14. ASSESSMENT OF ECONOMIC EFFECTS

14.1 INTRODUCTION

Economic effects of mine development are generally considered a key benefit of any project as they are seen as a potential engine of economic growth, providing jobs, incomes, tax revenues, and business opportunities that contribute to community, regional, and provincial prosperity. The Project's anticipated positive economic effects are discussed in Section 1.7, Project Benefits (Chapter 1). This chapter examines only the potential adverse economic effects of the proposed Project. The British Columbia *Environmental Assessment Act* (2002) as well as the Application Information Requirements (AIR) require the assessment of the economic adverse effects of the Project (BC EAO 2013). The potential adverse economic effects considered in this assessment include effects on the labour market and economic activity. These effects are associated with direct Project employment and spin-off employment and Project procurement of goods and services.

This chapter:

- includes a description of the regulatory and policy framework and economic baseline setting, which is informed by the Murray River Coal Project 2013 Socio-economic Baseline Report (Appendix 14-A);
- defines spatial, temporal, administrative and technical boundaries for the economic effects assessment;
- identifies potential economic effects;
- provides economic effects assessment and proposes mitigation measures;
- describes residual effects of the Project remaining after the implementation of mitigation measures;
- provides characterization and significance of the residual effects, and evaluates the confidence/uncertainty of the residual effects of the Project;
- identifies historical, present, and reasonably foreseeable future projects and activities that impact economic Valued Components (VCs) and that could contribute to potential cumulative effects; and
- assesses cumulative economic effects of the Project and other projects.

14.2 REGULATORY AND POLICY FRAMEWORK

This chapter is written pursuant to the *Canadian Environmental Assessment Act, 2012* (2012b) and the British Columbia *Environmental Assessment Act* (2002), which requires an assessment of the potential adverse economic effects (among others) of the Project. Although there is no federal or provincial legislation that specifically applies to the management of adverse economic effects, several government institutions, as enabled by legislation and policies, set out specific objectives, standards,

or guidelines for the enhancement of economic conditions and the overall management of development to, indirectly, avoid adverse economic effects.

The Economic Development Division of BC, under the Ministry of Jobs, Tourism, and Skills Training, works with communities, industry, economic development agencies and other ministries to promote regional economic growth and diversification in BC (BC Ministry of Transportation and Infrastructure 2014). The BC Jobs Plan is a government's strategy lunched in 2011 to grow the BC economy; the plan focuses on BC's unique competitive advantages and identifies a series of targets and government actions that help drive new investment and job opportunity (Canada Starts Here: BC Jobs Plan 2014). Further, the Economic Development Association of BC (EDABC) is an association of economic development practitioners in the Province of BC; EDABC provides services that help member communities grow and expand new and existing businesses, attract new business investments, and work towards strategic infrastructure investment, land use planning, and community enhancement (EDABC 2014).

The North Peace Economic Development Commission (NPEDC), mandated by bylaw 1531 of the Peace River Regional District (PRRD), encourages economic development projects to diversify and strengthen the economy of the North Peace. The commission is primarily concerned with eliminating the barriers to economic development in the North Peace. Key sectors of economic development include forestry, agriculture, energy, and community and rural development (NPEDC 2014).

The Northern Development Initiative Trust (Northern Development or NDIT) was established in 2004 by the provincial government to foster economic development and job creation in central and northern BC. NDTI covers 70% of the province and offers a range of funding programs suited to a diverse set of economic development priorities. By legislated mandate, Northern Development project investment must fall within on the following ten primary investment areas including: agriculture, economic development, energy, forestry, mining, Olympic opportunities, pine beetle recovery, small business, tourism and transportation (NDIT 2014).

At the local level, all incorporated municipalities are required by provincial statute to produce and maintain an Official Community Plan (OCP). An OCP is a municipal bylaw that defines policies for land use and development. The purpose of the OCP is to guide the physical development of the community by establishing goals for long term growth. Ultimately, these goals are aimed at meeting the long term needs of current and future residents, as well as the businesses that serve them. Within the region, OCPs have been developed for Tumbler Ridge, Chetwynd, City of Dawson Creek and City of Fort St John.

14.3 REGIONAL OVERVIEW

The Project is located in the PRRD in the Northwest BC. With an area of approximately 119,000 square kilometres (km^2), the PRRD is the largest regional district in BC, and comprises 1.4% of the Province's population (Table 14.3-1; BC Stats 2012b; PRRD n.d.). Fort St. John is the largest community within the PRRD and it is an important government service, logistical and supply centre (FSJ 2012).

Table 14.3-1. BC and PRRD Population, 1996 to 2013

Year	1996	2001	2006	2011	2012[1]	2013[2]	% Change (1996-2011)	% Change (2011-2013)
British Columbia	3,724,500	3,907,738	4,113,487	4,400,057	4,543,308	4,581,978	+18.1%	+4.0%
Peace River (Regional District)	56,477	55,080	58,264	60,082	61,905	63,176	+6.4%	+4.9%

Source: Statistics Canada (2002b, 2007c, 2012b)
[1,2] Population estimates by BC Stats (2014b), population in BC, Peace River South and North.
[2]Population as of July 1, 2013.

The PRRD has experienced a modest population increase since 2001. In 2013, the total population was estimated at 63,176, representing growth of 12.8% since 2001; between 1996 and 2001, the region's population declined by 2.5% due to out-migration largely as a result of mine closures when coal prices declined (Table 14.3-1; BC Stats 2014b). As prices have risen in recent years and de-commissioned mines have re-opened and new mines have opened, the region has seen an influx of new workers and their families. Approximately, 44% of PRRD population live in Peace River South, and 56% live in Peace River North (BC Stats 2014b). Mobility status for the PRRD further indicates that 83.3% of the population lived at the same address in 2010 as in 2011, compared to 56.6% people who lived as the same address in 2006 as in 2011 (Statistics Canada 2013). By 2036, the population in the PRRD is projected to increase to 87,482, a growth of 38.5% from 2013 levels (BC Stats 2013). As a result of the Project, the population may also increase with increases in the number of people of the working age (15 to 65 years of age) largely as a result of new employment opportunities in the region.

The PRRD has a relatively young population; in 2011, the median age of the PRRD was 34.3 years, 7.6 years younger than the provincial median. In contrast to the Province, the gender ratio for the PRRD is weighted slightly in favour of males (51%; Statistics Canada 2012a); this likely reflects the prevalence of male-dominated occupations in the area. Two percent of the region's population was identified as a visible minority, which is well below the provincial average of 24.8% (BC Stats 2012d). This trend potentially reflects the relatively isolated nature of the PRRD, as well as the distance of the PRRD from major urban centres, which makes it less attractive for new migrants to the province.

The average number of persons per census family was 3.0 in 2011; in comparison, BC had 2.8 persons per census family. There were 2.5 persons on average in a private household, this was in line with the provincial average (2.5; Statistics Canada 2012b). Further, there were as many couple family households with children as couple family households without children. The average number of children per home was 1.1, being above the provincial average of 1.0 (Statistics Canada 2012b)

Aboriginal peoples have a physical, cultural, and historical presence throughout the PRRD. The PRRD is further typified by a high proportion of First Nations residents in comparison with the rest of the province. The PRRD includes First Nation communities of: Blueberry River, Doig River, Halfway River, Kwadacha, Saulteau, Tsay Keh Dene, and West Moberly (PRRD 2014). In 2011, 13.8% of the PRRD's population (8,135 people) identified as Aboriginal, including people living on and off-reserve, compared with 5.4% provincially (Statistics Canada 2013).

The PRRD exhibits a large dependency on primary resource industries. The main economic activities are energy and oil and gas, mining, forestry, and agriculture. Tourism is also a growing area, with potential for further development in backcountry, cultural, and eco-tourism (SPEDC 2012f).

The PRRD has large reserves of oil and natural gas and remains the hub for exploration activity and production in the province. Compared with mining, oil and gas production is not as labour intensive, but is equipment intensive. As such, most of the employment created by the industry is in exploration and drilling activities rather than in primary extraction (BC Stats 2010). The oil and gas industry has also created indirect opportunities for local businesses and the local labour force in activities such as road and facility construction, pipelines, safety and security services, environmental assessment services, and land reclamation (SPEDC 2012b).

British Columbia has 12.0 billion tonnes of potentially mineable coal resources of which 4.0 billion tonnes are located in the Peace River coalfield and the remaining in the East Kootenay (Coal Association of Canada 2013). The PRRD is an active area for mining and mineral exploration. Most mining activity is coal-based and is primarily located in the South Peace area. In 2008, coal accounted for approximately $2 billion of the PRRD's $6.6 billion in GDP and over 66.6% of coal value in BC. In 2011, direct GDP impact as a result of coal mine operations totaled $2,269 million in BC whereas contributions to BC's GDP from indirect activities related to coal mine operations contributed another $972 million (Coal Association of Canada 2013). Related government revenue totaled $399 million; additionally, $316 million was contributed in mineral taxes paid to the provincial government. There were 26,041 direct and indirect jobs in the coal mining worth $1,603 million in income earned (Coal Association of Canada 2013).

As of 2012 there were four mines in operation in the region and six proposed projects in various stages of exploration or development (SPEDC 2012e). Capital expenditures are expected to increase in the area, as the operating mines are making significant investments to expand their capacity and make their operations more cost effective (PWC 2012). In 2012, 28.6 million tonnes of coal were extracted in BC, worth $5.1 billion dollars; as compared to 2011 when 27.4 billion tonnes of coal were extracted valued at $6.1 billion dollars (BC MEMPR 2012).

A global oversupply of coal combined with falling demand created challenges for the coal industry in BC. Coal prices fell from an average price of US$193 in 2012, to US$160 in 2013; currently the prices per tonne is US$120 (May 2014; Constantineau 2014). Further, Walter Energy announced the closing of its Wolverine coal mine near Tumbler Ridge in April of 2014 and the mid-July (2014) shutdown of its Brule coal mine near Chetwynd; consequently, there will be layoffs at these mines resulting from these announced shutdowns (Constantineau 2014).

The PRRD encompasses the Peace Forest District. This contains two Timber Supply Areas (TSAs): the Fort St. John TSA, which covers 4.673 million hectares; and the Dawson Creek TSA, which covers 2.078 million hectares (BC Stats 2012c; NPEDC 2012; SPEDC 2012c). In addition to timber harvest, the PRRD has an active forest manufacturing industry. It is home to various large lumber and pulp and paper mills and remanufacturing facilities, where the majority of the harvested timber is processed (BC Stats 2012c; NPEDC 2012).

The PRRD is also the most northerly agricultural area of Canada (NPEDC 2012) encompassing over 1,600 farms and ranches (BC Stats 2012c). Cattle, sheep, bison, pigs and horse ranching, as well as grain farming, are the main local agricultural activities. Approximately 90% of the Province's grain and 95% of its canola is produced in the PRRD. A significant proportion (around 30%) of the Provincial honey production is centered in the region as well (NPEDC 2012).

Tourism is becoming increasingly important in the region and it is a sector with significant growth potential both demographically and economically (Norton 2006). The Northeast accommodation market has been steadily increasing in recent years, and revenue growth has surpassed that of any other region in the Province. The Northeast Development Region generated nearly $76 million in room revenue in 2009, 3.8% of the provincial total (Tourism BC 2010).

The PRRD's labour market was relatively strong in 2011, with participation rate of 74.8% and unemployment rate of 6.4%. In comparison, the province's participation rate was lower (64.6%) and its unemployment rate was higher (7.8%). Most PRRD workers were employed in the mining, quarrying, and oil and gas extraction industries (13.2%), followed closely by retail trade (11.2%) and construction (11.0%). In line with this, the most common occupations included trades, transport, and equipment operation (25.1%), followed by sales (19.5%). Employment increased in the PRRD between 2001 and 2011, with a 5.8% increase in the employment rate between 2001 and 2006 and a slight decline of 2% between 2006 and 2011. In 2011, the average income in PRRD was $46,218, above the provincial average of $39,415 (Statistics Canada 2002a, 2007d, 2013).

Worker retention is an ongoing challenge for service providers in the PRRD, who are currently competing with heavy industry for staff and are unable in most cases to provide wages comparable to that paid by the mining, oil and gas, and energy sectors (S. Kenny, Pers. Comm., 2012).

14.4 HISTORICAL ACTIVITIES

Several historic and current economic activities are within close proximity to the proposed Project. These include mining exploration and production, oil and gas, hydro and wind energy projects, forestry, and tourism.[1]

The Quintette Coal Mine, about 20 km south of Tumbler Ridge, was an open pit mine that operated between 1982 and 2000. The mine consisted of five open pits in three discrete areas: Sheriff (Wolverine and Mesa Pits), Frame (Shikano Pit) and Babcock (Windy and Window Pits). Mine permits for the Wolverine and Mesa Pits were issued in December 1982 and mining commenced from 1983 until 1998 (Wolverine) and 2000 (Mesa). Raw coal was transported via an overland conveyor from the Mesa and Wolverine Pits to the Quintette plant site for processing. The coal processing plant has been under care and maintenance since the end of mining in 2000; the overland conveyor, which previously crossed through a portion of HD Mining's Decline Site, was decommissioned by Teck in 2011. Teck is currently securing the necessary approvals to re-initiate mining in the Babcock area.

[1] Hunting and trapping also occurs in the region, but are considered within the Land Use Effects Assessment (Chapter 16).

The Bullmoose Coal Mine operated from 1983 to 2003 and was the largest open pit coal mine at the time, producing about 3 million tons of metallurgical coal. The 1.7-million-tonne-per-year operation consisted of an open-pit mine, a plant facility in the Bullmoose Creek valley below the mine, and a separate rail load-out facility on the B.C. Rail branchline.

Willow Creek mine is located 45 km west of Chetwynd. The mine is wholly owned by Walter Energy (formerly Western Coal Corp) and began production in 2004. It was shut down in 2007 and then reopened in June 2010. In 2011, the mine produced 0.9 million tonnes of combined primarily pulverised coal injection and hard coking coal (Peace River Block Daily News 2005; DeGrace 2011; Walter Energy Inc. 2011c; Ledcor n.d.). Willow Creek employed approximately 510 people in 2011 (including contract and temporary employees).

Walter Energy's (Western Coal Corp.) Brule open-pit coal mine is located 45 km south of Chetwynd. Production in 2011 totalled about 1.3 million tonnes, up slightly from 2010. The mine employed 416 people on site in 2011, including contract and temporary employees (DeGrace 2011; Walter Energy Inc. 2011a).

Walter Energy also owns the Wolverine property, located 15 km west of Tumbler Ridge. The property includes coal processing and rail load-out facilities as well as the Perry Creek open pit coal mine. The Wolverine-Perry Creek mine produced metallurgical coal for the steel industry. In 2011 the mine produced about 1.8 million tonnes. Including contract and temporary employees, the mine employed 477 people in 2011 (DeGrace 2011; Walter Energy Inc. 2011b).

On April 15, 2014 Walter Energy announced the idling of the Wolverine Coal Mine, the Willow Creek Mine and the Brue Mine (Carter 2014). The Brule Mine will continue to operate past July 2014, the initial shut down date (Carter 2014). Approximately 450 workers were laid off at the Wolverine mine; Willow Creek once employing up to 300 workers, reduced project employment to 80, 40 workers in the pit and 40 in the plant preparing coal (Carter 2014).

Further, Anglo American recently purchased Peace River Coal's Trend mine, located approximately 25 km south of Tumbler Ridge. Operation began in December 2005. The mine is permitted to produce a maximum of 1.5 million tonnes per year for about 10 years (Anglo American n.d.; Peace River Coal n.d.). Mine employment was estimated at 350 people in 2011 (DeGrace 2011).

The primary areas of oil and gas activity are around Fort St. John and Dawson Creek, which are part of the Fort St. John Geological Region (BC MEMPR 2009). Recent industry activity has centered on unconventional reservoirs in the South Peace area (BC MEMPR 2009). There are around 99 oil and gas companies operating in the South Peace area alone with over 254 oil and gas wells approved in 2009 (SPEDC 2012b). The major operators in the Fort St. John Region are Canadian Natural Resources Limited and ConocoPhillips Canada Resources Corp. In 2007, Canadian Natural Resources Limited was also the second largest gas producer by sales volume in BC (BC MEMPR 2009). The North Peace Economic Development Commission estimates that the oil and gas industry provides direct employment to around 12,000 people in the area. The industrial service sector in the region has also distinguished itself, with small and large pipeline, well site construction, trucking and seismic companies providing support to the industry (NPEDC 2012).

There are two hydroelectric dams operating in the PRRD, the Peace Canyon Dam and the WAC Bennett Dam, the latter being the largest hydroelectric dam in BC. These facilities provide approximately 40% of the hydro-electrical power utilized by the province. Further, there are several wind and solar power projects in the PRRD, including AltaGas' Bear Mountain Wind Park, located southwest of Dawson Creek. Bear Mountain was completed in 2009 and was the first wind park operating in BC. In addition, the Plutonic Power Corporation and GE Energy's Dokie Wind Farm Project achieved commercial operations in February 2011. This wind farm now provides energy to BC Hydro under a 25-year Electricity Purchase Agreement. The project is located near Chetwynd and has become the largest wind farm in BC (SPEDC 2012d).

The forestry sector, in addition to timber harvest, support lumber and pulp and paper mills and remanufacturing facilities, where the majority of the harvested timber is processed (BC Stats 2012c; NPEDC 2012). The forest industry in the PRRD has been facing many challenges in recent years. It was negatively affected by the global economic downturn in 2008/2009. In early 2008, Chetwynd saw the closure of its Canfor sawmill. This was followed by the shutdown of the Tembec pulp mill in February 2009. Both operations re-opened in early 2010 due to strong demand in Asian markets (CA 2010). As a result, the past two years have seen a revival in the regional forest industry (ICABC 2012). The 2006 census estimated a total of 845 people directly employed in forest and logging industry (including support activities). The industry accounted for 2.4% of employment in the Northeast Development Region, compared to a provincial average of 1.3% (BC Stats 2012a). Wood product manufacturing and paper manufacturing also employ people throughout the region. In 2006, wood product manufacturing directly employed 780 people (2.3% of PRRD employment), while paper manufacturing employed 365 people (1.1% of PRRD employment). Overall, the forest sector accounted for 5.8% of the regional employment (BC Stats 2012a). Large portions of the region have been recently harvested to remove pine-beetle affected timber.

