Benga Mining Ltd.
Grassy Mountain Coal Project
Socio-Economic Impact Assessment

Submitted to	Benga Mining Ltd.
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1. Introduction

1.1 Project Description

Benga Mining Limited (Benga), a wholly owned subsidiary of Riversdale Resources Limited (Riversdale), is proposing the development of the Grassy Mountain Mine (the Project), a 4.5 million tonne per annum (Mta) coal mine located in the Municipal District of Ranchland No. 66 (Ranchland) and the Specialized Municipality of Crowsnest Pass (Crowsnest Pass) approximately seven kilometres north of Blairmore in Townships 8 and 9, Ranges 3 and 4 West of 5. The Project involves a surface coal mine, a coal preparation plant and associated infrastructure including a coal conveyor system, a rail load-out facility, an access corridor, maintenance shops, environmental management systems, and other necessary facilities for the operational life of the Project.

Actual timing of construction and operations will depend on the timing of regulatory approvals and market conditions. For the purpose of this assessment, the following schedule has been assumed:

- construction of the Project starting in Q1 2018 and ending in Q3 2019; and
- operations start-up in Q3 2019.

If approved, the Project will operate for approximately 23 years following completion of construction.

1.2 Mitigations and Enhancements

The Project has a number of characteristics that serve to mitigate the negative and enhance the positive socio-economic effects of the Project, including:

- a temporary camp to house construction workers;
- local hiring and procurement;
- traffic mitigations;
- community enhancement through sponsoring local events and charities; and,
- planning initiatives.

1.3 Summary of Conclusions

The Project will create positive economic and fiscal effects on the socio-economic regional study area (RSA) consisting of Ranchland, Crowsnest Pass and Town of Sparwood (Sparwood). The Project is estimated to create:

- 90 person years of engineering employment prior to and during construction;
- 910 person years of on- and off-site employment related to the construction of the plant, facilities and infrastructure for the mine between 2018 and 2019; and
- 385 long-term operations positions to be hired by 2020.

Once fully operational, the Project will add an estimated $1.5 million annually in property taxes to Ranchland and Crowsnest Pass, which over the life of the Project has a net present value (NPV) of approximately $11.2 million (NPV 2015) assuming no change in mill rates. An estimated 67% of these taxes will be paid to Ranchland and the balance will be paid to Crowsnest Pass. The Ranchland council has acknowledged that much of the impacts of the Project will accrue to Crowsnest Pass and has indicated they would be open to negotiating a revenue-sharing agreement once the Project commences (RL 2013). The Project will also contribute an estimated $140 million (NPV 2015) and $210 million (NPV 2015) to provincial and federal corporate income taxes respectively as well as approximately $195 million (NPV 2015) in provincial royalties over the 23-year operating life of the project, assuming a $140/tonne average real price of coal.

The jobs created by the Project are expected to be filled primarily by in-migrants to the region, thereby increasing the permanent population in the RSA. Within Alberta, the population impact of the Project is expected to fall primarily on the S.M. of Crowsnest Pass, particularly the communities of Blairmore and Coleman as they are closest to the Project.

In addition to the impact in Alberta, the Project is also expected to result in population growth in the nearby Town of Sparwood in British Columbia (B.C.). By the year 2021, an estimated 1,100 people are expected to have re-located to the region, with approximately 430 going to Sparwood, 660 to Crowsnest Pass, and the balance (10) to Ranchland. The effects on regional services and infrastructure will largely be in line with population effects, falling primarily on Crowsnest Pass and Sparwood.

A number of service providers have indicated that they are well positioned to plan for and address future growth forecasted under both Base and Application Case assumptions, particularly in Sparwood. In Crowsnest Pass, concerns were raised about the ability of the municipality to provide sewage and water services to a larger population.

While service providers will likely face challenges in meeting the increased demand, future growth can also help generate opportunities to address this increased demand by increasing revenues to government, increasing the labour and volunteer base, and growing the number of businesses that can support local programs and infrastructure. Growth in a community can also help increase or revitalize the breadth and nature of infrastructure and services available to local residents (e.g. specialized health services, broader educational offerings).

2. Scope of the Socio-Economic Impact Assessment

As per the Terms of Reference (TOR) for the Environmental Impact Assessment (EIA) of the Project issued by Alberta Energy Regulator (AER), the Socio-Economic Impact Assessment (SEIA) addresses the socio-economic impacts of construction and operation of the Project on the communities in the RSA. The SEIA also considers the Canadian Environmental Assessment Agency (CEAA) guidelines for the Project which note that the assessment should consider the socio-economic environment via a broad range of socio-economic matters that affect communities in the study area.

2.1 Valued Components

The SEIA draws on the following sources for identifying the key socio-economic valued components:

- Section 8 of the TOR for the EIA of the Project, as issued by Alberta Energy Regulator 2015 (AER 2015);
- Regulations Designating Physical Activities in the Canadian Environmental Assessment Act, 2012;
- discussions with regional service providers;
- responses by the AER, other stakeholders, and interveners, to recent SEIAs in the course of the regulatory review process, including public hearings;
- socio-economic studies and reports prepared by government, industry or regional service providers; and
- analysis of recent SEIAs for other mining and large industrial projects.

These sources indicate that the socio-economic value components to be considered in this analysis fall into the following categories:

- employment;
- personal and business income;
- government tax and royalty income;
- population;
- regional infrastructure and services, including:
    - housing, including worker housing;

  - social infrastructure (e.g. health, education, policing, emergency, recreation and social services);
  - municipal infrastructure and services;
  - transportation effects; and
- traditional (Aboriginal Groups) land use.

2.2 Key Indicators

Key indicators used to assess the effects of the Project on the valued components identified in Section 2.1 are:

- workforce;
- income;
- population changes;
- effects of population changes on service providers and physical infrastructure;
- effects of increased traffic on the regional road network;
- effects on traditional land use and culture;
- municipal taxes;
- provincial corporate tax and resource royalty income; and
- federal corporate tax.

Many of these key indicators are well suited for quantification and provide an easy-to-interpret measure for potential effects. Effects on service providers are based, in part, on key respondent interviews and are treated mostly qualitatively.

2.3 Assessment Cases

This analysis defines three assessment cases to evaluate key socio-economic issues and associated key indicators. They are:

- The **Base Case**, consisting of all the current economic activity in the RSA plus those large industrial projects that are currently under construction or have regulatory approval.
- The **Application Case**, consisting of all the economic activity assumed under the Base Case, plus the Project.

- The **Planned Development Case (PDC)**, consisting of all the economic activity assumed under the Application Case, plus additional projects that were disclosed as of February 1, 2016 including:
    - The Altalink Castle Rock Ridge to Chapel Rock Transmission Project;
    - CanAus Coal's Michel Creek Coking Coal project; and
    - Teck's Baldy Ridge Extension project.

Teck's other proposed project in the region, the Coal Mountain Phase 2 Project, was suspended in late 2015 and is therefore not included in the PDC assessment (Teck 2015). A complete listing of the projects included in the Base Case and PDC is included in the Application (Section D.2.4.5, Table D.2.5-1).

2.4 Study Boundaries

2.4.1 Temporal Considerations

The SEIA covers the project life from construction through to the end of operations. It will concentrate on the time between 2018 and 2021, reflecting that:

- on-site construction of the Project is expected to take place over an approximate two-year period between Q1 2018 and Q3 2019; and
- operation of the Project is expected to begin in Q3 2019 with full operations hiring to be completed by 2020.

The 2018 to 2021 period captures the maximum socio-economic effects of the Project as it encompasses the period in which the population effect of the Project is most pronounced. Other projects may come forward within that timeframe that would compound some of these effects. If they occur, any future projects will be subject to separate applications, including cumulative effects assessments of industry development as is known at that time.

2.4.2 Spatial Considerations

The Project is fully located within the province of Alberta in the M.D. of Ranchland and the S.M. of Crowsnest Pass. However, the Town of Sparwood, located 40 km to the west of the Project in the province of British Columbia (B.C.), acts as a service centre to several mines in southeastern B.C. and will likely also serve the Project. The RSA therefore consists of two unique parts:

- the Alberta portion which includes Ranchland and Crowsnest Pass; and
- the B.C. portion which includes only the Town of Sparwood and the portion of Highway 3 connecting the Project to the Town.

The boundaries of the RSA have been defined based on the following considerations:

- the existing trade patterns and traffic flows in the region;
- the existing distribution of service providers and infrastructure in the region;
- Benga's hiring and materials procurement plan for the construction of the Project;
- the experience of other industrial projects in the region;
- land use concerns related to lands nearby the Project; and
- the availability of statistical data to adequately measure the impacts of the Project.

This analysis focuses on the impact to the services in the communities of Crowsnest Pass due to their proximity to the Project and Sparwood as the nearest service centre for the mining industry. The socio-economic effects of the Project will not be uniformly distributed across the RSA and the effects assessment for different VCs is focused on different communities as appropriate.

It should be noted that Crowsnest Pass was formed in 1979 as a result of the amalgamation of the following six municipalities:

- the Town of Coleman;
- the Town of Blairmore;
- the Village of Bellevue;
- the Village of Frank;
- Improvement District No. 5; and
- Improvement District No. 6.

Due to the amalgamation, census and other socio-economic data for individual communities are limited. Baseline conditions are therefore presented for Crowsnest Pass as a whole unless community-specific data are available.

A map of the RSA can be seen in Figure 2.1.

2.5 Analytical Approaches

The differences between the Base Case, Application Case and PDC are determined using a variety of methods, ranging from extensive quantitative analysis to qualitative approaches, including:

- economic input-output modeling of the Alberta and B.C. economies to determine the impact of the Project in terms of total employment impacts and the impact on the gross domestic product (GDP) of both provinces;
- labour market analysis to relate the construction workforce demands to the availability of workers in light of other anticipated heavy industrial construction in the province;
- population projections to determine the Project's impact on regional population growth and thus on the demand for future social and physical infrastructure;
- key respondent interviews and analysis of historical performance to gauge the capacity of education, health and other systems to respond to an influx of population during the construction and operations phases of the Project; and
- data analysis and key respondent interviews with regard to construction and operations traffic issues on regional highways.

The choice of assessment methodology depends on the issue and the availability of data.

2.6 Residual Effects Characterization and Significance Determination

A residual effect is one which remains after mitigation and other management measures have been implemented. A significance determination for residual socio-economic effects takes into account:

- Key indicators identified in 2. Many of these indicators have been quantified and provide easy-to-interpret measures for potential effects.
- Input obtained from public data sources and local representatives with respect to anticipated infrastructure and service provider capacity. This input takes into consideration targets, standards and desired outcomes established by service providers.
- The professional expertise of the socio-economic team, based on the team's collective experience having conducted over 40 socio-economic impact assessments in the past 10 years across Alberta and elsewhere in Canada.

The characterization of residual effects and evaluation of significance is consistent with the method used elsewhere in the filed application, which itself draws on guidance from both Federal and Provincial regulators. The criteria for characterizing residual effects and evaluating significance are: project contribution, geographic extent, duration, frequency, reversibility, magnitude, confidence rating, and probability of occurrence.

The SEIA assesses significance with regard to residual effects in a regional or provincial context. It does not address the level of significance of any one effect as it may be experienced by individuals or groups.

Rg 4
Rg 3 W5M
Tp 9
Tp 8
Tp 7
Daisy Creek
Forestry Trunk Road
Proposed Mine Permit Boundary
North Rock Disposal Area
Ultimate Pit Extent
Central Rock Disposal Area
Coal Handling Processing Plant and Infrastructure
Topsoil Stockpiles
Proposed Water Pipeline/ Service Road
Covered Conveyor, Access Road and Powerline ROW
South Rock Disposal Area
Proposed Golf Course
Construction Camp
Proposed Rail Loadout
Proposed Rail Loop
Proposed Helipad Access
Road Access
Coleman
Blairmore
Frank
Bellevue
Crowsnest River
Caudron Creek
Blairmore Creek
Morin Creek
Gold Creek
Green Creek
Pellletier Creek
McGillivray Creek
York Creek
North York Creek
Nez Perce Creek
Loop Creek
40
3

LEGEND

- Primary Highway
- Secondary Highway
- Existing Railway
- Existing Access Road
- Existing Powerline
- CHPP Facilities
- Proposed Water Pipeline/ Service Road
- Railway Loop
- Proposed Helipad Access
- Proposed Mine Permit Boundary
- Ultimate Pit Extent
- Ultimate Rock Disposal Area Extent
- Topsoil Storage
- Construction Camp
- Ponds and Ditches
- Coal Handling Processing Plant and Infrastructure
- Covered Conveyor, Access Road and Powerline ROW
- Proposed Golf Course Area
- Undisturbed Area
- Legacy Mine Disturbance

PROJECT

RIVERSDALE RESOURCES

GRASSY MOUNTAIN COAL PROJECT

MILLENNIUM EMS Solutions Ltd.

