,138	\$329.0	\$23.3	\$20.2	\$43.5
2037	3,148	\$327.2	\$22.0	\$19.1	\$41.1
2038	3,148	\$338.1	\$29.9	\$25.9	\$55.8
2039	2,993	\$317.2	\$28.2	\$24.5	\$52.7
2040	2,888	\$308.0	\$27.3	\$23.7	\$51.0
2041	2,861	\$305.7	\$27.1	\$23.5	\$50.6
2042	2,873	\$303.5	\$25.8	\$22.4	\$48.2
2043	981	\$84.1	\$7.5	\$6.5	\$14.0
2044	350	\$30.0	\$2.8	\$2.4	\$5.2
2045	140	\$12.1	\$1.1	\$1.0	\$2.1
2046	58	\$5.0	\$0.5	\$0.4	\$0.9
2047	25	\$2.2	\$0.2	\$0.2	\$0.4
2048	11	\$0.9	\$0.1	\$0.1	\$0.2
2049	6	\$0.4	\$0.0	\$0.0	\$0.0
2050	2	\$0.4	\$0.0	\$0.0	\$0.0
<b>Total</b>	<b>72,053</b>	<b>\$7,591.7</b>	<b>\$603.7</b>	<b>\$523.8</b>	<b>\$1,127.5</b>

**Table 3.2-5. Employment, Income and GDP Impacts of Operation by Census Division in British Columbia**

Census Division	Employment (Person-years)				Personal Income (Millions of Dollars)				GDP (Millions of Dollars)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
01 (East Kootenay)	0	1,889	620	2,509	\$0.0	\$88.8	\$26.0	\$114.8	\$0.3	\$254.4	\$57.5	\$312.2
03 (Central Kootenay)	0	143	187	330	\$0.0	\$6.8	\$7.7	\$14.5	\$0.5	\$13.8	\$17.0	\$31.3
05 (Kootenay Boundary)	0	152	194	346	\$0.0	\$7.6	\$7.8	\$15.4	\$0.5	\$17.4	\$16.5	\$34.4
07 (Okanagan-Similkameen)	0	239	326	565	\$0.0	\$11.3	\$13.4	\$24.7	\$0.6	\$19.9	\$28.0	\$48.5
09 (Fraser Valley)	1,684	810	1,420	3,914	\$157.8	\$36.7	\$60.7	\$255.2	\$215.4	\$59.6	\$135.4	\$410.4
15 (Greater Vancouver)	3,384	10,781	7,708	21,873	\$315.5	\$525.6	\$337.6	\$1,178.7	\$453.5	\$1,123.0	\$725.1	\$2,301.6
17 (Capital)	0	849	834	1,683	\$0.0	\$40.6	\$37.3	\$77.9	\$2.5	\$65.6	\$72.5	\$140.6
19 (Cowichan Valley)	0	169	228	397	\$0.0	\$7.9	\$9.2	\$17.1	\$0.4	\$12.7	\$17.3	\$30.4
21 (Nanaimo)	0	514	431	945	\$0.0	\$25.4	\$18.5	\$43.9	\$0.8	\$45.7	\$36.8	\$83.3
23 (Alberni-Clayoquot)	0	194	211	405	\$0.0	\$8.9	\$8.3	\$17.2	\$0.2	\$14.9	\$16.0	\$31.1
24&26 (Comox-Strathcona)	0	250	274	524	\$0.0	\$11.7	\$11.2	\$22.9	\$0.6	\$20.2	\$21.9	\$42.7
27 (Powell River)	0	94	157	251	\$0.0	\$4.5	\$6.3	\$10.8	\$0.1	\$8.7	\$13.9	\$22.7
29 (Sunshine Coast)	0	134	194	328	\$0.0	\$6.5	\$7.8	\$14.3	\$0.1	\$10.6	\$16.2	\$26.9
31 (Squamish-Lillooet)	0	289	370	659	\$0.0	\$13.2	\$15.5	\$28.7	\$0.3	\$21.7	\$29.1	\$51.1
33 (Thompson-Nicola)	0	877	515	1,392	\$0.0	\$42.0	\$21.8	\$63.8	\$1.2	\$91.2	\$45.6	\$138.0
35 (Central Okanagan)	844	523	938	2,305	\$78.9	\$24.9	\$40.4	\$144.2	\$107.8	\$47.4	\$89.0	\$244.2
37 (North Okanagan)	0	359	354	713	\$0.0	\$16.9	\$14.8	\$31.7	\$0.5	\$31.4	\$29.8	\$61.7
39 (Columbia-Shuswap)	0	2,354	626	2,980	\$0.0	\$110.2	\$26.2	\$136.4	\$0.4	\$334.8	\$62.4	\$397.6
41 (Cariboo)	0	254	250	504	\$0.0	\$11.8	\$10.3	\$22.1	\$0.4	\$22.3	\$22.5	\$45.2
43 (Mount Waddington)	0	245	196	441	\$0.0	\$11.8	\$8.1	\$19.9	\$0.1	\$19.6	\$16.4	\$36.1
45 (Central Coast)	0	297	122	419	\$0.0	\$14.7	\$5.0	\$19.7	\$0.0	\$25.9	\$12.1	\$38.0
47 (Skeena-Queen Charlotte)	0	2,430	658	3,088	\$0.0	\$119.5	\$28.3	\$147.8	\$0.2	\$203.7	\$66.3	\$270.2
49 (Kitimat-Stikine)	0	119	166	285	\$0.0	\$5.7	\$6.6	\$12.3	\$0.2	\$9.8	\$13.2	\$23.2
51 (Bulkley-Nechako)	0	344	240	584	\$0.0	\$17.6	\$9.7	\$27.3	\$0.2	\$26.8	\$19.9	\$46.9
53 (Fraser-Fort George)	2,544	760	1,778	5,082	\$236.6	\$35.3	\$76.8	\$348.7	\$321.8	\$57.9	\$170.4	\$550.1
55 (Peace River)	8,454	2,743	6,614	17,811	\$788.8	\$134.0	\$284.6	\$1,207.4	\$1,066.3	\$281.4	\$651.9	\$1,999.6
57 (Stikine)	0	267	253	520	\$0.0	\$12.6	\$10.6	\$23.2	\$0.0	\$16.5	\$19.6	\$36.1
59 (Northern Rockies)	0	757	443	1,200	\$0.0	\$39.3	\$19.5	\$58.8	\$0.0	\$89.1	\$48.5	\$137.6
<b>Total</b>	<b>16,910</b>	<b>28,836</b>	<b>26,307</b>	<b>72,053</b>	<b>\$1,577.6</b>	<b>\$1,391.8</b>	<b>\$1,130.0</b>	<b>\$4,099.4</b>	<b>\$2,174.9</b>	<b>\$2,946.0</b>	<b>\$2,470.8</b>	<b>\$7,591.7</b>