Finally, tourism is becoming increasingly important in the region; it is a sector with significant growth potential both demographically and economically (Norton 2006). Tourists are drawn to the area because of its relatively remote location and wide-open spaces. Outdoor activities such as hiking, white-water rafting and fishing make the region an attractive location for travellers looking for a unique opportunity to "get away" (Stroomer 2010). The PRRD offers tourism opportunities that reflect the natural wilderness of the area as well as its cultural and economic activity. The tourism industry provides strong potential for business investment, job creation, economic growth and rural development in the PRRD (NPEDC 2012; SPEDC 2012f). In northern BC, employment in the tourism industry was 6,900 in 2012, which was a 2.8% decrease from 2011 (BC Stats 2012e).

14.5 BASELINE STUDIES

A baseline study of the economic environment was undertaken to understand existing baseline conditions in the vicinity of the Project, as well as more broadly across the region and the province, and provide a benchmark for evaluating the potential economic effects of the Project. The complete baseline report is provided as Appendix 14-A (Murray River Coal Project, 2013 Socio-economic Baseline Report).

The economic baseline study provides an overall description of the economy and trends over time. As specified in the AIR for the Project, the description of the economic setting focuses on:

- Population and Demographics:
  - trends in population and demographic characteristics, mobility and household structure;
  - expected growth of population in nearby communities and changes in population characteristics;
- Employment and Income:
  - provincial and regional labour supply and demand by job sector and category;
  - income and earnings;
- Economic Activity:
  - economic activity and trends in the region; and
  - local and regional suppliers of goods and services.

Important components for the economic baseline include employment (labour force) and income, and the economy and business environment. In addition to information on the population as a whole, economic baseline information is provided for local Aboriginal communities that may benefit from or otherwise might be impacted by the Project. In developing the economic baseline, the following assumptions guided the work:

- The Project will derive a portion of its workforce from the communities of Tumbler Ridge, Dawson Creek, Chetwynd and Fort St. John, as well as the Aboriginal communities of West Moberly First Nation (WMFN), Saulteau First Nation (SFN), and McLeod Lake Indian Band (MLIB); and
- Census and other statistical information, with consideration to relevant temporal constraints, accurately reflect the characteristics of each community's economic context.

14.5.1 Data Sources

Data sources consisted of secondary information collected during desk-based research and field work, and primary research consisting of key informant interviews and field observations.

Primary and secondary research was undertaken to gather economic information between 2010 and 2014. Primary research included meetings and interviews with knowledge holders in the District of Tumbler Ridge, City of Dawson Creek, District of Chetwynd, and City of Fort St. John (Appendix 14-A). Secondary research included accessing and compiling information from a number of sources:

- Statistics Canada 2001, 2006, and 2011 census data provided statistical data related to population and demographics;
- National Household Survey (NHS) 2011 data provided statistical data related to Aboriginal population, employment and income, and industry;

- BC Stats provided data related to: development regions, regional employment projections, BC economy and labour market, community statistics, exports and imports, socio-economic profiles, tourism indicators, BC economic accounts, sub-provincial population projections, consumer price index (CPI), and population estimates;
- The PRRD website provided information on regional spending and expenditures, as well as the main economic activities in the region;
- District of Tumbler Ridge, City of Dawson Creek, and District of Chetwynd and other websites for communities provided general information on the communities; and
- North Peace Economic Development Commission and South Peace Economic Development Commission provided information on business activities and key sectors in the region.

All information sources are referenced where used.

14.5.2 Methods

14.5.2.1 Baseline Study Area

Baseline study was conducted using a tiered approach beginning with a desk-based review of information available from government sources, engineering and technical reports, scientific studies, and peer-reviewed articles (Appendix 14-A).

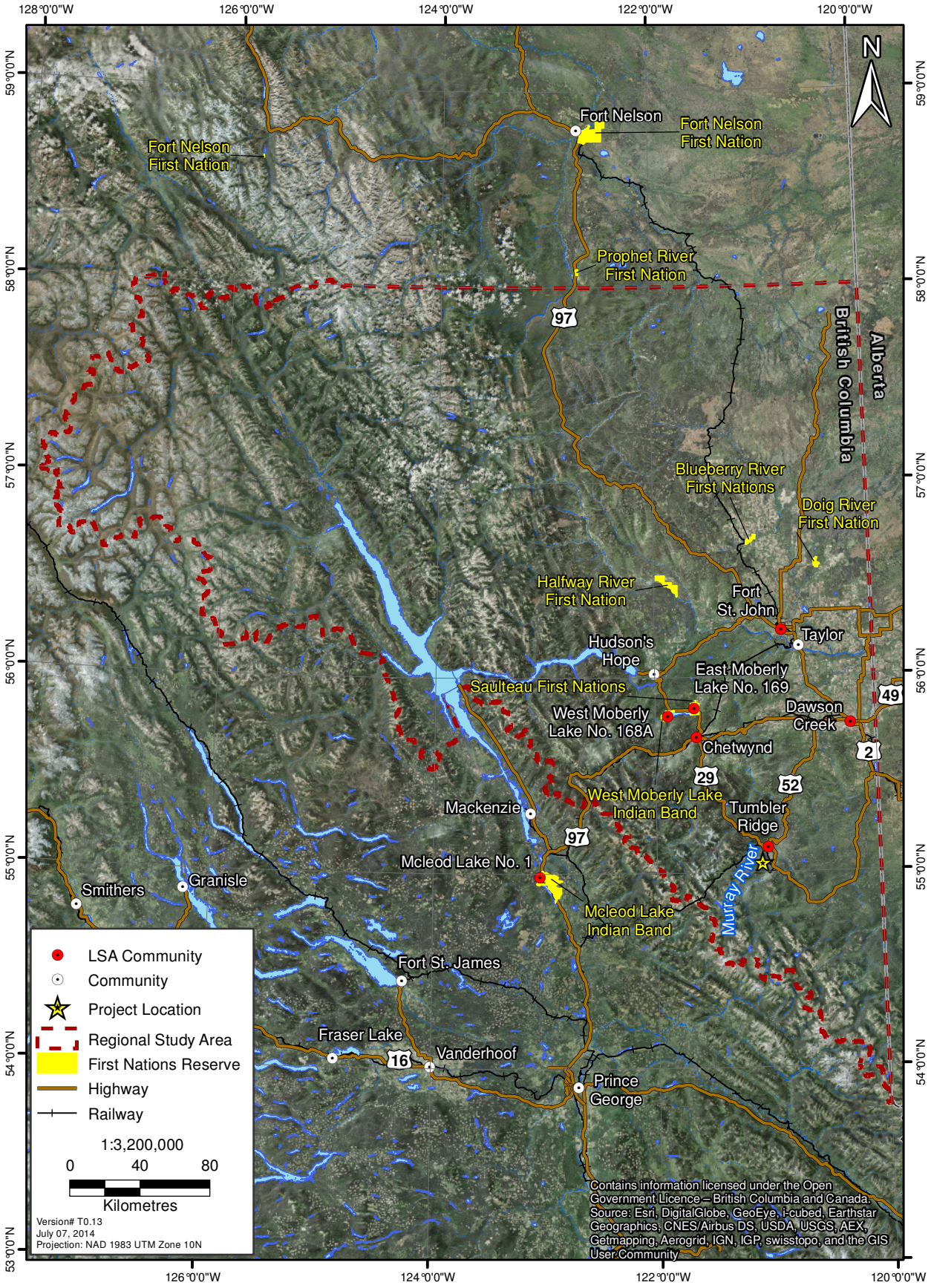
The economic impact assessment draws upon the economic baseline data for both the regional study area (RSA) and local study area (LSA; Figure 14.5-1); the collected data was updated where possible. The economic RSA is defined as the PRRD. The Project is located within the boundaries of the PRRD and will rely on the RSA for human resources, supplies, services and other requirements. The PRRD is the largest regional district in the province (119,000 km^2). The LSA includes several communities located within the RSA. The communities included in the baseline study were selected due to their proximity to the Project and access requirements, as well as their expected role in construction, operation and closure (e.g., provision of labour, and goods and services). The LSA includes both municipal communities and Indian Reserves (IRs).

The following municipalities and IRs are included in the LSA:

- District of Tumbler Ridge;
- City of Dawson Creek;
- District of Chetwynd;
- City of Fort St. John;
- West Moberly Lake IR 168A (WMFN);
- East Moberly Lake IR 169 (SFN); and
- McLeod Lake IR 1 (MLIB).

Figure 14.5-1

Regional Study Area and Local Study Area Communities



Economic effects that may be experienced at the provincial level have been included in this assessment. Accordingly, provincial level data and information have been included as part of the baseline setting.

14.5.2.2 Economic Baseline Assessment

The overall approach of the economic baseline assessment was to provide a characterization of key economic components to support the effects assessment. Data and information for the study was collected through both desk-based research and information interviews with key informants.

Desk-based research was conducted between August 2010 and July 2014. This work included reviewing and compiling relevant economic information available from various provincial and federal government agencies, private sector and professional associations.

Throughout the research process, information and data gathered were triangulated, or verified using multiple sources, in order to confirm the accuracy of information and data and to remove the potential for bias that arises through the use of single source information. The selection of indicators was influenced by the availability and reliability of information and data.

Primary research was undertaken to fill data gaps after completing secondary research and to confirm the results of this research. Primary research consisted of telephone and face-to-face interviews with key informants in communities in the LSA. Key informants are defined as individuals with specific knowledge and experience concerning a particular socio-economic component as a result of their professional capacity and/or role in their community.

Interviews were conducted during April 2012 in Tumbler Ridge, Chetwynd, Dawson Creek, and Fort St. John. Telephone interviews were conducted from May to July of 2012 with knowledge holders in Tumbler Ridge and Fort St. John. Twenty-five people were interviewed. Representation was achieved across a number of areas including economic development, education and training, and planning and resource management, among others. A complete list of the organizations interviewed is provided in Appendix 14-A.

Further, the Proponent engaged with WMFN, SFN, and MLIB to verify economic information derived from public sources and to identify and fill any data gaps. The Proponent agreed to fund a socio-economic baseline study for WMFN (to be undertaken by a consultant of their choosing). At the time of submission of the Application/EIS, WMFN had not released the results of the study to the Proponent. The Proponent provided a draft socio-economic baseline study to SFN to enable their consultant to conduct a gap analysis and propose methods to address any gaps. At the time of submission of the Application/EIS, the Proponent had received SFN's gap analysis but had received a proposal to collect new information to address identified gaps. Plans to undertake primary socio-economic baseline research with MLIB were delayed by negotiations for memorandum over understanding between MLIB and the Proponent and a study had not been undertaken by the time of submission of the Application/EIS (Chapter 2).

14.5.3 Characterization of Economic Baseline Condition

This section describes the economic profile and characteristics of the communities in the LSA, including qualitative and quantitative descriptions of provincial, regional and community-level demographics, labour force supply and demand by job category, income and earnings, and economic activity.

14.5.3.1 Population and Demographics

In 2011, the total population in the LSA was 36,029; of that, 492 lived in the three First Nation communities. The District of Tumbler Ridge is the closest community to the Project, whereas the City of Dawson Creek is the closest city to the Project site.

Tumbler Ridge

The population in the LSA non-Aboriginal communities increased between 2001 and 2011 (Table 14.5-1). The District of Tumbler Ridge's population saw the return of coal mining with the opening of the Wolverine-Perry Creek Mine in 2005, followed by the Trend Mine (DTR n.d.). Consequently, between 2001 and 2006, Tumbler Ridge's population increased 32.6%, from 1,851 to 2,454; since 2006, the population has increased by 10.4% to 2,710 in 2011.

Table 14.5-1. Population and Demographic Changes, Non-Aboriginal Communities, 2001 to 2011

	District of Tumbler Ridge			District of Chetwynd			City of Dawson Creek			City of Fort St. John		
	2001	2006	2011	2001	2006	2011	2001	2006	2011	2001	2006	2011
Total Population	1,851	2,454	2,710	2,591	2,633	2,635	10,754	10,994	11,583	16,034	17,402	18,609
Population change from previous Census (%)	-51.0%	32.6%	10.4%	-13.1%	1.6%	0.1%	-3.3%	2.2%	5.4%	6.7%	8.4%	6.9%
Males	960	1,300	1,465	1,335	1,365	1,360	5,255	5,435	5,690	8,190	8,975	9,545
Females	890	1,155	1,245	1,255	1,265	1,275	5,495	5,560	5,895	7,845	8,430	9,070
Median Age (yrs)	38.8	42.2	39	31.1	32.8	32.6	34	35.6	36.2	29.6	29.8	30.6
Population over 15 years (%)	79.2%	82.2%	81.9%	74.8%	76.9%	78.5%	77.6%	79.4%	81.2%	76.9%	78.3%	78.8%

Source: Statistics Canada (2002b, 2007c, 2012b)

In 2011, Tumbler Ridge had slightly more males (54.1%) than females. The median age for the community in 2011 was estimated at 39.0 years, slightly lower than the provincial median age of 41.9 years. Nearly 82% of the population of Tumbler Ridge is over the age of 15. Further, in 2011, there were an average of 2.3 persons per household in Tumbler Ridge, which was lower than the provincial median of 2.5 (Statistics Canada 2012i, 2012a). The latest data on mobility status is from 2011, and it indicates that 80.7% of 2011 residents lived at the same address in 2010; however, only 46.5% lived at the same address in 2006 (Statistics Canada 2013).

As there is no established IR near Tumbler Ridge, the Aboriginal population of the community is low relative to other communities in the RSA. According to the 2011 NHS, 12.4% of the community

of Tumbler Ridge identified themselves as Aboriginal as compared to 13.8% regionally. The presence of visible minorities in Tumbler Ridge is even smaller, with 1.6% of all residents identified as a visible minority (Statistics Canada 2013).

Chetwynd

According to the 2011 Census, the population of Chetwynd totalled 2,635, nearly identical to that of 2006 and comparable to the population of Tumbler Ridge (Table 14.5-1). Fifty-two percent of all residents are male, which is the opposite pattern to the province's gender ratio statistics. The median age for the community was estimated at 32.6 years, which was 9.3 years younger than the provincial median. Chetwynd's population over the age of 15 was reported at 78.5%, nearly the same as that reported across the Province as a whole (Statistics Canada 2012c).

The District of Chetwynd in 2012 conducted its own municipal census. They believed their population to be 30 to 50% higher than the Census of Canada had recorded due to the "shadow population" in work camps in the area utilizing the community's services (Chetwynd Echo 2012; D. Fleming, Pers. Comm., 2012). Information is not readily available on the results of the municipal census. In 2011, there were on average 2.5 persons per household, which is the same as the provincial average (Statistics Canada 2012c). Further, in 2011 73.3% of residents indicated that they lived at the same address in 2010 as compared to 46.3% who lived at the same address in 2006 (Statistics Canada 2013).

The Aboriginal population of the Chetwynd, according to the 2011 NHS, is 12.1% of the total population compared to 13.8% regionally (Statistics Canada 2013). In 2011, approximately 10.9% of all residents of Chetwynd identified themselves as a visible minority, all of whom were either Chinese or Filipino (Statistics Canada 2013).

Dawson Creek

The population of Dawson Creek totalled 11,583, having increased 5.4% from 10,994 people in 2006 (Table 14.5-1). Fifty-one percent of all reported residents were female, which is reflective of the province's statistics. The median age for the community was estimated at 36.2 years, which was 5.7 years younger than the provincial median. Approximately 81% of the population of Dawson Creek is over the age of 15 (Statistics Canada 2012d). Further, in 2011, there were on average of 2.3 persons per household in the City of Dawson Creek, which was lower than the provincial median (2.5). Further, in 2011 82.5% residents lived at the same address as in 2010, however only 53.8% lived at the same address in 2006 (Statistics Canada 2013). The City of Dawson Creek, being the closest city to the Project, is expected to be one of the main sources (including also the City of Fort St. John) of direct and indirect workforce and service providers.

The Aboriginal population of the community is high relative to other communities in the RSA. According to the 2011 NHS, 14.7% of residents of Dawson Creek identified themselves as Aboriginal as compared to 13.8% regionally. The presence of visible minorities in Dawson Creek, however, is

small, with 5.4% of all residents identified as a visible minority, most of whom are from China, the Philippines or South Asian[2] countries (Statistics Canada 2013).

Fort St. John

The 2011 census reported a total population of 18,609 people in Fort St. John, an increase of 6.9% from 2006 (Table 14.5-1). The male population slightly outweighed the female population, with 51.2% of all residents reported to be male (Statistics Canada 2012k). Fort St. John's population is relatively young compared to the province; the median age in 2011 was 30.6 years, considerably lower than the provincial median of 41.9 years. Nearly 79% of the population was over the age of 15 (Statistics Canada 2012k, 2012f). The average number of persons per household was 2.5 in 2011 (Statistics Canada 2012k). With respect to the mobility status, in 2011 77.3% lived at the same address as in 2010 and only 43.5% lived at the same address in 2006 (Statistics Canada 2013).

Despite the relative proximity of First Nations communities such as Halfway River, Blueberry River and Doig River, the Aboriginal population of Fort St. John is lower relative to other communities in the RSA. According to the 2011 NHS, 11.5% of the city's residents identified themselves as Aboriginal, compared to 13.8% regionally. The presence of visible minorities in Fort St. John is even smaller, with 5.1% of all residents identified as a visible minority, most of which are of Chinese, South Asian, African or Filipino descent (Statistics Canada 2013). As with other communities in the RSA, Fort St. John has an extensive "shadow population" which utilizes the city's commercial and municipal services in addition to its permanent residents.

West Moberly Lake

West Moberly Lake IR 168A, in 2012, had a registered population of 247 people - 88 persons living on-reserve and 159 persons off-reserve (AANDC 2012). By comparison, the 2011 Census reported an on-reserve population of 95, an 86.3% increase from 2006 when only 51 people lived on the reserve (Statistics Canada 2012j). This indicates a reversal from population declines noted in the 2001 and 2006 Census data (Table 14.5-2). The reversal has apparently been attributed to recent housing price increases in the nearby community of Chetwynd (PRCI 2010), which has forced many members of WMFN to return to the reserve to reduce their cost of living.