TITLE

PROPOSED PROJECT FOOTPRINT AND MINE PERMIT BOUNDARY

NOTES

AltaLIS, 2016; NRCAN, 2015; Riversdale, 2016
Datum/Projection: UTM NAD 83 Zone 11

PROJECT:	14-00201-01
DRAWN BY:	SL
CHECKED BY:	DM
DATE:	JUNE 13, 2016

0 1 2 4
Kilometres

FIGURE

2.1

Document Path: K:\Active Projects 2014\AP 14-00201 to 14-00250\14-00201\MXD\Final Figures\Noise\Resubmission\Fig 1 Proposed Project Footprint and Mine Permit Boundary.mxd

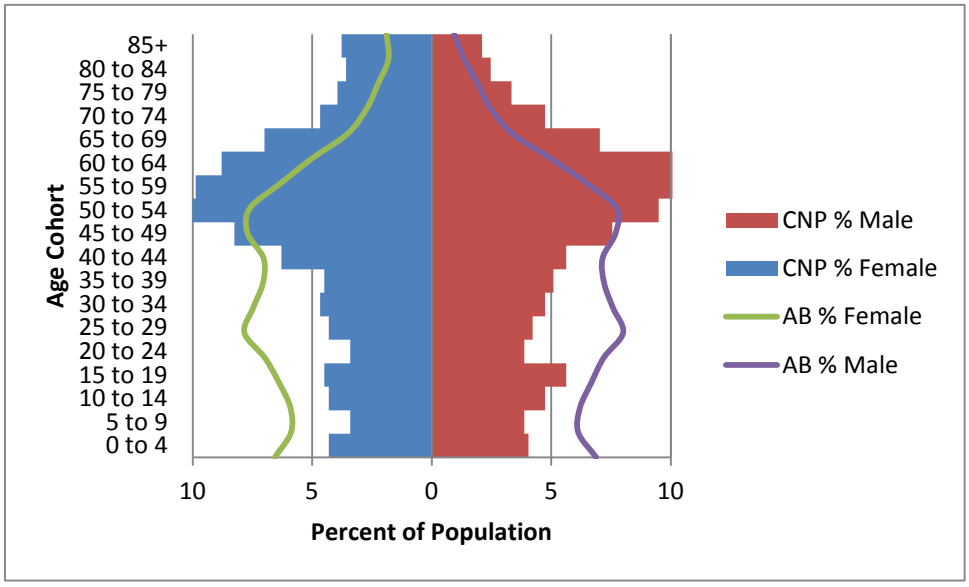
3. Socio-Economic Setting

3.1 Population

In 2011, the RSA was home to approximately 9,312 people, of which 5,645 resided in Alberta and 3,667 resided in B.C. As shown in Table 3.1, the majority of the population in the Alberta portion of the RSA is distributed throughout Crowsnest Pass in the communities of Coleman (1,050), Blairmore (2,060), Bellevue (790), and Frank (260). Population change in the Alberta portion of the RSA region during the 2001 to 2011 period was negative, as the population declined at an average annual rate of 1.2%, a marked contrast to the 2.1% annual growth in the province overall.

The population in the Alberta portion of the RSA is also considerably older than the population of the province overall (Statistics Canada 2011, Environics 2014). The median age in the Crowsnest Pass, where the majority of the population is located, is 50.5 years, well above the provincial measure of 36.5 (Statistics Canada 2011, Environics 2014). As shown in Figure 3.1 below, the proportion of the Crowsnest Pass population under the age of 45 is considerably lower than the province overall and a disproportionately high percentage of the population is aged between 45 and 85.

Figure 3.1: Population Distribution by Age



Source: Statistics Canada 2011, Environics 2014, and Nichols Applied Management.

The 2011 population in the B.C. portion of the RSA was approximately 3,667 people, located entirely in Sparwood. Population change in the Town during the 2001 to 2011 period was negative and declined an average of 0.4% annually during that period as compared to the province overall which grew at an average annual rate of 1.4%. The age of the population in

Sparwood is generally in line with British Columbia overall, with the median ages being 39.5 and 40.7 respectively (Statistics Canada 2011, Environics 2014).

Table 3.1: RSA Population

Geography	2001	2011	10 Year Change	Average Annual Growth Rate (%)
Ranchland	95	80	-15	-1.7
Crowsnest Pass	6,260	5,565	-695	-1.2
Blairmore[1]	n/a	2,060	n/a	n/a
Coleman[1]	n/a	1,050	n/a	n/a
Bellevue[1]	n/a	790	n/a	n/a
Frank[1]	n/a	260	n/a	n/a
Other[1]	n/a	1,510	n/a	n/a
Total AB portion of the RSA	**6,355**	**5,670**	**-710**	**-1.2**
Town of Sparwood	3,810	3,667	-143	-0.4
Total B.C. portion of the RSA	**3,810**	**3,667**	**-143**	**-0.4**
Total RSA	**10,165**	**9,312**	**-853**	**-0.9**
Alberta	**2,974,807**	**3,645,257**	**670,450**	**2.1**
B.C.	**3,907,740**	**4,400,057**	**492,317**	**1.4**

Source: Statistics Canada, 2001, 2011, Nichols Applied Management

1. 2011 estimate is based on 2009 Alberta Official Population List (Alberta Municipal Affairs) and the 2011 Federal Census (Statistics Canada). Specific community data not available for other years (represented as n/a).

There are no First Nation reserves or Métis settlements within the RSA. However, approximately 3% (175 people) of the Alberta portion of the RSA identify themselves as Aboriginal. Of the 175 people identifying as Aboriginal, approximately three quarters identify as Métis and the balance as First Nations. In Sparwood, 258 people identify themselves as Aboriginal of which 157 are Métis and the balance are First Nations (Statistics Canada 2011, Environics 2014).

3.1.1 Non-Permanent Population

There is a non-permanent population in the RSA that fluctuates seasonally and with the level of industrial activity.

The non-permanent population consists of:

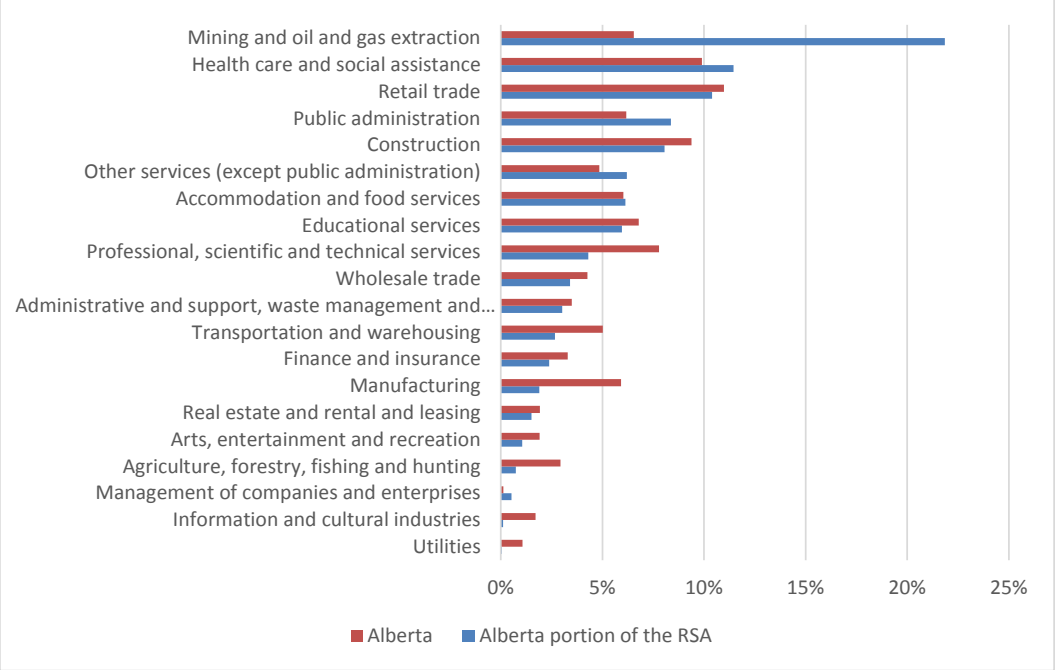
- visitors with secondary residences in Crowsnest Pass;
- tourists, primarily during the summer months;
- mobile workers who reside permanently outside of the region but work in the RSA and reside in rental accommodations in Crowsnest Pass or Sparwood during their shifts; and,
- seasonal construction workers.

Mobile workers are accommodated primarily in rental accommodations but also in hotels and motels. The administrations of the S.M. of the Crowsnest Pass and the Town of Sparwood estimate that their non-permanent populations are approximately 1,500 to 2,000 and 400 to 1,700 respectively (Schalekamp 2015, pers. comm., SOCP 2015). These estimates were derived by examining utility usage rates, taxfiler data, and Teck employee studies.

3.2 Wage Economy

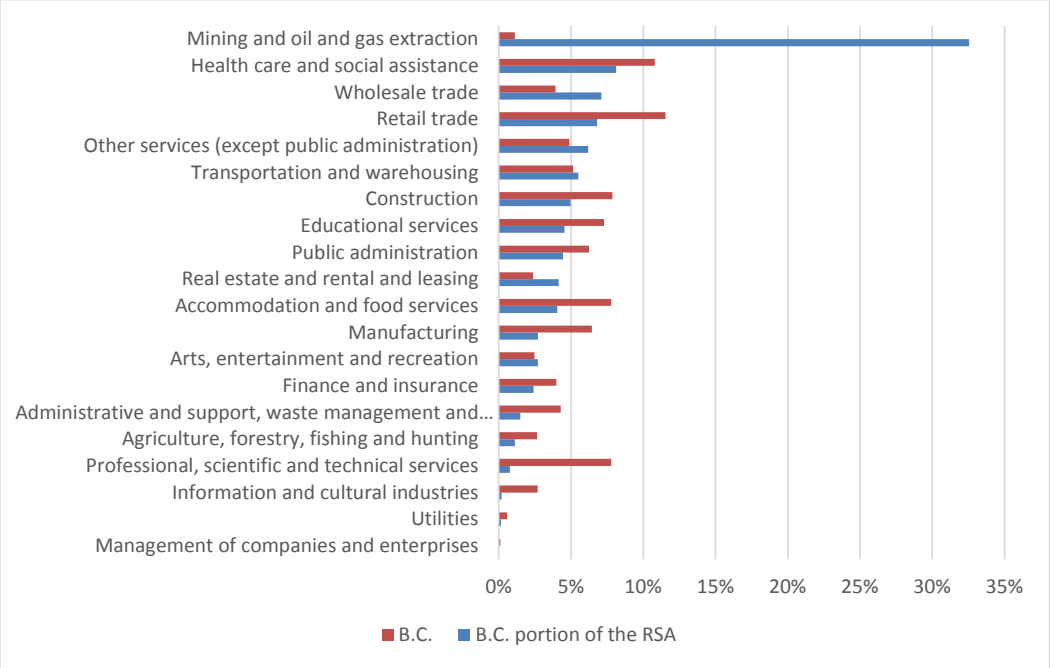
The wage economy of the RSA is driven primarily by the mining, quarrying, and oil and gas extraction industry, which accounts for approximately 22% of all jobs in the Alberta portion of the RSA and 33% of jobs in the B.C. portion of the RSA. These numbers are well above the provincial averages of 7% and 1%, respectively (Stats Can 2011, Environics 2014) (Figure 3.2, Figure 3.3). The primary employer in the region is Teck Coal Ltd., which operates five mines in the region and directly employs 800 workers who live in Sparwood (SOCP 2015). Other large employers in Sparwood include mine service companies such as Finning Canada and Joy Global.

Figure 3.2: Employment by Industry, Alberta Portion of RSA



Source: Statistics Canada 2011, Environics 2014.

Figure 3.3: Employment by Industry, B.C. Portion of RSA



Source: Statistics Canada 2011, Environics 2014.

Other key industries in the RSA include health care and social assistance, retail trade, construction and public administration which, when taken together with the mining industry, account for more than half of all employment in the RSA (Stats Can 2011, Environics 2014). Tourism, particularly in the summer, is also a key economic driver in the Crowsnest Pass region.

3.3 Labour Force

The labour force participation rate in the Alberta portion of the RSA is 61%, well below the provincial average of 73%. This is reflective of the fact that persons aged 65 and over make up 22% of the population of Crowsnest Pass as compared to 11% in Alberta overall. The unemployment rate for the Alberta portion of the RSA is identical to the provincial rate of 5.8% (Stats Can 2011, Environics 2014).

The labour force participation rate in the B.C. portion of the RSA is 69%, which is slightly above the provincial average of 65%. The unemployment rate for the B.C. portion of the RSA (5.5%) is well below the provincial rate of 7.8%. Table 3.2 shows the labour force indicators for the RSA relative to the provinces of Alberta and B.C.

Table 3.2: Labour Force Indicators

Labour force indicator	Alberta Portion of the RSA	Alberta	B.C. portion of the RSA	B.C.
Labour force size	2,906	2,116,416	2,073	2,355,193
Participation rate (%)	60.8%	73.2%	68.8%	64.6%
Unemployment rate (%)	5.8%	5.8%	5.5%	7.8%

Source: Statistics Canada 2011, Environics 2014.

3.3.1 Educational Attainment

The prominent role of resource extraction in the regional economy is reflected in the level and type of educational attainment of RSA residents. In the Alberta portion of the RSA, the percentage of the population holding an apprenticeship or trade certificate (14%) is above the provincial average (11%). Additionally, an estimated 32% of the Alberta RSA population over the age of 15 has not completed high school compared to the provincial average of 23% (Nichols Applied Management 2011, Stats Can 2006).

In the B.C. portion of the RSA, the percentage of the population holding an apprenticeship or trade certificate is also above the provincial average (19% as compared to 11%). Unlike the Alberta portion of the RSA, an estimated 26% of the population over the age of 15 have not completed high school compared to the provincial average of 20% (Stats Can 2006).

3.4 Income

As shown in Table 3.3, household incomes in the Alberta portion of the RSA in 2011 were below the provincial average by approximately 30%. This is reflective of the high number of seniors and retirees in the area (the median age in Crowsnest Pass is 51 and 43 in Ranchland as compared to 36.5 in Alberta as a whole). In contrast, the population of Sparwood is younger than the provincial average (median age of 39.5 as compared to 42 for the province of B.C.) and more likely to be in the labour force (see Table 3.2) and the median household income is 32% higher than the B.C. provincial average (Stats Can 2011).

Table 3.3: Median Household Income

Geography	2001	2011
Ranchland	-	$48,750
Crowsnest Pass	$37,971	$53,158
Town of Sparwood	$55,313	$78,731
Alberta	**$52,934**	**$76,354**
B.C.	**$47,084**	**$59,632**

Note: Data is unavailable for M.D. Ranchland in the 2001 Census.
Source: Statistics Canada 2001, 2011.