### 3.2.2 Gross Domestic Product

For Canada, the total GDP impact of Project Operation is estimated at approximately \$13.1 billion (Table 3.2-1). The impact will increase from \$188.2 million in 2018 to \$562.5 million in 2033; following, GDP impact will fall to \$205.5 in 2043, mostly dissipating by 2050 (Table 3.2-1).

Of the total GDP impact in Canada, British Columbia is predicted to realize the majority of the benefits with an estimated GDP impact of approximately \$7.59 billion (Table 3.2-2). Provincial GDP impacts begin at approximately \$117.5 million in 2018 rising to \$338.1 million by 2038, after which annual provincial GDP contributions fall with decreased Operation expenditures through the next decade. GDP impacts decrease significantly after Operation ceases in 2042 (Table 3.2-4). Substantial GDP benefits are also expected for the province of Ontario, Quebec and Alberta (Table 3.2-3).

With respect to regional impacts in British Columbia, GDP benefits are predicted to predominantly occur within the Greater Vancouver (CD 15) and Peace River (CD 55) regions. In CD 55, total GDP impacts (direct, indirect and induced) are estimated at \$2.0 billion (Table 3.2-5).

### 3.2.3 Tax Revenue

For Operation, government tax revenues (direct, indirect and induced), primarily from personal income tax, indirect corporate profit tax and sales tax, total approximately \$2.0 billion, with \$1.1 billion projected to be generated for the federal government and \$0.9 billion for the provincial and territorial governments (Table 3.2-1). Tax revenue is projected at \$29.9 million in 2018, during the first year of Project Operation; the revenue is expected to remain fairly stable over the Operation phase, reaching \$91.8 million in 2038 and mostly dissipating by 2050 (Table 3.2-1).

Of the total tax revenue impact in Canada, British Columbia is predicted to realize the majority of the tax revenue benefits, with the total tax revenue of approximately \$1.13 billion (Table 3.2-2). The tax revenue increases to approximately \$55.8 million in 2038 (with approximately \$29.9 million to the federal government and \$25.9 million to the provincial government; Table 3.2-4). Note that the government tax revenue estimates are predominately comprised of income and sales tax collected, and do not include direct corporate profit tax or any royalties that are payable by HD Mining.

## 4. SUMMARY

The Project is expected to result in substantial economic benefits to British Columbia and Canada as a whole during Construction and Operation, and from the year 2014 and beyond to 2050.

The economic benefit to the province of British Columbia and Canada lasts longer than the life of the Project as a result of indirect and induced benefits. Indirect benefits result from inter-industry purchases of goods and services and induced effects result from spending after-tax household income, primarily from wages and salaries.

For the Construction phase, key economic benefits include the following:

- Direct Project employment of approximately 1,354 person-years in British Columbia and 1,766 person-years for all of Canada;
- Total employment (direct, indirect, and induced) of approximately 4,055 person-years in British Columbia and 6,483 person-years for all of Canada;
- Total GDP (direct, indirect, and induced) generated by the Project of approximately \$329.5 million in British Columbia and \$545.4 million for all of Canada; and
- Total tax revenue (federal and provincial) of approximately \$55.3 million from economic activity in British Columbia and \$94.5 million for all of Canada.

For Operation, excluding impacts due to Construction expenditures and employment that extend into the Operation phase (mainly associated with construction of the western shaft), key economic benefits include the following:

- Direct Project employment in British Columbia and Canada of approximately 16,910 person-years;
- Total employment (direct, indirect, and induced) of approximately 72,053 person-years in British Columbia and 124,349 person-years for all of Canada;
- Total GDP (direct, indirect, and induced) generated by the Project of approximately \$7.6 billion in British Columbia and \$13.1 billion for all of Canada; and
- Total tax revenue (federal and provincial) of approximately \$1.1 billion from economic activity in British Columbia and \$2.0 billion for all of Canada.

## REFERENCES

PwC. 2014. *Input Data for the Murray River Coal Project Economic Impact Analysis*. Report prepared for HD Mining International. July 22, 2014. 15pp.