WMFN's population had an equal amount of male and female residents in 2006[3]. The median age for the community in that year was estimated at 22.5 years, a notable 18.3 years younger than the provincial median, and 5.6 years younger than the Aboriginal median for the Province; more recent data is not available (Statistics Canada 2007b, 2012c). Data on household structure was suppressed (Statistics Canada 2012c). The latest data on mobility status is from 2011, and it indicates that 85.7% of 2011 residents lived at the same address in 2010; however only 61.5% lived at the same address in 2006 (Statistics Canada 2013).

[2] Statistics Canada used this terminology in the 2006 Census. All visible minorities from South Asian countries (e.g. India, Pakistan, Sri Lanka) were aggregated into this category.

[3] Statistics Canada has suppressed most demographic data on West Moberly Lake 168A in 2011 due to the small size of the community.

Table 14.5-2. Population and Demographic Changes, Aboriginal Communities, 2001 to 2011

	West Moberly Lake IR 168A			East Moberly Lake IR 169			McLeod Lake IR1		
	2001	2006	2011	2001	2006	2011	2001	2006	2011
Total Population	52	51	95	330	275	324	70	94	73
Population change from previous Census (%)	-24.6%	-1.9%	86.3%	84.4%	-16.7%	17.8%	6.1%	34.3%	-22.3%
Males	25	25	n/a	180	140	170	35	50	35
Females	25	25	n/a	145	130	155	35	40	40
Median Age (yrs)	16.8	22.5	n/a	23	27.6	29.7	31.5	33	40.8
Population over 15 years (%)	54.5%	70.0%	n/a	62.1%	72.7%	73.8%	71.4%	83.3%	88.1%

Source: Statistics Canada (2002b, 2007c, 2012b)

East Moberly Lake

The SFN population has fluctuated over the last decade. According to the 2011 Census, the population of East Moberly Lake IR 169 totalled 324, having increased 17.8% from 2006, but still below the population reported in 2001 (Table 14.5-2). The community population was slightly male-dominant in 2011, with 52.3% of all residents reported to be male. The median age for the community was estimated at 29.7 years, a notable 12.2 years younger than the provincial median in 2011 (Statistics Canada 2007a, 2012e, 2012a). The population over the age of 15 has increased by nearly 12 percentage points between 2001 and 2011; the reason for this trend, however, is unclear. According to the last available data available from AANDC (as of January 2010), the SFN had a total registered population of 877 people (MARR n.d.). Off-reserve members live in the nearby towns of Chetwynd, Prince George and Fort St. John, as well as further afield in Vancouver and Kamloops. There was an average of 3.1 people per household, notably higher than the provincial median for 2011 (2.5; Statistics Canada 2007a; Statistics Canada 2012e). With respect to the mobility status, in 2011, 95.1% lived at the same address as the year before, and 76.3% lived at the same address as five years ago (Statistics Canada 2013).

McLeod Lake

For McLeod Lake the population figures have fluctuated over the last ten years. The 2011 Census reported the total population of McLeod Lake IR 1 to be 73, a decrease of 22.3% from 94 people in 2006, but 4.2% higher than the population in 2001 (Table 14.5-2). Only 46% of the community was male, which was slightly lower than the provincial median for that year. The median age for the community was estimated at 40.8 years, the oldest of all three Aboriginal study communities, being only 1.1 years younger than the provincial median (Statistics Canada 2012h, 2012g). The population over the age of 15 has increased by nearly 17 percentage points between 2001 and 2011, and the median age of the population has increased by over 9 years in the same time period; the reason for this trend, however, is unclear. MLIB estimates that their total registered membership is 500, with approximately 100 members living in McLeod Lake (on and off-reserve), and another 150 members living in Mackenzie, Chetwynd and Prince George (MLIB 2012), and the remainder living in other communities in British Columbia and elsewhere. AANDC does not provide data on the total registered population

of the MLIB. There were an average of 1.8 people per household (Statistics Canada 2012d), notably below the provincial median for 2011 (2.5). Further, approximately 92.9% of 2011 residents lived at the same address in 2010; 84.6% lived at the same address in 2006 (Statistics Canada 2013).

14.5.3.2 Employment and Income

In 2011, the LSA had 21,390 people in the labour force, of that 1,325 (6.2%) were unemployed. Aboriginal workers comprised 1.1% (225) of the total LSA labour force. In the non-Aboriginal communities, the unemployment rate ranged from 5.6% to 9.7% (Table 14.5-3), whereas the Aboriginal communities had relatively higher unemployment rates of 17.9% to 25.0% in 2011. In comparison, BC had an unemployment rate of 7.8%. Income was relatively higher in the non-Aboriginal communities compared to the Aboriginal communities.

Tumbler Ridge

In 2011, Tumbler Ridge had 1,665 people in the labour force, an increase of 36.9% from 2001. The participation rate was 73.3% and the unemployment rate was 9.3%, above the PRRD (6.4%) and the provincial average (7.8%; Table 14.5-3; Statistics Canada 2013). Based on 2011 NHS, the average income in Tumbler Ridge was $49,386, which is above the regional ($36,538) and provincial ($28,765) averages; whereas the average employment income in the community was $80,685, 28.0% higher than the regional average employment income and 39.1% higher than the provincial average employment income. Tumbler Ridge also had the highest average income as compared to other LSA communities (Table 14.5-4; Statistics Canada 2013).

The key industries in the District of Tumbler Ridge by labour force included resource-based industries (39.0%), retail trade (10.2%), and construction (7.5%; Table 14.5-5). Consequently, mining represents almost 40% of employment by industry in the community, as compared to 1.1% provincially. In 2011, the majority of the working population was employed in occupations related to trades, transport, and equipment operation (34.5%), followed by sales and service (19.5%), and business, finance, and administration (10.2%; Table 14.5-6; Statistics Canada 2013).

Chetwynd

The 2011 Chetwynd labour force had 1,505 individuals, and that was a 10.6% increase as compared to the labour force in 2001. The participation rate was 73.8% and the unemployment rate was 5.9% (Table 14.5-3). The average income and average employment income were, respectively, $45,765 and $60,219; the average income was above the regional and provincial averages, whereas the average employment income fell below the regional average however exceeded the provincial average (Table 14.5-4; Statistics Canada 2013).

Table 14.5-3. Employment in the Local Study Area Non-Aboriginal Communities and the Regional Study Area, 2001 to 2011

	District of Tumbler Ridge			District of Chetwynd			City of Dawson Creek			City of Fort St. John			PRRD			BC
	2001	2006	2011	2001	2006	2011	2001	2006	2011	2001	2006	2011	2001	2006	2011	2011
Total Population 15+	1,462	2,000	2,270	1,865	2,035	2,040	8154	8650	9,075	12,118	13,510	14,515	41,206	48,180	46,465	3,646,840
In the Labour Force	1,050	1,335	1,665	1,345	1,555	1,505	5,675	6,220	6,580	9,440	10,875	11,415	30,245	34,405	34,750	2,354,245
Employed	944	1,260	1,505	1,088	1,465	1,415	5,080	5,835	6,140	8,567	10,345	10,820	27,278	32,530	32,525	2,171,465
Unemployed	106	75	155	257	90	85	595	380	440	873	530	600	2,967	1,875	2,220	182,775
Participation Rate (%)	71.8	66.8	73.3	72.1	76.4	73.8	69.6	71.9	72.5	77.9	80.5	78.6	73.4	76.2	74.8	64.6
Employment Rate (%)	64.6	63.0	66.3	58.3	72.0	69.4	62.3	67.5	67.7	70.7	76.6	74.5	66.2	72.0	70.0	59.5
Unemployment Rate (%)	10.0	5.6	9.3	19.1	5.8	5.6	10.3	6.1	6.7	9.1	4.9	5.3	9.7	5.4	6.4	7.8

Source: Statistics Canada (2002b, 2007c, 2012b, 2013)

Table 14.5-4. Income Data for Population 15 Years and Over, 2010

Income, 2010	District of Tumbler Ridge	District of Chetwynd	City of Dawson Creek	City of Fort St. John	PRRD	BC
Median Income ($)	40,586	35,798	33,490	39,549	36,538	28,765
Average Income ($)	49,386	45,765	40,735	49,104	46,218	39,415
Median Employment Income ($)	60,392	58,424	50,069	58,964	54,876	49,143
Average Employment Income ($)	80,685	60,219	55,603	66,719	63,012	58,016
Employment Income (%)	87.0	86.4	81.4	87.4	84.5	73.7
Government Transfer Payments (%)	7.5	9.5	10.9	7.0	8.5	11.7

Source: Statistics Canada (2013)

Table 14.5-5. Industry by Labour Force in the Local Study Area Non-Aboriginal Communities and the Regional Study Area, 2011

Industry	District of Tumbler Ridge	District of Chetwynd	City of Dawson Creek	City of Fort St. John	PRRD	BC
Total experienced labour force over 15	1,665	1,505	6,585	16,015	34,745	2,354,245
Agriculture, forestry, fishing and hunting (%)	0	7.0	0.9	2.7	5.7	2.6
Mining, quarrying, and oil and gas extraction (%)	39.0	16.9	5.9	13.7	13.2	1.1
Utilities (%)	0	0	0.7	1.1	1.2	0.6
Construction (%)	7.5	6.3	12.8	11.2	11.0	7.7
Manufacturing (%)	0	15.6	3.6	4.0	4.3	6.3
Wholesale trade (%)	2.1	0.7	3.6	3.7	3.1	3.8
Retail trade (%)	10.2	6.0	17.5	11.5	11.2	11.3
Transportation and warehousing (%)	7.5	4.7	3.6	5.8	5.8	5.0
Information and cultural industries (%)	0	1.3	1.2	0.8	0.9	2.6
Finance and insurance (%)	2.4	1.3	2.5	1.7	1.7	3.9
Real estate and rental and leasing (%)	0	3.0	1.8	3.0	2.3	2.3
Professional, scientific and technical services (%)	0.9	2.0	3.1	7.2	5.4	7.6
Management of companies and enterprises (%)	0	0	0	0	0	0.1
Administrative and support, waste management and remediation services (%)	1.2	3.0	2.4	2.3	2.4	4.2
Educational services (%)	2.4	4.3	5.1	5.7	5.7	7.1
Health care and social assistance (%)	8.1	8.0	13.0	5.5	7.1	10.6
Arts, entertainment and recreation (%)	1.8	0	1.5	1.4	1.5	2.4
Accommodation and food services (%)	4.2	9.0	8.5	6.9	6.0	7.6
Other services (except public administration) (%)	2.7	5.0	5.4	6.3	5.8	4.8
Public administration (%)	4.8	3.3	6.2	4.8	5.2	6.1

Source: Statistics Canada (2013)

Table 14.5-6. Labour Force by Occupation in the Local Study Area Non-Aboriginal Communities and the Regional Study Area, 2011

Occupations	District of Tumbler Ridge	District of Chetwynd	City of Dawson Creek	City of Fort St. John	PRRD	BC
Total experienced labour force over 15	1,665	1,505	6,580	11,415	34745	2,354,245
Management (%)	7.5	12	8.4	7.3	11.2	11.2
Business, finance, administration (%)	10.2	8.6	13.0	15.6	14.6	15.7
Natural and applied sciences (%)	3.9	4	3.6	8.2	5.0	6.5
Health (%)	2.1	4.6	8.5	3.8	4.1	6.3
Education, law and social, community and government services (%)	6.6	9.3	9.7	9.1	8.2	11.3
Art, culture, recreation, sport (%)	0	0	1.0	1.7	1.3	3.3
Sales and service (%)	19.5	16.9	26.7	21.2	19.5	23.5
Trades, transport, and equipment operators and related (%)	34.5	25.9	22.9	23.9	25.1	14.3
Natural resources, agriculture and related (%)	6.9	5.3	3.5	5.1	5.8	2.6
Manufacturing and utilities (%)	6.6	13.2	3.0	3.5	4.5	3.2

Source: Statistics Canada (2013)

The key industries in the District of Chetwynd were resource-based industries (16.9%) and manufacturing (15.6%; Table 14.5-5), whereas the majority of occupations were in trades and transportation (25.9%), sales and service (16.9%), and manufacturing (13.2%; Table 14.5-6; Statistics Canada 2013). As with other communities in the Peace Region, the District of Chetwynd has a shortage of available skilled tradespeople as most are already employed in heavy industry. As a result, labourers from as far as Prince George or Vancouver are contracted for work, effectively tripling the cost (L. Sabulsky, Pers. Comm., 2012). The available skill sets within the community have also traditionally been used by the forest industry, the mining and oil and gas industries being more recent arrivals to the area. As such the transition of skill sets within the community is ongoing (D. Fleming and E. Davis, Pers. Comm., 2012).

Dawson Creek

The City of Dawson Creek had a relatively large labour force of 6,580 people in 2011, which was a 12.6% growth from 2001. The participation and the unemployment rates were, respectively, 72.5% and 6.7%, as compared to the regional averages of 74.8% and 6.4% (Table 14.5-3; Statistics Canada 2013). The average income and the average employment income were, respectively, $40,735 and $55,603; these were the lowest among the non-Aboriginal LSA communities. The average income was below the regional average but above the provincial average; the average employment income was below both the regional and provincial averages (Table 14.5-4; Statistics Canada 2013).

The key industries in the City of Dawson Creek by industry were retail trade (17.5%), health care and social services (13.0%), and construction (12.8%; Table 14.5-5). Notably, retail trade in Dawson

Creek was 5% higher than the provincial average, though the reason for this is unclear. In the City of Dawson Creek, labour force by occupation figures were broadly similar to provincial trends (Table 14.5-6). In 2011, the majority of the working population was employed in occupations related to sales and service (26.7%), followed by trades, transport, and equipment operators (22.9%) and business, finance, and administration (13.0%; (Table 14.5-6; Statistics Canada 2013).

Fort St. John

The City of Fort St. John experienced an increase in the labour force between 2001 and 2011 of 17.3%; in 2011, the labour force had 11,415 workers. The 2011 participation and unemployment rates were 78.6% and 5.3%, respectively; therefore, Fort St. John performed better than the PRRD and the province (Table 14.5-3; (Statistics Canada 2013)). The average income and the average employment income were $49,104 and $66,719, being above the regional and provincial averages (Table 14.5-4; Statistics Canada 2013).

Similarly, most Fort St. John residents work in resource-based industries (13.7%), followed by retail trade (11.5%) and construction (11.2%; Table 14.5-5). Fort St. John's labour force economy is fairly diversified. The proportion of residents employed in resource-based industries in Fort St. John was far higher than the provincial average (5.1%), whereas the proportion of the workforce in industries such as manufacturing was lower than the provincial average (Table 14.5-5).The majority of Fort St. John's population was employed in occupations such as trades, transport, and equipment operators (23.9%), sales and services (21.2%), and business, finance and administration (15.6%), reflecting the city role as a logistical and supply centre for the PRRD (Table 14.5-6; Statistics Canada 2013).

West Moberly Lake

Aboriginal communities experienced higher unemployment rates than the PRRD and the province. WMFN had a labour force of 40 in 2011 that represented an increase of 62.5% between 2001 and 2011. The participation and unemployment rates were, respectively, 72.7% and 25.0%. WMFN had the smallest labour force and the highest unemployment rate out of all Aboriginal communities in the LSA (Table 14.5-7; Statistics Canada 2013). Due to the low number of residents, income data was suppressed to protect confidentiality and is not reported (Table 14.5-8).

In contrast to non-aboriginal communities, Aboriginal workers were most likely to be employed in public administration (Table 14.5-9; Statistics Canada 2013). An estimated 20% of working population was employed in trades and transportation and 10% in services related to education, law, and government (Table 14.5-10; Statistics Canada 2013).

East Moberly Lake

According to 2011 NHS, SFN (Saulteau First Nation/East Moberly Lake) had the largest labour force (140) of all Aboriginal communities in the LSA; the labour force increased by 14.3% between 2001 and 2011. The participation rate was low at 59.6%, with an unemployment rate of 17.9% being substantially above the regional (6.4%) and the provincial (7.8%) averages (Table 14.5-7; Statistics Canada 2013). The average income in the SFN was $29,858 whereas the average employment income was $47,976, both being below the regional and provincial averages. Government transfer payments accounted for 16.4% of all income (Table 14.5-8; Statistics Canada 2013).

Table 14.5-7. Employment in the Local Study Area Aboriginal Communities, 2001 to 2011

	West Moberly First Nations			Saulteau First Nations			McLeod Lake Indian Band			PRRD			BC
	2001	2006	2011	2001	2006	2011	2001	2006	2011	2001	2006	2011	2011
Total Population 15+	30	35	55	210	n/a	235	55	70	60	41,206	48,180	46,465	3,646,840
In the Labour Force	15	25	40	120	n/a	140	35	50	45	30,245	34,405	34,750	2,354,245
Employed	10	20	30	70	n/a	115	25	45	35	27,278	32,530	32,525	2,171,465
Unemployed	0	0	10	50	n/a	25	10	10	10	2,967	1,875	2,220	182,775
Participation Rate (%)	50	71.4	72.7	57.1	n/a	59.6	63.6	71.4	75.0	73.4	76.2	74.8	64.6
Employment Rate (%)	33.3	57.1	54.5	33.3	n/a	48.9	45.5	64.3	58.3	66.2	72.0	70.0	59.5
Unemployment Rate (%)	0	0	25.0	41.7	n/a	17.9	28.6	20.0	22.2	9.7	5.4	6.4	7.8

Source: Statistics Canada (2002b, 2007c, 2012b, 2013)
n/a indicates that the data was suppressed.

Table 14.5-8. Income Data for Population 15 Years and Over, Local Study Area Aboriginal Communities, 2010

Income, 2010	West Moberly First Nations	Saulteau First Nations	McLeod Lake Indian Band	PRRD	BC
Median Income ($)	n/a	20,893	n/a	36,538	28,765
Average Income ($)	n/a	29,858	n/a	46,218	39,415
Median Employment Income ($)	n/a	40,271	n/a	54,876	49,143
Average Employment Income ($)	n/a	47,976	n/a	63,012	58,016
Employment Income (%)	n/a	79.9	n/a	84.5	73.7
Government Transfer Payments (%)	n/a	16.4	n/a	8.5	11.7

Source: Statistics Canada (2013)
n/a indicates that the data was suppressed.