4. Economic and Fiscal Effects

4.1 Scope

This section provides an overview of the economic and fiscal effects of the Project.

4.2 Project Expenditures

4.2.1 Construction Expenditures by Region

Total initial capital expenditure for the Project is estimated to be $730 million. Construction capital expenditures include wages and salaries paid to construction workers, engineering and environmental services, and the direct purchase of goods and services, such as equipment modules and structural steel elements. Capital outlays will likely begin before the construction period for items such as engineering and purchases of long lead-time equipment.

Table 4.1 provides a breakdown of the estimated construction expenditure by region, based on published supply ratios, discussions with local service contractors, information provided by Benga, and the past experiences of similar projects in the region (AF 2015). The table indicates that an estimated 0.5% of the total expenditure will accrue to the RSA, 45.5% to the rest of Alberta, and 9.0% to the rest of B.C. An additional 5.8% will accrue to the rest of Canada, and the balance to foreign suppliers. The expenditure accruing to foreign suppliers is related primarily to the purchase of materials and equipment.

Table 4.1: Construction Expenditure by Region

Expenditures	RSA	Other Alberta	Other B.C.	Other Canada	Foreign	Total
	[$ million]					
Engineering	--	20	2	2	2	26
Materials/Equipment	2	203	38	40	284	567
Labour	2	109	26	-	-	137
Total	**4**	**332**	**66**	**42**	**286**	**730**
Total [%]	**0.5**	**45.5**	**9.0**	**5.8**	**39.2**	**100**

-- Not significant

4.2.2 Operations Expenditures by Region

Once fully constructed, the annual operations expenditure of the Project will average approximately $225 million per year. Table 4.2 provides a breakdown, by region, of the annual operations and sustaining capital expenditure based on the published supply ratios by industry (AF 2015). An estimated 42% of the expenditures will accrue to Alberta, 9% to B.C., and 11% to the RSA. A further 7% will be spent in the rest of Canada and the balance (31%) on foreign suppliers.

Table 4.2: Operations Expenditure by Region

Expenditures	RSA	Other Alberta	Other B.C.	Other Canada	Foreign	Total
	[$ million]					
Materials	5	40	5	15	65	130
Labour	20	15	10	-	-	45
Fuel & Utilities	-	40	5	-	5	50
Total	**25**	**95**	**20**	**15**	**70**	**225**
Total [%]	**11**	**42**	**9**	**7**	**31**	**100**

-- Not significant

4.2.3 Local Hire and Procurement

Benga has policies in place to hire locally first and to use Alberta-based contractors as often as possible subject to labour availability, cost, and quality considerations. Engagement of the local labour force will be coordinated from Benga's Blairmore office location.

The Project will also offer increased contracting opportunities for qualified local Aboriginal businesses and employment opportunities for qualified local Aboriginal workers. Benga is committed to communicating employment and contracting opportunities to local Aboriginal persons through career fairs, reverse trade shows, open houses, information sessions, and project update presentations.

Aboriginal persons face a number of barriers to accessing employment opportunities including education levels, skill sets and experience. In order to help overcome these barriers, Benga is also committed to supporting education and training initiatives for local Aboriginal persons, where appropriate. Further, Benga will work to form relationships and communicate regularly with local Aboriginal communities in order to identify and address barriers to accessing Project-specific employment and contracting opportunities.

As of filing, Benga are in advanced discussions regarding a benefits agreement with the Piikani First Nation, the closest First Nation to the project. The agreement includes provisions to support preferential hiring and contracting, as well as training, of Piikani First Nation members.

4.3 Total Income Effects

The construction expenditures associated with the Project will constitute income for contractors, suppliers and workers. These primary recipients will, in turn, spend a portion of this income on goods and services, thus circulating the expenditures throughout the economy, compounding the income effect.

4.3.1 Construction

Based on published statistics, the Project's direct, indirect and induced impact in terms of GDP and household income is approximately:

- $225 million and $150 million, respectively, in Alberta; and
- $56 million and $45 million, respectively, in British Columbia.

4.3.2 Operations

Based on published statistics, the direct, indirect, and induced impact of an average year of Project operations in terms of GDP and household income is approximately:

- $99 million and $42 million, respectively, in Alberta; and
- $27 million and $12 million, respectively, in British Columbia.

4.3.3 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Project contribution is positive during both construction and operation as the Project will contribute to increased incomes to individuals, households, and businesses in the region.
- Geographic extent of the effects will mostly be recognized at the regional level, but will also occur at the provincial and even national level.
- Duration of Project effects during construction will be short (less than two years). During operations, the duration will be long-term.
- Frequency of Project effects during both construction and operations will be continuous.
- Project effects are reversible in the long-term. The Project effects on income will last through the operational life of the Project and then cease after closure.
- Magnitude is low during both construction and operation, taking into consideration the size of communities in the RSA, the use of mobile workers from outside the region, and the procurement of goods and services from suppliers both within and outside the RSA.
- Probability of occurrence is high.

Based on the residual effects characterization above, Project-related effects on income are predicted to be not significant. Prediction confidence is high.

4.4 Fiscal Effects

The Project contributes property taxes to both Ranchland and Crowsnest Pass, coal royalties to the provincial government, and corporate taxes to the provincial and federal government. Tax

and royalty payments expand the ability of the different levels of government to fund programs and initiatives in the RSA and elsewhere.

4.4.1 Municipal Fiscal Effects

The amount of property taxes that the Project will pay is uncertain, as both the actual assessment of the facility and the tax rates in effect when it becomes operational are unknown. Approximately 80% of the Project is situated in Ranchland and 20% in Crowsnest Pass. It is estimated that the Project will increase the non-residential assessment base of:

- Ranchland by $175 million (90% of the 2014 non-residential assessment base); and
- Crowsnest Pass by $44 million (29% of the 2014 non-residential assessment base).

Annual municipal tax payments to Ranchland and Crowsnest Pass are estimated at $990,000 and $490,000, respectively, once the project is fully operational. Using an 8% discount rate, the present value of the municipal taxes over the life of the project is estimated at $11.2 million ($ 2015).

Ranchland has indicated they are willing to enter into a revenue-sharing agreement with Crowsnest Pass once the Project is operational in recognition of the increased demand for services resulting from the Project's population effect falling disproportionately more on Crowsnest Pass than Ranchland (RL 2013).

4.4.2 Provincial Fiscal Effects

Once the Project is fully operational, it will pay royalties to the provincial government of Alberta. Future royalty payments are subject to uncertainty as they are directly related to the prevailing market price of coal, the Canadian-US dollar exchange rate, and production costs.

The following assumptions underlie this analysis:

- the Project is considered as a single entity;
- a real discount rate of 8%;
- a long-term average real price of coal equal to CAD $140/tonne; and
- the Alberta government's Coal Royalty Guidelines are in effect for the life of the Project.

Under these assumptions, the Project is estimated to pay royalties with a net present value of $195 million ($ 2015) over its productive life.

Benga will also pay provincial and federal corporate income taxes on revenue derived from the Project. Under the same pricing assumptions described above and assuming the present tax

frameworks apply over the life of the Project, Benga will pay corporate income taxes of approximately $140 million and $210 million (NPV 2015) over the life of the Project to the governments of Alberta and Canada respectively.

These provincial fiscal benefits are not net of potential costs to the province of social and physical infrastructure investment driven by industry expansion, including the Project.

4.4.3 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Project contribution is positive as the Project will contribute increased government revenue to all three levels of government.
- Project effects will be felt at the municipal (i.e. regional), provincial and even national levels.
- Duration of Project effects will be long-term.
- Frequency of Project effects will be continuous.
- Project effects are reversible in the long-term. The Project effects on government revenue will last through the operational life of the Project and then cease after closure.
- Magnitude is considered moderate at the regional level, taking into consideration the fiscal position of host municipalities in the RSA, and low at the provincial and national level.
- Probability of occurrence is high.

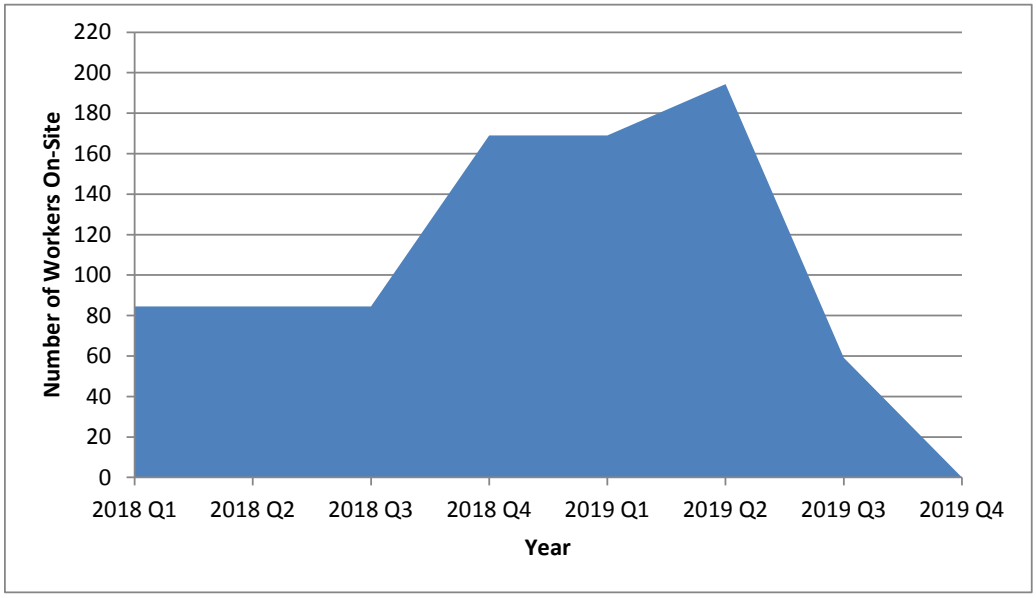
Based on the residual effects characterization above, Project-related effects on government revenue are predicted to be not significant. Prediction confidence is high.

4.5 Employment Effects

4.5.1 On-Site Construction Employment

Construction of the Project is expected to require a total of approximately 910 person years of labour during the 2018 to 2019 period. An estimated 845 person years are expected to be on-site, with the balance in fabrication shops outside of the RSA. The number of workers on-site between 2018 and 2019 is expected to average 120 during the two-year period and peak at 195 during Q2 of 2019 as shown in Figure 4.1.

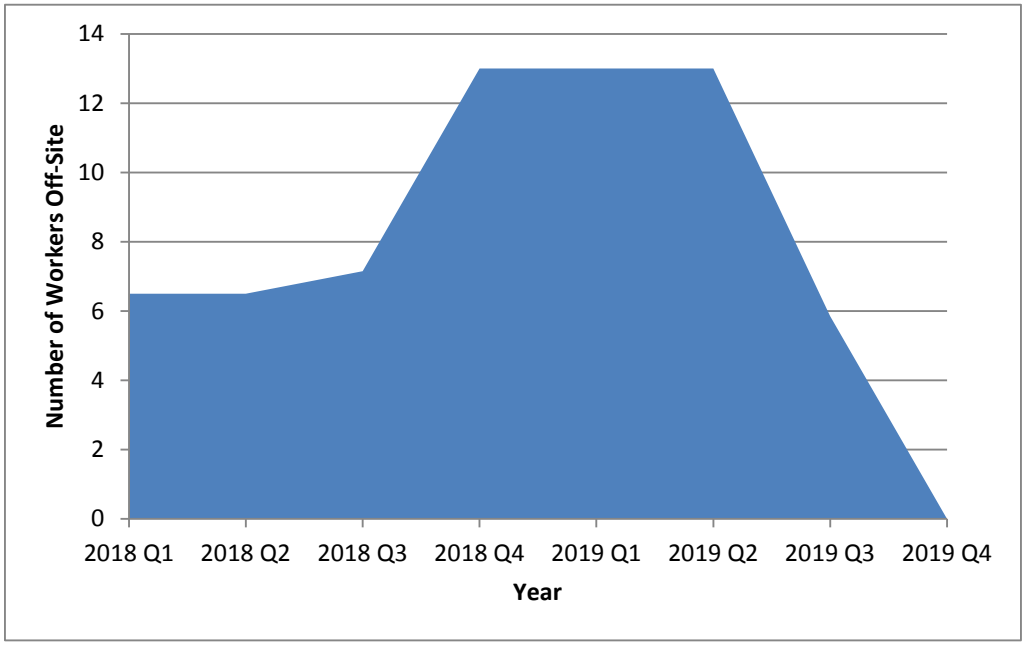
Figure 4.1: On-Site Construction Workforce



4.5.2 Off-Site Construction Employment

The construction of the Project will create work in fabrication and machine shops outside of the RSA. Off-site construction is estimated to require approximately 65 person years of labour during the 2018 to 2019 period. Figure 4.2 shows that the off-site workforce is expected to peak at 13 people in late 2018 and persist at that level until mid-2019.

Figure 4.2: Off-Site Construction Workforce



4.5.3 Construction Employment by Type

The Project will employ a broad range of construction trades during the on-site construction activities, the bulk of which will be heavy equipment operators, welders, millwrights, pipefitters, iron workers, and electricians. Some construction workers are expected to remain on-site for up to two years following the completion of construction. These workers will be primarily millwrights and iron workers.

4.5.4 Engineering Employment

In addition to the on- and off-site construction employment, the Project is expected to create an estimated 90 person years of engineering employment. The majority of this work will accrue to engineering firms outside of the RSA in Edmonton and Calgary, and take place prior to the beginning of on-site construction activities.

4.5.5 On-Site Operations Employment

The Project is expected to start operations during 2019. Once fully operational, the Project will employ an annual average of 385 individuals. This number will vary slightly year-to-year because haulage distances will vary as the resource is extracted and the required number of equipment operators will vary in turn.

