15. ASSESSMENT OF SOCIAL EFFECTS

15.1 INTRODUCTION

This chapter assesses potential adverse social effects which may arise from the Project during Construction, Operation, Decommissioning and Reclamation, and Post Closure. Social effects associated with mine development in developed countries are generally driven by economic activity and related population growth, and include: demographic changes; increased demand on community infrastructure and services; changes in housing supply and prices; crime and other social problems; changes to social cohesion (civic participation, volunteering, sense of place, sense of community); cultural effects (changes to local customs, traditions, and identity); changes to family dynamics (family roles, responsibilities and structures); and disproportionate effects on vulnerable groups (e.g., women, disabled, elderly, indigenous, ethnic minorities) (Joyce 2001; Lockie et al. 2009; Carrington and Pereira 2011; Franks 2012). Northeastern BC communities have historically experienced economic and population changes associated with resource development and have expressed the desire to maximize socio-economic benefits while mitigating adverse social effects (Halseth and Sullivan 2002; Markey and Heisler 2011; Shandro et al. 2011).

The baseline socio-economic study report supporting this assessment is located in Appendix 14-A.

15.2 REGULATORY AND POLICY FRAMEWORK

Social conditions are often the responsibility of one or more of the three levels of government (local, provincial, and federal). Community services are largely the responsibility of local governments as empowered through the *Local Government Act* and the *Community Charter*. Key community services under local jurisdiction include fire protection (under the *Fire Services Act*), engineering services (including water supply, waste management, and transportation), parks and recreation, and housing as affected by zoning and other plans. Local governments are also empowered to form committees and task forces to address specific community issues. Several community services are the responsibility of regional-level local governance, including health care services (Health Authorities under the *Health Authorities Act*), education (School Districts under the *School Act*), services provided by a regional district in the absence of a municipality, and housing as affected by regional planning initiatives.

Provincial ministries maintain responsibility for province-wide service delivery and specific areas of provincial jurisdiction. The BC Ministry of Health is responsible for health services to all BC residents (key pieces of legislation include the *Ministry of Health Act*, the *Medicare Protection Act*, and the *Pharmaceutical Services Act*). The BC Ambulance Service, under BC Emergency Health Services, provides ambulance services on a provincial level. The BC Ministry of Education supervises the administration of school districts, administers provincial funding of the districts and supervises finances under the *School Act*. The BC Ministry of Advanced Education provides funding to post-secondary institutions under the *University Act* and the *College and Institute Act*. The BC Ministry of Forests, Lands and Natural Resource Operations is responsible for wildfire suppression on Crown land. Social and family services are principally the responsibility of the Ministry of Children and Family Development.

The federal government is responsible for police services for municipalities with populations under 5,000 people (under the *Royal Canadian Mounted Police Act* and specific Municipal Police Unit Agreements). The federal government is also responsible for Aboriginal services under the *Constitution Act, 1867*, including health care, housing, education and social development programs, and land management and economic development. Under the *Indian Act*, Aboriginal communities have the authority to enact bylaws and to create boards, societies, commissions and committees on Indian reserves.

Legislation and regulations relating to social areas generally do not set out specific objectives, standards, or guidelines for the measurement of social conditions. However, BC ministries outline performance metrics in their service plans and report progress in their annual reports, as required under the *Budget Transparency and Accountability Act*. Some of these metrics are applicable to the assessment of social effects. In addition, the *Community Charter*, section 98(2)(f), requires local governments to specify objectives and measures in their annual reports. Local government planning documents, including land and resource management plans, official community plans, and regional growth strategies also specify objectives that may be relevant. Where regulatory guidance is lacking, a variety of other bodies, such as professional associations and academic research institutions, provide relevant standards, benchmarks and best practices. Broad direction may be found in provincial ministries policies, initiatives and plans.

This chapter presents relevant standards, objectives, benchmarks and/or best practices in the appropriate sections of the assessment.

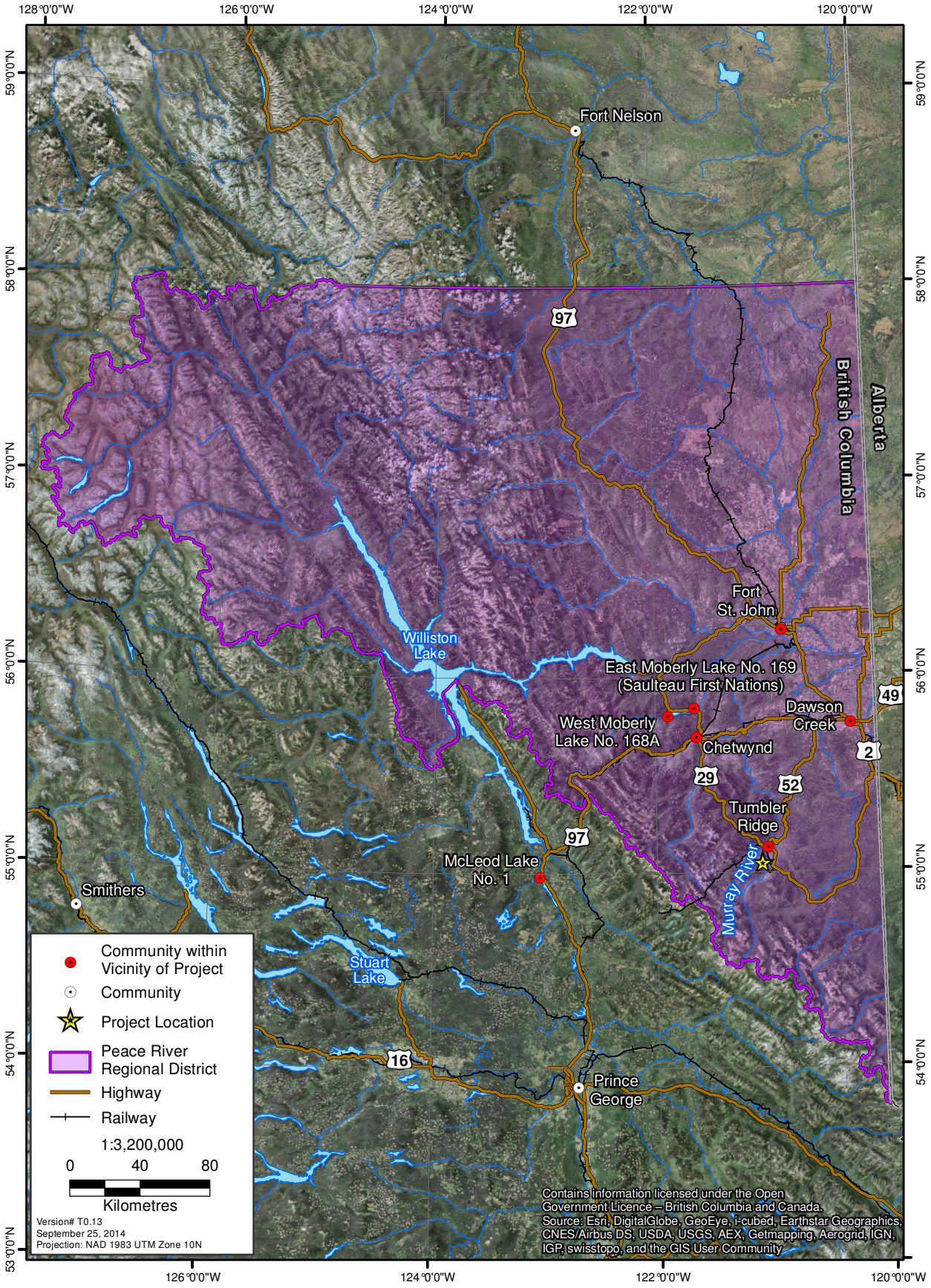
15.3 REGIONAL OVERVIEW

The Project is located within lands traditionally occupied by Tsek'ehne, Dane-zaa, Saulteaux, Cree, and Métis peoples. All contemporary Aboriginal groups in the area, with the exception of Métis peoples, are signatories to Treaty 8 (signed on June 21, 1899 with a number of subsequent adhesions to Treaty 8). An assessment of potential adverse effects on Aboriginal and treaty rights and related interests is located in Chapter 20.

Administratively, the Project is located within the boundaries of the Peace River Regional District (PRRD). The PRRD encompasses 119, 000 square kilometers of land south of the 58th parallel and east of the Rocky Mountains to the Alberta border. Seven municipalities, 45 unincorporated communities, and seven First Nations communities are located within the PRRD, comprising a population of approximately 58,895 residents. The majority of PRRD residents are ethnically European and/or non-Aboriginal North American; however, approximately 14% of the PRRD population identify as Aboriginal, which is above the provincial average of approximately 5.5% (Stats Can 2013b). Figure 15.3-1 displays the location of communities in the vicinity of the Project.

Figure 15.3-1

Communities in the Vicinity of the Project



The PRRD is characterized by a strong economic reliance on natural resource extraction. Founded on agriculture (Leanard 1992), the region now relies primarily on energy extraction based on oil, natural gas and hydro-electricity (NPEDC 2012; SPEDC 2012a).Agriculture remains an important economic sector, however; for example, the region currently produces nearly 90% of BC's grain and 95% of BC's canola, as well as a large share of livestock such as beef and bison (NPEDC 2014). Forestry is also an important economic sector, with several pulp and paper mills, saw mills and remanufacturing facilities supporting regional timber harvest. Tourism is a growing area, with potential for further development in the backcountry, cultural, and eco-tourism sectors (SPEDC 2012b).

British Columbia has 12.0 billion tonnes of potentially mineable coal resources, of which 4.0 billion tonnes is located in the Peace River Coalfield. The coal mining industry contributed $3.2 billion in value-added GDP to the Provincial economy in 2011 (PWC 2013). There is currently one operating coal mine, the Trend Mine. Three other coal mines, including the Brule Mine, Willow Creek, and Wolverine-Perry Creek, were recently idled due to low international coal prices.

Communities within the present-day PRRD support the resource extraction industries. The City of Fort St. John (pop. 18,609) serves as a regional service centre for the resource industry, with a regional airport, hospital and industrial services (FSJ 2012). The City of Dawson Creek (pop. 11,583) is a regional agricultural service centre and transshipment point. With a sizable population, Dawson Creek supports the resource industry, retail and tourism businesses, and has its own hospital. The District of Tumbler Ridge (pop. 2,710) was built to service the mining industry. The District of Chetwynd (pop. 2,635) serves primarily as a transportation hub, due to its location at the junction of Highways 97 and 29 and the CN mainline. The District of Taylor (pop. 1,373) is a small town within commuting distance of Fort St. John that houses several industrial plants. Finally, the District of Hudson's Hope (pop. 970) was built to house the workforce for the W.A.C. Bennett hydroelectric dam and, later, the Peace Canyon dam, and remains economically reliant on the dams.

Aboriginal communities in the vicinity of the Project include West Moberly First Nations (pop. 109), located on the west side of Moberly Lake, and Saulteau First Nations (pop. 324), located on the east side of Moberly Lake. Both communities rely on a mix of traditional subsistence economic activities and market economic activities, the latter including businesses and employment in the forestry, energy, mining, construction, and tourism sectors (PRCI 2010; Finavera 2011; Fasken Martineau 2013; Statistics Canada 2013c, 2013a). With most workers employed in the mining, quarrying, and oil and gas extraction sectors, the PRRD workforce is close to fully employed, with an unemployment rate of 6.4% (as compared to the provincial rate of 7.8%) (Stats Can 2013b). Unemployment rates in Aboriginal communities are higher, sitting at 25% for West Moberly First Nations and 18% for Saulteau First Nations (Statistics Canada 2013c, 2013a).

Regional employment opportunities have induced rapid population growth: PRRD communities contribute over 90% to the Northeast Development Region's status as the fastest growing development region in the province (ICABC 2013). Population growth has failed to keep pace with employment opportunities, however, and the region is experiencing an acute labour shortage, particularly for skilled labour (NRWT 2012). Population growth has resulted in housing shortages and strains on community infrastructure and services (City Spaces 2006; Fraser Basin Council 2012). Consequently, workers are often housed in short-term accommodations (hotels and motels) or

camp-style housing. This solution puts further strain on regional communities as transient workers use local infrastructure and services without contributing taxes toward their maintenance. Population influx, increasing employment and income, and a mobile workforce have also contributed to social problems such as problematic substance use, crime, violence and prostitution (Northern Health 2012; Troy Media 2012; W. Beamish Consulting Ltd. and Heartwood Solutions Consulting 2013).