Table 14.5-9. Industry by Labour Force in the Local Study Area Aboriginal Communities, 2011

Industry	West Moberly First Nations	Saulteau First Nations	McLeod Lake Indian Band	PRRD	BC
Total experienced labour force over 15	40	140	45	34,745	2,354,245
Agriculture, forestry, fishing and hunting (%)	0	0	22.2	5.7	2.6
Mining, quarrying, and oil and gas extraction (%)	0	7.1	0	13.2	1.1
Utilities (%)	0	0	0	1.2	0.6
Construction (%)	0	17.8	0	11.0	7.7
Manufacturing (%)	0	7.1	0	4.3	6.3
Wholesale trade (%)	0	0	0	3.1	3.8
Retail trade (%)	0	7.1	0	11.2	11.3
Transportation and warehousing (%)	0	7.1	0	5.8	5.0
Information and cultural industries (%)	0	0	0	0.9	2.6
Finance and insurance (%)	0	0	0	1.7	3.9
Real estate and rental and leasing (%)	0	0	0	2.3	2.3
Professional, scientific and technical services (%)	0	7.1	0	5.4	7.6
Management of companies and enterprises (%)	0	0	0	0	0.1
Administrative and support, waste management and remediation services (%)	0	0	0	2.4	4.2
Educational services (%)	0	7.1	0	5.7	7.1
Health care and social assistance (%)	0	7.1	0	7.1	10.6
Arts, entertainment and recreation (%)	0	0	0	1.5	2.4
Accommodation and food services (%)	0	0	0	6.0	7.6
Other services (except public administration) (%)	0	0	0	5.8	4.8
Public administration (%)	37.5	17.8	44.4	5.2	6.1

Source: Statistics Canada (2013)

Table 14.5-10. Labour Force by Occupation in the Local Study Area Aboriginal Communities, 2011

Occupations	West Moberly First Nations	Saulteau First Nations	McLeod Lake Indian Band	PRRD	BC
Total experienced labour force over 15	40	140	45	34745	2,354,245
Management (%)	0	7.1	0	11.2	11.2
Business, finance, administration (%)	0	7.1	22.2	14.6	15.7
Natural and applied sciences (%)	0	7.1	0	5.0	6.5
Health (%)	0	0	0	4.1	6.3
Education, law and social, community and government services (%)	25.0	10.7	22.2	8.2	11.3
Art, culture, recreation, sport (%)	0	0	0	1.3	3.3
Sales and service (%)	0	7.1	22.2	19.5	23.5
Trades, transport, and equipment operators and related (%)	50.0	32.1	22.2	25.1	14.3
Natural resources, agriculture and related (%)	0	7.1	22.2	5.8	2.6
Manufacturing and utilities (%)	0	7.1	0	4.5	3.2

Source: Statistics Canada (2013)

SFN labour force worked primarily in public administration (25%) and construction (25%; Table 14.5-9). Trades, transport and equipment operators and related occupations (32.1%) dominated the labour force (Table 14.5-10; Statistics Canada 2013).

McLeod Lake

MLIB had a small labour force of 45 in 2011 that increased by 30.0% between 2001 and 2006 but decreased by 10.0% between 2006 and 2011. According to 2011 NHS, the participation and unemployment rates were 75.0% and 22.2%, respectively (Table 14.5-7; Statistics Canada 2013). Income data was suppressed for MBIL.

The labour force of McLeod Lake IR 1 was mainly employed in two key industries: agriculture and public administration (Table 14.5-9). In terms of occupations, the majority of the MLIB population was employed in business, finance and administration; education, law and government; sales and services; trades and transportation; and natural resources (Table 14.5-10; Statistics Canada 2013).

14.5.3.3 Economic Activity

Tumbler Ridge

The importance of mining in the community of Tumbler Ridge is significant, with the community being the central service hub for the mines currently active in the area. Also, most newcomers work in the coal mines (K. Bryan, Pers. Comm., 2012). Tourism, and most specifically outdoor recreation, is also an emerging sector. The recent paleontological discoveries around Tumbler Ridge have also

led to an emerging "dinosaur tourism" industry, and the Peace River Paleontological Research Centre is quickly becoming well-known (K. Bryan, Pers. Comm., 2012).

The District of Tumbler Ridge hosts a variety of businesses and services such as accommodation, building suppliers and services, industrial services, grocery and retail services, insurance services, employment services, financial services, outdoor recreational services, restaurant and food services, transportation and shipping services and many others. However, the town's residents have noted that the community is lacking in certain amenities such as a bakery/butcher/deli store, specialized legal, technical and management services, personal services, clothing stores, diverse restaurants, and indoor entertainment facilities (DTR 2010). A complete list of businesses and services is provided on the town's website (DTR n.d.). The District of Tumbler Ridge also developed an 11.7 hectare heavy industrial park, located 11 km south of the Tumbler Ridge town centre (DTR 2009).

Chetwynd

The District of Chetwynd has a diverse economy that includes agriculture (ranching), energy (oil and gas, wind), forestry, mining, and tourism. Pipeline construction and oil and gas drilling is being managed by five major multinational companies who are continuing to expand their activities in the area (SPEDC 2012a). The Dokie Wind Farm operates 48 wind turbines (Canada Newswire 2011). In addition, Avro Wind Energy and Finavera Wind Energy are developing the Wartenbe Wind Energy Project and Wildmare Energy Project (Finavera 2011; EAO n.d.). Forestry provides opportunities in harvesting and sawmilling, as well as in pulp and paper production.

The District of Chetwynd also hosts a variety of businesses and services, such as accommodations, grocery and retail services, food, commercial and industrial services. A complete list of businesses and services is provided on the city's website (Chetwynd 2012). The Chetwynd Chamber of Commerce promotes and improves trade and commerce in Chetwynd and the surrounding area (CCOC n.d.).

Dawson Creek

Dawson Creek's economic base includes agriculture, energy (oil and gas), forestry, mining, and tourism. Agricultural activities include production of hay and field crops and livestock operations (Dawson Creek 2011). The energy sector creates employment and generates revenues for the local economy and the province. There are many corporations active in the area, such as Murphy Oil Corporation, ARC Energy Trust, Pengrowth Energy Trust, EnCana Corporation, Spectra Energy Corp., Shell Canada Ltd., Apache Canada Ltd., and Alta Gas Ltd. (Dawson Creek 2011). Trucking companies servicing the oil and gas sector are also doing very well (K. Connelly and K. Cooke, Pers. Comm., 2012). Mining is a significant employment and revenue source to the area as well; there are several nearby coal mines operated by Walter Energy and Anglo American. Forestry provides opportunities in harvesting and processing, as well as production of remanufactured products, engineered wood products, panel boards and furniture and housing products (Dawson Creek 2011).

The City of Dawson Creek also hosts a variety of businesses and services, such as accommodations, retail, business, commercial and industrial services. Due to the upturn in the regional economy, and an increase in mining and energy exploration and development, there has been a boom in recent years in residential, hotel and restaurant construction (S. Connelly, Pers. Comm., 2012; K. Connelly

and K. Cooke, Pers. Comm., 2012). Dawson Creek's Chamber of Commerce, which also represents business interests in Tumbler Ridge, advocates for businesses in the community and actively encourages heavy industry to invest locally (DCDCC n.d.).

Fort St. John

The oil and gas industry is a significant driver of the Fort St. John economy. It is one of the main employers in the city and has stimulated a range of other supporting businesses such as construction, trucking and pipeline operations (FSJ 2012). Fort St. John also has strong agricultural and forestry industries; the local forestry industry directly employs an estimated 600 people and generates approximately $90 million in revenues per year (FSJ 2012).

The city of Fort St. John also hosts a wide range of businesses and services. It is the largest city and the regional service centre in northeastern BC, servicing more than 64,000 people in the area (FSJ 2012). Like all communities in the Peace Region, employers in the service industry are challenged by finding staff, since those staff can earn significantly higher wages working for heavy industry. As a result, businesses are recruiting immigrant labour from other countries and, if required, reducing the level of service delivery (L. Selby, Pers. Comm., 2012).

West Moberly Lake

The WMFN relies on logging, an industrial contracting business, and trapping for employment opportunities and for generating revenues to the community (T8TA 2005-2012b). Past economic activity in the areas has been primarily in the forestry, retail trade, mining and oil and gas sectors. Agriculture and tourism are also important to the WMFN (PRCI 2010). The First Nation is a signee with the District of Chetwynd and the SFN in the Chetwynd Community Forest. Also, WMFN has formed a partnership to plan the development of the 'Pine Pass Mountain Resort', a year-round tourism destination resort in northeast BC located along Highway 97 on Mount Lavitah, in the heart of the Rocky Mountains (NDIT 2011).

Dunne-Za Ventures LP, a WMFN company, provides many services to the oil and gas, forestry and mining sectors. Core service areas include forestry, earthworks, transportation, road upgrades and clearing (PRCI 2010; Dunne-za Ventures LP 2012). Further, WMFN and Tarpon Energy Services Ltd. have established a joint venture, Tarpon WestMo Services Ltd, to supply electrical and instrumentation services, controls systems and steel building solutions to the energy sector in northeastern British Columbia (Canada Newswire 2012).

East Moberly Lake

The main economic activities that support the SFN community are from a cattle ranch and farm, silviculture, gravel extraction and sales (T8TA 2005-2012a), and mining contracting. Agriculture and tourism are important to the SFN. The non-wage economy, which consists of activities such as trapping, hunting and fishing are also key, both economically and culturally (PRCI 2010). Forestry, construction, as well as heavy industrial support and supply, have also grown in importance in recent years (4Evergreen Resources LP 2013).

The SFN have several contractors in the community. As a First Nation, they develop joint ventures to pursue contracting opportunities, including Three Nations Ventures (a log and lumber brokerage) and Six Nations Ventures. In 2005, the community established 4Evergreen Resources Inc. to provide communal benefit from contracts. As at 2007, it had delivered $9.4 million in seismic work (WCC 2007). 4Evergreen Resources has since expanded into a number of different sectors, performing logging, road construction, civil works construction, site maintenance, drill support, and site clearing. The total value of contracts held by the company from 2010 to 2013 is approximately $25 million (4Evergreen Resources LP 2013). The SFN have also had contracts in the past for supplying a water truck and for aggregate crushing for mines in the area (PRCI 2010).

McLeod Lake

MLIB owns several companies whose profits are used to support community programs or are reinvested in the businesses. Duz Cho Logging, established in 1988, is the main business operator and the major employer on the reserve. The company is also one of the largest logging contractors in BC (MLIB 2012). In 2002, the MLIB also established Duz Cho Construction with services that include project site development, road access, and reclamation for the oil and gas, wind energy, and mining industries. Further, in 2004, MLIB acquired 80% of Summit Pipeline Services, an Ontario-based construction company. Summit Pipeline Services operates across Canada and specializes in the repair and construction of oil and gas pipelines. It also provides piping and facilities services to the pulp and paper and processing industries, as well as to municipalities (MLIB 2012).

14.6 ESTABLISHING THE SCOPE OF THE EFFECTS ASSESSMENT FOR ECONOMIC CONDITIONS

This section includes a description of the scoping process used to identify potentially affected Valued Components (VCs), select assessment boundaries, and identify the potential effects of the Project that are likely to arise from the Project's interaction with a VC. Scoping is fundamental to focusing the Application/EIS on those issues where there is the greatest potential to cause significant adverse effects. The scoping process for the assessment of economics consisted of the following steps:

- *Step 1:* conducting a desk-based review of available data, technical reports, and other Project examples to compile a list of potentially affected VCs in the vicinity of the Project;
- *Step 2:* carrying out detailed baseline studies to fill information gaps and confirm presence/absence of VCs;
- *Step 3:* considering feedback from the EA Working Group on the proposed list of VCs included in the AIR and the EIS Guidelines;
- *Step 4:* defining assessment boundaries for each economic VC; and
- *Step 5:* identifying key potential effects on VCs.

These steps are described in detail below.

14.6.1 Selecting Valued Components

VCs are components of the natural and human environment that are considered to be of scientific, ecological, economic, social, cultural, or heritage importance (CEA Agency 2006; BC EAO 2013). To be included in the EA, there must be a perceived likelihood that the VC will be affected by the proposed Project. Valued components are scoped into the environmental assessment based on issues raised during consultation on the AIR and EIS Guidelines with Aboriginal communities, government agencies, the public and stakeholders. Consideration of certain VCs may also be a legislated requirement, or known to be a concern because of previous project experience.

14.6.1.1 Identification of Potential Valued Components

During the development of the AIR, a VC-scoping exercise was conducted to explore potential Project interactions with candidate VCs, and to identify the key potential adverse effects associated with those interactions. A preliminary list of potential VCs was developed based on professional judgement, combined with knowledge of the Project, and experience from previous mining projects.

On the basis of scoping, the following economic VCs were identified for the assessment of the potential economic effects of the Project:

- Employment and Income ; and
- Economic Activity.

As identified by the methodological approach to writing this chapter (Chapter 5), all identified VCs will relate to the potential adverse effects of the Project, whereas all beneficial impacts will be discussed in Chapter 1, Section 1.7 (Project Benefits).

14.6.1.2 Consultation Feedback on Valued Components

As part of the EA processes defined under the British Columbia *Environmental Assessment Act* (2002) and CEAA, 2012 (2012), the preliminary list of VCs in the dAIR and draft EIS Guidelines was released for comment and feedback. Comments on both documents were received from regulators, Aboriginal groups, and the public over a period of 30 days. Comments were also received from regulators and Aboriginal groups outside of the 30 day public comments period through Working Group meetings and discussions. The scoping process also relied on feedback from Proponent-led public consultation, and considerations under Treaty 8, and regulatory requirements.

During consultation activities First Nation communities and public stakeholders expressed interests in economic opportunities related to Project Construction and Operation. Economic interests expressed by Aboriginal Groups related to the provision of employment opportunities, opportunities for revenue sharing agreement with the Proponent, and opportunities for community economic development. Public stakeholders expressed interests in business contract opportunities.

14.6.1.3 Valued Components Included in the Effects Assessment

The VCs selected for assessing the potential adverse impacts of the Project on economics are: 1) Employment and Income; and 2) Economic Activity (Table 14.6-1). The Employment and Income VC relates to the potential adverse effect of a decrease in employment and personal income at Decommissioning and Reclamation. The Economic Activity VC relates to the assessment of the demand for skilled labour in local and regional communities and the potential of this effect to result in inflationary pressures on wages and adversely affect the ability of other businesses and industry to secure the necessary workforce and remain cost competitive. The two VCs will fully characterize the Project's potential adverse economic effects.

Table 14.6-1. Economic Valued Components Included in the Economic Effects Assessment

Valued Components	Identified by*				Rationale for Inclusion
	AG	G	P/S	Other	
Employment and Income	✓	✓			Project-related employment and income will cease at Project Decommissioning and Reclamation.
Economic Activity	✓	✓	✓		Project-induced competition for skilled labour during Construction and Operation may result in a shortage of skilled and experienced labour and impose inflationary wage pressures in the local and regional communities.

**AG = Aboriginal Group; G = Guideline requirement; P/S = Public/Stakeholder.*

The Construction and Operation phases on the Project will provide direct and spin-off employment opportunities to local and regional workers that will consequently increase workers' personal income. The Project will also provide a number of economic opportunities including the provision of business contracts and the support of local community development. The provision of business opportunities, increased demand for business services and economic development will benefit local businesses, including Aboriginal-owned businesses, and support the overall growth and development of the local and regional economy. These effects are considered beneficial. All beneficial effects of the Project as related to the two VCs: 1) Employment and Income, and 2) Economic Activity, are discussed in Chapter 1, Section 1.7.

All VCs identified in the AIR (BC EAO 2013), as related to potential adverse economic effects, are included in the assessment.

14.6.2 Assessment Boundaries

Assessment boundaries define the maximum limit within which the effects assessment is conducted. They encompass the areas within (spatial boundaries), and times during which (temporal boundaries), the Project is expected to interact with the receptor VCs, as well as the constraints that may be placed on the assessment of those interactions due to political, social, and economic realities (administrative boundaries) or the ability to predict or measure change (technical boundaries). The definition of these assessment boundaries is an integral part of the assessment process, and encompasses possible direct, indirect, and induced effects of the Project on the economy, inclusive of Project effects on relevant intermediate components, as well as the trends in processes that may be relevant.

14.6.2.1 Spatial Boundaries

The spatial boundaries for the economic effects assessment were selected based on the extent of the economic supply, demand, and production systems that may be affected by the Project. As a result of employment and expenditures associated with the Construction, Operation, Decommissioning and Reclamation, and Post Closure phases of the Project potential adverse effects on economic conditions may be experienced at the local and regional levels. The spatial boundaries of the effects assessment are defined as follows:

Regional Study Area

The economic regional study area (RSA) for the Project is the Peace River Regional District (PRRD). The PRRD is the largest regional district in the province (119,000 km^2); it has seven incorporated municipalities and four rural electoral areas (Figure 14.5-1).

Local Study Area

The following municipalities and IRs are included in the LSA (Figure 14.5-1):

- District of Tumbler Ridge;
- City of Dawson Creek;
- District of Chetwynd;
- City of Fort St. John;
- West Moberly Lake IR 168A (WMFN);
- East Moberly Lake IR 169 (SFN); and
- McLeod Lake IR 1 (MLIB).

Specific rationale for the inclusion of each community in the economic LSA is provided in Section 14.5.2.

14.6.2.2 Temporal Boundaries

The economic effects of the Project will be examined over all four stages of mine life. The Projects interaction with the economic VCs will vary depending on what stage in the mine lifecycle the Project is in, similarly effects will also vary. The temporal phases of the Project are:

- **Construction**: 3 years;
- **Operation**: 25-year run-of-mine life;
- **Decommissioning and Reclamation**: 3 years (includes project decommissioning, abandonment and reclamation activities, as well as temporary closure, and care and maintenance); and
- **Post Closure**: 30 years (includes ongoing reclamation activities and post-closure monitoring).

14.6.2.3 Administrative Boundaries

Relevant to the economic effects assessment, regional administrative divisions of the province include areas defined by regional districts, municipalities, First Nations reserves and economic development zones. The boundaries of these, with the exception of economic development zones, coincide with the LSA and RSA defined for the assessment. Because these coincide, the economic effects assessment is not notably influenced by administrative boundaries as they may either influence the information available or the management of key socio-economic issues by governments. However, it should be noted that the traditional territories of LSA First Nation communities transcend many of these contemporary boundaries, and socio-economic and cultural linkages may extend across different administrative jurisdictions. To this extent, the economic effects assessment based on the defined LSA communities may be constrained.