4.5.6 Off-Site Operations Employment

Off-site operations employment directly related to the Project will consist of corporate staff located at the Benga Mining office in Blairmore.

4.5.7 Operations Employment by Type

The operation of the Project is expected to require primarily heavy equipment operators, millwrights, and process operators.

4.5.8 Total Employment Effects

The economic activity associated with the Project will stimulate employment with suppliers to the Project and in the general economy as the affected workers spend their income on goods and services, hence creating employment in consumer goods and service sectors. The employment effect of the Project on suppliers is referred to as indirect employment effects and the employment generation effect in the general economy as induced employment effects. An order of magnitude estimate of these indirect and induced employment effects is derived using published multipliers from an Input-Output model of the Alberta and B.C economies. The results are presented below.

The direct employment effect of the construction phase of the Project on the provincial economies of Alberta and B.C., including the on- and off-site workforces and engineering contractors, is estimated to be 1,000 person years. The total direct, indirect, and induced employment effect of the construction phase is estimated to be:

- 1,215 person years in Alberta; and
- 810 person years in B.C.

As noted in Section 4.5.5, the total direct operations employment effect of the Project is approximately 385 full-time equivalent positions. The total direct, indirect, and induced employment effect of operations is estimated to be:

- 640 person years annually in Alberta; and
- 410 person years annually in B.C.

Much of these employment effects will happen outside of the RSA due to the low population density and limited services within the study area. Effects will most likely be spread throughout the RSA and nearby municipalities including Pincher Creek, Lundbreck and Brocket as well as major service centres such as Calgary and Lethbridge.

4.5.9 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Project contribution is positive during both construction and operation as the Project will create employment opportunities at both the regional and provincial level.
- Geographic extent of the effects will mostly be recognized at the regional level, but will also occur at the provincial level.
- Duration of Project effects during construction will be short (less than two years). During operations, the duration will be long-term.
- Frequency of Project effects during both construction and operations will be continuous.
- Project effects are reversible in the long-term. The Project effects on employment will last through the operational life of the Project and then cease after closure.
- Magnitude is low during both construction and operation, taking into consideration the size of communities in the RSA, the use of mobile workers from outside the region, and the procurement of goods and services from suppliers both within and outside the RSA.
- Probability of occurrence is high.

Based on the residual effects characterization above, Project-related effects on employment are predicted to be not significant. Prediction confidence is high.

5. Population

5.1 Scope

This section presents the population effects associated with the Project on the RSA under the Base Case, Application Case, and PDC assumptions.

5.2 Setting

As outlined in Section 3, the population of the RSA was estimated to be 9,312 in 2011, with approximately 1% and 60% of the population living in Ranchland and Crowsnest Pass respectively, and the balance in Sparwood. The permanent population in the RSA decreased by approximately 8% (853 people) in the decade between 2001 and 2011.

In addition to the permanent residents, the RSA has a non-permanent population contingent, comprised partly of mobile workers who are housed in secondary suites, rented rooms and hotel and motel rooms throughout the region. The non-permanent population in the Alberta portion of the RSA has been estimated to range between 1,500 to 2,000, and 400 and 1,700 in Sparwood.

The population service centre in closest proximity to the Project is the Town of Blairmore, located approximately 7 kilometres south of the Project. The Towns of Coleman and Sparwood are also within commuting distance of the Project, approximately 14 km and 40 km to the west, respectively.

Crowsnest Pass has expressed a desire to grow and established the key strategies and associated actions to accomplish this in their economic development plan (CP 2011). The outcomes of this plan include promoting business development, tourism and residential attraction in order to increase population growth. Sparwood has also expressed a desire to grow, indicating that municipal infrastructure such as sewage treatment, has been built for a population that far exceeds the current number and 50 acres of developable residential land is available to accommodate future growth (Melcer 2015, pers. comm.).

5.3 Effects Assessment

Any estimate of the future population of the RSA is subject to uncertainty and is linked to the pace of development in the primary resource extraction industries as well as the availability of housing and services in the RSA.

For the purpose of this analysis, a Base Case, an Application Case, and a PDC were defined based on available industry plans in early 2016. The timing, size, and likelihood of future projects are subject to uncertainty as is the continued operation of existing primary resource extraction facilities.

Industry practice is to use mobile workers to construct facilities, housing them temporarily in hotel and motel rooms, and to a lesser extent temporary camps, throughout the region. Individuals employed in long-term operations positions tend to live in the region. The relatively low unemployment rate in the RSA suggests that future employment opportunities in the region will lead to in-migration, thus contributing to the permanent population of the RSA.

As the service centres nearest the Project, the towns of Sparwood, Blairmore, and Coleman are expected to attract the majority of population growth associated with the Project. However, the distribution of population across the RSA is open to considerable uncertainty and therefore the results presented here should be treated as estimates only and not as certain outcomes. The cost and availability of housing, infrastructure and services and personal preferences will influence the actual population distribution. Some of these elements are, at least in part, subject to steps taken by the municipalities and service providers in the region to prepare and plan for population growth.

As outlined in Section 2.4.1, the analysis of population effects is focused on the 2018 to 2021 period as it captures the maximum socio-economic effects of the Project.

5.3.1 Permanent Population Effects

The population effects presented here assume that mobile workers engaged in construction activities will be housed temporarily in a camp whereas the majority of operations workers are assumed to migrate to the region and become permanent residents.

5.3.1.1 Base Case

The Base Case population forecast limits the analysis of population effects to projects that are under construction or have regulatory approval six months prior to the filing of this Application. Under these assumptions, the future industrial activity is similar to that experienced in the recent past. The population of the RSA is expected to decline by an average annual rate of 0.8% between 2011 and 2021, in line with the ten-year average annual rate between the 2001 and 2011 federal census. A detailed breakdown of population growth for each municipality is shown in Table 5.1.

Table 5.1: Base Case Population Growth

Geography	2011	2021	% Change From 2011 Population
M.D. of Ranchland	80	67	-16
S.M. of Crowsnest Pass	5,670	5,041	-11
Total AB RSA	**5,750**	**5,108**	**-11**
Town of Sparwood	3,667	3,529	-4
Total BC RSA	**3,667**	**3,529**	**-4**
Total RSA	**9,417**	**8,637**	**-7.8**

Source: Statistics Canada 2011, Nichols Applied Management

5.3.1.2 Application Case

The Project is expected to result in a net permanent population increase in the RSA comprised of in-migrants who relocate to the RSA to fill many of the jobs created as a result of the Project. The permanent population increase associated with Project activity will begin with operations in 2019 with approximately 490 in-migrants being drawn to the Alberta portion of the RSA and 320 to Sparwood. Figure 5.1 and Figure 5.2 depict the population impact of the Project through to 2021.

Figure 5.1: Application Case Population Growth – AB portion of the RSA

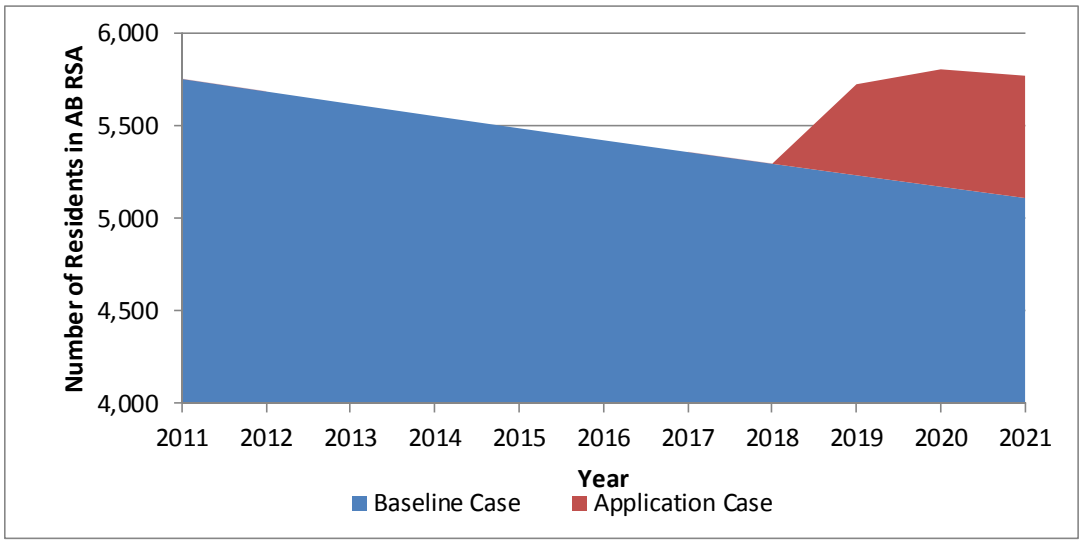
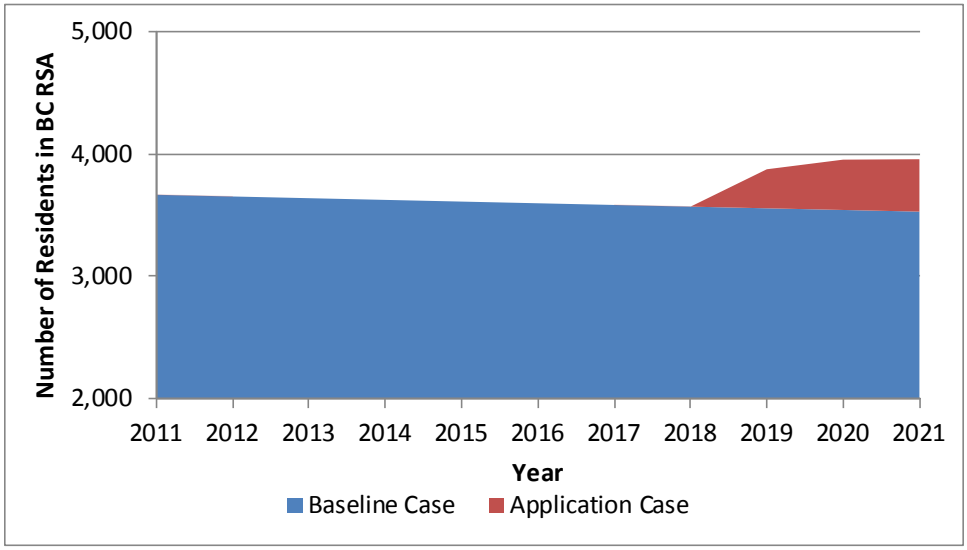


Figure 5.2: Application Case Population Growth – BC portion of the RSA



Over its operational life, the Project will employ, on average, 385 people per year. The anticipated distribution of population throughout the RSA under the Application Case assumptions is shown in Table 5.2.

Table 5.2: Application Case Population Growth

Geography	2011	2021 Base Case	2021 Application Case	% Increase Above Base Case 2021 Population
M.D. of Ranchland	80	67	80	19%
S.M. of Crowsnest Pass	5,670	5,041	6,150	22%
Alberta portion of the RSA	**5,750**	**5,108**	**6,230**	**22%**
Town of Sparwood	3,667	3,529	4,191	19%
B.C. portion of the RSA	**3,667**	**3,529**	**4,191**	**19%**
Total RSA	**9,417**	**8,637**	**10,421**	**20%**

Source: Nichols Applied Management

The population of Ranchland is expected rise by 19% above the Base Case as a result of the Project. The effect on Crowsnest Pass will be 22% above the Base Case and in Sparwood it will be 19%.

5.3.1.3 Planned Development Case

The effect of additional projects considered in the PDC will be limited, as they are not expected to generate additional permanent operations jobs in the area. Specifically:

- The Altalink project will involve some activity around construction of the transmission line but this will be short-term and temporary.
- Teck's Baldy Ridge Extension project is an expansion project that aims only to replace current production in the Baldy Ridge mines and maintain current operations employment (BRE 2014).
- CanAus Coal's Michel Creek Coking Coal project is a proposed new project in the region, but its population impact is expected to be offset by the anticipated decrease associated with closure of Teck's Coal Mountain project.

5.3.2 Non-Permanent Population Effects

Over the construction period, the Project may increase the average number of mobile workers in the region by approximately 120 and, during peak construction activity, the increase in the number of mobile workers may reach up to 195. The use of mobile workers as part of the construction workforce will:

- spread the economic benefits of industrial development beyond the RSA communities; and,

- allow spouses and family members of mobile workers to remain active in the labour force in the community in which they permanently reside.

Mobile workers will add to the pressure on the health system (especially emergency department), police and emergency services, and transportation infrastructure (Nichols Applied Management 2007). The relationship between mobile workers and social infrastructure and housing is explored in Sections 6, 7, and 8 of this report.

5.4 Mitigations for Potential Impacts on Population

Since it acquired the Grassy Mountain leases in 2013, Benga has been communicating regularly with local communities – such as Crowsnest Pass, Sparwood and Ranchland – to keep them informed about the Project, identify issues, and explore mitigation options. In addition, Benga has offered to support the hiring of a municipal planner for Crowsnest Pass to assist with community planning.

Additional measures that Benga is prepared to take in order to mitigate the population effects of its Project on social infrastructure in the region are identified in Section 7. Benga is also prepared to support local municipalities in discussions with the province to acquire additional funding for services and infrastructure.

5.5 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Project contribution is mixed as population growth leads to both increased employment and business opportunities as well as increased demand on regional infrastructure and services.

- Geographic extent of the effects will be at the regional level. Project effects will mostly fall on service centres in the region.

- Duration of Project effects during construction will be short (less than two years). During operations, the duration will be long-term.

- Frequency of Project effects during both construction and operations will be continuous.

- Project effects are reversible in the long-term. The Project effects on population will last through the operational life of the Project and then cease after closure.

- Magnitude is low during both construction and operation, taking into consideration the size of communities in the RSA and the expected Project-related population effect.

- Probability of occurrence is high. However, the distribution of population across the RSA is open to considerable uncertainty and therefore the results presented here should be treated as estimates only and not as certain outcomes.