15.4 HISTORICAL ACTIVITIES

Northeastern BC was subject to intensive resource planning in the 1970s, as provincial and federal governments sought to develop a major coal exporting industry. In 1976, the BC Cabinet Committee on Coal Development initiated the Northeast Coal Study, which made a number of recommendations with respect to coal policy and development issues. In 1981, representatives of the Denison Mines, Teck Corporation, the provincial government, and a consortium of Japanese steel mills signed an agreement to develop the Northeast Coal Project. As one of the largest and most comprehensively planned regional developments ever undertaken in Canada, this project included the development of the Quintette Coal Mine, the Bullmoose Coal Mine, the town of Tumbler Ridge, roads (including Hwy 97 from Chetwynd), a transmission line from the W.A.C. Bennett Dam, a rail line to Prince George and a coal terminal in Prince Rupert (Ridley Island). The entire cost for the project was $4.6 billion (in 2000 Canadian dollars), of which $2 billion was for the mines and the remainder for infrastructure (Gunton 2003).

The Quintette Coal Mine, located approximately 20 km south of Tumbler Ridge, was an open pit mine that began operations in 1982. The mine produced 65 million tonnes of coal and generated 20,000 direct person years of employment (1,129 jobs per year) over its life (Zacharias 2000). Layoffs occurred over the 1990s and the mine ceased production in 2000, three years ahead of schedule. Approximately 600 workers were laid off, 500 of whom resided in Tumbler Ridge (Gill 2002). The coal processing plant is currently under care and maintenance, with a mine permit application to re-initiate mining currently under review. The Bullmoose Coal Mine commenced operations in 1983. It consisted of an open-pit mine, a plant facility in the Bullmoose Creek valley below the mine, and a separate rail loadout facility on the B.C. Rail branchline. The mine ceased operation in 2003, laying off 135 workers (Strickland 2003).

The town of Tumbler Ridge was built by the provincial government between 1982 and 1984 under the *Instant Towns Act*. The town was designed by the BC Ministry of Municipal Affairs according to the principle of "socially-sensitive planning," which embedded concerns about social well-being in design decisions (Gill 2002). Infrastructure was designed to accommodate a population of 10,000. However, the population was less than half that (4,650) at its peak in 1991. Population declined thereafter, to less than 2,000 (1,851) in 2001 (Stats Can 2002). In an attempt to sustain itself, the community sold approximately 900 vacant homes at well below assessed values in 2002 (Shandro et al. 2011). Many of the homes were bought by retirees, significantly shifting the demographic composition of the town. Since the closure of the mines, the town has attempted to diversify the local economy away economic dependence on a single resource and the associated "boom and bust" economic and social dynamics (Halseth and Sullivan 2002; Markey and Heisler 2011; Shandro et al. 2011).

Other key historical activities in the region that hold implications for current social conditions include:

- the discovery of significant deposits of oil and gas in the 1950s, together with the construction of the W.A.C. Bennett Dam on the upper Peace River in the mid-1960s, leading to the current regional dominance of energy extraction;
- softwood lumber trade disputes between Canada and the United States in the 1990s, leading to reduced forestry activities;
- intensive forestry harvesting undertaken in the early 2000s to address mountain pine-beetle affected timber stands;
- the discovery of dinosaur fossils in 2000, leading to the development of paleontological tourism in Tumbler Ridge; and ongoing subsistence activities, such as trapping, hunting, and fishing.

The historical activities described above influence the current socio-economic conditions for all residents of the PRRD, including Aboriginal groups. However, Aboriginal groups highlight other historical events that uniquely shape their current socio-economic conditions. Aboriginal groups' current socio-economic conditions are influenced, *inter alia*, by early trade relationships, disease epidemics, historic treaties, colonial policies (such as residential schools), imposed systems of governance (under the *Indian Act*), and the cumulative effects of natural resource extraction on Aboriginal peoples' ability to exercise Aboriginal and Treaty rights (Treaty 8 First Nations Community Assessment Team and The Firelight Group Research Cooperative 2012).

15.5 BASELINE STUDIES

In order to identify current socio-economic conditions for communities in the vicinity of the Project, ERM Rescan conducted a socio-economic baseline study from 2010 to 2012 (Appendix 14-A). The objectives of the baseline study were to:

- characterize existing socio-economic conditions in the vicinity of the Project, including demographics, governance, education, employment, income and earnings, economy and business environment, infrastructure and services;
- identify socio-economic trends in the vicinity of the Project;
- identify community interests, values, issues and concerns about current and future socio-economic conditions, challenges, and opportunities;
- identify potential valued components that may be affected by Project components and activities; and
- provide a baseline against which to evaluate project-specific socio-economic effects.

15.5.1 Data Sources

Data sources accessed during the baseline study included:

- Statistics Canada census data from 2001, 2006, and 2011;

- research reports distributed by the Peace River Regional District, federal and provincial governments, educational institutions, and professional associations;
- federal, provincial and municipal websites; and
- municipal, regional, and provincial representatives, service providers, business leaders and members of economic development organizations and chambers of commerce.

A list of secondary and primary data sources is presented in Tables 3.2-2 and 3.2-3 of the Socio-economic Baseline Report located in Appendix 14-A.

15.5.2 Methods

A mixed methods approach was used to collect baseline data (Cresswell 2013), using both qualitative and quantitative, and both secondary and primary, research methods to collect baseline information. Secondary methods consisted of the collection and review of existing publications, reports and data tables. Primary methods involved interviews with key knowledge-holders.

15.5.2.1 Baseline Study Area

The socio-economic baseline study defined two study areas: a regional study area (RSA) and a local study area (LSA). The RSA aligns with the boundaries of the Peace River Regional District (PRRD). This regional study area was chosen in order to capture baseline socio-economic characteristics across an area likely to experience regional effects of the proposed Project. The PRRD was also chosen due to the availability of data at the regional district level. The LSA is defined by individual communities that are located in the vicinity of the Project that are likely to experience effects of the Project. Non-Aboriginal LSA communities include: Tumbler Ridge, which will be the location for employee housing; Chetwynd, which is within commuting distance of the Project; Dawson Creek, which contains businesses likely to serve the Project; and Fort St. John, which also contains businesses likely to serve the Project. Aboriginal LSA communities include West Moberly First Nations and Saulteau First Nations. Both Aboriginal communities are within commuting distance of the Project, have businesses likely to serve the Project, and rely on neighbouring Chetwynd for a number of community services.

Figure 15.3-1 presents the outlines of the RSA and LSA in relation to the Project footprint.

15.5.2.2 Secondary Socio-economic Research

Secondary data was systematically collected and reviewed to extract relevant socio-economic information for the study areas. Data were organized in tables and analyzed for trends and gaps. Multiple data sources were drawn on, where possible, to enhance the validity of the results through cross-verification (see Table 3.2-2 in the Socio-economic Baseline Report located in Appendix 14-A).

15.5.2.3 Socio-economic Interviews

Interviews with key knowledge holders were conducted to address data gaps identified through the secondary research and to verify findings. Interviews also provided insight into the primary socio-economic trends, issues and concerns for study area communities. A criterion sample (Patton 2001)

was developed from which interviewees were purposefully selected based on their specific knowledge and experience concerning particular socio-economic components as a result of their professional capacity and/or role in their community. Semi-structured interview guides were developed in the following areas: economic development; education services; emergency services; governance, housing and infrastructure; health and social services; and municipal issues. One guide was used per interviewee. Interviewers used the guides as a source of topics and example questions, but the interviews were free to follow their natural course (Cresswell 2013). Interviews were audio-recorded, with the consent of the participant, and the recording was used to verify written notes. Interview notes were later provided to the interviewees for their review and comment if they requested it in the interview. A total of 25 interviews were completed in the communities of Tumbler Ridge, Chetwynd, Dawson Creek, and Fort St. John (see Table 3.2-3 in the Socio-economic Baseline Report located in Appendix 14-A).

West Moberly First Nations and Saulteau First Nations were provided with draft socio-economic baseline reports and invited them to participate in socio-economic interviews. The Proponent agreed to fund a gap analysis of the draft Saulteau First Nations Socio-economic Baseline Report. A gap analysis report was provided to the Proponent by the SFN and the information was incorporated into the assessment.

15.5.3 Characterization of Social Baseline Conditions

15.5.3.1 Population and Demographics

The PRRD experienced modest population growth over the last decade, reaching a population of 60,082 in 2011 (Stats Can 2012f). Following a 2.5% population decline between 1996 and 2001 (associated with regional mine closures), the region's population rose steadily, increasing by approximately 9% between 2001 and 2011 (Stats Can 2007a, 2012f). This growth rate, however, was lower than the provincial rate of 12.6%. Within LSA communities, Tumbler Ridge grew by the greatest amount (increasing by approximately 46%), followed by Fort St. John and Dawson Creek (Stats Can 2007c, 2007b, 2007d, 2012b, 2012i, 2013c). Almost 14% of the PRRD population identify as Aboriginal, above the provincial average of approximately 5.5%. Within LSA communities, Tumbler Ridge has the highest proportion of Aboriginal people, at approximately 12.5%. This proportion represents an increase of approximately 4.5% between 2001 and 2011, a greater increase than in other non-Aboriginal LSA communities (especially Chetwynd, which was the only community to experience a decrease in the number and proportion of Aboriginal peoples).

As of September 2013, West Moberly First Nations had a registered population of 270 people, with 109 persons living on-reserve and 161 persons living off-reserve (AANDC 2013). The Nations' on-reserve population increased by approximately 86% between 2006 and 2011 (Stats Can 2012j), reversing population declines occurring between 2001 and 2006. Recent population growth is attributed to housing price increases in Chetwynd (PRCI 2010), which has induced West Moberly First Nations' members to return to the reserve where housing is more affordable. Demographic data for West Moberly First Nations was suppressed in the 2011 Statistics Canada census due to a high global non response rate. Saulteau First Nations has a total registered population of 894 members with 357 members living on reserve (AANDC 2014). The Nations' on-reserve population increased by approximately 15% between 2006 and 2011 (Statistics Canada 2013a).

The median age on reserve is approximately 30 years, with approximately 26% of the population under the age of 15.

The population within the PRRD is relatively young, with a median age of approximately 34 years (approximately 7.5 years younger than the provincial median). Tumbler Ridge has the oldest population among LSA communities due to an influx of retirees following worker out-migration in the 1990s. The number of child-care aged children (defined here as 14 years old and younger) increased in Tumbler Ridge and Fort St. John over 2001-2011, but decreased in the other LSA communities, as in the PRRD and BC as a whole.

Visible minorities make up approximately 2% of the PRRD population, below the provincial average of 24.8%. Tumbler Ridge has the lowest proportion of visible minorities among LSA communities (approximately 1.6%). In comparison to other LSA communities, all of which experienced an increase in the proportion of visible minorities, the proportion of visible minorities decreased in Tumbler Ridge between 2001 and 2011.

Population projections estimate that the PRRD population will increase by nearly 33% in 25 years, surpassing 85,000 people by 2036 (BC Stats 2012).

15.5.3.2 Community Services and Infrastructure

Full service regional hospitals are located in Fort St. John and Dawson Creek, while more limited health care services are provided to local populations in Chetwynd and Tumbler Ridge. Health care practitioner shortages are a concern in non-Aboriginal LSA communities and all facilities are actively recruiting new personnel.

Primary and secondary education facilities are located in non-Aboriginal LSA communities in quantities commensurate with population size. Northern Lights College maintains a campus in all non-Aboriginal LSA communities. The Peace River-Liard regional campus of the University of Northern British Columbia is located in Fort St. John. Post-secondary enrolment patterns have shifted in recent years from academic courses to trades-related training as students and employers focus on developing skills that are required for the regional workforce (B. Powers, pers. comm. 2012). At the same time, instructor recruitment has become an issue as qualified individuals can earn greater salaries working directly for industry than working as a college instructor (Anonymous 1, pers. comm. 2012).

Emergency services (fire, ambulance, and police) are provided in non-Aboriginal LSA communities commensurate with population size. Tumbler Ridge's RCMP detachment is currently at capacity and will need increased staff and funding to match expected population growth.