14.6.2.4 Technical Boundaries

Technical boundaries apply to those boundaries that may limit the ability to predict or measure change. Relevant to the economic effects assessment, technical boundaries of the province can include those boundaries for which economic data is collected. These can be defined by regional districts, municipalities, First Nations reserves and economic development zones. However, economic data may not be collected for all LSA communities over time, can be dated, and is suppressed for smaller communities (population less than 250), which might consequently affect or constrain the assessment of some potential effects.

14.6.3 Identifying Potential Effects on Economic Conditions

The selection of potential adverse effects for inclusion in the economic effects assessment of the Project was based on the AIR as well as an effect-scoping exercise which explored the potential Project interactions with the identified economic VCs. An impact matrix approach is used to identify and rank Project-component interactions. The key potential effects associated with each interaction have been classified in Table 14.6-2 to have spatial or temporal overlap (O), negligible to minor adverse effect (L, green), potential moderate adverse effect (M, yellow), or key interaction resulting in potential significant major adverse effect (H, red) on the existing conditions.

14.6.3.1 Effects Included in the Assessment

The two economic VCs for the Project are: 1) Employment and Income, and 2) Economic Activity. The Employment and Income VC includes effects on direct, indirect, and induced employment, and personal income. The Economic Activity VC relates to changes to the competition for labour in the LSA communities and potential for businesses to have difficulties in securing the necessary skilled workforce and the resulting wage inflation pressures.

With Decommissioning and Reclamation, there will be a loss of Project-related employment and a decrease in household income. There will be a loss of approximately 764 full-time positions. During Decommissioning and Reclamation and Post Closure, there will be some employment (direct, indirect and induced) that continues; however, there will be a decrease in the size of the workforce as compared to Construction and Operation. Decreases in the workforce will lead to decreases in

personal income due to the loss of jobs in the mining sector. Further, businesses that are direct and indirect suppliers to the Project are likely to experience some negative impacts, as are businesses that provide goods and services to workers and their families. Businesses with operations dependant on the existence of the Project will experience a decrease in business revenue that could potentially lead to a loss of employment. These impacts have the potential to be felt most strongly within the LSA and RSA. As a result of the decrease in employment and personal income, related economic value-added (GDP) will decrease as the Project comes to an end and the Project will no longer contribute to government tax revenues from personal income tax, corporate profit tax, and sales tax, among others.

Table 14.6-2. Ranking Potential Economic Effects

	Project Activities	Potential Effects on Employment and Income *Decrease in Employment and Income at Decommissioning and Reclamation*	Potential Effects on Economic Activity *Increased Competition for Labour and Wage Inflation*
Construction	**Underground Mine**		
	Construction of Production Decline (2 headings - surface and underground)	O	O
	Haul of waste rock from Production Decline portal to Shaft Site	O	O
	Ventilation during construction	O	O
	Development mining of underground service bays, sumps, conveyor headings, etc.	O	O
	Construct underground conveyor system	O	O
	Coal Processing Site		
	Surface Preparation		
	Establish site drainage and water management	O	O
	Site clearing and stripping (CPP site, CCR North)	O	O
	Soil salvage for reclamation	O	O
	Upgrade access roads, parking and laydown areas	O	O
	Heavy machinery use	O	O
	Buildings and Services		
	Install domestic water system	O	O
	Install sanitary sewer system	O	O
	Install natural gas and electricity distribution network	O	O
	Construct main fuel station	O	O
	Construct buildings (e.g., maintenance, administration, warehouse)	O	O
	Construct raw coal and clean coal stockpile areas	O	O
	Construct coal preparation plant buildings and install/commission equipment	O	O
	Construct surface conveyor system	O	O
	Construct rail load-out facilities	O	O

(continued)

Table 14.6-2. Ranking Potential Economic Effects (continued)

	Project Activities	Potential Effects on Employment and Income *Decrease in Employment and Income at Decommissioning and Reclamation*	Potential Effects on Economic Activity *Increased Competition for Labour and Wage Inflation*
Construction (*cont'd*)	**Shaft Site**		
	Upgrades to infrastructure within existing site	O	O
	Addition of waste rock within existing storage area	O	O
	Management of runoff from waste rock pile and release to receiving environment (M20 Creek)	O	O
	Decline Site		
	Upgrades to infrastructure within existing site	O	O
	Management of water from underground activities and release by exfiltration to ground	O	O
	Traffic and Transportation		
	Transportation of materials to and from site	O	O
	Recycling and solid waste disposal	O	O
	Shuttling workforce to and from site	O	O
	Workforce and Administration		
	Hiring and management of workforce	O	M
	Taxes, contracts, and purchases	O	O
Operations	**Underground Mine**		
	Longwall panel mining, and development mining	O	O
	Ventilation from underground	O	O
	Methane management	O	O
	Secondary shaft construction	O	O
	Underground seepage collection and water management	O	O
	Surface subsidence	O	O
	Coal Processing Site		
	Coal Processing Plant		
	Stockpiles of raw coal	O	O
	Operation of coal preparation plant and conveyor system	O	O
	Stockpiles of clean coal and middlings	O	O
	Operation of rail loadout	O	O
	CCR		
	CCR Pile development	O	O
	Site clearing and stripping (expansion of CCR North, construction of CCR South)	O	O
	Seepage collection system	O	O

(continued)

Table 14.6-2. Ranking Potential Economic Effects (continued)

	Project Activities	Potential Effects on Employment and Income *Decrease in Employment and Income at Decommissioning and Reclamation*	Potential Effects on Economic Activity *Increased Competition for Labour and Wage Inflation*
Operations (*cont'd*)	**Water Management**		
	Management of water brought to surface from underground	O	O
	Management of seepage from CCR	O	O
	Management of other site contact water	O	O
	Maintenance of site ditching and water management infrastructure	O	O
	Release of excess contact water to receiving environment	O	O
	Shaft Site		
	Maintenance of infrastructure within existing site	O	O
	Progressive reclamation of waste rock pile	O	O
	Management of runoff from waste rock pile and release to receiving environment (M20 Creek)	O	O
	Decline Site		
	Maintenance of infrastructure within existing site	O	O
	Secondary Shafts Site		
	Site preparation and construction of shafts	O	O
	Maintenance of infrastructure within existing site	O	O
	Utilities, Power, and Waste Handling		
	Electrical power use	O	O
	Natural gas use	O	O
	Domestic water use	O	O
	Domestic sewage handling	O	O
	Recycling and solid waste disposal	O	O
	Heavy Machinery, Traffic, and Transportation		
	Shuttling workforce to and from site	O	O
	Transportation of materials to and from site	O	O
	Surface mobile equipment use	O	O
	Road maintenance	O	O
	Fuel storage	O	O
	Workforce and Administration		
	Hiring and management of workforce	O	M
	Taxes, contracts, and purchases	O	M

(continued)

Table 14.6-2. Ranking Potential Economic Effects (completed)

	Project Activities	Potential Effects on Employment and Income *Decrease in Employment and Income at Decommissioning and Reclamation*	Potential Effects on Economic Activity *Increased Competition for Labour and Wage Inflation*
Decommissioning and Reclamation	**Infrastructure Removal and Site Reclamation**		
	Facility tear down and removal	O	O
	Reclamation of plant site	O	O
	Reclamation of on-site roads and rail lines	O	O
	Recycling and solid waste disposal	O	O
	Heavy Machinery, Traffic, and Transportation		
	Shuttling workforce to and from site	O	O
	Transportation of materials to and from site	O	O
	Surface mobile equipment use	O	O
	Fuel storage	O	O
	CCR		
	Reclamation of CCR	O	O
	Seepage collection system	O	O
	Site water management and discharge to receiving environment	O	O
	Underground Mine		
	Infrastructure tear down and removal	O	O
	Geotechnical and hydrogeological assessment and bulkhead installation	O	O
	Groundwater monitoring	O	O
	Workforce and Administration		
	Hiring and management of workforce	M	L
	Taxes, contracts, and purchases	M	L
Post Closure	**Shaft Site**		
	Waste rock pile seepage monitoring	O	O
	CCR		
	Seepage collection system	O	O
	Site water management and discharge to receiving environment	O	O
	Underground Mine		
	Groundwater monitoring	O	O

Notes:

O	*Spatial and temporal overlap, but no interaction is anticipated, no further consideration warranted.*
L	*Negligible to minor adverse effect expected; implementation of best practices, standard mitigation and management measures; no monitoring required, no further consideration warranted.*
M	*Potential moderate adverse effect requiring unique active management/monitoring/mitigation; warrants further consideration.*
H	*Key interaction resulting in potential significant major adverse effect or significant concern; warrants further consideration.*

During Construction and Operation, the Project-related employment opportunities are expected to increase the demand for skilled labour and create potential labour shortages for local and regional businesses. For the mining sector and other industries that require workers with similar skillsets, it may become more difficult to secure the necessary workforce. Increased demand for skilled labour may create wage inflation pressure as it is expected that the average wage offered by the Project will be relatively higher as compared to the average income in the affected communities, particularly outside of the mining sector; it is, therefore, expected that some skilled workers will leave their current jobs in order to work at the Project directly or indirectly with a mine service or supply company. Local and regional businesses may be required to either increase wages to retain skilled workers, or hire less experienced workers. The hiring less skilled workers will necessitate an additionally investment into training. Businesses may also have to look outside of the region for the necessary workers.

Consequently, the potential effects associated with each of the VCs are as follows:

1. Employment and Income
   - Decrease in Employment and Income at Decommissioning and Reclamation
2. Economic Activity
   - Increased Competition for Labour and Wage Inflation

Economic effects associated with each VC are further ranked in Table 14.6-2. Those interactions marked as a potential moderate adverse effect (yellow) are being carried forward in the assessment.

14.6.3.2 Effects not Included in the Assessment

There are several effects that are excluded from the economic effects assessment. The excluded effects include beneficial effects of the Project that are discussed in Chapter 1, Section 1.7 (Project Benefits). Other excluded effects relate to potential adverse effects due to: 1) a disruption of commercial or industrial activities due to Project activities at the mine site, or with the transportation of personnel, equipment and supplies for the Project; and 2) a decrease in the economic diversity of the LSA communities with an associated increase in the reliance on the mining sector.

The assessment of the Project's effects on commercial land use activities is included in Chapter 16 (Assessment of Land Use Effects). The assessed effects include effects on Crown-granted tenures (e.g., coal, guide outfitting, trapping, oil and gas, commercial recreation), among others. For this reason, the potential adverse economic effects due to disruption of these commercial and industrial land uses are not assessed here.

The Project will use Highway 52 and the Murray River Forest Service Road for the mobilization of personnel, equipment and supplies. There is the potential that Project-related traffic, including the associated noise and emissions, will disrupt any businesses that operate along or adjacent to, or are otherwise dependent on, these routes. Tumbler Ridge and Highway 52 are the areas of highest traffic for both locals and visitors to the area. Traffic increases due to the Project along the Murray Forest Service Road (FSR) will be an estimated 30 vehicles per day during Construction and 20 vehicles per day during Operation (see Chapter 16). Traffic increases on Highway 52 will be minor (40 trips per day at peak levels during Operation). Further, noise associated with road traffic

is expected to be the limited to the Murray FSR and Highway 52. Highway 29 and Highway 52 leading to the Project do not have many businesses where trucks pass directly; further, businesses that do exist are mostly industrial. Consequently, the minor increases in traffic are not expected to have notable effects on commercial activities along these roads; consequently, this potential effect is considered negligible and is not further assessed.

A second potential adverse effect excluded from the assessment is the potential for a decrease in the economic diversity of the LSA communities with an associated increase in the reliance on the mining sector. This potential adverse effect can be of concern because communities may become dependent on a particular sector or project and be vulnerable to adverse economic effects associated with downturns in the sector or project business decisions, such as temporary shut-downs or reductions in production. However, this effect is excluded from the assessment as it is not expected that the Project would increase the economic reliance of the LSA communities on the mining sector, given that the mining sector is currently present in most LSA communities, with the economic base being diversified to other sectors such as agriculture, energy, forestry and tourism. Further, the presence of the Project in the region is viewed as beneficial to the LSA communities as the Project is expected to provide a number of additional economic opportunities for economic growth that would otherwise not be present.

Beneficial effects of the Project excluded from the assessment include the provision of direct, indirect and induced employment opportunities and income; increased demand for business services; the provision of business contracts to local business; increased access to economic opportunities; and the Project's contribution to GDP and regional, provincial and federal government tax revenue. These effects result from direct Project expenditures, as well as indirect and induced activities in supplier and retail industries. The provision of employment will have a positive impact on the skills and experience of the labour market and on personal income, as well as government tax revenue sourced from personal income taxes. Higher household incomes contribute to workers' savings and spending that, in turn, increase the purchases of goods and services and, correspondingly, business revenue. Government tax revenues are expected to grow further as a result of additional corporate income taxes as well as sales tax. As a result of Project's spending, new business opportunities may be created that contribute to overall regional economic development.

These positive impacts will vary by phase. During both Construction and Operation, the direct, indirect and induced employment, income and GDP effects of the Project will be strongly positive, and consequently, GDP will contribute to the economic growth in the RSA and across BC. At Project Decommissioning and Reclamation, it is expected that there will continue to be beneficial GDP and government tax revenue effects, although the impacts will be substantially less than during Operation. Business opportunities are also predicted for the phase, although the specific Project requirements have yet to be determined. There are no direct measures to mitigate the adverse effects of a decrease in GDP and government tax revenue at Decommissioning and Reclamation; however, it is expected that identified measures to enhance Project beneficial effects (Chapter 1, Section 1.7) as well as the implementation of mitigation measures described in this chapter will indirectly help to mitigate changes to the economy during Decommissioning and Reclamation. That is, mitigating adverse effects related to a decrease in employment and income at Decommissioning and Reclamation, as identified for assessment in this chapter (Section 14.6.3.1), contributes to the mitigation of adverse effects on the broader economy. It is further recognized the Project's

contribution to both GDP and government tax revenue will be strongly beneficial during Project Construction and Operation and that these contributions would not take place without the Project. A decrease in those contributions at Decommissioning and Reclamation is a necessary stage in the Project's life cycle and does not diminish the strongly positive economic benefits of the Project overall. Consequently, the potential for an adverse effect on Economic Activity at Decommissioning and Reclamation is excluded from further assessment.

14.6.3.3 Summary of Economic Benefits of the Project

Expected beneficial Project impacts on employment, income, GDP and taxes are summarized below, and described in more detail in Chapter 1, Section 1.7 (Project Benefits). The results of the economic modeling are also provided in Appendix 14-B (Murray River Coal Project: 2014 Economic Model Report). This summary is provided here as context to the assessment of the potential adverse economic effects that is the subject of the rest of this chapter.

Construction

The Construction phase of the Project will take an estimated three years and will create a total of approximately 1,139 person-years of direct employment for Canadian workers. Capital expenditures for the bulk sample (2014) and the construction of the mine (2015 to 2017) are estimated at $480 million, of which $300 million is expected to be spent in Canada. Over the life of the mine, after the initial Construction phase, there will be additional construction works resulting in a total benefit of an estimated 1,766 person-years of direct employment for Canadian workers and $411 million in Project expenditures within Canada (Appendix 14-B).

The construction of the Project as well as Project-induced activities in supplier industries are expected to have beneficial impacts on the level of employment, personal income, GDP and tax revenue. As the Project is located in British Columbia, substantial impacts are expected to be felt in the province; however, the provinces of Ontario, Alberta and Quebec are also expect to receive notable employment, GDP and tax revenue impacts.

Total direct, indirect and induced employment impacts in BC are estimated at 4,055 person-years, along with total personal income benefits of $214 million. GDP benefits are estimated at approximately $330 million; whereas, tax revenues to the Government of British Columbia are estimated to total approximately $25 million, with an additional $30 million to the federal government (Appendix 14-B).

The PRRD is anticipated to benefit in 687 person-years of direct, indirect and induced employment; of which, 406 person-years in expected in direct Project employment. Further, personal income impacts from direct, indirect and induced activities are estimated at $37 million whereas GDP impacts are estimated at $53 million (Appendix 14-B).

Overall, during Construction, the Project is estimated to result in a total of 6,483 person-years of direct, indirect and induced employment across Canada. The total GDP impact is estimated to be approximately $545 million. Further, resulting government revenues from personal income tax, indirect corporate profit tax and sales tax total approximately $95 million, with $51 million projected

to be generated for the federal government and $44 million for provincial governments across Canada (Appendix 14-B).

Operation

Operation of the Project is expected to occur over a 25 year mine life. During that time, a total of 19,100 person-years (764 jobs) of direct Project employment will be created. Of that, 16,250 person-years of employment will be created for Canadian workers with the remaining for overseas workers. During Operation, total operating expenditures are estimated at $10.7 billion, of which $9.96 billion (93%) is expected to be spent in Canada.

As with Construction, Operation is expected to create direct, indirect and induced employment opportunities at the regional (PRRD), provincial and national level. The Project will also contribute to the personal income, GDP and government tax revenue.

Total direct, indirect and induced employment impacts in BC are estimated at 72,053 person-years, along with total personal income benefits of $4.1 billion. GDP benefits are estimated at approximately $7.6 billion; whereas, tax revenues to the Government of British Columbia are estimated to total approximately $524 million, with $604 million to the federal government (Appendix 14-B). In addition, the Project will directly contribute to government revenues during Operation. Tax payments are estimated to total approximately $892 million in BC Mineral Tax, $656 million in provincial income tax, $895 million in federal income tax, and $69.6 million in property tax. Total direct tax payments over the life of the Project are estimated at $3.66 billion.

The PRRD is anticipated to benefit in 17,811 person-years of direct, indirect and induced employment, of which 8,454 person-years in expected in direct Project employment. Personal income impacts from direct, indirect and induced activities are estimated at $1.2 billion, whereas regional GDP impacts are estimated at $2.0 billion (Appendix 14-B).

Overall, during Operation, the Project is estimated to result in a total of 124,349 person-years of direct, indirect and induced employment across Canada. The GDP impact is estimated at $13.1 billion, whereas government revenues from personal income tax, indirect corporate profit tax and sales tax total are estimated at $2.0 billion, with $1.1 billion projected to be generated for the federal government and $0.9 billion for the provincial governments (Appendix 14-B).