Based on the residual effects characterization above, Project-related effects on population are predicted to be not significant. Prediction confidence is high.

6. Housing

6.1 Scope

This section discusses the housing effect in the RSA associated with the Base Case, Application Case and PDC assumptions.

6.2 Setting

The housing market conditions in the RSA vary considerably across communities in terms of price, quality, and availability. Together, these conditions will influence the settlement patterns of new residents who relocate to the region to pursue employment opportunities related to the Project.

6.2.1 Availability

The number of total dwelling units in the Alberta portion of the RSA has declined at an average annual rate of 0.35% from 2,710 units in 2001 to 2,617 in 2011, a change that is roughly in line with the steady decline in the regional population. In 2011, the regional housing stock was comprised primarily of single detached homes (85%), low-rise apartment units (5%), and mobile homes (7%). The balance of homes were duplexes, semi-detached and row houses. Of these 2,617 units, approximately 81% were owned and 19% were rented (Stats Can 2011, Environics 2014).

The housing stock that remains in the Crowsnest Pass also appears to be of below average quality as compared to the Province overall. For example, 48% of the dwellings in Crowsnest Pass were in need of minor or major repairs, compared to 34% in the province of Alberta as a whole (Stats Can 2006). This suggests a number of dwellings are old, in disrepair and may require considerable maintenance prior to being suitable for habitation. It is estimated that as many as 305 homes in Crowsnest Pass are in need of major repairs (AHNA 2009). Despite the general decline in the overall housing stock, there are some new housing developments taking place. In particular, the construction of custom country residential homes on three to four acre parcels is taking place in some rural areas in the municipality. There is also one higher end townhome development currently being completed but no new starter homes or mobile home developments are underway or planned (Thomas 2015, pers. comm.).

Since 2008, the vacancy rates in Crowsnest Pass have been higher than both the provincial average and the prevailing rates in surrounding communities including Pincher Creek - a trend that is broadly reflective of the below average quality and the steady decline in regional population (GoA 2014). The vacancy rate in Crowsnest Pass recently increased from 7.3% in 2013 to 12.2% in 2014. The vacancy rate in Sparwood is considerably lower averaging 5.4% over the past 5 years (OCP 2015).

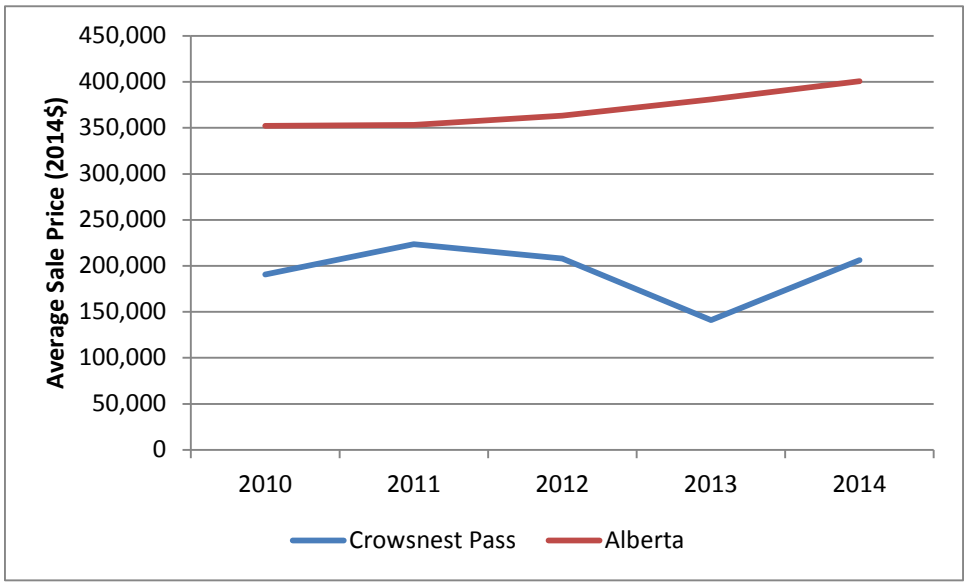
The total number of house sales in Crowsnest Pass has increased from approximately 105 in 2010 to 140 in 2014 (Maloff 2015, pers. comm.). However, the average amount of time that houses are on the market has increased from approximately 120 to 150 days over the same time period.

In contrast to the experience of the Crowsnest Pass, the number of total dwelling units in Sparwood has increased slightly at an average annual rate of 0.3% from 1,540 in 2001 to 1,588 in 2011, while the population remained roughly constant. In 2011, the regional housing stock was comprised primarily of single detached homes (68.9%), low-rise apartment units (12.5%), semi-detached and row houses (14.5%) and mobile homes (4.1%). Of the 1,588 units, approximately 73.4% were owned and 26.6% were rented. Similar to the Alberta portion of the RSA, the quality of the housing stock in Sparwood is also below average with approximately 40% of dwellings in need of repair compared to 32% in the province of B.C. overall (Stats Can 2011, Environics 2014). Approximately 18.7% of homes are occupied by non-permanent residents, which town officials believe are mainly occupied by mobile workers (OCP 2015).

6.2.2 Affordability

The price of housing in the Alberta portion of the RSA has not risen as quickly or to the same heights as the province as a whole. The average real house price in 2014 in Crowsnest Pass was $216,200, nearly 50% less than the average house price in Alberta ($400,590), which may also be an indicator of lower average house quality. Figure 6.1 shows the real average sale price for housing in Crowsnest Pass compared to Alberta over the past 5 years.

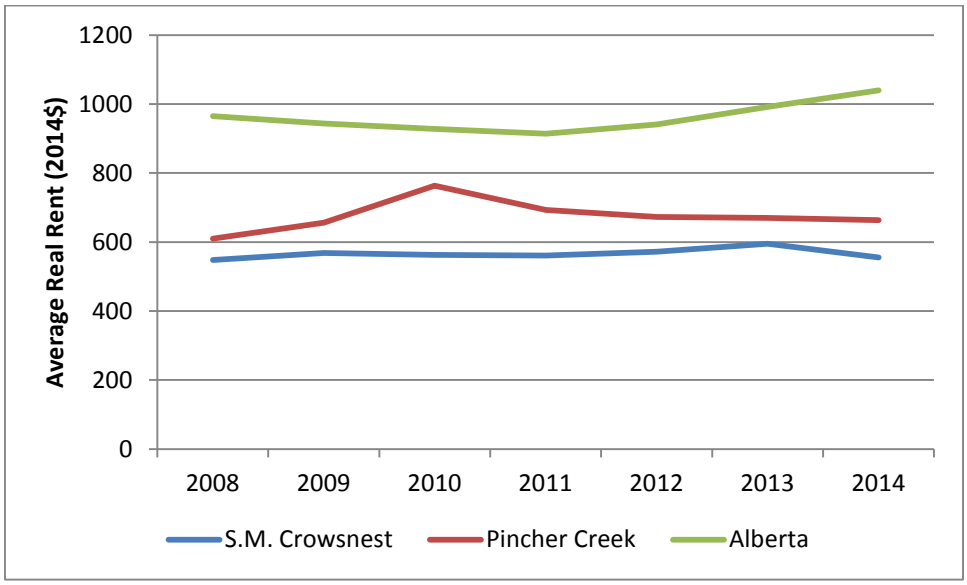
Figure 6.1: Average Real Sale Price of Houses in Crowsnest Pass and Alberta



Source: Maloff 2015, pers. comm.; CMHC 2015

Apartment rents in the region have also been below the provincial average since 2008 (Figure 6.2). The average real rent in Crowsnest Pass in 2014 was $555 for a one-bedroom apartment as compared to the provincial average of $1,040 and $663 in the nearby community of Pincher Creek (GoA 2014).

Figure 6.2: Average Real Rent for One-Bedroom Apartment, 2008 to 2014



Source: GoA 2014

Housing affordability is a function of the cost of housing and also the incomes being earned in the region. Although purchase and rental prices are below the provincial average in Alberta, so too are the incomes in the RSA. Specifically, household income in Ranchland in 2011 was $48,750 and $58,158 in Crowsnest Pass, approximately 36% and 30% lower than the provincial average of $76,354. Despite household income in the Alberta portion of the RSA being below average, the relatively low cost purchase and rental rates has created an environment where housing is more affordable as compared to the province overall.

Household income in Sparwood is approximately 30% higher than the provincial average and house prices are approximately 44% lower (CHBA 2014; CMHC 2014) which suggests that, similarly to the Alberta portion of the RSA, housing in Sparwood is relatively more affordable than the provincial average of B.C. However, affordable housing options are scarce and in 2010, as many as 90 households spent 50% or more of their income on housing despite the high median income of Sparwood residents (OCP 2015).

6.3 Effects Assessment

The need for housing is driven by population growth. The housing effects presented here assume that mobile workers engaged in construction activities will be housed in a temporary camp whereas the majority of operations workers are assumed to migrate to the region and

become permanent residents. It is also assumed that the population growth driven by industrial development accrues primarily to the Towns of Blairmore, Coleman and Sparwood. However, as noted in Section 5.3, the settlement patterns of new residents in the region is subject to uncertainty and will be influenced by a number of factors that include the availability and affordability of housing, the level and quality of particular services, and personal preferences.

6.3.1 Base Case

Additional housing is not required to accommodate Base Case population growth in the Alberta portion of the RSA as the population is not expected to increase beyond what the current housing stock and pace of development is able to accommodate. Similarly in the B.C. portion of the RSA, the local population is growing at roughly the same pace as new housing development. These estimates reflect historical levels of population growth rates and persons per dwelling. The actual number of excess housing units may vary based on the condition of the dwelling.

6.3.2 Application Case

The in-migration anticipated to occur as a result of the Project will increase the need for housing in the RSA. This need will be the most pronounced as the Project hires workers to achieve full operations. In 2021, the anticipated need for housing related to Project-driven in-migration is approximately 277 units. An approximate geographic distribution of this housing need is shown in Table 6.1; however, the settlement patterns of in-migrants is subject to uncertainty and may vary across the RSA as individuals respond to housing availability and affordability.

Table 6.1: Housing Needed in Application Case

Geography	Cumulative Houses Needed by 2021
Ranchland	2
Crowsnest Pass	166
Total AB portion of the RSA	**168**
Town of Sparwood	109
Total BC portion of the RSA	**109**
Total RSA	**277**

The current stock of housing and pace of development in the RSA is not adequate to accommodate the additional population; however, Sparwood has indicated they have 119 serviced lots that are currently being developed and capacity for 900 units to be built, should the demand arise (Melcer 2015, pers. comm.). Crowsnest Pass has lots available to be serviced once the need arises and there is potential for older homes to be upgraded or replaced with new homes that are more suitable for families migrating into the region (Thomas 2015, pers. comm.).

6.3.3 Planned Development Case

There is no net in-migration to the region anticipated as result of projects currently disclosed in the PDC and therefore, no significant change in the demand for housing is anticipated.

6.4 Mitigations for Potential Impacts on Housing

Benga recognizes that the Project will increase the demand for housing in the RSA and is committed to working with local governments to facilitate the timely development of residential land and dwellings, such as those identified in Sparwood, by means of ongoing discussions regarding Project timelines and execution strategies.

Benga will prepare a separate regulatory application for any future development or expansion to the Grassy Mountain Mine project. Additional housing and land development mitigation measures may be included in that application if required by the timing of the project and the reaction of the land development and home building industry in the RSA in the intervening years.

Benga's plan to house construction workers in a temporary camp has the ancillary effect of reducing the resident population effect of the Project and thus, the anticipated demand for housing. Although operations workers are assumed to migrate to the region and become permanent residents, the temporary camp may be used to house some of the operations workforce until adequate housing in the region is available.

6.5 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Project contribution is positive as the demand for housing provides business opportunities and increased revenue for local suppliers.
- Geographic extent of the effects will be at the regional level. Project effects will mostly fall on service centres in the region.
- Duration of Project effects during construction will be short (less than two years). During operations, the duration will be long-term.
- Frequency of Project effects during both construction and operations will be continuous.
- Project effects are reversible in the long-term. The Project effects on housing will last through the operational life of the Project and then cease after closure.
- Magnitude is moderate during both construction and operation, taking into consideration the current stock of housing and pace of development in the RSA.

- Probability of occurrence is high. However, the distribution of housing impacts across the RSA is open to uncertainty based on a number of factors (e.g. workers' housing preferences, housing market response) and therefore the results presented here should be treated as estimates only and not as certain outcomes.

Based on the residual effects characterization above, Project-related effects on housing are predicted to be not significant. Prediction confidence is high.

7. Social Infrastructure

7.1 Scope

Social infrastructure includes a diverse range of human services and infrastructure including health, education, social, recreation, policing and emergency services. The Project will have an effect on social infrastructure in the RSA primarily via its population effect. This section discusses those effects and provides order-of-magnitude estimates of select social infrastructure effects under the Base and Application scenarios.

Particular attention is paid to Crowsnest Pass and Sparwood where population effects, and therefore social infrastructure effects, are expected to be largely concentrated.

7.2 Setting

7.2.1 The Social Environment

Discussions with key stakeholders in the region as well as a review of background reports and planning documents identifies several key elements of the region's current social environment, including:

- **An older population in the Alberta portion of the RSA.** The population in Crowsnest Pass and Ranchland is notably older than the provincial average. The median age in Crowsnest Pass and Ranchland is 51.0 and 43.0, respectively, as compared to 36.5 in Alberta as a whole. These demographic factors influence the types of programs and services needed by residents (e.g. senior's care, housing and support services, etc.). In contrast, Sparwood has a relatively young population with a median age of 39.5 as compared to 42.0 for the province of B.C.