Daycare shortages were noted as an issue in Tumbler Ridge and Dawson Creek.

Community infrastructure in non-Aboriginal LSA communities, in general, can accommodate future population growth. However, infrastructure is aging and will need to be replaced in the near future. In Tumbler Ridge, for example, the replacement of sewer lines and electrical cables is projected (P. Hascarl and B. Elliott, Pers. Comm., 2012). Dawson Creek notes particular concerns about its potable water supply (J. Chute, Pers. Comm., 2012). Water and sewer lines also will need to be

replaced in Fort St. John (D. Hunter, Pers. Comm., 2012). The District of Chetwynd notes that growth would cause service capacity issues in the areas of water, sewer and treatment (D. Fleming, Pers. Comm., 2012).

The West Moberly First Nations reserve community has no education facilities and students commute to Moberly Lake or Chetwynd for classes (Treaty 8 First Nations Community Assessment Team and The Firelight Group Research Cooperative 2012). The community's on-reserve health centre provides limited health care services, including: infant immunizations (on a bi-monthly basis), a mental health counselor (on a weekly basis), a pre-natal nutrition program, a drug and alcohol prevention program, massage therapy, and an adult in-home support program. The Dakii Yadze Centre operates a licensed multi-age child care program, serving the needs of working parents, post-secondary parents, and other community members needing child care on a full time, part time, and drop in basis (West Moberly First Nations nd). West Moberly Kids Club provides school age group child care in Moberly Lake. The community has a strong demand for day care (Treaty 8 First Nations Community Assessment Team and The Firelight Group Research Cooperative 2012). Policing services are provided in the community through a co-operative on-reserve policing program established with the Chetwynd RCMP (PRCI 2010). The reserve community is in the Chetwynd ambulance area and the Moberly Lake First Services area. Fire protection services are provided through the Moberly Lake Volunteer Fire Department and the PRRD (PRCI 2010). Homes are serviced with heating, electricity and potable water. In 2007, the West Moberly First Nations community identified social issues associated with resource development, including gambling, substance abuse, an increasing socio-economic gap between youth and elders, and lack of activities for youth (Treaty 8 First Nations Community Assessment Team and The Firelight Group Research Cooperative 2012).

Saulteau First Nations' reserve community has no primary or secondary education facilities and students commute to Moberly Lake or Chetwynd for classes (WCCC 2007). The on-reserve Muskoti Learning Center provides adult educational upgrading, tutoring for elementary and secondary school students, and a computer lab and computer training. Health services provided by the Community Wellness Centre within the community include a diabetes program, a prenatal program, children's oral health, a foot clinic, HIV and AIDs programming and workshops, and tuberculosis programming. The community is also visited once or twice monthly (depending on demand) by a physiotherapist (Sunderman and Linos Gate Consulting Inc. 2013). Mental health and addictions counselling and outreach services, and health promotion and prevention are provided by the Tansi Friendship Centre Society, located in Chetwynd. Saulteau First Nations' members travel to Chetwynd and Fort St. John for regular and specialized care (Sunderman and Linos Gate Consulting Inc. 2013). Cree-ative Wonders Headstart provides multi-age child care on the reserve. The daycare is currently at capacity (Sunderman and Linos Gate Consulting Inc. 2013). Police services are provided by the Chetwynd detachment of the RCMP. The East Moberly reserve is in the Chetwynd ambulance area and the Moberly Lake First Services area. Fire protection services are provided through the Moberly Lake Volunteer Fire Department and the PRRD (PRCI 2010). Resourcing and staffing challenges limit emergency services effectiveness in serving new residents (Sunderman and Linos Gate Consulting Inc. 2013). Homes are serviced with heating, electricity and potable water.

15.5.3.3 Housing

Housing shortages are common across LSA communities. Table 15.5-1 presents housing characteristics for 2011. Vacancy rates for single detached homes and rental suites are close to zero. Consequently, housing and rental values have increased significantly over the last ten years. As a result of housing shortages and costs, workers often commute from neighboring communities, reside in work camps, rent movable dwellings, or stay in hotels. LSA communities are considering a variety of options to increase housing options, including rezoning land, selling undeveloped land to developers, and increasing the heights of new structures.

Table 15.5-1. Housing Characteristics of Local Study Area Communities, 2011

Community	No. of Private Dwellings	Private Dwellings Occupied by Usual Residents	% Occupancy	Avg. No. of Persons Per Household
District of Tumbler Ridge	1,510	1,158	76.7	2.3
City of Dawson Creek	5,406	4,859	89.8	2.3
District of Chetwynd	1,119	1,027	91.8	2.5
City of Fort St. John	8,238	7,480	90.8	2.5
West Moberly Lake 168 (WMFN)	47	36	76.5	n/a
East Moberly Lake 169 (SFN)	110	103	93.6	3.1
McLeod Lake IR 1 (MLIB)	45	42	93.3	1.8

Source: Statistics Canada (2012a, 2012b, 2012c, 2012d, 2012g, 2012h, 2012e)

An increase in housing costs in Chetwynd has resulted in some Aboriginal people in the LSA returning to the West Moberly Lake and East Moberly Lake reserves to share homes, in some cases leading to overcrowding (WCC 2007). A doubling of the housing stock since 2006, however, has partly alleviated overcrowding in the community (Treaty 8 First Nations Community Assessment Team and The Firelight Group Research Cooperative 2012). According to a survey conducted with Saulteau First Nations members in 2012 (Sunderman and Linos Gate Consulting Inc. 2013), a significant number of non-reserve respondents would be interested relocating to the reserve community if suitable housing was available. A majority of respondents indicated that their dwellings were in need of repairs.

15.5.3.4 Education and Skills

Educational attainment in LSA communities is lower than that for the province, but trades-related attainment is higher (Table 15.5-2). The emphasis on trades-related skills matches with the existing and growing need for skilled labour in the region. Nevertheless, regional shortages in skilled labour persist, as they do in the province as a whole (Ingenia Consulting 2012).

Table 15.5-2. Educational Characteristics of Local Study Area Communities, 2011

Community	Total Pop. Aged 25-64	No Certificate, Degree or Diploma (%)	Post-secondary Certificate, Diploma or Degree (%)	Apprenticeship or Trades Certificate or Diploma (%)
District of Tumbler Ridge	1,675	440 (26.3)	835 (49.8)	265 (15.8)
City of Dawson Creek	6,045	960 (15.9)	3,440 (56.9)	1,320 (21.8)
District of Chetwynd	1,460	220 (15.0)	815 (55.8)	260 (17.8)
City of Fort St. John	10,525	1,640 (15.6)	5,740 (54.5)	1,790 (17.0)
West Moberly Lake 168 (WMFN)	40	15 (37.5)	20 (50.0)	10 (25.0)
East Moberly Lake 169 (SFN)	165	90 (54.5)	55 (33.3)	20 (12.1)
McLeod Lake IR 1 (MLIB)	55	30 (54.5)	15 (27.2)	0
British Columbia	2,451,615	247,390 (10.1)	1,589,635 (64.8)	277,125 (11.3)

Source: Statistics Canada (2013a)

15.6 ESTABLISHING THE SCOPE OF THE SOCIAL EFFECTS ASSESSMENT

This section describes 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 social effects consisted of the following steps:

- *Step 1:* conducting a desk-based review of available scientific 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 field 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 VC; and
- *Step 5:* identifying key potential effects on VCs.

These steps are described in detail below.

15.6.1 Selecting Valued Components

Valued components are components of the natural and human environment that are considered to be of scientific, ecological, economic, social, cultural, or heritage importance (CEAA 2006; 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 dAIR 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.

Valued components were derived from a review of social issues related to the Project, as identified by the public, stakeholders, Aboriginal groups, and government agencies. Key issues were identified through review of the following materials:

- publically available reports, including environmental assessment applications for other BC mining projects and other projects in the vicinity of the Project;
- minutes from Project-related meetings with Aboriginal groups, stakeholders and government agencies, including BC EAO Working Group meetings;
- comments submitted during public and Aboriginal consultation periods or events (e.g., Open Houses);
- correspondence between the public, stakeholders, Aboriginal groups, government agencies, and the proponent;
- baseline interviews with stakeholders and government agencies;
- official documents (e.g., BC EAO Application Information Requirements and the CEA Agency EIS Guidelines); and
- media reports.

The public, Aboriginal groups, and local government note a number of concerns related to potential demographic changes associated with the Project. Unions and the McLeod Lake Indian Band express a concern that the importation of temporary foreign workers would restrict the availability of jobs for British Columbians and other Canadians (Information Session, McLeod Lake Indian Band Reserve, October 1, 2012). Language proficiency issues are identified as an issue of concern. Others suggest that ethnic tensions may become an issue if certain groups are favoured in hiring or if immigration is prevalent (L. Sabulsky, pers. comm., April 24, 2012). The District of Tumbler Ridge notes the need to encourage immigrant and migrant workforce – a predominantly transient population – to "become local" (B. Elliott and P. Hascarl, pers. comm., April 23, 2012).

During interviews, community representatives expressed concerns about the potential effects of Project-related population growth on community services, including medical services, emergency services, day care, education, and policing. Capacity issues with respect to medical services are common across the region (B. Powers and L. Selby, pers. comm., April 27, 2012), with difficulty in recruiting doctors and nurses (K. Bryan, pers. comm., April 23, 2012; D. Fleming, pers. comm., April 24, 2012), limited staff to deliver existing medical services (B. Schuerkamp, pers. comm., April 23, 2012), and limited health care services (S. Kenny, pers. comm., April 26, 2012). Emergency services and policing capacity is also identified as a vulnerability (G. Smith, pers. comm., April 25, 2012; D. Traichevich, pers. comm., April 25, 2012; K. Render, pers. comm., April 23, 2012; M. Treit, pers. comm., April 23, 2012), particularly in relation to transient populations, who are difficult to service in general (L. Sabulsky, pers. comm., April 24, 2012; K. Bryan, pers. comm., April 23, 2012). An anticipated influx of younger families into the region would also create demands for more child

care facilities (B. Elliott and P. Hascarl, pers. comm., April 23, 2012; K. Render, pers. comm., April 23, 2012; M. Treit, pers. comm., April 23, 2012; J. Chute, pers. comm., April 25, 2012; D. Hunter, pers. comm., April 27, 2012) and schools (R. Denis, pers. comm., April 25, 2012; B. Deinstadt, pers. comm., April 25, 2012).

Local governments, business associations, and the public express concerns that community infrastructure is not presently adequate to meet increasing demand. For example, while the District of Tumbler Ridge has a relatively robust infrastructure system that was built for high capacity (10,000 pop.), the replacement of sewer lines and electrical cables is projected (B. Elliott and P. Hascarl, pers. comm., April 23, 2012). Dawson Creek notes particular concerns about its potable water supply (J. Chute, Pers. Comm., 2012). Similarly, the City of Fort St. John notes that the replacement or renewal of city infrastructure is already a major issue; for example, water and sewer systems are near capacity (D. Hunter, Pers. Comm., 2012). The District of Chetwynd notes that growth would cause service capacity issues in the areas of water, sewer and treatment (D. Fleming, Pers. Comm., 2012). Some communities are already experiencing increased demand on community infrastructure due to population growth, as in Dawson Creek.

Local governments are particularly concerned about potential impacts that new resource projects may have on housing. Adequate and affordable housing is an issue across the region (F. Banham, pers. comm., April 25, 2012; S. Lemmon, pers. comm., April 27, 2012). Economic development, and associated increases in personal income, drives up housing rental rates. This results in hardship to low-income families (K. Bryan, pers. comm., April 23, 2012; K. Connelly and K. Cook, pers. comm., April 25, 2012). Moreover, community representatives in Tumbler Ridge, Chetwynd, Dawson Creek, and Fort St. John all express concerns regarding limited housing and rental availability coupled with high numbers of transient workers (B. Elliott and P. Hascarl, pers. comm., April 23, 2012; E. Davis, pers. comm., April 24, 2012; D. Fleming, pers. comm., April 24, 2012; J. Chute, pers. comm, April 25, 2012; Kenny, pers. comm., April 26, 2012; D. Traichevich, pers. comm., April 25, 2012; K. Connelly and K. Cook, pers. comm., April 25, 2012; D. Hunter, pers. comm., April 27, 2012). Tumbler Ridge community members have also expressed a concern about potential Project effects on housing (Open House, Tumbler Ridge, November 24, 2012). Occupancy rates are highest in the Saulteau First Nations reserve, the McLeod Lake Indian Band reserve, Chetwynd, and Fort St. John.