Enhancement Measures for Beneficial Effects

There are a number of measures that will be undertaken by the Proponent to enhance the positive effects of the Project. These include a Recruitment, Training and Employment (RTE) Plan, a Procurement Strategy, and continued engagement with First Nations and communities. These are described in Chapter 1, Section 1.7 (Project Benefits). The RTE Plan is outlined in Chapter 24 (Section 24.16). These measures also serve to mitigate the potential adverse economic effects of the Project, and relevant activities are described later in the chapter as they apply to the mitigation of each adverse economic effect (see Section 14.7).

14.6.3.4 Summary of Potential Economic Effects to be Assessed

The Project is not expected to produce any major adverse effects (Table 14.6-2). A limited number of interactions are expected to result in potential moderate adverse effects (see Table 14.6-2); these interactions will be brought forward for further consideration. In sum, potential adverse economic effects that will be considered in Section 14.7 below include:

1. Employment and Income
   - Decrease in Employment and Income at Decommissioning and Reclamation
2. Economic Activity
   - Increased Competition for Labour and Wage Inflation

14.7 EFFECTS ASSESSMENT AND MITIGATION FOR VALUED COMPONENTS

The key effects identified in Section 14.6.3 with potential for a moderate impact on the receptor VCs are further described and any relevant mitigation measures are identified and discussed in the following sections. This process is iterative in nature; and key effects and relevant mitigation may be refined and identified multiple times. Any effects remaining after all feasible mitigation measures are identified are considered to be the Project's residual effects, which are considered in Section 14.8.

14.7.1 Key Effects on Employment and Income

14.7.1.1 Decrease in Employment and Income at Decommissioning and Reclamation

Professional judgement based on baseline data collection and research, as well as consultation and feedback from stakeholders, was used to screen the economic effects for Employment and Income and it's interaction with the Project. The key effect that will be analyzed and assessed below relates to decrease in employment and income at Decommissioning and Reclamation.

During Operation, over the 25 mine life an average of an estimated 764 direct on-site jobs (total of 19,100 person-years) and an average of about 2,250 indirect jobs (56,278 person-years) in supplier industries related to the Project will be created. The first year of Operation will provide 270 jobs for local and regional workers (Appendix 14-B). As there are currently no operating underground longwall mining operations in Canada, the remaining 494 positions required for the underground mine development will initially be filled by Temporary Foreign Workers. A training and transition plan has been developed to transfer employment from Temporary Foreign Workers to local Canadian workers by 10 percent per year over 10 years. Therefore, it is expected that starting with the 11th year of Operation, all but an estimated 20 workers employed at the Project will be sourced locally, regionally and from within the Province (Table 14.7-1). Although this effect will be very beneficial for local and regional communities, once the Operation ceases there will be a notable decrease in the number of jobs available.

Table 14.7-1. Annual Transition from International to Locally-Sourced Workforce

Year	Internationally-Sourced Workers	Locally-Sourced Workers	Total
Year 1	494	270	764
Year 2	452	312	764
Year 3	410	354	764
Year 4	362	402	764
Year 5	287	477	764
Year 6	216	548	764
Year 7	159	605	764
Year 8	94	670	764
Year 9	56	708	764
Year 10	20	744	764
Year 11	20	744	764
Years 12-25	20	744	764

Decommissioning and Reclamation will involve the removal of all structures and equipment, closure of portals and rehabilitation of site disturbances. Project-related activities will require a substantially reduced workforce compared to Operation. There will be also a decrease in Project-related spending. Accordingly, there will be a loss of employment directly and indirectly associated with the Project. Definitive estimates of employment generated by Decommissioning and Reclamation cannot be provided at this time.

During Post Closure, the majority of Project activities will be focused on monitoring the success of reclamation efforts. As with Decommissioning and Reclamation, definitive estimates of workforce numbers are not available at this time. It is anticipated that this phase will produce very limited direct, indirect and induced employment opportunities in the LSA and RSA. At the end of the Post Closure phase there will be no Project-related employment.

The community of Tumbler Ridge is expected to be affected most notably as it is the closest community to the proposed development (12.5 km). HD Mining has invested $15 million to develop worker housing in Tumbler Ridge, building duplex houses. This is the single largest residential development in the history of Tumbler Ridge. It is also expected that other workers will move to the community either to work at the Project or in Project-induced supplier services. Consequently, at Decommissioning and Reclamation, there may be a substantial out-migration of workers and their families associated with the loss of employment, contributing to the slowdown of economic activities in the community.

While these job losses will not represent an adverse effect relative to the pre-Project baseline, they will nonetheless have an adverse impact. In order to mitigate the impact, the Project will plan for Decommissioning and Reclamation and Post Closure to ensure adequate preparation and information is provided to the workforce about the timing and sequencing of activities (see Section 14.7.2).

During Decommissioning and Reclamation the incremental loss of direct and indirect employment may further result in a potential change in personal income. It is anticipated there will be a loss of personal/household income for those who previously had employment at the Project. Personal income indirectly associated with the Project may also decline should mining industry related businesses in the LSA and RSA experience a loss in demand for services.

In 2013, the mining industry in BC paid the average salary and benefits of $114,600 (MABC 2014). The average annual wage for those directly employed by coal companies in Canada was $95,174 in 2011 (Coal Association of Canada 2013). This is nearly twice the average wage of $46,218 in PRRD, and more than double the average provincial wage of $39,415 (Section 14.5.3). Increased personal income due to direct employment may have a marked effect on personal income levels for those in the LSA and RSA communities.

The average personal income to workers directly employed by the Project during Operation is estimated at $93,294. Employees in supplier industries supplying to the Project can expect an average income of approximately $48,266. It is, therefore, anticipated that personal income drawn from direct employment at the Project will be substantially higher than current average earnings within the PRRD communities, wherein the average employment income is $63,012 (this also holds true for the closest community Tumbler Ridge, which has an average annual income of $80,685 per year; see Section 14.5.3).

Overall, direct project employment and expenditures will be much less during Decommissioning and Reclamation as compared to Operation and, therefore, loss of employment, income, GDP, and government tax revenues is expected. This loss of employment and reduction in expenditures to suppliers has the potential to further result in indirect and induced employment and income loss.

14.7.2 Mitigation Measures for Employment and Income

14.7.2.1 Decrease in Employment and Income at Decommissioning and Reclamation

A number of mitigation measures will be adopted to facilitate the transition of the workforce to other employment following the end of Operation. The mitigation measures will seek to minimize the adverse effects associated with increased levels of unemployment and will focus on enhancing the ability of Project employees to find employment elsewhere. Mitigation actions complement and are integrated with the RTE Plan (Section 24.16), Procurement Strategy, and continued engagement with First Nations and communities as described in Section 1.7 (Project Benefits) of Chapter 1. To specifically mitigate the adverse effect of *Decrease in Employment and Income at Decommissioning and Reclamation*, a Workforce Transition Plan will also be developed and implemented prior to the start of Decommissioning and Reclamation. The objective of the Workforce Transition Plan will be to allow employees to take advantage of the labour market demand for trades, mining-related skill sets and professions that exist at the time of Decommissioning and Reclamation, and Post Closure.

The proposed mitigation strategies will aim to achieve the following:

- Communications with communities in the LSA:
  - Provide formal, clear, and transparent communications with LSA communities, including First Nations, in advance of when Decommissioning and Reclamation is going

to occur so that affected Project contractors and local business employees are able to adjust accordingly.

- Engage with municipal and Aboriginal leadership responsible for economic development for the LSA communities. The primary purpose of the ongoing engagement will be to ensure leadership is aware of the current Project activities and when Decommissioning and Reclamation is going to occur.

- Workforce Transition Plan:
  - Support training and career development opportunities prior to Decommissioning and Reclamation, including worker training programs as part of worker recruitment and on-the-job training to enhance worker job expertise.
  - Implement measures prior to Decommissioning and Reclamation to assist employees to identify opportunities for career succession planning and employment, including providing job search assistance to workers seeking the service to maximize the number of workers that find alternative suitable employment.
  - Identify skills acquired during employment with the Project and match the identified skills to similar positions available at Decommissioning and Reclamation, as well as alternative industries.
  - Assist employees in identifying ongoing employment and training opportunities in the LSA and RSA that will require existing or complementary skills, including assisting workers in identifying available external resources.

These measures are thought to contribute to Project employees' ability to transition to other employment once mining ends.

While mitigation measures are expected to reduce the effect of the *Decrease in Employment and Income at Decommissioning and Reclamation*, a residual effect is predicted and will be further assessed in Section 14.8.

14.7.3 Key Effects on Economic Activity

14.7.3.1 Increased Competition for Labour and Wage Inflation

Professional judgement based on baseline data collection and research, as well as consultation and feedback from stakeholders, was used to screen the economic effects for Economic Activity and its interaction with the Project. The key effect that will be analyzed and assessed below relates to *Increased Competition for Labour and Wage Inflation*.

The provision of direct Project employment may serve to attract skilled workers who are currently employed within the RSA, indirectly creating the need to replace those skilled workers. This competition may take place in the mining sector as workers with transferable skills search for employment at the Murray River Coal Project. The competition for skilled labour may also affect other industries as skilled workers leave their current jobs in hopes of obtaining Project-related employment. That is, the provision of Project employment may result in an increased need for skilled labour in non-mining sectors if workers choose to leave their current positions. Further, this increase in demand for skilled employees also has the potential to produce inflated wage

expectations as one of the attractions to employment in the mining sector is the provision of higher than average salaries and compensation; in response, employers in other industries may be forced to increase wages in order to retain workers.

Construction of a mine site typically requires a relatively large workforce comprised of trained and skilled workers. The Project will be utilizing a mechanized longwall mining construction method that is not currently used in Canada. Longwall mining is a highly skilled and comparatively rare process within the Canadian mining industry. It involves an automated shearer traveling back and forth across the coal face, with a hydraulic roof support system that automatically advances. Construction of the mine using the automated longwall mining technology will require a comparatively smaller workforce and more specialized training (CIM 2013).

Although Construction will require up to approximately 600 workers (full-time equivalent), the short-term nature of Construction and the specific skill sets required are not expected to substantially increase the competition for skilled labour in the RSA. Due to the nature of the work, it is expected that a number of Construction workers will be brought in from outside of the RSA, the rest of Canada, and elsewhere.

Operation will require approximately 764 workers over the 25-year production period (Table 14.7-1). Longwall mining will be utilized throughout Operation. Because this technique is not currently used by other mining operations in Canada, it is not likely that the majority of potential skilled and unskilled candidates at the LSA, RSA and provincial level will have the technical expertise to fulfill the job requirements for the underground mine development, at least in the initial years of Operation. The Proponent will engage Temporary Foreign Workers (TFWs; Table 14.7-1) over the short term for the underground mine development with the long-term strategy of providing workforce training at the local level to encourage training and recruitment of workers from within the LSA communities, the RSA and in Canada.

Temporary workers will be required at the beginning of Operation, decreasing in number throughout the mine life (Table 14.7-1). HD Mining has developed a training and transition plan with the goal of incrementally replacing TFWs with locally-sourced workers by 10% of the total workforce per year over a period of 10 years. This means, starting with the 11th year of production (as discussed in Section 14.7.1.1), all but approximately 20 workers (i.e., a limited number of positions) will be Canadian residents, the vast majority residing in the LSA and RSA. The purpose of the incremental recruitment of locally-sourced workers is to allow adequate time for training of the workers on the usage and maintenance of longwall mining equipment. The Project will aim to provide skills training and employment to residents of LSA and RSA communities with the goal of providing opportunities for ongoing employment on the Project. Consequently, during Operation, there will likely be a change in employment in the LSA and RSA attributed to the Project with the share of the workforce from the region increasing over time.

In 2011, mining-related jobs constituted 13.2% of employment in the RSA, as compared to 1.1% provincially (Section 14.5.3). The community of Tumbler Ridge had almost 40% of all jobs by industry in the mining sector. Approximately 17% of those employed in the District of Chetwynd and 14% of those employed in the City of Fort St. John worked in the mining industry in 2011 (Section 14.5.3).

Although it is expected that the demand for workforce as a result of the Project will be gradual and programs put in place will help with training of new workers, there is the potential for the demand for skilled labour to be affected in the region particularly with respect to surface activities related to mine development (e.g., ground surface preparation, hauling and trucking, fuel services, road work, engineering and surveying). Increased training efforts may result in draws of the capable, skilled labour force from other types of employment that these individuals would likely have obtained in the absence of the Project.

It should be noted that due to an overall skills shortage in locally-sourced labour markets, foreign workers are expected to continue to be a key source for BC's mining industry. According to forecasting by the Mining Industry Human Resources (MiHR) Council (CMM 2014), approximately 145,000 workers, with a significant portion of this being worker replacement due to retirement, will be needed to service the mining industry in Canada. In BC, the industry will need to hire an estimated 13,000 to 20,000 workers by 2022, depending on the realized economic growth of the sector (CMM 2014). Resourcing the mining industry with sufficient numbers of skilled, locally-sourced labour will be a challenge to all mine projects in BC.

As another indication of the potential extent of labour competition within the LSA communities during Operation, total direct Project employment of 764 workers represents approximately 4% of the current labour force in the LSA, but approximately 46% of the current labour force of the nearest community, Tumbler Ridge (with the majority of the LSA labour force residing in Fort St. John). Looked at another way and focusing in on mining-related experience within the labour force, Project employment during Operation represents approximately 28% of the current number of mine-related jobs in the LSA. The strategy to employ Temporary Foreign Workers initially and phasing in a local workforce over a 10-year period will serve to lessen this impact, while concurrently utilizing the available local-sourced skilled labour where practical; nevertheless, competition for skilled and experienced workers is expected.

Further, as discussed in Section 14.7.3.1, one attractant of the mining sector are the higher-than-average earnings. The higher demand for skilled workers might consequently induce wage inflation in the RSA as businesses in other industries are forced to increase wages in order to retain employees. In the last decade, wage inflation in BC varied for different goods and service producing industries, mostly being above the overall inflation (BC Stats 2014c, 2014a). Between 2012 and 2013, wages in the natural resource industries such as forestry, fishing, mining, quarrying, oil and gas fell by 0.10%, but rose significantly in other industries such as agriculture (12.78%), construction (4.74%), transportation and warehousing (5.56%) and professional services (7.66%; Table 14.7-2; BC Stats 2014c, 2014a). However, data for the first quarter of 2014 indicates that, wages in the natural resource industries are also on the rise, with an increase of 11.5% between March of 2013 and March of 2014 (BC Stats 2014c, 2014a). Further, as confirmed by the data for the first quarter of 2014, it is expected that in 2014 the province of BC will see an overall surge in wages, especially as a result of the liquefied natural gas (LNG) projects (Tertzakian 2014). This shows how wages in other industries tend to increase to be able to compete with the mining sector. Consequently, direct Project employment and procurement may increase competition for local labour and inflate wage expectations within the RSA.

Table 14.7-2. BC Industrial Comparison – Annual Wage Inflation, 2004 to 2014

Year	Agriculture (%)	Forestry, Fishing, Mining, Quarrying, Oil and Gas (%)	Utilities (%)	Manufacturing (%)	Construction (%)	Transportation and Warehousing (%)	Retail and Wholesale Trade (%)	Finance and Related (%)	Professional, Scientific, and Technical Services (%)	Accommodation and Food Service (%)	Public Administration (%)	Consumer Price Index (2002=100), Annual Percent Change, BC
2005	0.55	0.88	6.91	1.50	-1.11	5.95	0.13	0.56	10.09	3.63	4.23	2.0
2006	0.24	4.05	2.50	3.10	4.80	1.18	5.07	4.22	2.88	-1.50	2.63	1.7
2007	13.68	1.11	2.41	3.05	6.33	2.47	2.54	1.25	0.88	4.65	2.41	1.8
2008	-2.97	5.50	3.42	3.38	5.18	6.97	3.47	8.14	2.73	4.77	3.49	2.1
2009	8.13	6.44	8.39	3.36	6.88	-0.55	3.71	4.23	8.55	0.23	6.32	0.0
2010	6.46	0.00	1.05	5.63	0.53	6.04	2.77	1.65	0.78	-0.46	2.64	1.3
2011	-4.15	6.57	6.78	-2.17	1.70	-0.32	1.07	1.54	1.87	2.78	4.49	2.4
2012	-0.39	-1.05	-3.09	5.24	0.92	1.22	1.00	5.20	0.17	7.15	-1.99	1.1
2013	12.78	-0.10	-1.95	0.48	4.74	5.56	2.31	-0.12	7.66	-0.70	3.08	-0.1
2014[1]	-1.20	9.15	12.06	2.42	1.70	3.90	1.01	2.27	-1.27	6.23	0.69	-

Notes:
Source: BC Stats (2014c, 2014a)
Wage inflation is based on the annual average of the hourly wage rate.
[1] The average for 2014 is based on data from January, February and March of 2014.

14.7.4 Mitigation Measures for Change in Economic Activity

14.7.4.1 Increased Competition for Labour and Wage Inflation

Issues concerning the development of the labour force and management of economic development are a shared responsibility. HD Mining will implement a number of measures to mitigate the adverse economic effects of the Project associated with increased competition for labour and wage inflation. Planning and management of the respective mitigation measures will be developed in collaboration with relevant Aboriginal communities, municipalities, and other government agencies, as appropriate.

Increased competition for skilled labour is predicted to occur mainly during Operation, as well as during Construction to a lesser extent. There are no specific mitigation measures that HD Mining can implement in isolation to eliminate the competition for skilled labour or prevent inflationary wage pressures; however, a number of proposed mitigation measure including the RTE Plan, Procurement Strategy, and continued engagement with First Nations and communities will be implemented to mitigate adverse effects on Economic Activity within the LSA and RSA. Together, this mitigation encourages the further development over time of a skilled and experienced workforce within the LSA communities and the RSA, while also ensuring that the Project is able to secure the necessary workforce. In particular, the initial use of Temporary Foreign Workers at the start of Operation, and the gradual phasing out and replacement with local workers over a 10-year

period will help to mitigate adverse effects on the labour market and to other businesses and industry in the region by avoiding abrupt increases in demands for labour by the Project.

Responsibility for each of the measures will be assigned to roles within Human Resources and/or Project management (to be determined based on finalized operational plans and or management structures) in order to facilitate implementation, monitoring and reporting of employment-related data (e.g., local employment objectives).