- **Presence of a non-permanent population.** The social setting in the RSA reflects a population comprised of: long-term residents with primary residences in the area; people with secondary residences that visit the region sporadically; seasonal tourists; and mobile workers in the mining industry. The non-permanent population places demands on regional social infrastructure, such as health and social services, as well as policing and emergency response.

- **Availability of high income jobs in Sparwood.** While the availability of relatively high paying resource sector jobs is a benefit to many residents, there is a concern among some that the availability of these jobs, especially during boom times, is enticing the younger population to either leave school or put off pursuing post-secondary studies. Based on educational attainment data from the Government of B.C., 50% of graduates from the Southeast Kootenay School Division transition to post-secondary institutions in B.C., of which most go to community college (87%) and 13% enrol in Universities. This is

compared to 59% of graduates in the province as a whole that went to B.C. post-secondary institutions, of which only 33% went to community college and the balance to Universities (BC ED 2014a, BC ED 2014b).

- **Limited housing options.** The need for housing that is adequate and affordable was highlighted in the Crowsnest Pass Affordable Housing Needs Assessment as a priority for the area (AHNA 2009). The strategy outlines several issues in the local housing market including:
  - A high number of houses in disrepair;
  - A shortage of accessible housing for seniors and people with disabilities;
  - Overcrowding in current dwellings; and,
  - A shortage of affordable housing.
- **Strain on individuals and families from resource sector work.** The regional economy is focused primarily on the mining sector. Work in this sector often involves shift work, long work schedules and overtime, putting strain on both individuals and families. These strains can lead to demands on family and social support services in the region such as family counselling and addiction and substance abuse services.

Additional factors comprising the region's social environment are discussed in Table 7.1.

7.2.2 Current Social Infrastructure

Social infrastructure is important to a community as a means of:

- supporting the functioning of the community by sustaining the well-being of its residents and building social cohesion; and
- sustaining economic growth by making the community more attractive to those considering investing or relocating to the region.

All residents rely to some degree on social infrastructure. In some cases, such as education, the services are a part of everyday life for many residents. In other cases, such as fire and ambulance services, residents avail themselves of social infrastructure primarily during an emergency.

The RSA has a well-developed social infrastructure system. The majority of infrastructure and services are located in Sparwood and in the villages and towns located in Crowsnest Pass. Table 7.1 presents a high-level summary of social, health and emergency services and infrastructure in the RSA along with key issues identified through stakeholder interviews and a review of relevant planning documents, studies and reports.

Table 7.1: Overview of Social Infrastructure in the RSA

Municipality	Infrastructure / Services	Issues
Health Services		
Crowsnest Pass	• The main health facility in the region is the Crowsnest Pass Health Centre located in Blairmore. The facility is a full-service community hospital with 16 acute and 58 long-term care beds, 24-hour emergency, obstetrical, palliative and surgical services (Cook 2015, pers. comm.). • Nine family physicians work in three medical clinics in Blairmore, Coleman, and Bellevue offering primary care services (AHS 2014; Cook 2015, pers. comm.).	• Alberta Health Services (AHS) representatives indicate that the Crowsnest Pass Health Centre emergency department is running at or over capacity approximately more than 50% of the time (Cook 2015, pers. comm.). • The area's rapidly aging population is causing strain on the long-term care capacity of the health centre. All long-term care beds are full and wait times are stagnant (Cook 2015, pers. comm.).
Ranchland	• There are no health services in Ranchland. Residents in the area typically access health services in Nanton, High River, Claresholm, Pincher Creek and Black Diamond (Gardner 2015, pers. comm.).	
Sparwood	• The main health facility in the region is the Sparwood Health Centre, providing emergency department (from 8 am to 7 pm, seven days a week), laboratory, dialysis, radiology and medical clinic services. The health centre is serviced by four physicians. • The nearest full service health facility is the Elk Valley Hospital, located 20 minutes away in Fernie, B.C.	
Emergency Response and Policing		
Crowsnest Pass	• Police services are provided by the RCMP from a detachment located in Blairmore. The detachment is home to nine full-time RCMP officers who serve and patrol both Crowsnest Pass and Ranchland (Philipuzzi 2014, pers. comm.). In addition to the RCMP officers, Crowsnest Pass also employs two full-time Peace Officers (CPM 2014). • Fire services are provided by a combination of paid and volunteer firefighters based throughout the region. Crowsnest Pass has a fulltime fire chief and deputy and 53 on-call, paid firefighters working out of fire stations located in Blairmore, Coleman and Bellevue. • There are eight full-time EMS staff (paramedics and EMTs) and two advanced life ambulances that service the area (Lindeman 2015, pers. comm.).	• In 2013, crime rates in Crowsnest Pass and the Town of Sparwood were below the provincial averages by 7% and 27%, respectively (Stats Can 2011b). • Emergency services in the Alberta portion of the RSA are adequate and well equipped. Staffing levels remain unchanged despite a shrinking population (Lindeman 2015, pers. comm.).

Municipality	Infrastructure / Services	Issues
Ranchland	• Partially serviced by RCMP detachments in Blairmore, Claresholm and Turner Valley. • M.D. of Foothills fire department services part of the area with response coming from the District 1, Longview station in Longview (Wilkinson 2014, pers. comm.; M.D Foothills website, accessed Nov. 2014).	
Sparwood	• There are five fire halls with two full-time staff and 30 paid on-call firefighters (Melcer 2015, pers. comm.). • Police services are provided by the Elk Valley RCMP detachment located in Sparwood, an amalgamated RCMP detachment that serves the towns of Elkford and Sparwood as well as the city of Fernie. There are 18 officers overall. (Podrasky 2015, pers. comm.). • There are two ambulances and 19 EMS staff in Sparwood (Jackson 2015, pers. comm.).	• Emergency services in Sparwood are adequate and well equipped (Jackson 2015, pers. comm.).
Social Services		
Crowsnest Pass	• Social services are provided by the Ministry of Human Services at the GoA and through the Family Community Support Services (FCSS) office located in Blairmore. The GoA provides child, family and other social services while FCSS delivers social programs that are preventive in nature to promote and enhance the well-being of individuals, families, and communities (CPM 2014).	• Pending discussions with Crowsnest Pass representatives.
Ranchland	• There are no social services available in M.D. Ranchland. Residents can access social services in High River, Claresholm or Turner Valley, all of which are serviced by FCSS.	
Sparwood	• The Sparwood Mental Health Centre provides mental health and substance abuse services.	
Recreation		
Crowsnest Pass	• The Municipality of Crowsnest Pass owns and operates numerous recreational facilities (some jointly with various community organizations) including one artificial ice arena, a six-sheet curling rink, indoor skateboard park, indoor climbing wall, outdoor swimming pool, gymnasium, a snowboard and downhill ski area, and a library (CPM 2014).	• The region's proximity to the Rocky Mountains and abundant opportunities to pursue outdoor recreational activities are an attraction for both tourists and potential residents. The area is home to numerous trails, parks, and natural areas.
Ranchland	• Within the boundaries of the M.D., there is one provincial park, a wildland park, an ecological reserve and three natural areas providing opportunities for fishing, camping, RV-ing and other outdoor recreational pursuits (RW 2015).	
Sparwood	• Sparwood has a pool and leisure centre and an arena, as well as outdoor recreational opportunities for mountain biking, hiking and ATV use.	

Municipality	Infrastructure / Services	Issues
Education		

Crowsnest Pass/ Ranchland	• The Livingstone Range School Division No. 68 is responsible for schools in Crowsnest Pass and nearby schools that are attended by children from Ranchland. Specifically:
	  • Crowsnest Pass has three schools – a Grades K-3 in Coleman, a Grades 4-6 in Blairmore and a Grades 7-12 in Coleman (LRSD 2015).
	  • Students from Ranchland attend schools outside the RSA in Nanton and Claresholm (Gardner 2015, pers. comm.).
		• According to Accountability Pillar Survey results from Alberta Education, 85% of teachers, parents and students surveyed in 2014 were satisfied with the overall quality of basic education offered by the Livingstone Range School Division. This is comparable to the provincial average of 89% (AE 2014).
		• Results of LRSD's Accountability Pillar Survey have been below the provincial average and on a downward trend with regard to student learning achievement in Grades K-9 for the past four years. However, the reverse is true in Grades 10-12 (AE, 2014).
		• At 74.2%, the high school completion rate is comparable to the provincial average (74.9%).
		• The six-year post-secondary transition rate in the LRSD is below the provincial average (54.8% as compared to 59.2% in 2014) (AE 2014).

Municipality	Infrastructure / Services	Issues
Sparwood	• Sparwood is located within School District #5 (Southeast Kootenay) (TSW 2015). • There is a Grades K-6 school and a Grades 7-12 school in Sparwood.	• A new Grades K-3 school is being considered in Sparwood (Melcer 2015, pers. comm.). • About 60 children from the community go to a private school in Fernie. • The schools in Sparwood are near capacity (Melcer 2015, pers. comm.). • The transition rate to post-secondary institutions is lower than the provincial average and students who attend post-secondary are more likely to attend community college instead of university (BC ED 2014a, BC ED 2014b).

7.3 Effects Assessment

Demand for social infrastructure is expected to change largely in line with population effects. Specifically:

- Under Base Case conditions, the RSA population is expected to decrease as a result of declining population in the Alberta portion of the RSA. The B.C. portion of the RSA (Sparwood) will increase but at a marginal rate of 0.25% per year over the 2011-2041 period. Service providers will have considerable time to plan for and address service and infrastructure effects related to this marginal increase.

- Under the Application case, the population increase will begin as Project operations ramp up in 2019 with approximately 490 in-migrants being drawn to the Alberta portion of the RSA and 320 to Sparwood. Additional social infrastructure in the RSA will be required, including additional programming and staffing.

- Under the PDC, no significant population growth is anticipated and, hence, no additional effect on social infrastructure is expected to occur.

Table 7.2 provides an overview of effects on selected social infrastructure indicators by 2021. Other indicators are possible. The social infrastructure indicators were selected with a view to illustrate generally the effect of growth in the region, not to conduct a full needs assessment for the social infrastructure areas under consideration. The indicators provide only a proxy of social infrastructure requirements, each of which comprises complex systems and interactions with other service areas. Further analysis will be required by the appropriate planning authorities and service providers for planning purposes.

Table 7.2: Additional Social Infrastructure Required by 2021

Assessment Case	Police Services *No. of RCMP Officers (FTEs)[1]*	Fire Services *No. of Staff (FTEs)[1] / No. of Volunteers*	Ambulance Services *No. of Staff[2]*	Health Services *No. of Full-Time Registered Physicians*	Education *No. of Licensed Teachers (FTEs)[1]*
Application Case ***(Project Effect Only)***	2	10	3	1	5

Notes:

1) FTEs = Full-Time Equivalents
2) Number of Emergency Medical Responders (EMRs), Emergency Medical Technicians (EMTs), and Emergency Medical Technician-Paramedics (EMT-P)

The social infrastructure requirements identified in Table 7.2 are for the RSA as a whole, but will largely fall on the towns of Blairmore and Sparwood where the majority of population effects are expected to occur.

The nature of the Project's effect on local services and infrastructure is expected to be as follows:

- Project construction will increase the mobile workforce in the region, placing temporary additional demands on regional social infrastructure, such as health and social services, and policing and emergency response services.

- Project operations will:

    - create stable, well-paying employment that will attract permanent residents to the region who are unlikely to draw on social supports or certain social services (e.g. affordable housing, income support);

    - require shift work, that might in turn generate demand for certain social services such as addiction services and family counseling among operations workers and their families;

    - draw operations workers from outside the region who will bring spouses and family members with them, increasing the labour pool and volunteer base on which local service providers can draw; and

    - increase the potential for traffic accidents and industrial accidents that could in turn place demands on policing, emergency response and health services in the region.

Project-induced population growth will place increased demands on local service providers. A number of service providers indicated that they are well positioned to plan for and address most, if not all, future growth forecasted under both Base and Application Case assumptions.

The ability of local service providers to respond in a timely and appropriate manner to increased service demands will be contingent on the availability of increased resources to meet those demands. This includes: increased funding from various levels of government; improved and new infrastructure (e.g. buildings, equipment) being planned for and built in a timely manner; and the ability to attract and retain additional staff.

While some service providers might face challenges in meeting increased demand, future growth can also help generate opportunities to address this increased demand by:

- leading to increased funding from the federal and provincial governments (e.g. per capita funding support for certain programs and services);

- increasing businesses in the area that can offer support for community programs and infrastructure used by residents;

- increasing the labour pool and volunteer base on which local service providers can draw; and

- increasing revenues to local government, which can be used to increase investment in public infrastructure and services.

Growth in a community can also help increase the breadth and nature of social infrastructure services available to local residents (e.g. specialized health services, broader educational offerings).

7.4 Mitigations for Potential Impacts on Social Infrastructure

Benga is committed to following through on a number of initiatives to both mitigate the social infrastructure effects of the Project and to support its role as a good corporate citizen in the region. Specifically, Benga will:

- Put in place project-related measures to mitigate effects on regional social infrastructure, including:
    - developing and implementing specific policies regarding employee health and safety and emergency response ;
    - maintaining explicit and enforced workplace policies with regards to alcohol and drug use, and illegal activities; and
    - providing employees with access to the company's confidential employee assistance plan, which provides support for families and individuals who may experience difficulty dealing with personal, family, or work-life issues that can affect one's health and well-being.
- Continue supporting local programs and initiatives through both financial and in-kind contributions, where appropriate.
- Cooperate with service providers (e.g. health, social, education), government, and other industrial operators in the region to assist in addressing effects of its project and resource development in general by:
    - communicating its development and operational plans with the appropriate agencies; and
    - working with the provincial and municipal governments on the implementation of relevant planning initiatives and coordination of emergency response procedures, where appropriate.

In addition, Benga is committed to continuous monitoring of project effects and associated mitigation measures via Benga's engagement with regional and provincial stakeholders. The results of this monitoring will be reported as part of ongoing community consultation and will help inform future project-related responses through open houses, newsletters, town hall meetings and individual meetings with local groups.