Communities recognize that in order to attain the full value of employment opportunities, regional communities require skilled workers eligible for required positions. However, the region has a shortage of skilled labour (J. Chute, pers. comm., April 25, 2012; NRWT 2012). The District of Chetwynd notes that skills required for employment in the area's primary economic activities (e.g., coal, oil and gas, and wind power) are not endogenous to the community but are imported via economic migration. Similarly, the City of Dawson Creek notes that it is difficult to find highly skilled labour (J. Chute, pers. comm., April 25, 2012). Moreover, according to Community Futures, trades people that live in the communities are already fully employed (S. Kenny, pers. comm., April 26, 2012). Consequently, there is a need for training in all industries (E. Davis, pers. comm., April 24, 2012). However, as the North Peace Economic Development Commission notes, education and training deficits exist in the region (S. Lemmon, pers. comm., April 27, 2012). UNBC notes that education levels are lower in the Peace Region than elsewhere and that there is a need to develop programs to retrain mine and oil and gas industry workers (B. Powers and L. Selby, pers. comm.,

April 27, 2012). Community members of the McLeod Lake Indian Band expressed an interest in training opportunities with the proposed Project (Open House, McLeod Lake Indian Band reserve, October 1, 2012). Saulteau First Nations also expressed an interest in training opportunities (EAO WG Meeting, Oct 2, 2012; SFN, December 18, 2012).

During community interviews, A number of individuals noted that a new mine could create a number of indirect effects on social integration and social problems. Interviewees suggest that the Project may induce issues for social integration, with culturally distinct transient populations failing to integrate socially (K. Connelly and K. Cook, pers. comm., April 25, 2012), culturally (Information Session, McLeod Lake Indian Band, October 1, 2012), and economically (B. Elliott and P. Hascarl, pers. comm., April 23, 2012; Zwambag 2011). For example, School District 59 notes that there will be a need to ensure that children of an immigrant workforce will not be ostracized at school (R. Dennis, pers. comm., April 25, 2012). Service providers and community leaders also express concerns that a number of social problems could arise in connection with Project employment, including the potential for resurgence in drug and alcohol issues due to higher incomes (B. Elliott and P. Hascarl, pers. comm., April 23, 2012; B. Schuerkamp, pers. comm., April 23, 2012). It could also increase certain types of crime, including impaired driving, domestic violence, mischief, and organized crime (K. Render, pers. comm., April 23, 2012).

West Moberly First Nations, Saulteau First Nations, and the McLeod Lake Indian Band, as vulnerable groups, are particularly sensitive to the issues described above. In addition, West Moberly First Nations and Saulteau First Nations identify Aboriginal-specific social issues. Dane-zaa peoples, including West Moberly First Nations, identify a number of social values that have the potential to be affected by environmental changes associated with resource extraction, including (Treaty 8 First Nations Community Assessment Team and The Firelight Group Research Cooperative 2012):

- traditional values, knowledge and skills;
- family strength and amount of time spent together on the land;
- community cohesion through ceremony; and
- reciprocity and sharing of benefits.

Saulteau First Nations have identified key social interests in land use, community infrastructure and services, economic activities, and community health in relation to resource extraction activities (Sunderman and Linos Gate Consulting Inc. 2013). In the *Saulteau First Nations Gap Analysis of HD Mining International Ltd. Murray River Coal Project Country Foods and Socio-Economic Baseline Reports*, Saulteau First Nations' socio-economic consultant emphasized that the socio-economic lived experience of Aboriginal and non-Aboriginal people are fundamentally different and that potential effects on Aboriginal health and well-being need to be assessed from different perspectives (McDonal and Stoner 2014). As an example, Saulteau First Nations identify the importance of cultural and spiritual uses of their traditional land use area (Sunderman and Linos Gate Consulting Inc. 2013).

All land use-related social issues identified above are addressed in Chapter 17 (Assessment of Current Use of Lands and Resources for Traditional Purposes Effects).

15.6.1.1 Summary of Valued Components Selected for Assessment

For the purposes of the assessment, the above issues were operationalized into VCs on the basis of:

- review of relevant social-scientific literature;
- review of recent BC EA applications for proposed mining projects;
- guidance from the BC EAO AIR and CEA Agency EIS Guidelines; and
- professional judgement.

The VCs identified in Table 15.6-1 were included in the assessment.

Table 15.6-1. Valued Components Included in the Social Effects Assessment

Valued Components	Identified by*			Rationale for Inclusion
	AG	G	P/S	
Health Care Services		✓	✓	Project-induced population growth could increase demand on health care services
Emergency Services		✓	✓	Project-induced population growth could increase demand on emergency services
Educational Services		✓	✓	Project-induced population growth could increase demand on educational services
Child Care services		✓		Project-induced population growth and employment could increase reduce access to childcare
Community infrastructure		✓	✓	Project-induced population growth could increase demand on community infrastructure
Housing		✓	✓	Project-induced population growth could increase demand on housing
Crime and Other Social Problems	✓	✓	✓	Project-related income could exacerbate alcohol and substance abuse, crime, and other social problems
Social Integration	✓		✓	Project-induced demographic change could affect social integration

**AG = Aboriginal Group; G = Government; P/S = Public/Stakeholder*

The list of VCs presented in Table 15.6-1 varies from the VCs provided in the AIR (Section 7.1.2) and in the EIS Guidelines (Section 9.1.3). Land use-related VCs listed in the AIR, including "commercial land use," "non-commercial land use," and "aesthetics" are addressed in Chapter 16 (Assessment of Non-traditional Land Use Effects). Land use-related VCs listed in the EIS Guidelines, including "land use context," and VCs related to navigation are also addressed in Chapter 16. The preliminary VC "community demographics," as listed in the AIR, is excluded from the assessment as it is considered to be a driver of changes to other VCs, rather than an end-point VC itself and is considered as part of the assessment of potential effects to community services, social integration and social problems. The social VC "community wellbeing," as listed in the AIR, is excluded from

the assessment as the category is deemed to be too broad to enable meaningful assessment[1]. The VCs "social integration" and "social problems" are added as specific topics in place of "community wellbeing." The preliminary VC "Education, Skills and Training" is excluded from the analysis as it refers to a benefit of the Project and is addressed in Chapter 1 (Introduction). The VC "housing" is added, as it was identified as a topic of concern by communities. Issues related to Aboriginal groups' cultural, ceremonial, and spiritual land uses; traditional knowledge; cultural transmission; and sharing and reciprocity are addressed in Chapter 17 (Current Use of Lands and Resources for Traditional Purposes) and Chapter 20 (Aboriginal and Treaty Rights and Related Resources Assessment).

Valued Components excluded from the analysis, and the rationale for their exclusion, are presented in Table 15.6-2.

Table 15.6-2. Valued Components Excluded from the Social Effects Assessment

Valued Components	Identified by*			Rationale for Exclusion
	AG	G	P/S	
Commercial land use		✓		Assessed in Chapter 16
Non-commercial land use		✓		Assessed in Chapter 16
Aesthetics	✓			Assessed in Chapter 16
Community demographics		✓		Considered as a driver rather than as an effect
Education and skills		✓		Addressed in Chapter 1
Community wellbeing		✓		Too broad to enable meaningful assessment

**AG = Aboriginal Group; G = Government; P/S = Public/Stakeholder*

15.6.2 Selecting Assessment Boundaries

15.6.2.1 Spatial Boundaries

Local Study Area

The Local Study Area for the effects assessment includes communities in the vicinity of the Project that are likely to experience Project-related effects to social VCs within their boundaries. Communities expected to experience population growth as a result of Project employment effects are the most likely to experience Project-related social effects. Tumbler Ridge is likely to experience social effects as it will house Project employees. Chetwynd is within commuting distance to the Project, so may also experience local effects.

Dawson Creek and Fort St. John are excluded from the LSA. While these communities may experience a degree of population growth due to indirect and induced employment, this growth is expected to be a small percentage of their existing population.

[1] For example, Employment and Social Development Canada list the following indicators of well-being: work, housing, family life, social participation, leisure, health, security, environment, financial security, and learning. See http://www4.hrsdc.gc.ca/h.4m.2@-eng.jsp

West Moberly First Nations and Saulteau First Nations communities are also within commuting distance to the Project, and also rely on Chetwynd for social services. Consequently, these two Aboriginal communities are included in the LSA.

Aboriginal groups other than West Moberly First Nations and Saulteau First Nation are excluded from the LSA as they are located too far away from the Project to experience employment effects and related population effects.

The list of LSA communities includes (Figure 15.6-1):

- District of Tumbler Ridge;
- District of Chetwynd;
- West Moberly First Nations; and
- Saulteau First Nations.

Regional Study Area

Some Project-related social effects may be experienced on a regional scale. Regional-scale effects arise when (1) several communities experience similar effects within their boundaries and those effects can be aggregated to a regional level, (2) the source of a social effect is located outside of particular communities, but it affects them equally, and/or (3) the effect is experienced by a regional body responsible for a number of communities within the region.

As different types of regional data are collected at different regional scales, several Regional Study Areas (RSAs) are defined, depending on the particular VC being assessed. RSAs used in the following assessment include (Figure 15.6-1):

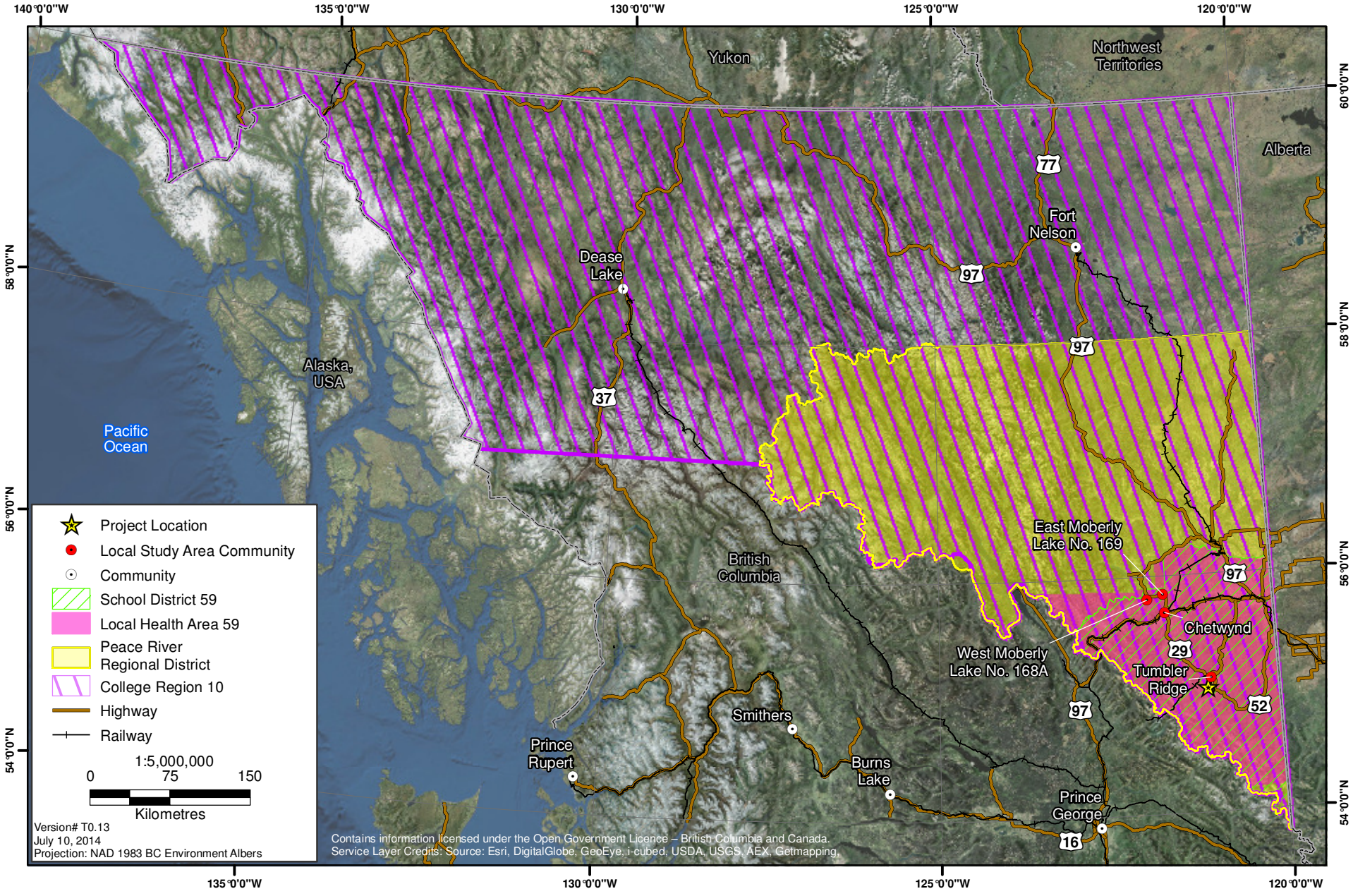
- College Region 10 (Northern Lights);
- School District 59 (Peace River South);
- Local Health Area 59 (Peace River South); and
- Peace River Regional District.