While mitigation measures are expected to reduce the effect of *Increased Competition for Labour and Wage Inflation*, a residual effect is predicted and will be further assessed in Section 14.8.

14.8 RESIDUAL EFFECTS ON ECONOMIC CONDITIONS

14.8.1 Residual Effects on Employment and Income

14.8.1.1 Decrease in Employment and Income at the Project Decommissioning and Reclamation

It is anticipated that the LSA communities and the RSA will experience an increase in direct, indirect and induced employment opportunities during Construction and Operation (see Chapter 1, Section 1.7, Project Benefits). The effects of the Project will be most noticeable during Operation due to the number of direct, indirect and induced employment opportunities that may become available within the LSA communities in line with Project employment plans. It is also anticipated that the LSA communities and RSA will likely experience a change in the number of skilled workers in the locally-sourced labour market following the implementation of Project-related mitigation and benefit enhancement measures such as the RTE Plan.

As the Project enters into Decommissioning and Reclamation and Post-Closure there will inevitably be a loss of employment opportunities available to residents of the economic LSA and RSA. Accordingly, this will result in an adverse effect on Employment and Income. It should be noted that the magnitude and duration of this adverse effect is dependent upon the economic conditions present at the time of Decommissioning and Reclamation and Post-Closure, including the overall economic climate and the availability of alternative employment opportunities with other businesses and projects (Table 14.8-1).

Further, the Project is predicted to increase personal incomes with the LSA and RSA, associated both with the increase in employment due to the Project and the potential to increase salaried and wage conditions in the localized economic area, most notably during Operation. Higher personal incomes drawn from direct Project employment will likely increase hourly wage and salaried incomes for employment within the LSA and RSA communities.

During Decommissioning and Reclamation, however, personal income associated directly and indirectly with the Project will decrease as there will be a loss of employment. Post Closure may see a further decline in the wages associated with the Project. Consequently, the region may experience an adverse effect associated with the general decrease in personal and/or household income (Table 14.8-1).

Table 14.8-1. Summary of Residual Effects on Economic Conditions

Valued Component	Project Phase (timing of effect)	Project Component / Physical Activity	Description of Cause-Effect[4]	Description of Mitigation Measure(s)	Description of Residual Effect
Employment and Income	Decommissioning and Closure, Post-Closure	Hiring and management of workforce; Taxes, contracts and purchases	At Project Decommissioning and Reclamation there will be a loss of employment and Project-related income. This can increase the unemployment rate and adversely affect household incomes and the economy in the LSA and RSA.	Recruitment, Training and Employment Plan, Procurement Strategy, Workforce Transition Plan and continued engagement with First Nations and communities.	Changes to the number of workers and skills necessary to complete Project activities will have a positive residual effect during the Construction and Operation phases. During Project Decommissioning and Reclamation and the Post-closure phases, loss of Project-related employment and income compared with Operation may have an adverse effect on the economic conditions (employment and income) in the LSA and RSA.
Economic Activity	Construction, Operation	Hiring and management of workforce; Taxes, contracts and purchases	Project-related or induced activities may require a workforce of varying size with specific skills, occupations and training. This may affect the competition for skilled labour in the LSA and RSA. Higher wages associated with mining employment may also increase wage expectations in other industries and sectors in the LSA and RSA.	Recruitment, Training and Employment Plan,Procurement Strategy, and continued engagement with First Nations and communities..	Changes to the number of workers and skills necessary to complete Project activities may result in increased competition for labour and wage inflation within the mining sector and in other industries. The project may also raise wage expectation in the available labour market which may impact the ability for local businesses and services to attract and retain workers.

[4]"Cause-effect" refers to the relationship between the Project component/physical activity that is causing the change or effect in the condition of the VC.

Proposed mitigation measures will help workers prepare for new job opportunities that are available and are expected to minimize the number of Project workers that become unemployed, particularly over the longer term. In addition, Project-related employment during Operation will provide the workforce with on-the-job training, skills, and experience that are expected to be highly marketable, thus positioning workers to be competitive in the labour market. However, despite mitigation measures that aim to reduce the adverse effects on employment and income, it is likely that the development of the Project will result in a residual adverse effect.

14.8.2 Residual Effects on Economic Activity

14.8.2.1 Increased Competition for Labour and Wage Inflation

During Construction and Operation, direct, indirect, and induced employment and business expenditures generated by the Project are expected to contribute to the competition for skilled labour and induce wage inflation pressures. Despite mitigation measures that aim to reduce the adverse effects of increased labour competition and wage inflation, it is likely that the development of the Project will result in a residual adverse effect. The higher wages associated with mine-related employment may draw workers interest from current employment areas and also serve to set higher expectations for income. Stronger competition for workers within the mining sector is expected to occur. Local business and industry will be required to respond to the increase in the demand for labour, likely through higher wage and salary offerings, as well as benefits. This will likely impact local businesses as they will incur additional costs for businesses and may experience reduce profitability or viability, at least in the short term (Table 14.8-1).

14.9 CHARACTERIZING RESIDUAL EFFECTS, SIGNIFICANCE, LIKELIHOOD AND CONFIDENCE ON ECONOMICS

This section characterizes residual effects using standard criteria, including magnitude, duration, frequency, geographic extent, reversibility, and resiliency (Federal Environmental Assessment Review Office 1994). The section describes likelihood that an effect will occur based on probability of occurrence and confidence level in the assessment. Definitions for each characterization criterion are provided in Table 14.9-1.

The CEA Agency's (1994) *Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* was used as guidance in evaluating the significance of the adverse residual effects for the Project. The significance of residual effects of the Project is founded on a comparison of the current receptor VC if the Project does not proceed, with the predicted state of the receptor VC if the Project proceeds, after mitigation measures.

Table 14.9-1. Definitions of Characterization Criteria for Residual Effects

Magnitude	Duration	Frequency	Geographic Extent (Physical/Biophysical)	Reversibility	Resiliency	Economic Context	Likelihood of Effects	
							Probability	Confidence Level
How severe will the effect be?	*How long will the effect last?*	*How often will the effect occur?*	*How far will the effect reach?*	*To what degree is the effect reversible?*	*How resilient is the receiving environment or population?*	*What is the current condition of the economy in the LSA?*	*How likely is the effect to occur?*	*How certain is this analysis?*
Negligible: No or very little detectable change from baseline conditions	**Short-term:** Effect lasts approximately 10 years or less.	**Once:** Effect is confined to one discrete period in time during the life of the Project.	**Local:** Effect experienced within one LSA community.	**Reversible Short-term:** Effect can be reversed relatively quickly.	**Low:** The receiving population has a low resilience to imposed stresses, and will not easily adapt to the effect.	**Low:** The component is considered to have little to no unique attributes.	**High:** It is highly likely that this effect will occur.	**High:** >80% confidence. There is a good understanding of the cause-effect relationship and all necessary data are available for the Project area. There is a low degree of uncertainty and variation from the predicted effect is expected to be low.
Minor: Differs from the average value for baseline conditions to a small degree.	**Medium-term:** Effect lasts from 11 to 50 years.	**Sporadic:** Effect an effect that occurs at sporadic or intermittent intervals during any phase of the Project.	**Sub-regional:** Effect is experienced in two to three LSA communities.	**Reversible Long-term:** Within 20 years of Post Closure.	**Neutral:** The receiving population has a neutral resilience to imposed stresses and may be able to respond and adapt to the effect.	**Neutral:** The component is considered to have some unique attributes.	**Medium:** This effect is likely, but may not occur.	**Medium:** 50 to 80% confidence. The cause-effect relationships are not fully understood, there are a number of unknown external variables, or data for the Project area are incomplete. There is a moderate degree of uncertainty; while results may vary, predictions are relatively confident.
Medium: Differs substantially from the average value for baseline conditions and approaches the limits of historical variation.	**Long-term:** Effect lasts between 51 and 100 years.	**Regular:** Effect occurs on a regular basis during the life span of the Project.	**Regional:** Effect extends across the broader region (i.e., RSA.).	**Irreversible:** Effect cannot be reversed (i.e., is permanent).	**High:** The receiving population has a high natural resilience to imposed stresses, and can respond and adapt to the effect.	**High:** The component is considered to be unique.	**Low:** This effect is unlikely but could occur.	**Low:** < 50% confidence. The cause-effect relationships are poorly understood, there are a number of unknown external variables, and data for the Project area are incomplete. High degree of uncertainty and final results may vary considerably.
Major: Differs substantially from baseline conditions, resulting in a detectable change beyond the range of historical variation.	**Far Future:** Effect lasts more than 101 years.	**Continuous:** Effect occurs constantly during the life of the Project.	**Beyond Regional:** Effect extends beyond the regional scale, and may extend across or beyond the province.					

The significance of effects is ranked according to the two categories described below.

- **Not significant**: Residual effects have low or moderate magnitude, individual/ household to community geographic extent, short- or medium-term duration, could occur at any frequency, and are reversible in either the short or long-term. The effects on the receptor VC are indistinguishable from background conditions (i.e., occur within the range of historical variation). There is a medium to high level of confidence in the analyses.
- **Significant:** Residual effects have high magnitude, have regional or beyond regional geographic extent, duration is long-term or far future, and occur at all frequencies. Residual effects on receptor VCs are consequential (i.e., structural and functional changes in communities). Confidence in the conclusions can be high, medium, or low.

The characterization of residual effects, significance, and likelihood that residual effects will occur is presented in Table 14.9-2. The assessment is based on an understanding of baseline conditions and the nature of the effect.

14.9.1 Residual Effects Characterization for Effects on Employment and Income

14.9.1.1 Significance of Residual Effects on Employment and Income

Decrease in Employment and Income at Decommissioning and Reclamation

During the Decommissioning and Reclamation phase of the Project, the number of workers required will be significantly reduced. Accordingly, a decrease in direct and indirect employment and income will occur. Based on the assessment process, the residual effect of the decrease in employment and income at Decommissioning and Reclamation is expected be moderate in magnitude, short-term in duration and occur only. The effect is further characterised as being of a regional extent, being reversible in the short-term, having neutral resiliency, and being neutral in context (Table 14.9-2).

Based on the characterization of this residual effect, the effect of a *Decrease in Employment and Income at Decommissioning and Reclamation* is predicted to be **not significant**.

14.9.1.2 Likelihood and Confidence for Residual Effects Conclusions on Employment and Income

Decrease in Employment and Income at Decommissioning and Reclamation

A high likelihood (probability) of occurrence is expected as the reduction in employment at Decommissioning and Reclamation is certain to occur. The confidence in the effect is also high (>80%) as there is a good understanding of the cause-effect relationship and collected data supports the prediction (Table 14.9-2).

14.9.2 Residual Effects Characterization for Economic Activity

14.9.2.1 Significance of Residual Effects on Economic Activity

Increased Competition for Labour and Wage Inflation

The residual effect of *Increased Competition for Labour and Wage Inflation* during Construction and Operation is assessed to be moderate in magnitude, of medium-term duration, being continuous through the duration of the Project phases, and extend to the LSA and RSA community level. Furthermore, the effect is reversible in the short-term, having neutral resiliency, and being neutral in context (Table 14.9-2).

Based on the characterization of this residual effect, the effect of increased competition for skilled labour and wage inflation is predicted to be **not significant**.

14.9.2.2 Likelihood and Confidence for Residual Effects Conclusions on Economic Activity

Increased Competition for Labour and Wage Inflation

Increased Competition for Labour and Wage Inflation is predicted to have a medium likelihood (50% to 80%) of occurrence. The potential for this outcome to materialize is dependent on the skill sets, availability, and motivations of individuals currently employed within the LSA and the RSA communities, as well as the realized development of the labour force over time. There is further a medium level of confidence that the development of the Project will result in increased competition for labour and wage inflation within the RSA. This outcome has been documented as one commonly related to resource development projects in BC and Canada (Table 14.9-2; MIHR 2013).

14.10 SUMMARY OF RESIDUAL EFFECTS ASSESSMENT AND SIGNIFICANCE FOR ECONOMICS

Two residuals effects were identified in the assessment of the potential adverse economic effects of the Project. A decrease in employment and income at Decommissioning and Reclamation is predicted to result in an adverse residual economic effect on the VC Employment and Income. Increased competition for labour and wage inflation is predicted to result in an adverse residual effect on the VC Economic Activity. Residual effect characterization rated both effects as not significant. Further, the assessment identified the residual effects as having either medium or high probability of occurrence, with a medium or high level of confidence in the assessment. The summary of residual effects characterization, along with mitigation measures, is provided in Table 14.10-1.

14.11 CUMULATIVE EFFECTS ASSESSMENT

14.11.1 Introduction

Cumulative effects are the result of a Project-related effect interacting with the effects of other human actions (i.e., developments, projects, or activities) to produce a combined effect. This section assesses the cumulative adverse effects for economics.

Table 14.9-2. Characterization of Residual Effects, Significance, Confidence and Likelihood

Residual Effects	Residual Effects Characterization Criteria							Significance of Adverse Residual Effects	Likelihood and Confidence	
	Magnitude *(minor, moderate, major)*	**Duration** *(short, medium, long, far future)*	**Frequency** *(once, sporadic, regular, continuous)*	**Geographic Extent** *(local, sub-regional, regional, beyond regional)*	**Reversibility** *(reversible short-term; reversible long-term; irreversible)*	**Resiliency** *(low, neutral, high)*	**Context** *(low, neutral, high)*	**Not significant** *(minor, moderate);* **Significant** *(major)*	**Probability** *(low, medium, high)*	**Confidence** *(low, medium, high)*
Decrease in Employment and Income at Decommissioning and Reclamation	Moderate	Short-term	Once	Regional	Reversible: Short-term	Neutral	Neutral	Not Significant (moderate)	High	High
Increased Competition for Labour and Wage Inflation	Moderate	Medium-Term	Continuous	Regional	Reversible: Short-term	Neutral	Neutral	Not Significant (moderate)	Medium	Medium

Table 14.10-1. Summary of Residual Effects, Mitigation, and Significance

Residual Effects	Project Phase	Mitigation Measures	Significance
Employment and Income			
Decrease in Employment and Income at Decommissioning and Reclamation	Decommissioning and Reclamation	Recruitment, Training and Employment Plan, Procurement Strategy, Workforce Transition Plan and continued engagement with First Nations and communities.	Not Significant
Economic Activity			
Increased Competition for Labour and Wage Inflation	Construction, Operation	Recruitment, Training and Employment Plan, Procurement Strategy, and continued engagement with First Nations and communities.	Not Significant

The method for assessing cumulative effects generally follows the same steps as the Project-specific effects assessment and it includes the following steps:

1. Scoping and identification of potential effects.
2. Description of potential effects and mitigation measures, with subsequent identification of residual cumulative effects.
3. Identification and characterization of residual cumulative effects.

14.11.2 Establishing the Scope of the Cumulative Effects Assessment

The following two criteria for the relevance of evidence pertaining to other human actions are considered in the scoping of the CEA:

- a residual effect of the Project must be demonstrated to operate cumulatively with the effects of another human action; and
- the other human action must be known to have been carried out, or it must be probable (using best professional judgement) that it *will be* carried out.

As stipulated in the AIR (BC EAO 2013), only residual effects are carried forward from the Project-specific effects assessment into the CEA. Thus, the VCs used as focal points for the Project-specific environmental assessment are also captured in the CEA.

Details about each of the other projects/human action considered in the CEA are provided in Chapter 5 (Effects Assessment Methodology).

14.11.2.1 Spatial Boundaries

Spatial boundaries for the CEA are identical with the boundaries defined for the effects assessment. The economic RSA is the PRRD. The LSA communities include:

- District of Tumbler Ridge;
- City of Dawson Creek;
- District of Chetwynd;
- City of Fort St. John;
- West Moberly Lake IR 168A (WMFN);
- East Moberly Lake IR 169 (SFN); and
- McLeod Lake IR 1 (MLIB).

While in principle economic effects may interact with other human actions to create cumulative effects on a regional scale, the residual adverse economic effects resulting from the effects assessment will be mostly experienced at a community level because these communities serve as the centres of population and economic activity within the RSA.

14.11.2.2 Temporal Boundaries

The temporal boundaries for the CEA go beyond the phases of the Project, beginning before major human actions were undertaken in the region, and extending into the future. While precisely forecasting which other human actions will occur at the end of the Project's Post-closure phase would be pure conjecture, an extrapolation of a likely future development scenario for the next several decades—based on information available today—is attempted.

The following temporal periods are evaluated as part of the CEA:

- **Past:** 1940 (to capture the early non-Aboriginal human activities in the region) to 2010 (when baseline studies at the Murray River Project began);
- **Present:** 2010 (from the start of the Project baseline studies) to 2014 (completion of the environmental assessment); and
- **Future:** 2015 (from the start of the Project Construction phase) to 2080 (after the end of the 30-year long Post-Closure phase).

The other human actions considered in the CEA fall into the following temporal categories:

- **Past** (closed) human actions;
- **Present** (continuing and active) human actions; and
- **Future** human actions, which may be:
  - **certain actions:** those actions that have received regulatory authorizations but are not as yet built or operating;
  - **reasonably foreseeable actions:** those actions that are currently in some stage of a regulatory authorization process, and for which a general concept is available from which potential cumulative effects may be anticipated; and
  - **hypothetical actions:** those actions that are conjectural but probable, based on best professional judgement of currently available information, including leases, licences, and extrapolations from historical development patterns; *the potential cumulative effects of such actions are discussed on a conceptual basis only in this CEA*.

14.11.2.3 Identification of Potential Cumulative Effects

Residual effects carried forward from the Project-specific assessment are considered in combination with the residual effects of past, present, and future human actions, where some spatial and temporal overlap occurs. Unless there is a spatial overlap, temporal overlap is considered irrelevant.

The results are presented in an impact matrix, as shown in Table 14.11-1. If there is no spatial and temporal overlap between the residual effects of the Project and those of another human action, the relevant cell is marked with a dash (-). Where there is spatial and temporal overlap, but no interaction is anticipated, the cell is marked grey (●). If there is overlap, and an interaction is anticipated, the cell is marked with a green (●), yellow (●), or red (●). As in the Project-specific effects assessment, only potential adverse effects ranked as moderate or major (yellow or red) before active application of mitigation measures will be carried forward in the CEA. The nature of each identified potential cumulative effect is discussed below (Section 14.11.3).