Regarding cooperative efforts with other industrial operators in the region, Benga is engaged in active discussions with Teck, a major employer in the region, regarding issues of common interest. Benga is committed to continuing its discussions with Teck and others in the region up to and during project

construction and operation. Any agreements or memorandums of understanding between the two parties will be drafted and ratified prior to Project construction.

7.5 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Project contribution is negative during construction as Project-related workforce and activities might increase demand for social infrastructure and services. Direction is mixed during operations as permanent population growth will increase demands but will also have the offsetting effect of maintaining capacity for local services and infrastructure (e.g., increases in per-capita funding, expanding the local volunteer and labour force base).
- Geographic extent is at the RSA level. Project effects will mostly fall on service centres in the region.
- Duration of Project effects during construction will be short (less than one year). Project effects during operations will be long-term.
- Frequency of Project effects during construction and operation will range between occasional and periodic on social infrastructure and services.
- Project effects are reversible in the long term. The Project effects on social infrastructure and services will occur through the operational life of the Project and then cease after closure.
- Magnitude is low during both construction and operation, taking into consideration the social infrastructure and service capacity of communities in the RSA and mitigation and other management measures to be undertaken.
- Probability of occurrence is high.

Based on the residual effects characterization above, Project-related effects on social infrastructure are predicted to be not significant. Prediction confidence is high.

8. Municipal Infrastructure and Services

8.1 Scope

Municipalities within the RSA are responsible for the planning, construction, operations, and maintenance of municipal infrastructure within their respective boundaries. This section discusses the Base, Application and PDC effects on municipal infrastructure and services and presents Benga's mitigation initiatives.

8.2 Setting

8.2.1 Existing Infrastructure

Potable water in Crowsnest Pass is recovered from nine ground wells and treated at four treatment plants located in Coleman, Blairmore, Bellevue and Hillcrest. It is then stored in one of four concrete reservoirs and piped throughout the community (CPM 2014). Ranchland has no central water wells or treatment plants as property owners have their own water wells (Christianson 2014, pers. comm.). In Sparwood there are three water wells and two reservoirs. There is no water treatment plant as the water from these sources is exceptionally clean (Melcer 2015, pers. comm.).

Wastewater within the Crowsnest Pass is treated at two treatment facilities located in Frank and in between Bellevue and Hillcrest (CPM 2014). In Ranchland, wastewater is stored in septic tanks on individual properties and hauled out as needed (Christianson 2014, pers. comm.).

Solid waste from the Crowsnest Pass is disposed of in the Pincher Creek Sanitary Landfill while waste from Ranchland is trucked out to the landfill in Okotoks (CPM 2014; Christianson 2014, pers. comm.).

8.2.2 Funding of Municipal Infrastructure

A high-level comparison of the fiscal situation of the RSA municipalities shows that (AMA 2015, CSCD 2015):

- In 2014, Crowsnest Pass and Sparwood had similar-sized assessment bases of approximately $166,400 and $161,300 per capita, respectively. For both municipalities, the majority of their assessment base is residential. In comparison, Ranchland's assessment base is $1,992,595 per capita, with nearly three-quarters of this assessment base reliant on non-residential linear property.

- In 2013, Ranchland had no debt while the per capita debt of Crowsnest Pass was just $75. These per capita debt levels are well below the Alberta average of $1,313 for specialized municipalities and indicates that there may be the capacity for the municipality to borrow in order to finance future infrastructure needs. In comparison, Sparwood's per capita debt was estimated in the range of $1,300 in 2013. This number dropped to $1,243 in 2014 and is expected to drop further to $1,205 in 2015 (Sparwood 2015).

8.3 Effects Assessment

8.3.1 Base Case

Current and planned municipal infrastructure in Crowsnest Pass, Ranchland, and Sparwood is sufficient to meet the level of service required by the anticipated population under the Base Case assumptions outlined in Section 5.3.1. This finding is driven largely by the declining population base in the region and the expectation that this trend will continue for the foreseeable future.

8.3.2 Application Case

The Project will not tie in directly to municipal water or sewer lines in the region. Water will be recovered from local runoff or wells and wastewater will be treated onsite before being returned to the landscape. The Project will make use of the regional waste transfer station operated by Crowsnest Pass.

The additional demand for municipal infrastructure requirements driven by the population increase estimated under the Application Case assumptions will exceed the current and planned levels of municipal infrastructure in Crowsnest Pass but not in Sparwood. The sewer treatment plant in Crowsnest Pass currently exceeds capacity during spring runoff season and is close to capacity the remainder of the time. The municipality is pursuing provincial funding to upgrade the plant but, despite the project having been approved, no funding is currently forthcoming. Officials in the municipality indicate that while the upgrade is scheduled to take five years, this schedule can be accelerated once funding is approved.

Crowsnest Pass currently also exceeds its allotment of potable water due, in part, to a flat fee structure that removes any financial incentive to limit water consumption. Officials report that there are no plans to move to a fee-for-use structure and that water capacity will continue to be an issue (Thomas 2015, pers. comm.). Officials in Sparwood maintain that the town can grow to 10,000 with little strain being placed on municipal services as water and waste capacity are currently abundant and there are planned upgrades to the sewage treatment plant (Melcer 2015, pers. comm.).

8.3.3 Planned Development Case

There is no net in-migration to the region anticipated as a result of the projects currently disclosed in the PDC and therefore, no additional municipal infrastructure is anticipated.

8.4 Mitigations for Potential Impacts to Municipal Infrastructure and Services

Benga is committed to working with the municipalities in the region to keep them informed of its development plans and their timing so that the affected municipalities have sufficient time to plan for changes in the demand for services. Additionally, Benga has offered to support the hiring of a municipal planner for Crowsnest Pass to assist with community planning. The use of an on-site camp and workforce transportation strategy will serve to limit the demands placed on local municipal infrastructure by the mobile construction workforce.

8.5 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Direction is negative as Project-related workforce and activities will increase demand for municipal infrastructure and services.
- Geographic extent is at the RSA level. Project effects will mostly fall on service centres in the region.
- Duration of Project effects during construction will be short (less than two years). Project effects during operations will be long-term.
- Frequency of Project effects will range between occasional during construction and continuous during operation.
- Project effects are reversible in the long term. The Project effects on municipal infrastructure and services will occur through the operational life of the Project and then cease after closure.
- Magnitude is low during construction and moderate during operation, taking into consideration the municipal infrastructure and service capacity of communities in the RSA and mitigation and other management measures to be undertaken.
- Probability of occurrence is high.

Based on the residual effects characterization above, Project-related effects on population are predicted to be not significant. Prediction confidence is high.

9. Traditional Land Use and Aboriginal Culture

9.1 Scope

This section discusses issues pertaining to the potential effects of the Project on Traditional Land Use (TLU) and Aboriginal culture from a socio-economic perspective. The discussion is informed by Benga's consultation with Aboriginal groups residing near the RSA, work carried out in support of the Aboriginal Consultation, Traditional Ecological Knowledge and Land Use section of the EIA (see Section H), and data available through Statistics Canada's Aboriginal Population Profile.

9.2 Setting

The area surrounding the RSA has been home to Aboriginal Groups for thousands of years. Although there are no Treaty 7 or other Aboriginal Group communities or reserves in the RSA, Benga recognizes that Aboriginal Groups use lands in the RSA for traditional purposes such as hunting and plant gathering. The company has made the effort to be inclusive and engage in consultation with the following Aboriginal Groups that have expressed interest in the Project:

- Piikani Nation, with reserve lands located approximately 60 km to the east of the Project on lands between Pincher Creek and Fort Macleod;
- Kainai Nation (Blood Tribe), with reserve lands located approximately 130 km to the east of the Project, near Fort Macleod and Lethbridge to the north and Cardston in the south;
- Siksika Nation, with reserve lands located approximately 240 km northeast of the Project and about 100 km east of Calgary;
- Tsuu T'ina Nation, with reserve lands located approximately 200 km north of the Project to the east of Calgary;
- Stoney Nations, with reserve lands located approximately 260 km north of the Project site (Bearspaw First Nation, Chiniki First Nation and Wesley First Nation);
- Samson Cree Nation, with reserve lands located approximately 430 km north of the Project site, near Hobbema
- Foothills Ojibway First Nation, a non-status First Nation located in and around Hinton
- Ktunaxa Nation, a small nation with five member Bands in British Columbia, including: Akiskinuk (Columbia Lake) near Windermere; Lower Kootenay near Creston; A'qam (St. Mary's) near Cranbrook; Shuswap near Invermere; and Tobacco Plains near Grasmere (Roosville Border) crossing.
- Metis Nation of Alberta – Region 3; and

- Metis Nation of British Columbia – Region 4

The relationship between Aboriginal Groups in Canada and their traditional lands is integral to community well-being. From the perspective of Aboriginal Groups, this mutually sustaining relationship has defined their identity over the centuries. Traditional lands themselves are also not merely the source of community well-being. They are also the place where traditional pursuits and knowledge are passed from generation to generation. Traditional land use and culture has changed over time for Aboriginal peoples, largely due to the influence of external factors, including: government policy, education, economic opportunity, and cultural influences such as the Internet or TV.

Aboriginal communities often have unique socio-demographic characteristics that set them apart from the province as a whole. In general, these communities tend to be younger with a lower rate of wage employment and earnings. According to Statistics Canada's 2011 National Household Survey, First Nations with whom Benga has consulted have the following characteristics:

- The employment rate was between 27% and 46% as compared to 69% in the province as a whole;
- Between 16% and 72.5% of the Aboriginal identity population had knowledge of an Aboriginal language as compared to 13% of the Aboriginal identity population in the province as a whole;
- The median age was between 21 and 29.5 years as compared to 36.5 years provincially;
- The median after-tax household income was between $26,848 and $40,846 as compared to $76,354 provincially; and
- The unemployment rate was between 9% and 40% as compared to 5.8% across Alberta (NHS 2011).

In addition to partaking in traditional land use, which includes harvesting wildlife, fish and plants (Section H on Traditional Land Use) First Nations with whom Benga has consulted are also involved in agriculture, ranching, resource development and the service industry (PIK 2015, SIK 2015, STO 2015, TSU 2015).

9.3 Effects Assessment

There are several pathways through which resource development can affect Aboriginal culture. These pathways, identified in Table 9.1, can yield both positive and negative effects.

Table 9.1: Project Effect Pathways

Project Effect Pathways	Effects on the Local Aboriginal Population
Access to traditional lands	• Industrial development may lead to decreased opportunities to carry out traditional activities on project-affected lands and to transmit traditional culture and oral history while on the land. • Increased incomes from employment with industrial projects may lead to the purchase of hunting and harvesting equipment that increases the effectiveness of traditional pursuits (i.e. vehicles, rifles) and allows participants to cover greater distances, thus mitigating some of the limited land use resulting from development.
Concerns over pollution	• The real or perceived contamination to traditional lands, water, plants and animals from development can directly affect how and where traditional practices are carried out, thereby affecting cultural values associated with these traditional practices.
Drawing on regional sources of water	• The perceived or actual use of water by industry may impact the quantity and quality of water in the region that is relied upon for carrying out traditional activities (e.g., fishing, means of accessing traditional lands).
Participation in the wage economy	• Participating in the wage economy may reduce the opportunities to carry out traditional pursuits and transfer traditional knowledge to Aboriginal youth while on the land. • Households may see an increase in spending power, lower need for government transfer payments, and an improved sense of self-worth for some. • Increased incomes may lead to increased disparity and social stratification within Aboriginal communities. This may also contribute to negative behaviours, including increased alcohol and drug abuse and gambling, especially among those lacking financial experience.
Increased non-Aboriginal population	• Non-Aboriginal workers migrating to the area for employment opportunities may increase competition for traditional resources from non-Aboriginal community members. An influx of non-Aboriginal migrants may increase exposure to outside cultural values.

The type of effect experienced by a particular Aboriginal community depends on several factors including:

- size and pace of development;
- the proximity of the development to traditional and reserve lands;
- engagement strategies taken by industry and government;
- mitigations enacted by industry (e.g. support for capacity-building initiatives, establishment of inclusive decision-making institutions); and

- the ability of individuals and communities to cope with external disturbances.

The last point refers to the ability of Aboriginal communities and cultures to withstand strong and competing forces. While resource development can pose a challenge to community resilience by placing increased pressure on traditional land use and further exposing Aboriginal peoples to external cultural influences, mitigation and engagement strategies taken by industry can build individual and community resilience by providing support for traditional land use knowledge and studies, Aboriginal community projects, and through the negotiation of benefit agreements.

It is also recognized that the distribution of effects is not equal among all Aboriginal persons. For example, many Aboriginal persons face barriers, such as lack of education and training, in realizing one of the most often cited benefits of development - employment and income. Those with education, employment, stronger support systems and internal resiliency will likely cope better with, and obtain more benefits from, change.

Some factors that will influence the effects of the Grassy Mountain Mine Project on Aboriginal communities are:

- The Project will employ approximately 385 people during operations and will peak at approximately 195 workers on-site during construction;
- First Nations reserve lands are located between 60 to over 400 km away from the Project;
- Population growth resulting from job in-migration will likely only temporarily reverse the current population decline in the area. An overall increase in the number of people living in the region is unlikely; and
- Information regarding Project-specific effects on traditional land use can be found in the Aboriginal Consultation, Traditional Ecological Knowledge and Land Use section of the EIA (Section H).