15.6.2.2 Temporal Boundaries

The Project's interaction with the social VCs will vary depending on the stage in the mine lifecycle; as such social effects of the Project will be examined over all four stages of mine life:

- **Construction Phase**: 3 years;
- **Operation Phase**: 25 years;
- **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).

Figure 15.6-1
Social Effects Assessment Study Areas



15.6.2.3 Administrative Boundaries

As noted in Section 15.6.2.1, the RSAs for the effects assessment match with the administrative boundaries, including: College Region 10 (Northern Lights) and School District 59 (Peace River South) for educational services; Local Health Area 59 (Peace River South) for health care services; and the PRRD for all other VCs.

15.6.2.4 Technical Boundaries

Technical boundaries refer to technical limitations on the ability to assess, evaluate, and/or monitor potential environmental effects. Technical boundaries may be related to current state-of-the-art for the prediction and measurement of effects (Beanlands and Duinker 1983) and/or to data availability and quality. In general, social VCs are difficult to assess in a predictive fashion due to the complex and variable nature of social systems. This is especially true for social VCs for which there is little available information, such as social integration. Ideally, social VCs would be assessed through a longitudinal research design involving surveys, focus groups, and qualitative interviews administered at different points in time. Time and resource constraints prevented such a research program in this case. In addition, data collection with Aboriginal groups can be a challenge due to capacity issues and Aboriginal communities' willingness to participate in studies.

15.6.3 Identifying Potential Social Effects

Potential social effects resulting from the Project are identified in Table 15.6-3.

Population growth and demographic changes associated with workforce hiring during construction and operations could increase public demand on community services, thereby decreasing public access to community services and decreasing the quality of community services rendered. Several LSA communities' services are near or at capacity; consequently, Project-related population growth has the potential to result in significant adverse effects to LSA community services. Tumbler Ridge has the potential to experience moderate effects as Project employees will be housed there and the Proponent has constructed housing in the community. Chetwynd is within commuting distance of the Project and may experience population growth associated with indirect and induced economic effects (see Chapter 14: Assessment of Economic Effects). West Moberly First Nations and Saulteau First Nations are within commuting distance of the Project and may experience population growth from members returning to the reserves to work on the Project. Transportation of workers to and from the site could moderately increase risk of traffic accidents and, consequently, demands on emergency services, both for first responders in LSA communities and the BC Ambulance Service, an RSA service. No effects are likely during decommissioning and post-closure, as the Project workforce will decrease substantially at this time.

Population growth resulting from workforce hiring during construction and operations could increase the utilization of community infrastructure, resulting in strained water supply and treatment, inadequate liquid and solid waste collection and treatment, and increased traffic delays, collisions and road wear. The town of Tumbler Ridge was originally constructed to service a population of 10,000 people. With a current population of approximately 2,710 (Stats Can 2012), the town's infrastructure can handle a significant increase in demand. Consequently, Tumbler Ridge's infrastructure is not expected to experience significant effects from the Project.

Table 15.6-3. Ranking Potential Social Effects

Project Activities		Potential Social Effects									
		Decreased Access to Services	Decreased Quality of Services	Increased Demand on Service Providers	Exceedance of Infrastructure Capacity	Increased Wear on Infrastructure	Decreased Access to Housing	Increased Housing Costs	Decreased Housing Quality	Decreased Social Integration	Increased Social Problems
Construction	**Traffic and Transportation**										
	Transportation of materials to and from site	L	L	M	L	L	L	L	L	L	L
	Shuttling workforce to and from site	L	L	M	L	L	L	L	L	L	L
	Workforce and Administration										
	Hiring and management of workforce	M	M	M	L	L	L	L	L	M	M
	Onsite work activities	L	L	M	L	L	L	L	L	L	L
Operation	**Heavy Machinery, Traffic, and Transportation**										
	Shuttling workforce to and from site	L	L	M	L	L	L	L	L	L	L
	Transportation of materials to and from site	L	L	M	L	L	L	L	L	L	L
	Workforce and Administration										
	Hiring and management of workforce	M	M	M	L	L	L	L	L	M	M
	Onsite work activities	L	L	M	L	L	L	L	L	L	L
Decommissioning and Reclamation	**Heavy Machinery, Traffic, and Transportation**										
	Shuttling workforce to and from site	L	L	L	L	L	L	L	L	L	L
	Transportation of materials to and from site	L	L	L	L	L	L	L	L	L	L
	Workforce and Administration										
	Hiring and management of workforce	L	L	L	L	L	L	L	L	L	L
	Onsite work activities	L	L	L	L	L	L	L	L	L	L
Post Closure	**Traffic and Transportation**										
	Shuttling workforce to and from site	L	L	L	L	L	L	L	L	L	L
	Hiring and Management of Workforce										
	Hiring and management of workforce	L	L	L	L	L	L	L	L	L	L
	Onsite work activities	L	L	L	L	L	L	L	L	L	L

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.*

Infrastructure in Chetwynd is closer to capacity (particularly for water treatment). However, it is unlikely that Chetwynd will experience a significant incremental effect on infrastructure as population growth in is expected to be relatively small. Constrained infrastructure capacity on West Moberly First Nations and Saulteau First Nations communities has not been identified. According to the BC Ministry of Transportation and Infrastructure (BC MOTI) Service Plan for 2013/2014, $20 million will be invested in the next two fiscal years in rehabilitating the existing public road infrastructure in the Northeast region of the province. Consequently, infrastructure effects at the RSA level are unlikely.

Population growth resulting from workforce hiring during construction and operations could increase demand on market and rental housing, potentially resulting in decreased access to housing, increased housing and rental costs and crowding in non-Aboriginal LSA communities. Tumbler Ridge currently has a limited housing and rental supply and is likely to experience an influx of workers for the Project. In response, the Proponent constructed permanent employee housing into the community. Consequently, direct housing effects will not occur in Tumbler Ridge. Population growth due to the indirect and induced economic effects of the Project could increase housing demand in Tumbler Ridge and Chetwynd. However, due to the relatively small population growth associated with indirect and induced economic effects, any effect to the housing market is expected to be negligible. Direct employment may prompt some West Moberly First Nations and Saulteau First Nations members to return to live in their communities and commute to work. However, the incremental increase on housing demand will likely be low given the small number of members employed by the Project who return to live in their communities. Demographic changes resulting from workforce hiring during construction and operations could affect social integration in non-Aboriginal LSA communities, particularly with respect to temporary foreign workers. Given the location of employee housing in Tumbler Ridge and the community's current demographic structure, Tumbler Ridge has the potential to experience moderate effects related to social integration. No effects are likely during decommissioning and post-closure, as the Project workforce will decrease substantially at this time.

Increased personal income resulting from workforce hiring during construction and operations, as well as indirect and induced employment, could exacerbate existing social problems. Alcohol abuse, drug abuse, prostitution, domestic violence and criminal mischief may all increase. Given the scale of population growth and income growth expected in Tumbler Ridge, the community could experience moderate effects. West Moberly First Nations and Saulteau First Nations could experience moderate effects. Chetwynd could experience minor effects, given the smaller amount of employment expected there. Effects are not expected to aggregate to the RSA level. No effects are likely during decommissioning and post-closure, as Project workforce will decrease substantially at this time.

15.6.3.1 Summary of Potential Social Effects to be Assessed

The Project is not expected to produce any major significant adverse effects, as can be seen in Table 15.6-3. Several interactions are expected to result in potential moderate adverse effects (interactions marked with a yellow 'M'); these interactions will be brought forward for further consideration. Interactions marked with a green 'L' will not be discussed further, except to identify

standard operating practices and mitigation measures that are well known and understood and will be used to address these minor concerns.

Potential social effects that will be considered in Section 15.7 below include:

- potential decreased access to health care services;
- potential decreased quality of health care services;
- potential decreased access to emergency services;
- potential decreased quality of emergency services;
- potential decreased access to educational services;
- potential decreased quality of educational services;
- potential decreased access to childcare services;
- potential decreased quality of childcare services;
- potential decreased access to housing;
- potential increased crowding;
- potential increased crime and other social problems; and
- potential decreased social integration.

15.7 SOCIAL EFFECTS ASSESSMENT AND MITIGATION

Project-created effects were assessed through a stepwise procedure. First, indicators for each VC were selected on the basis of data availability, ease of prediction, and presence of standards or benchmarks. Second, baseline conditions were determined for each indicator. Third, changes resulting from interactions with Project components were predicted for each indicator. Fourth, post-interaction indicator values were compared against baseline indicator values to evaluate the effect of the Project component on the VC (trends were taken into account to adjust for the temporal boundaries of the Project). Fifth, post-interaction values were compared against benchmarks (where available) to evaluate the importance of predicted changes.

As many of the effects assessed below depend on changes to local population levels, population effects are described here before presentation of the main social effects assessment. Economic modelling undertaken for the Proponent predicts that the Project will create 687 person years of total employment (direct, indirect, and induced) in the PRRD during construction and 17,811person years of total employment (direct, indirect, and induced) in the PRRD during operation (Appendix 14-B).

The Proponent requires specially trained overseas workers to operate the longwall mining equipment and manage the mining operations. This requirement will decrease as local Canadians become trained with the necessary skills to operate the longwall mining equipment. The Proponent is working with Northern Lights College to develop a training curriculum for the Canadian workforce. Overall, it is expected that the import content of employment after 2027 will be low at approximately 3% of total direct employment.

The 2011 National Household Survey finds that the PRRD has a low unemployment rate of 6.4% (Statistics Canada 2013b). However, recent closures of three mining operations have increased the number of people available for work in the PRRD. Skills required for indirect employment (e.g., transportation and warehousing) are well represented in the PRRD, as are skills required for induced employment (e.g., retail trade). Consequently, a significant portion of indirect and induced employment is likely to be filled by PRRD residents, with the remainder to be filled by in-migrants. While the PRRD includes some workers with skill sets required for direct employment, including construction and the surface components of the project, this is not the case for the underground mine skill set, as there is only one other underground coal mine in BC, no long wall mining operations in Canada, and no coal mines operating at depths of over 500 metres.

Given the fact that significant Project-related employment positions that will be available to PRRD residents, and that through training the proportion of local to overseas workers will increase over time, the Project is not expected to result in substantial population growth in the PRRD. Moreover, residents of other PRRD locations are not likely to relocate to Tumbler Ridge and Chetwynd, as available positions will likely be met by demand by workers in Tumbler Ridge and Chetwynd who have been affected by recent mine closures.

15.7.1 Key Effects on Health Care Services

15.7.1.1 Decreased Access to Health Care Services

Population growth resulting from direct, indirect and induced Project-related employment has the potential to increase health care services demand in the LSA and RSA. Increased demand has the potential to decrease community members' access to health care services, depending on the current and predicted future capacity of health care services to absorb increased demand. Access to health care can be measured as the percentage of the population with a regular health care provider (Canadian Institute for Health Information 2013).