Table 14.11-1. Screening for Residual Effects to Interact Cumulatively with Effects of Other Human Actions on Employment and Income and Economic Activity

Murray River Coal Project Residual Effect	Potential for Cumulative Effect with Other Human Actions																	
	Time Frame																	
	Past						Present						Future					
	Historic		Recent										Certain					
	Hasler Coal Mine	Sukunka (Bullmoose) Mine	Bullmoose Mine	Dillon Coal Mine	Quintette (Babcock) Mine	Willow Creek Mine	Brule Mine	Trend Mine	Quality Wind Project	Peace Canyon Dam	Wolverine Mine (Perry Creek) and EB Pit	WAC Bennett Dam	Hermann Mine	Quintette Mine	Roman Mine Project	Thunder Mountain Wind Park	Tumbler Ridge Wind Project	Wartenbe Wind Project
Decrease in Employment and Income at Decommissioning and Reclamation	-	-	-	-	-	-	O	O	O	O	O	O	O	O	O	O	O	O
Increased Competition for Labour and Wage Inflation	-	-	-	-	-	-	L	L	O	O	M	O	M	M	M	O	O	O

Murray River Coal Project Residual Effect	Potential for Cumulative Effect with Other Human Actions *(cont'd)*																	
	Time Frame *(cont'd)*																	
	Future *(cont'd)*																	
	Reasonably Foreseeable										Hypothetical							
	Echo Hill Mine	Coastal Gaslink Project	Horizon Mine	Meikle Wind Energy Project	Northern Gateway Pipeline	Rocky Creek Energy Project	Site C Clean Energy Project	Sukunka Coal Mine Project	Sundance Wind Project	Wildmare Wind Energy Project	Babcock Creek Wind Project	Belcourt Saxon Coal Project	Huguenot Mine	Moose Lake Wind Power	Septimus Creek Wind Power Project	Suska Mine	Wapiti River Coal Project
Decrease in Employment and Income at Decommissioning and Reclamation	O	L	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Increased Competition for Labour and Wage Inflation	M	O	M	O	O	O	O	M	O	O	O	M	M	O	O	M	M	

Notes:

(-)	*No spatial or temporal overlap.*
O	*Spatial and temporal overlap, but no interaction is anticipated, no further consideration warranted.*
L	*Negligible to minor adverse effect expected; implementation of best practices, standard mitigation and management measures; no monitoring required, no further consideration warranted.*
M	*Potential moderate adverse effect requiring unique active management/monitoring/mitigation; warrants further consideration.*
H	*Key interaction resulting in potential significant major adverse effect or significant concern; warrants further consideration.*

14.11.3 Description of Potential Cumulative Effects and Mitigation

Although past projects are not expected to cumulatively interact with the economic effects of the Murray River Coal Project, there are several present and future (certain and foreseeable) developments that are expected to have a spatial and temporal overlap, with a smaller number expected to result in negligible to minor adverse effects or moderate adverse effects (Table 14.11-1).

The present coal mines include the Brule Mine, the Trend Mine and the Wolverine-Perry Creek Mine (Table 14.11-1). The Brue Mine is a surface (open pit) metallurgical coal mine in Northeast British Columbia coalfields; the mine employs 416 people. The Trend Mine is an open pit coal mine located approximately 25 km south of Tumbler Ridge; an estimated 350 people are employed at the mine. Similarly, the Wolverine-Perry Creek mine in an open pit coal mine that employed 477 people. All three mines were expected to be in operation until 2016; however, on April 15, 2014 Walter Energy announced the idling of the Wolverine Coal Mine and the Brue Mine (Carter 2014). The Brule Mine will continue to operate past July 2014, the initial shut down date (Carter 2014). Consequently, it is unlikely that the mines will compete for labour with the Murray River Coal Project (Table 14.11-1). It would be rather expected that workers with transferable skills will seek employment at the Murray River Coal Project; this will work to reduce the cumulative competition for skilled workers and reduce inflationary pressures on wages. There is no cumulative interaction on the effect of the *Decrease in Employment and Income at Decommissioning and Reclamation* as the identified mines will close before Operation of the Project commences.

The Hermann, EB Pit, Quintette and Roman Mine projects are all coal mines in the economic RSA that are certain to be in operation in the future (Table 14.11-1). The Hermann Mine will be an open pit mine expected to be in operation for ten years (2014 to 2025) with 43 to 94 workers during the operation phase. The EB Pit is a proposed expansion of the Wolverine Mine. The Quintette Mine is a proposed expansion to the former Quintette Mine, expected to be in operation until 2025 with a workforce of 565 people. Finally, the Roman Mine will also be an open pit mine in operation until 2024, employing 100 workers – a total of 450 when combined with the Trend Mine. Given the projected construction timelines, these mines are expected to be constructed before the Construction phase of the Murray River Coal Project. Therefore, the mines are unlikely to compete for construction labour or services assuming that the predicted timelines hold. Further, their operation will cease years before Decommissioning and Reclamation of the Murray River Coal Project. Consequently, the mines are not expected to cumulatively contribute to the effect of a *Decrease in Employment and Income at Decommissioning and Reclamation*.

The Hermann, EB Pit, Quintette and Roman projects are expected to contribute to the change in the demand for skilled labour that can also result in potential wage inflation pressures. This effect of *Increased Competition for Labour and Wage Inflation* is expected to be moderate as the skillset required for the Hermann, EB Pit, Quintette and Roman Mine projects is mostly associated with surface mining. The Murray River Project, that is an underground mine, will offer surface positions as well (coal washing plant, rail loadout, and maintenance); however, as only 140 of the 764 Project-related positions are expected to be on the surface, there will be a limited number of opportunities. The effect of the *Increased Competition for Labour and Wage Inflation* is further expected to be felt in the mining sector as well as in other industries. As described in Section 14.7.3, skilled workers may leave

their current employment in hopes of obtaining higher wages associated with Project-related opportunities. This may further lead to wage inflation pressures as employers in other industries increase wages to retain skilled workers in order to compete for local labour with the mining sector.

Eco Hill Mine, Sukunka Coal Mine and the Horizon Mine are the only reasonably foreseeable future mines considered in the CEA because of the potential to interact with the Project. Eco Hill Mine will be a coal mine located 44 km north of Tumbler Ridge. Coal will be extracted by a combination of contour and highwall auger mining with progressing reclamation. The mine is estimated to be in operation from ten to 14 years, projected to employ 80 workers. The Sukunka Coal Mine will be an integrated surface and underground mining operation located 55 km south of Chetwynd with a lifespan of 20 years; the mine will employ up to 700 workers during operation. Horizon Mine, located about 20 km southeast of the Project, will be an open pit mine with a lifespan of 20 years; the mine is expected to require 200 workers during operation. The construction of the Echo Hill Mine may overlap with the construction of the Murray River Coal Mine. However, given the projected timelines, the mines will cease operations years before the Decommissioning and Reclamation phase of the Murray River Coal Project (Table 14.11-1). Consequently, although the mines will not cumulatively interact with the effect of the *Decrease in Employment and Income at Decommissioning and Reclamation*, they may contribute to the demand for skilled workers in the region. Thus, there is the potential for contributing to an adverse cumulative effect on *Increased Competition for Labour and Wage Inflation.*

Finally, the Belcourt Saxon Coal Project (open pit coal mine), the Huguenot Mine (open pit coal mine), the Suska Mine (open cut coal mine) and the Wapiti River Coal Project (underground coal mine) are also expected to be in the proximity to the Murray River Coal Project; however, as the projects are not yet in the application phase, little is known of the planned construction or operation phases and workforce requirements (Table 14.11-1). It would be expected, however, that if the projects were to take place, there could be some change in the demand for skilled labour, both in the mining sector and in other industries. For this reason it is speculated that there is the potential for a moderate adverse cumulative effect on *Increased Competition for Labour and Wage Inflation* associated with these hypothetical projects.

Finally, the Coastal Gaslink Project is a proposed 650 km long natural gas pipeline running from near Dawson Creek in northeastern BC to the proposed LNG Canada export facility near Kitimat. The project is expected to have a lifespan of 30 years with a workforce of 15 to 20 people. Due to the nature of the project and the skillset required it is not expected that the project will cumulatively contribute to the competition for skilled labour. However, as the closure of the project is expected to coincide with Decommissioning and Reclamation of the Murray River Coal Project, the Coastal Gaslink project may cumulatively contribute to the effect of the *Decrease in Employment and Income at Decommissioning and Reclamation*. The small workforce projected for the Coastal Gaslink Project will, however, make this effect negligible to minor.

Due to the very different nature of the required construction and operation activities, all other energy projects (dams, wind energy projects, and other energy projects; identified in the Assessment Methodology, Chapter 5) are not expected to cumulatively interact with the adverse economic effects of the Murray River Coal Project. The Project could contribute to the increased demand for services but this effect will overall be beneficial as it will promote business growth and development

in the region. Accordingly, the projects are identified to have a spatial and temporal overlap with the Murray River Coal Project; however, other interactions are not anticipated (Table 14.11-1).

The Hermann, EB Pit, Quintette, Roman, Eco Hill, Sukunka Mine and the Horizon Mine projects as well as the potential developments of the Belcourt Saxon Coal Project, the Hugeuenot Mine, the Suska Mine and the Wapiti River Coal Project are expected to interact cumulatively with the Murray River Coal Project on the effect of *Increased Competition for Labour and Wage Inflation*. Changes to the number of workers and skills necessary to complete activities at various projects in the region may result in increased competition for labour and wage inflation within the mining sector and in other industries. Further, changes in wage expectation in the available labour market may impact the ability of local businesses and service providers to attract and retain workers. Consequently, the effect of *Increased Competition for Labour and Wage Inflation* is expected to result in a residual cumulative effect. For the effect of *Decrease in Employment and Income at Decommissioning and Reclamation*, given the proposed timelines for projects in the region, no interaction or only negligible to minor interactions are expected. Consequently, the effect of the *Decrease in Employment and Income at Decommissioning and Reclamation* is not anticipated to be a residual cumulative effect; no further mitigation measures are recommended and the effect is not carried forward for assessment. No other interactions of the Murray River Coal Project with other projects in the region are expected.

Mitigation measures for the residual cumulative effect of the *Increased Competition for Labour and Wage Inflation* are described in Section 14.7.4. The mitigation measures comprise several actions as defined by the RTE Plan, Procurement Strategy, and continued engagement with First Nations and communities. There are no specific mitigation or management measures expected from other projects or activities to address the availability of skilled labour and wage inflation; however, it is expected that other large resource development projects, to meet the labour and skill requirements for existing and future projects, would adopt mitigation and management measures similar to those of the Murray River Coal Project.

Despite the implemented mitigation measures, it is expected that the development of the Murray River Coal Project, and its cumulative interaction with other future projects, may result in competition for labour and wage inflation. Consequently, a residual cumulative effect of *Increased Competition for Labour and Wage Inflation* is expected. This effect is characterized in the following section.

14.11.4 Characterization of Residual Cumulative Effects, Significance, Likelihood, and Confidence

The residual cumulative effects to VCs are described in Table 14.11-3 and characterized using the same criteria described in Section 14.9 and Table 14.9-1 (e.g., magnitude, geographic extent, duration, frequency, reversibility, context). Significance, probability and confidence are also assessed using the same criteria described in Section 14.9.

As indicated in Section 14.11.3 (Table 14.11-2), there is one residual cumulative effect carried forward for characterization. It is the effect of increased competition for labour and wage inflation.

14.11.4.1 Significance of a Residual Cumulative Effect on Economic Activity

Increased Competition for Labour and Wage Inflation

The Murray River Coal Project, as well as future mine projects, have the potential to result in an adverse residual cumulative effect on economic activity in the RSA. For the Construction and Operation phases, the cumulative effect of *Increased Competition for Labour and Wage Inflation* is assessed to be of moderate magnitude, medium-term duration, being continuous through the duration of the Project, and extend to the RSA. Furthermore, the effect is predicted to be reversible in the short-term, having neutral resiliency, and being neutral in context (Table 14.11-3).

Based on the characterization of this residual effect, the cumulative residual effect of increased competition for skilled labour and wage inflation is predicted to be **not significant**.

14.11.4.2 Likelihood and Confidence for Residual Cumulative Effects Conclusions on Economic Activity

Increased Competition for Labour and Wage Inflation

The residual cumulative effect of *Increased Competition for Labour and Wage Inflation* is predicted to have a medium likelihood of occurrence. It is likely that multiple projects will occur in tandem, but it is unlikely that all of the project considered in the CEA would proceed at the same time. There is further a medium level of confidence in the assessment as the effect will depend on the number of projects to be actually developed in the region, and the timing of those developments (Table 14.11-3).

14.12 EFFECTS ASSESSMENT CONCLUSIONS FOR ECONOMICS

The proposed Murray River Coal Project is expected to result in two adverse economic effects. Specifically, activities related to hiring and management of the workforce, and taxes, contracts and purchases are expected to interact with two economic VCs: 1) Employment and Income; and, 2) Economic Activity (Table 14.12-1). Employment and Income VC is associated with one adverse economic effect: *Decrease in Employment and Income at Decommissioning and Reclamation*. Economic Activity VC is associated with another adverse effect: *Increased Competition for Labour and Wage Inflation*. The effect of the *Decrease in Employment and Income at Decommissioning and Reclamation* is expected to occur at the Decommissioning and Reclamation phase of the Murray River Coal Project. The effect of *Increased Competition for Labour and Wage Inflation* is expected to occur during Construction and Operation phases of the Project.

The two adverse economic effects will be mitigated through a set of plans, programs and strategies including the RTE Plan, Procurement Strategy, Workforce Transition Plan and continued engagement with First Nations and communities. Despite the implemented mitigation measures, residual effects are predicted for each VC.

The adverse residual effects of the Project on the economic environment are assessed as being moderate in magnitude, of short to medium term duration, regional in geographic extent and reversible in the short term. Both residual effects are rated not significant. Further, there is a high level of probability and confidence in the effect of *Decrease in Employment and Income at Decommissioning and Reclamation*. Further, there is a medium level of probability and confidence in the effect of *Increased Competition for Labour and Wage Inflation*.

Table 14.11-2. Summary of Residual Cumulative Effects

Valued Component	Murray River Activity	Other Human Action Activity	Description of Potential Cumulative Effect	Description of Mitigation Measure(s)	Description of Residual Cumulative Effect
Economic Activity	Hiring and Management of Workforce; Taxes, Contracts and Purchases	Herman Mine, EB Pit, Quintette Mine, Roman Mine Project, Echo Hill Mine, Sukunka Mine, Horizon Mine, Belcourt Saxon Coal Project, Huguenot Mine, Suska Mine, and Wapiti River Coal Project	There will be an increase in the competition for skilled labour that may result in difficulties securing the required labour force and induce wage inflation pressures.	Recruitment, Training and Employment Plan, Procurement Strategy, Workforce Transition Plan and continued engagement with First Nations and communities. No additional mitigation measures other than those implement by other proposed projects.	There is predicted to be an adverse effect on the ability of projects to secure the necessary skilled and experienced workers, with the increase in competition for skilled labour resulting in wage inflation pressures.

Table 14.11-3. Characterization of Residual Cumulative Effects, Significance, Confidence and Likelihood

Cumulative Residual Effect	Residual Cumulative Effects Characterization Criteria							Significance of Adverse Residual Cumulative Effects	Likelihood and Confidence	
	Magnitude *(minor, moderate, major)*	**Duration** *(short, medium, long, far future)*	**Frequency** *(once, sporadic, regular, continuous)*	**Geographic Extent** *(local, sub-regional, regional, beyond regional)*	**Reversibility** *(reversible short-term; reversible long-term; irreversible)*	**Resiliency** *(low, neutral, high)*	**Context** *(low, neutral, high)*	**Not significant** *(minor, moderate);* **Significant** *(major)*	**Probability** *(low, medium, high)*	**Confidence** *(low, medium, high)*
Increased Competition for Labour and Wage Inflation	Moderate	Medium-term	Continuous	Regional	Reversible Short-term	Neutral	Neutral	Not significant (moderate)	Medium	Medium

Table 14.12-1. Summary of Project and Cumulative Residual Effects, Mitigation, and Significance

Residual Effects	Project Phase	Mitigation Measures	Significance of Residual Effects	
			Project	Cumulative
Employment and Income				
Decrease in Employment and Income at Decommissioning and Reclamation	Decommissioning and Reclamation	Recruitment, Training and Employment Plan, Procurement Strategy, Workforce Transition Plan and continued engagement with First Nations and communities.	Not Significant (moderate)	N/A
Economic Activity				
Increased Competition for Labour and Wage Inflation	Construction, Operation	Recruitment, Training and Employment Plan, Procurement Strategy, and continued engagement with First Nations and communities. No additional mitigation measures other than those implement by other proposed projects.	Not Significant (moderate)	Not Significant (moderate)

Notes: N/A indicates that the cumulative effect for the residual effect is not predicted.

Only one adverse residual Project effect, *Increased Competition for Labour and Wage Inflation*, was carried forward for cumulative effects assessment because of the potential for interaction with other projects. Several coal mines that are in the development stage in the region may contribute to the competition for skilled labour and, therefore, adversely affect the ability of businesses and industry to secure the necessary workforce and result in inflation pressures on wages. The closures of other projects in the region do not coincide with Decommissioning and Reclamation of the Murray River Coal Project; consequently, a cumulative effect for *Decrease in Employment and Income at Decommissioning and Reclamation* is not predicted.

In addition to the Project-specific mitigation, there may be additional mitigation to address the cumulative effect. Specifically, it is assumed that the proponents of other projects and activities, in particular other mine developments in the RSA, will implement mitigation and benefit enhancement measures that are similar to those identified for the Murray River Coal Project. In sum, the adverse residual cumulative effect on the economic activity (i.e., *Increased Competition for Labour and Wage Inflation*) is rated not significant as it is expected to be moderate in magnitude. There may be competition for skilled labour once proposed projects are in the operation phase; however, the specialized skillsets and qualifications of workers required for the Murray River Coal Project is not anticipated to overlap strongly with the requirements for workers at other projects in the region. Further, it is unknown how many of the proposed projects will proceed and the actual timing of the interaction with the Project.

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Definitions of the acronyms and abbreviations used in this reference list can be found in the Glossary and Abbreviations section.

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