9.4 Mitigations for Potential Impacts to Aboriginal Groups

Benga recognizes the effects of resource development on traditional land use and culture. The proponent will therefore carry out the following actions to enhance the positive and minimize the adverse effects of its Project:

- undertake progressive reclamation, giving consideration to traditional land use, where possible;
- provide access to traditional users across the lease;
- compensate trappers directly affected by the Project, according to industry standards;
- promote cultural diversity awareness to Benga's employees and contractors regarding respect for traditional resource users;
- support specific community projects, such as elder and youth programs, where appropriate; and

- continue working with Aboriginal communities in the region to ensure that their concerns with respect to traditional land use and culture are continually considered during Project planning and operation.

Additionally, Benga recently signed a benefits agreement with the Piikani First Nations. Benga continues to discuss the Project with other First Nations.

9.5 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Direction is mixed. The Project is anticipated to have negative effects related to traditional land use but both positive and negative social and cultural implications as a result of new economic opportunities related to the Project.
- Geographic extent is at the RSA level.
- Duration of Project effects will be extended, occurring over the lift of the Project but diminishing after Project closure.
- Frequency of Project effects will be continuous.
- Project effects are reversible in the long term with the application of mitigation and management measures.
- Magnitude is low, taking into consideration mitigation and other management measures.
- Probability of occurrence is high.

Based on the residual effects characterization above, Project-related effects on population are predicted to be not significant. The assessment of significance relates to residual effects in a regional context. It does not address the level of significance of any one effect as it may be experienced by individuals or groups.

10. Transportation

10.1 Scope

This section focuses on road traffic effects under Base, Application, and Planned Development Case assumptions. Specifically, the focus is on the section of Highway 3 between Sparwood, British Columbia and Lethbridge, Alberta.

10.2 Setting

The road network in the RSA consists of a number of primary and secondary highways, including:

- Highway 3, a two-lane undivided highway that is the main highway in the RSA.[1] It runs in an east-west direction near the southernmost boundary of the proposed mine. This highway connects the RSA with the population centres of Fort Macleod and Lethbridge to the east, and also runs west into B.C., near the U.S. border. The proposed mine access road would intersect Highway 3 near Blairmore.

- Highway 40, which runs north-south through Coleman, approximately 2 km from the western boundary of the proposed mine permit area.

- Secondary Highway 22, which is located approximately 10 km to the east of the eastern boundary of the proposed mine permit area and runs north towards Calgary. Most of the population of Ranchland lives along Highway 22 (Christianson 2014).

Highway 3 spans the RSA from east to west and, as the main arterial road in the region, will be the road travelled by workers and material loads travelling to the Project site.

10.2.1 Traffic Volume

In 2014, traffic volumes on Highway 3 between Sparwood, British Columbia and Lethbridge, Alberta ranged between 4,120 and 7,880 average annual daily traffic (AADT) or two-way vehicle movements (see Table 10.1). These traffic volumes are well within the carrying capacity of this highway classification, which is generally considered to be in the range of 10,000 AADT, before twinning is required. However, in summer months traffic volumes temporarily increases as people travel to or through the region. During selected peak travel times, such as long weekends, traffic volumes reach or slightly exceed the carrying capacity of the highway and travellers may experience delays travelling through the RSA, particularly in the Crowsnest Pass.

Between 2006 and 2014, traffic volumes along this stretch of Highway have increased between 3% and 23%. Average annual growth rates in traffic volumes range between 0.8% and 2.6%.

[1] East of Fort Macleod, Highway 3 becomes a four-lane divided highway.

Table 10.1:Historic Traffic Volume on Highway 3

Highway Section	AADT									8-year change (06-14)	
	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total (%)	AARC (%)
2 km West of the British Columbia – Alberta Boundary	3,672	3,911	3,884	3,861	3,937	4,277	4,488	4,484	4,505	22	2.6
Alberta – British Columbia Border	3,710	3,970	3,920	3,860	4,180	4,310	4,510	4,510	4,530	22	2.5
East of 107 Street in Town of Blairmore	5,560	6,750	6,770	6,710	6,880	6,500	6,680	6,680	6,680	20	2.3
West of Frank Slide Interpretive Centre	7,680	7,930	8,110	8,030	8,230	8,230	7,880	7,880	7,880	3	0.3
West of Highway 507 East of Burmis	4,790	4,770	4,890	4,850	4,990	4,990	5,890	5,880	5,880	23	2.6
West of Highway 6 North of Pincher Creek	3,880	4,160	4,080	4,120	4,120	4,060	4,080	4,070	4,120	6	0.8
West of Highway 2 West of Fort Macleod	4,600	4,790	4,800	4,800	4,980	4,940	5,000	5,080	5,200	13	1.5

Notes: AADT = average annual daily traffic. AARC = annual average rate of change.
Source: Alberta Transportation

10.2.2 Traffic Safety

Collision rates along Highway 3 from the Alberta/British Columbia border to Lethbridge are generally at or below provincial averages, except for the stretch between the S.M. of Crowsnest Pass border and Pincher Creek, which was approximately 27% above the provincial average in 2012 (Table 10.2). Collision rates along the stretch of road within Crowsnest Pass which includes the Project access road were approximately 7% above the provincial average in 2012 (Table 10.2).

Table 10.2: Vehicle Collisions on Highway 3

Highway/Segment	2008	2009	2010	2011	2012	2012 Provincial Rate	2012 as % of Provincial Rate
	(Collision rate per 100 million vehicle km)						
Highway 3 in S.M. Crowsnest Pass	80	71	75	89	102	95	107%
Highway 3 from S.M. Crowsnest Pass border to Pincher Creek	159	143	164	191	121	95	127%
Highway 3 from Pincher Creek to Fort Macleod	115	117	82	93	88	95	93%
Highway 3 from Fort Macleod to west side of Lethbridge	51	36	40	43	34	55	62%

Source: Alberta Transportation, Nichols Applied Management

10.3 Effects Assessment

10.3.1 Base Case

Under Base Case assumptions, traffic volumes on Highway 3 are expected to increase by a similar magnitude as has been experienced in the recent past. Under these assumptions, the volume of traffic

travelling along Highway 3 near the Town of Blairmore will increase to approximately 7,100 AADT in 2017 and 7,450 AADT in 2019.

10.3.2 Applications Case

Project-related traffic, as measured at the proposed mine access road to Highway 3 near Blairmore, is expected to average 50 AADT during the construction period, peaking in the range of 80 AADT in early 2018, mostly due to equipment and materials deliveries. This traffic is expected to move east and west along Highway 3 and represents an increase of approximately 1% to Base Case traffic levels in 2018.

During operations, the average contribution to traffic volumes along Highway 3 both east and west of the Project access road is estimated in the range of 130 AADT. This represents approximately a 2% increase over Base Case traffic levels in 2019.

10.3.3 Planned Development Case

There is no significant change anticipated in traffic levels as a result of additional projects currently considered in the PDC.

10.4 Mitigations for Potential Impacts to Transportation

In 2015, Benga commissioned Hatch Mott MacDonald, an engineering firm, to conduct a traffic impact assessment of Project operations on traffic along Highway 3 near the Project as well as develop recommendations for vehicle access to the project. As per Hatch Mott MacDonald's recommendations, improvements to the left turn lane storage at intersections within Blairmore, and additional signalization at the 129th Street intersection will be completed by 2021 to accommodate projected increases in background traffic volumes. In addition, the existing gravel access road to the Project will need to be upgraded to accommodate Project-related traffic.

During both construction and operations, Benga and its contractors will use buses and multi-passenger vans to transport personnel to site in order to reduce the total number of vehicles traveling on local roads. Benga will also endeavour to schedule construction deliveries during off-peak hours.

Further, Benga is committed to maintaining an open dialogue and communicating its development and operational plans, including traffic management plans, with the appropriate agencies such as Alberta Transportation and B.C. Transportation and Infrastructure.

10.5 Characterization of Residual Project Effects

The descriptors for the characterization of this residual effect are:

- Direction is negative during construction and operation as Project-related workforce and activities will increase traffic.

- Geographic extent is at the RSA level. Project effects will mostly fall on road segments and intersections near the Project site.
- Duration of Project effects during construction will be short (less than two years). Project effects during operations will be long-term.
- Frequency of Project effects during construction and operation will be continuous.
- Project effects are reversible in the long term. The Project effects on transportation will occur through the operational life of the Project and then cease after closure.
- Magnitude is moderate during construction and operation, taking into consideration the transportation infrastructure in the RSA and recommended mitigation and other management measures.
- Probability of occurrence is high.

Based on the residual effects characterization above, Project-related effects on transportation infrastructure are predicted to be not significant. Prediction confidence is high.

11. Project Closure

The Project is expected to be in operation for approximately 23 years, meaning Project closure will fall well outside the typical 3, 5 and 10-year planning horizons of planning authorities and service providers.

It is currently unknown what regional socio-economic conditions will be so far into the future. However, there are a number of factors which might influence those conditions, including:

- **Growing global energy needs:** Demand for energy from all sources, both renewable and non-renewable, is expected to increase as both developed and emerging countries continue to grow. This need for energy, along with the extent of non-renewable resources available in the region, means ongoing activity in both mining and oil and gas exploration is plausible at the time of Project closure. If so, socio-economic effects related to employment and population may continue.

- **Provincial government policy with respect to non-renewable resource extraction and consumption.** Recent changes in the provincial government are expected to result in changes to policies that may influence the recovery of coal in Alberta while also prescribing specific closure and reclamation activities.

- **Advances in knowledge and technology:** Technological progress and improvements in our understanding of best practices will play an important role in:

    - changing both the type of services available in the region and the manner in which they are delivered; and

    - ushering in productivity improvement measures that will result in changes to construction and operations within the mining industry.

Despite the uncertainty regarding socio-economic conditions, a variety of individuals or groups will be affected, to varying degrees, by Project closure. For this reason, a closure plan will be developed to manage the human resource elements of the closure process. The development of this closure plan will occur closer to the date of actual Project closure and will:

- take into consideration the likely socio-economic environment in which the closure will take place;

- take into consideration Aboriginal community and public stakeholder input provided during ongoing Project consultations and engage with them in developing reclamation and closure plans; and

- draw upon other closure experiences in the region, including strategies used and lessons learned.

12. Evaluation of Significance

Table 12.1 provides the determination of significance for the effects of Project operations on socio-economic VCs identified in Section 2.1. The determination of significance considers residual effects after mitigation and other management measures are implemented. It is consistent with the method used elsewhere in the filed application, which itself draws on guidance from both Federal and Provincial regulators.

Table 12.1:Project Operations Residual Effects on Socio-Economic VCs

VC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Geographical Extent of Impact[1]	Duration of Impact[2]	Frequency of Impact[3]	Ability for Recovery[4]	Magnitude[5]	Project Contribution[6]	Confidence Rating[7]	Probability Occurrence[8]	Significance[9]
Income	• Project expenditures will generate income for businesses and workers	• See Section 4.2.3	Regional/ Provincial	Long	Continuous	Reversible in long-term	Low	Positive	High	High	Not Significant
Government Revenue	• The Project will generate revenue for government	N/A	Regional/ Provincial/ National	Long	Continuous	Reversible in long-term	Low to Moderate	Positive	High	High	Not Significant
Employment	• Project activities will generate employment opportunities	• See Section 4.2.3	Regional/ Provincial	Long	Continuous	Reversible in long-term	Low	Positive	High	High	Not Significant
Population	• The operations jobs created by the Project are expected to be filled primarily by in-migrants to the region, thereby increasing the permanent population in the RSA.	• See Section 5.4	Regional	Long	Continuous	Reversible in long term	Low	Mixed	High	High	Not Significant

VC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Geographical Extent of Impact[1]	Duration of Impact[2]	Frequency of Impact[3]	Ability for Recovery[4]	Magnitude[5]	Project Contribution[6]	Confidence Rating[7]	Probability Occurrence[8]	Significance[9]
Housing	• Project-related population increases will increase demand for housing in the RSA.	• See Section 6.4	Regional	Long	Continuous	Reversible in long term	Moderate	Positive	High	High	Not Significant
Social Infrastructure	• Project-related activities, workers, traffic, and population effects will place demands on social infrastructure in the RSA	• See Section 7.4	Regional	Long	Occasional to Periodic	Reversible in long term	Low	Negative	High	High	Not Significant
Municipal Infrastructure and Services	• Project-related activities and population will place demands on municipal infrastructure in the RSA	• See Section 8.4	Regional	Long	Continuous	Reversible in long term	Moderate	Negative	High	High	Not Significant

VC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Geographical Extent of Impact[1]	Duration of Impact[2]	Frequency of Impact[3]	Ability for Recovery[4]	Magnitude[5]	Project Contribution[6]	Confidence Rating[7]	Probability Occurrence[8]	Significance[9]
Traditional Land Use and Culture	• Project-related local wage employment opportunities and land use might affect local traditional land use and associated social and cultural conditions for local Aboriginal communities.	• See Section 9.4 • Project-specific effects on traditional land use can be found in the Aboriginal Consultation, Traditional Ecological Knowledge and Land Use section of the EIA	Regional	Extended	Continuous	Reversible in long term	Low	Mixed	High	High	Not significant
Transportation	• The transportation of materials, equipment and workers will increase traffic in the RSA.	• See Section 10.4	Regional	Long	Continuous	Reversible in long term	Moderate	Negative	High	High	Not Significant

VC	Nature of Potential Impact or Effect	Mitigation/ Protection Plan	Geographical Extent of Impact[1]	Duration of Impact[2]	Frequency of Impact[3]	Ability for Recovery[4]	Magnitude[5]	Project Contribution[6]	Confidence Rating[7]	Probability Occurrence[8]	Significance[9]

[1] Local, Regional, Provincial, National, Global
[2] Short, Long, Extended, Residual
[3] Continuous, Isolated, Periodic, Occasional, Accidental, Seasonal
[4] Reversible in short term, Reversible in long term, Irreversible – rare
[5] No Impact, Low Impact, Moderate Impact, High Impact
[6] Positive, Mixed, Negative
[7] Low, Moderate, High
[8] Low, Medium, High
[9] Significant, Not significant

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