Project-related population growth is predicted to be relatively low in the PRRD, with the majority of population change expected in Tumbler Ridge and Chetwynd. Some population growth may occur in West Moberly First Nations' and Saulteau First Nations' respective reserve communities. As noted in Section 15.5, LSA communities currently have little to no capacity to absorb increased demand in the health care sector. Consequently, the percentage of the population in LSA communities who have a regular health care provider is expected to decrease by an amount commensurate with the expected population change, everything else being equal.

15.7.1.2 Decreased Quality of Health Care Services

Population growth resulting from direct, indirect and induced Project-related employment would increase health care services demand in the LSA and RSA. Increased demand has the potential to increase health care practitioner workloads, depending on current practitioner workload, expected future workload, and the ability of health care facilities to recruit additional personnel. Increased practitioner workload has the potential to decrease the quality of health care services rendered, due to the relationship between practitioner workload and health care outcomes (Kapinos 2012). The quality of health care services can be measured by readmission rate (McHugh 2013).

Project-related population growth is predicted to be relatively low in the PRRD, with the majority of population change expected in Tumbler Ridge and Chetwynd. Some population growth may occur in West Moberly First Nations' and Saulteau First Nations' respective reserve communities. As noted in Section 15.5, LSA communities currently have little to no capacity to absorb increased demand. Consequently, the workload of existing health care practitioners is expected to increase to an extent commensurate with population growth. The readmission rate of patients is expected to increase as a result, everything else being equal.

15.7.2 Mitigation Measures for Health Care Services

LSA communities are aware of health care shortages and expected population growth and are actively recruiting new personnel. The government of BC, together with the Doctors of BC, have launched an initiative called "A GP for Me" that has the goal of providing all British Columbians who want one with access to a family doctor. Supports will include helping doctors to increase the efficiency of their practices and improve capacity so that they will be able to accept more patients into their practice (Doctors of BC 2014). The BC Ministry of Health's service plan (BC Ministry of Health 2014) includes a number of actions relevant to health care capacity, including plans to:

- implement a system of inter-professional health teams at the community level, improving access to primary health care across the province;
- work with rural communities, including First Nations, to implement a renewed approach to providing quality health services across rural and remote areas;
- explore opportunities to use hospitals more effectively, including shifting to community based delivery of services where appropriate and using outpatient clinics; and
- develop and implement an integrated provincial workforce strategy to ensure British Columbia has the required supply of health care providers.

The Proponent will work with local, Aboriginal, and provincial health care providers to provide relevant information about expected Project-related population changes. Workers will receive an employment benefits package that includes Workers' Compensation Board, Accidental Death and Dismemberment, Canadian Pension Plan, Employment Insurance, Long-Term Disability, and Medical Services Plan. In addition, the Proponent will provide temporary foreign workers with English language training and provide new workers with a local information package about the health services that are available to them.

15.7.3 Key Effects on Emergency Services

15.7.3.1 Decreased Ability to Respond to Fire Emergencies

Population growth resulting from direct, indirect and induced Project-related employment, as well as new housing in Tumbler Ridge, has the potential to increase the risk of fire in LSA communities. This is due to the established relationship community growth and fire risk (International Organization for Standardization 2004). Increased fire risk, in turn, could increase the risk of damage to people and property, depending on the capacity of fire services to prevent and suppress fires in LSA communities. In addition, Project activities and infrastructure has the potential to increase the risk of fire at the Project site, which is within the District of Tumbler Ridge's municipal boundaries.

Fire department performance can be measured against response time standards contained in NFPA 1710 (NFPA2010).

Project-related population growth is predicted to be relatively low in the PRRD, with the majority of population change expected in Tumbler Ridge and Chetwynd. Some population growth may occur in West Moberly First Nations' and Saulteau First Nations' respective reserve communities. The Tumbler Ridge Fire Department is well equipped with emergency and fire protection vehicles (M. Treit, pers. comm. 2012; DTR 2009, n.d.). The Chetwynd Fire Department is well equipped with modern fire-fighting equipment including a pumper truck, a ladder truck, an initial response vehicle, and a rescue vehicle (Chetwynd 2012, n.d.). Consequently, despite increased Project-related fire risk in LSA communities, local fire departments will likely be able to adapt to increasing demands and any increase to response time will likely be negligible. No further mitigation measures are required.

15.7.3.2 Decreased Quality of Ambulance Services

The Project will have an industrial ambulance and two Level-3 first aid attendants on the Project site. Accordingly, direct Project-related demand on the BC Ambulance Service is expected to be minimal.

Population growth resulting from direct, indirect and induced Project-related employment, as well as the potential for traffic accidents during travel to and from the Project work site has the potential to increase demands on ambulance services in the RSA during construction and operations. In addition, recruitment of health services personnel by the Proponent could exacerbate staffing shortages. Increasing demands on ambulance services, in turn could reduce the timeliness with which ambulances can attend a scene, a critical consideration in a medical emergency (Pell et al. 2001).

The BC Ambulance Services has staffing shortages in the Northern Health Region. Given the increased demand on ambulance services expected as a result of the Project and the BC Ambulance Service's capacity constraints, the Project could result in increased ambulance response time in the RSA during construction and operations.

15.7.4 Mitigation Measures for Emergency Services

The Proponent will also hire adequate emergency response personnel, as required by the *Health, Safety and Reclamation Code for Mines in BC,* while seeking to avoid direct labour competition with the BC Ambulance Service. The Proponent will work with the BC Ambulance Service and provide it with information regarding population estimates and site activities, so that the service can incorporate the projected population and Project activities into their planning and budgeting process.

15.7.5 Key Effects on Educational Services

15.7.5.1 Reduced Access to Educational Services

Population growth resulting from direct, indirect and induced Project-related employment has the potential to increase demand for K-12 and post-secondary education in the LSA and RSA. Increased demand has the potential to decrease community members' access to educational services, depending on the current and predicted future capacity of educational services to absorb increased

demand. Access to education can be measured as the ratio of school age children to available student spaces, in the case of K-12 educational facilities, and the acceptance rate, in the case of post-secondary institutions.

Enrollment in public schools has recently declined in School District 59 (Stoldalka 2013), mirroring a provincial trend in school enrollment away from public schools toward independent facilities. The Project is unlikely to increase the number of school age children during the construction period and the first several years of operations, as most workers will be temporary foreign workers who will live in the communities without their families. Given the recently increased public school capacity, and the expected small magnitude of any increased demand, any change in the ratio of school age children to available student spaces in LSA communities is likely to be negligible.

15.7.5.2 Reduced Quality of Educational Services

Population growth resulting from direct, indirect and induced Project-related employment has the potential to increase demand on K-12 educational facilities in the LSA. Increased demand has the potential to increase class sizes which, in turn, is inversely related to the quality of education (Whitehurst and Chingos 2011). The Ministry of Education uses a number of measures to assess educational quality, including, for example, completion rate and national and international assessments (BC Ministry of Education 2014).

As noted in Section 15.7.5.1, enrollment in public schools has recently declined in School District 59. The Project is unlikely to increase the number of school age children during the construction period and the first several years of operations, as most workers during this time will be temporary foreign workers who will live in the communities without their families. Given the recently increased public school capacity, and the expected small magnitude of any increased demand, any effects of the Project on school completion rates and national and international assessments is likely to be negligible.

15.7.6 Mitigation Measures for Educational Services

As effects of the Project on education are expected to be negligible, no specific mitigation measures are required.

15.7.7 Key Effects on Child Care Services

15.7.7.1 Decreased Access to Child Care Services

Direct, indirect and induced Project-related employment and related population growth during construction and operations has the potential to increase demand for child care services in LSA communities. Increased demand has the potential to decrease community members' access to child care services, depending on the current and predicted future capacity of child care services to absorb increased demand. Access to child care services can be measured by the ratio of child care-aged children to child care spaces.

Project-related population growth is predicted to be relatively low in the PRRD, with the majority of population change expected in Tumbler Ridge and Chetwynd. Some population growth may occur in West Moberly First Nations' and Saulteau First Nations' respective reserve communities.

The Tumbler Ridge District Council identified a lack of daycare spaces in 2011 and the issue has not yet been resolved. Chetwynd has pre-school and multi-age child care services at the Kici-Awasimsak Child & Family Development Centre (maximum capacity 28), Little Bear Daycare (maximum capacity 7), and Little Lights Daycare (maximum capacity 20). The Chetwynd campus of Northern Lights College also provides daycare facilities to full time students with a limited number of spaces available to the general public (Northern Lights College 2014). West Moberly First Nations and Saulteau First Nations both have limited capacity in their on-reserve childcare facilities.

Given employment and population projections, together with current and future childcare capacity in LSA communities, the Project is likely to increase the ratio of child care-aged children to child care spaces in LSA communities during construction and operations. As a result, LSA community members would experience decreased access to child care, everything else being equal.

15.7.7.2 Decreased Quality of Child Care Services

Direct, indirect and induced Project-related employment and related population growth has the potential to increase demand for child care facilities in the LSA. Increased demand has the potential to increase the child care group size and decrease the child to adult ratio, both of which, in turn, are inversely related to child care quality (Huntsman 2008).

Project-related population growth is predicted to be relatively low in the PRRD, with the majority of population change expected in Tumbler Ridge and Chetwynd. Some population growth may occur in West Moberly First Nations' and Saulteau First Nations' respective reserve communities. The Tumbler Ridge District Council identified a lack of daycare spaces in 2011 and the issue has not yet been resolved. Chetwynd has pre-school and multi-age child care services at the Kici-Awasimsak Child & Family Development Centre (maximum capacity 28), Little Bear Daycare (maximum capacity 7), and Little Lights Daycare (maximum capacity 20). The Chetwynd campus of Northern Lights College also provides daycare facilities to full time students with a limited number of spaces available to the general public (Northern Lights College 2014). West Moberly First Nations and Saulteau First Nations both have limited capacity in their on-reserve childcare facilities.

Given employment and population projections, together with current and future childcare capacity in LSA communities, the Project is likely to increase child care group size and decrease the child to adult ratio in LSA communities. Consequently, the Project is likely to decrease the quality of child care in LSA communities, everything else being equal.

15.7.8 Mitigation Measures for Child Care

The District of Tumbler Ridge held a series of meetings about daycare issues in 2011 (District of Tumbler Ridge 2011). The Tumbler Ridge Family Needs Task Force assumed responsibility to address daycare spaces in the community in 2012. The Proponent will share information about its projected workforce needs with elected officials and childcare service providers in order to help them plan for future increased demand.

15.7.9 Key Effects on Crime and Other Social Problems

15.7.9.1 Increased Crime and Other Social Problems

Population growth and increased personal income resulting from direct, indirect and induced Project-related employment, the relationship between resource development and crime (Ruddel 2011, 2014), and the increased demands on local law enforcement have the potential to increase crime and other social problems in LSA communities and in the RSA. Crimes and other social problems that are likely to increase include impaired driving, legal and illegal substance abuse, domestic violence, mischief, and organized crime (Angell, Parkins, and MacKendrick 2006; Ruddel 2014; National Coalitation Against Domestic Violence n.d.; World Heatlh Organization n.d.) (K. Render, pers. comm.). The incidence of crime can be measured by the number of reported crimes and case clearance rate (Royal Canadian Mounted Police 2013).

Project-related population growth is predicted to be relatively low in the PRRD, with the majority of population change expected in Tumbler Ridge and Chetwynd. Some population growth may occur in West Moberly First Nations' and Saulteau First Nations' respective reserve communities. Personal income is expected to increase by $37.30 in the PRRD during construction and by $1,207.4 during Operation (Appendix 14-B). As noted in Section 15.5.3, the Tumbler Ridge RCMP detachment is currently at capacity. Given these factors, the number of reported crimes is likely to increase in LSA communities and the RSA and the clearance rate is likely to decrease in Tumbler Ridge, everything else being equal.

15.7.10 Mitigation Measures for Crime and Other Social Problems

The BC Ministry of Justice, Community Safety and Crime Prevention Branch is currently developing a provincial crime prevention strategy (BC Ministry of Justice 2013). Action Item #8 of the British Columbia Policing and Community Safety Plan states:

> *In support of enhancing community safety, the Ministry of Justice will work with stakeholders to develop strategies to: a) support crime prevention efforts; b) support province-led crime reduction initiatives; and c) support further development of civil/administrative law strategies to enhance community safety.*

The District of Tumbler Ridge OCP lists the following objective with respect to crime: "15.2.4 Continue to provide a high level of protective services (fire and police) in the community" (District of Tumbler Ridge 2012).

The Proponent will work with the District of Tumbler Ridge, the District of Chetwynd and service providers to support their efforts to anticipate and address crime and other social problems. The Proponent will also work with the Ministry of Justice, as appropriate, in implementing the British Columbia Policing and Community Safety Plan to help prevent and reduce crime in communities that have the potential to be affected by the Project. Specifically, the Proponent will supply information about expected workforce, as well as indirect and induced employment resulting from the Project. In addition, the Proponent will implement strict company policies to

restrict illegal activities on the work site and HD Workers will be required to comply with the company's Alcohol and Drug Policy and be subject to testing.

15.7.11 Key Effects on Social Integration

15.7.11.1 Decreased Social Integration

Demographic changes resulting from direct Project employment during construction and operations could change overall levels of social integration in Tumbler Ridge. Social integration refers to the degree of individual and group participation in social networks, from informal networks of friend and neighbours to membership in formal organizations (Kymlicka 2010). Social integration benefits individuals by providing social support and access to socially-embedded resources, which partially determine other life outcomes, such as health (Seeman 2006). Social integration also confers benefits at the community level, such as reducing crime rates (Buoanno, Montolio, and Vanin 2009). Immigration of ethnic minority groups can pose challenges for integration with respect to both immigrants and the host community (Soroka, Johnston, and Banting 2007). For example, immigrants to Canada tend to have smaller social networks which are utilized less frequently and less effectively than non-immigrants (Kazemipur 2004). Alternatively, demographic changes require communities to reconstitute social cohesion around new and varied points of common bonding (Galabuzi and Teelucksingh 2010).

The visible minority population in Tumbler Ridge currently comprises approximately 1.6% of the population (Stats Can 2013c). This proportion will increase when temporary foreign workers (TFWs) are hired for the underground component of the underground mine development.[2] The first year of Operation will provide an estimated 270 jobs for Canadian workers (see Table 1.7-3 in Chapter 1: Introduction). 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 (see Table 1.7-3 in Chapter 1: Introduction). The TFWs will be housed in the Monkman Commons complex (newly built by the Proponent). The Tumbler Ridge community has demonstrated a welcoming attitude toward the TFWs and the TFWs working on the bulk sample have participated in community events and in activities at the local recreation centre. The Proponent is committed to working with the community on the transition of the underground mine skill set to Canadians as well as the continued community integration of the required TFWs during that transition period.

Technical boundaries prevented the Proponent's socio-economic from collecting information on current levels of social integration in Tumbler Ridge, so there is no baseline from which to predict expected effects.

[2] There are currently no Canadian workers who possess specialized the skills required for long-wall mining. Consequently, temporary foreign workers who have the requisite experience will be sourced from China to fill jobs for the underground component of the Project.

15.7.12 Mitigation Measures for Social Integration

The Proponent will provide TFWs with English language training. In addition, the Proponent will provide new TFWs with an information package about Tumbler Ridge and the surrounding region that will include information about community services, associations, and activities. The Proponent will also actively support worker engagement in community activities and seek to sponsor community events that serve to bring TFWs together with current Tumbler Ridge residents.

15.8 RESIDUAL SOCIAL EFFECTS

15.8.1 Residual Effects on Health Care

15.8.1.1 Decreased Access to Health Care Services

The Project has the potential to indirectly decrease LSA community members' access to health care services during construction and operations. Given the low potential incremental demand on health services in LSA communities and the RSA, together with local and provincial initiatives to increase local health care capacity to meet current and future demand, and Project-related mitigations, the potential residual effect of the Project on access to health care is negligible.

15.8.1.2 Decreased Quality of Health Care Services

The Project has the potential to indirectly decrease health care service quality for LSA community members during construction and operations. Given the low potential incremental demand on health services in LSA communities and the RSA, together with local and provincial initiatives to increase local health care capacity to meet current and future demand, and Project-related mitigations, the potential residual effect of the Project on the quality of health care services is negligible.

15.8.2 Residual Effects on Emergency Services

15.8.2.1 Decreased Ability to Respond to Fire Emergencies

The Project has the potential to indirectly increase the risk of fire emergencies in LSA communities during construction and operations. Local fire departments will be able to adapt to increasing demands and any increase to response time will be negligible. No mitigation measures are required and no residual effects are expected.

15.8.2.2 Decreased Quality of Ambulance Services

The Project has the potential to indirectly decrease the quality of ambulance services in the RSA during construction and operations. Given the small expected population growth due to the Project in the RSA and Project-led mitigation measures, residual effects of the Project on the quality of ambulance service in the RSA during construction and operations will be negligible.

15.8.3 Residual Effects on Educational Services

15.8.3.1 Decreased Access to Educational Services

The Project is unlikely to affect LSA community members' access to educational services during construction and operations. No specific mitigation measures are required and no residual effects are anticipated.

15.8.3.2 Decreased Quality of Educational Services

The Project is unlikely to affect the quality of educational services for LSA community members during construction and operations. No specific mitigation measures are required and no residual effects are anticipated.

15.8.4 Residual Effects on Child Care Services

15.8.4.1 Decreased Access to Child Care Services

The Project has the potential to indirectly decrease LSA community members' access to child care services. Project mitigation measures will not be sufficient to avoid or minimize this effect. Consequently, the Project will likely result in a residual effect for access to child care services.

15.8.4.2 Decreased Quality of Child Care Services

The Project has the potential to indirectly decrease the quality of child care services for LSA community members. Project mitigation measures will not be sufficient to avoid or minimize this effect. Consequently, the Project is likely to result in a residual effect for quality of child care services.

15.8.5 Residual Effects on Crime and Other Social Problems

15.8.5.1 Increased Crime and Other Social Problems

The Project has the potential to indirectly increase crime and other social problems in the LSA communities and the RSA during construction and operations. Given the small expected population increase in the LSA communities and in the RSA, together with Provincial and local initiatives to prevent and reduce crime, and Proponent-led mitigations, the potential residual effect of the Project on crime and other social problems is negligible.

15.8.6 Residual Effects on Social Integration

15.8.6.1 Decreased Social Integration

Data limitations and technical boundaries prevent a precise prediction for social integration effects due to the Project. However, positive community responses toward TFWs to date and Project mitigation measures indicate that the Project is not likely to adversely affect social integration in Tumbler Ridge.

15.9 CHARACTERIZING SOCIAL RESIDUAL EFFECTS, SIGNIFICANCE, LIKELIHOOD, AND CONFIDENCE

This section characterizes residual effects using standard criteria, including magnitude, geographic extent, duration, frequency, 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 15.9-1.

The characterization of residual effects, significance, and likelihood that residual effects will occur is presented in Table 15.9-2. The assessment is based on an understanding of baseline conditions and the nature of the effect.

15.9.1 Residual Effects Characterization for Child Care Services

Project hiring will reduce access to child care services for LSA community members. Two-earner families have a limited capacity to adapt to insufficient childcare, and thus have low resiliency to this effect. Indirect and induced employment and related population growth will result in a small decrease in child care space availability in LSA communities. Access to childcare facilities will decrease further as TFWs are replaced with Canadian citizens. LSA communities are aware of childcare shortage and are actively seeking to address the problem. Consequently, the effect will likely not continue beyond the medium term. The effect on childcare access will be continuous, but reversible if and when additional capacity is provided (e.g., if/when new childcare facilities are built).

Project hiring will also reduce the quality of childcare services in LSA communities, as it will alter the caregiver to child ratio. This effect is likely to be minor, given 1) the relatively small increase in childcare aged children in LSA communities, and 2) the caregiver/child ratio is only one of a number of factors that are related to childcare quality (Huntsman 2008). Childcare children will experience the effect continuously and may or may not be able to adapt to additional children in their facility. The effect on childcare quality will be reversible if and when childcare facilities hire additional care providers.

15.9.1.1 Significance of Residual Effects on Child Care Services

Given the small magnitude of the effect, its sub-regional extent, its medium-term duration, and its reversibility, the effect of the Project on families will not be significant.

15.9.1.2 Characterization of Likelihood and Confidence for Residual Effects on Child Care Services

As childcare facilities in LSA communities are at or beyond capacity, any increased demand is highly likely to result in decreased access. Confidence in this assessment is high, based on a similar effect observed in other cases. The likelihood that Project hiring will result in decreased childcare quality is somewhat less likely and less certain as the effect will depend on situational factors, including the skills and approaches of childcare providers.

Table 15.9-1. Definitions of Characterization Criteria for Residual Effects

Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Resiliency	Likelihood of Effects: Probability	Likelihood of Effects: 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 population?*	*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 1 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.	**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 2-3 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.	**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:** An 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.	**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.				

Table 15.9-2. Characterization of Residual Social Effects, Significance, Confidence and Likelihood

Residual Effect	Residual Effects Characterization Criteria: Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Resiliency	Significance of Adverse Residual Effects	Likelihood and Confidence: Probability	Confidence
LSA community members will have reduced access to child care services	Minor	Medium-term	Continuous	Sub-regional	Reversible Short-term	Low	Not Significant (minor)	High	High
Children in child care facilities will experience decreased quality of child care services	Minor	Medium-term	Continuous	Sub-regional	Reversible Short-term	Neutral	Not Significant (minor)	Medium	Medium

15.10 SUMMARY OF SOCIAL RESIDUAL EFFECTS ASSESSMENT AND SIGNIFICANCE

The residual effects assessment identified two residual effects for one VC (Table 15.10-1). Project hiring will result in residual effects for childcare services, including access to childcare services and the quality of childcare services rendered. Given the size and nature of the residual effect, as assessed above, the residual effect on families is not significant (minor). Both residual effects are brought forward into the cumulative effects assessment below.

Table 15.10-1. Summary of Social Residual Effects, Mitigation, and Significance for Childcare Services

Residual Effects	Project Phase	Mitigation Measures	Significance
LSA community members will have reduced access to child care services	Construction Operation	The Proponent will share information about its projected workforce needs with childcare service providers	Not significant (minor)
Children in child care facilities will experience decreased quality of child care services	Construction Operation		Not significant (minor)

15.11 CUMULATIVE EFFECTS ASSESSMENT

15.11.1 Introduction

Cumulative effects are the result of a Project-related effect interacting with the effects of other human actions (i.e., anthropogenic developments, projects, or activities) to produce a combined effect. The method for assessing cumulative effects generally follows the same steps as the Project-specific effects assessment.

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.

However, because of the broader scope and greater uncertainties inherent in CEA (e.g., data limitations associated with some human actions, particularly future actions), there is greater dependency on qualitative methods and expert judgement.

15.11.2 Other Human Actions Considered in the CEA

An initial list of past, present, and future human actions to be considered in the CEA was developed as part of the Murray River Land Use Baseline Report via desk-based review of existing information and field research conducted between 2010 and 2014 (see Appendix 16-A) for a detailed description of this methodology). For the purposes of the CEA, this list was augmented with information on past historic mining operations retrieved from the BC Ministry of Energy and Mines, information on current and future hydroelectric projects from BC Hydro, FortisBC, and Columbia Power Corporation, and information on future actions from the BC EAO and the BC Ministry of Forests, Lands, and Natural Resource Operations. Human actions considered in the CEA are presented in Table 15.11-1.

Table 15.11-1. List of Human Actions Considered in the Murray River CEA

INDUSTRIAL PROJECTS				
Timeframe		**Name of Action**	**Dates Active**	**Proponent (if applicable)**
Past	**Historic**	Hasler Coal Mine	1941 - 1945	Hasler Creek Coal Company
		Sukunka (Bullmoose) Mine	1972 – 1975	BP Exploration Canada Ltd.
	Recent	Bullmoose Mine	1983 – 2003	Teck Corporation
		Dillon Coal Mine	2004 – 2007	Walter Energy / Western Coal
		Quintette (Babcock) Mine	1983 - 2000	Teck Corporation
		Willow Creek Mine	2000 - 2013	Walter Energy
Present		Brule Mine	2005 - 2016	Walter Energy
		Trend Mine	2003 - 2016	Peace River Coal
		Quality Wind Project	2013 - unknown	Capital Power
		Peace Canyon Dam	1980 – unknown	BC Hydro
		Wolverine Mine (Perry Creek) and EB Pit	2004 - 2016	Walter Energy
		WAC Bennett Dam	1961 – unknown	BC Hydro
Future	**Certain**	Hermann Mine	2014 - 2025	Walter Energy
		Quintette Mine	2013 - 2025	Teck Corporation
		Roman Mine Project	2013 - 2024	Peace River Coal
		Thunder Mountain Wind Park	2014 – unknown	Aeolis Wind
		Tumbler Ridge Wind Project	2013 - unknown	Pattern Energy Group
		Wartenbe Wind Project	2014 - unknown	Avro Wind Energy Inc.
	Reasonably Foreseeable	Echo Hill Mine	2015 - 2029	Hillsborough Resources Ltd.
		Coastal Gaslink Project	2015 – 2048	TransCanada Pipelines
		Horizon Mine	2015 - 2038	Peace River Coal
		Meikle Wind Energy Project	2015 – 2041	Meikle Wind Energy Partnership
		Northern Gateway Pipeline	2016 – 2068	Enbridge Northern Gateway Pipelines
		Rocky Creek Energy Project	2015 – unknown	Rupert Peace Power Corporation
		Site C Clean Energy Project	2015 – unknown	BC Hydro
		Sukunka Coal Mine Project	2015 – 2038	Glencore
		Sundance Wind Project	2015 - unknown	EDF Energies Nouvelles
		Wildmare Wind Energy Project	2015 – unknown	Pattern Energy Group
	Hypothetical	Babcock Creek Wind Project	Unknown	Babcock Ridge Wind Limited Partnership
		Belcourt Saxon Coal Project	Unknown	Xstrata Coal Canada Ltd.
		Huguenot Mine	Unknown	Colonial Coal International
		Moose Lake Wind Power	Unknown	Moose Lake Wind Power Corporation
		Septimus Creek Wind Power Project	Unknown	Zero Emission Energy Developments
		Suska Mine	Unknown	Xstrata Coal Canada Ltd.
		Wapiti River Coal Project	Unknown	Canadian Dehua International Mines Group Inc.

(continued)

Table 15.11-1. List of Human Actions Considered in the Murray River CEA (completed)

OTHER LAND USE ACTIVITIES
• Aboriginal harvest (fish, animals, and plants) • Agriculture and range • Forestry and manufacturing • Industrial roads • Coal and mineral exploration • Oil and gas drilling and exploration • Other fishing and trapping (commercial and recreational) • Recreation and tourism • Transportation (road and rail access and traffic)

Figures 15.11-1 and 15.11-2 respectively present the spatial locations and timelines of these human actions relative to the Project. Methods used to develop spatial footprints and details about each human action are provided in Chapter 5 (Effects Assessment Methodology).

15.11.3 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.

1. A residual effect of the Project must be demonstrated to operate cumulatively with the effects of another human action.
2. 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.[3]

As stipulated in the Application Information Requirements (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.

15.11.3.1 Spatial Boundaries

Spatial boundaries for the CEA are identical with the LSA defined for the effects assessment. While in principle social effects may interact with other human actions to create cumulative effects on a regional scale, the residual effects resulting from the effects assessment will be experienced at a community level.

[3] These criteria are based on the report of the Joint Review Panel for the Express Pipeline Project (National Energy Board 1996). The Joint Panel specifically excluded consideration of "hypothetical" human actions from CEA. However, the CEA Agency's Practitioner's Guide states, "best practice suggests that effort should be made in identifying actions if there is reason to believe they may occur, yet are not overly hypothetical" (Hegmann et al. 1999). Further, the CEAA's more recent Operational Policy Statement added, "the Agency position has evolved to include 'certain' and 'reasonably foreseeable' projects and, where appropriate those projects that are 'hypothetical'" (CEA Agency 2007). Therefore, in accordance with best practices, future human actions that are hypothetical but are still judged to be probable are considered in this assessment.

15.11.3.2 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:** temporal boundaries are stated in each assessment chapter, and vary according to the time estimated for VCs to recover to baseline conditions (taking into account natural cycles of ecosystem change).

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*.

15.11.3.3 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.

Figure 15.11-1
Other Human Actions Near the Murray River Project

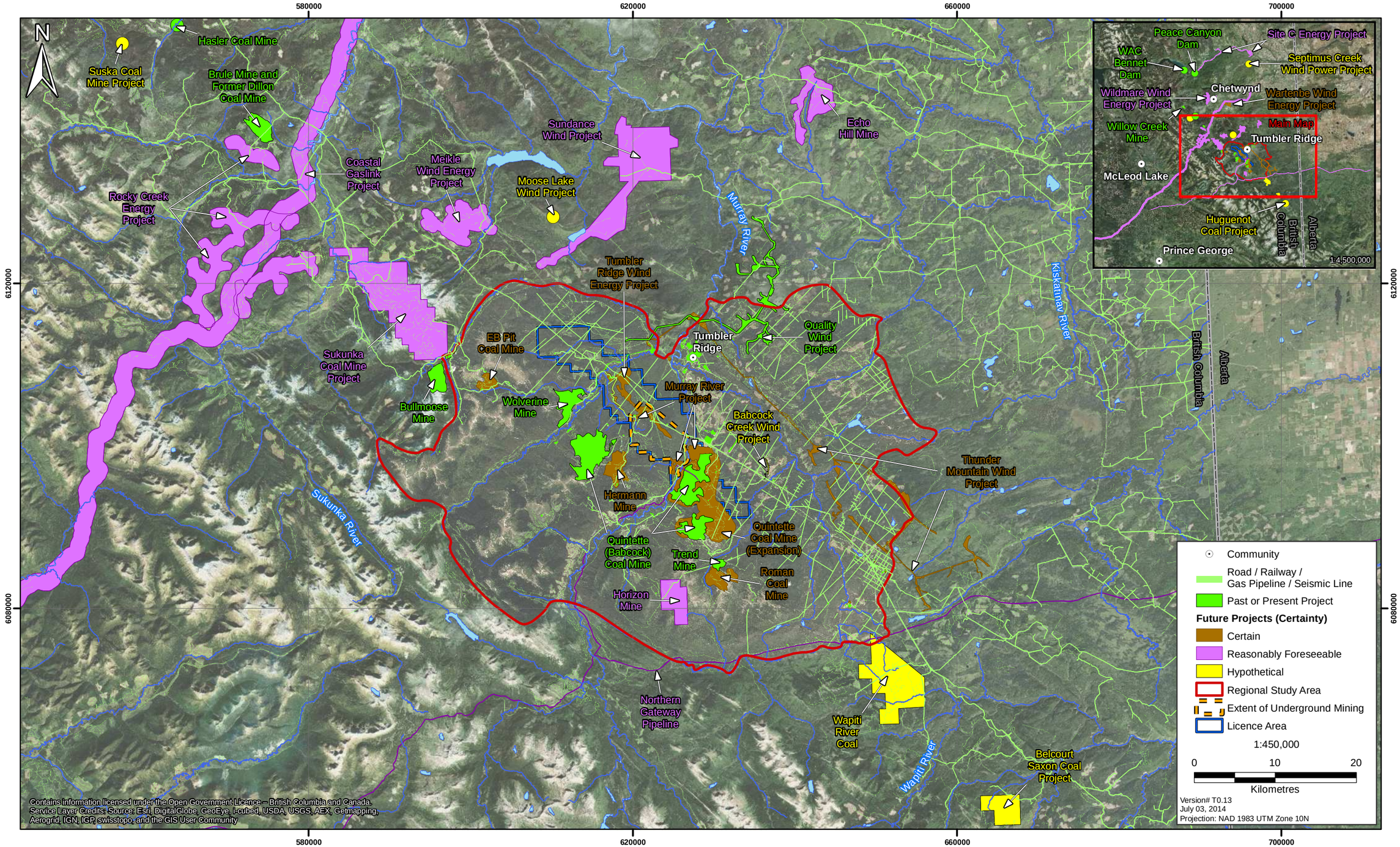
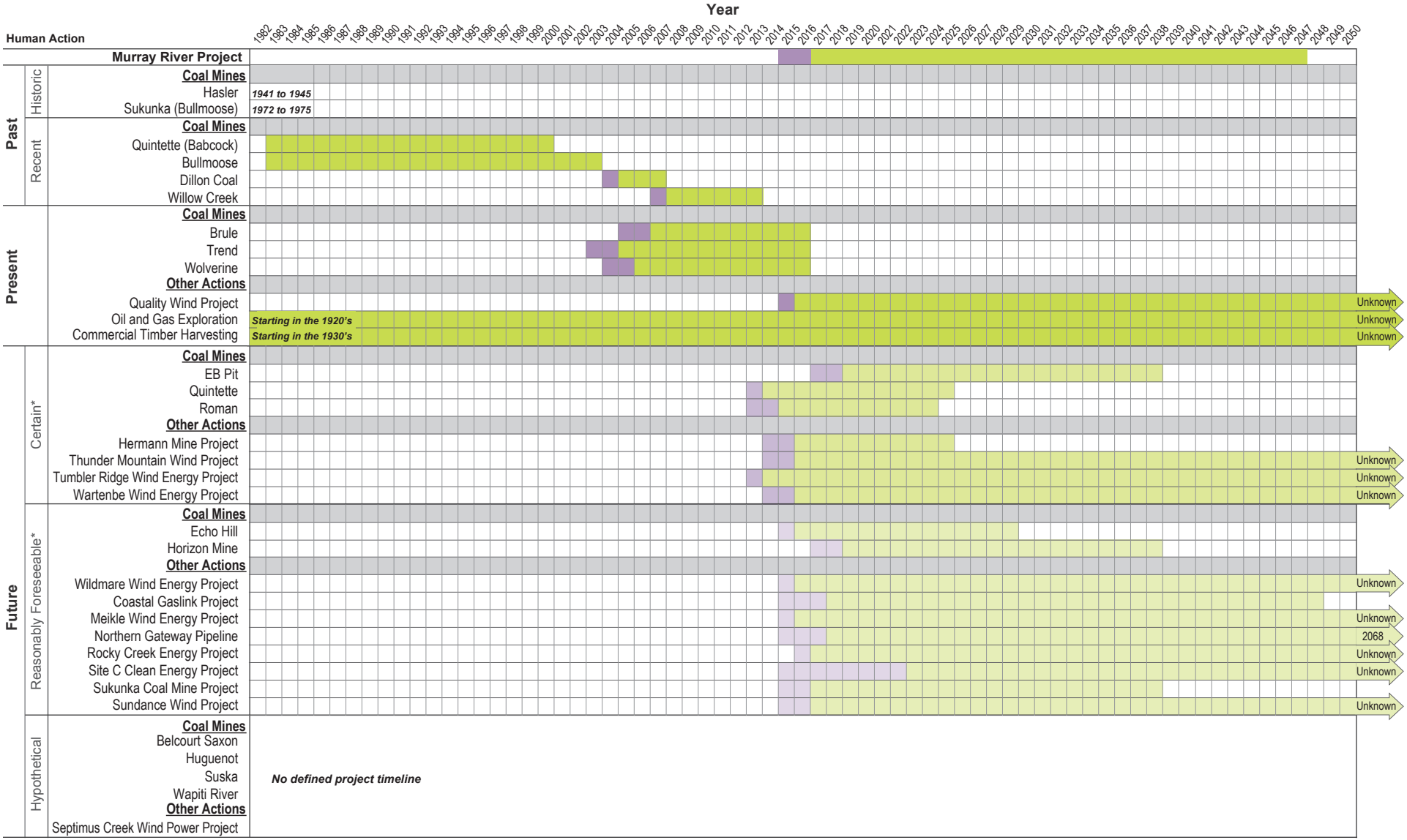


Figure 15.11-2

Estimated Past, Present and Future Human Action Timelines



Note: Additional human actions considered in the cumulative effects assessment (e.g., ongoing mining and energy exploration) do not appear on this schedule.

** These timelines are speculative based on the documentation available for these actions (e.g., Project Description or Environmental Assessment Application on file with the BC EAO). Lighter shading indicates decreasing certainty that the action will proceed*

The results are presented in an impact matrix, as shown in Table 15.11-2. 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 (●), and a rationale as to why no interaction is predicted is given in the accompanying text. If there is overlap, and an interaction is anticipated, the cell is marked with 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.

15.11.4 Description of Potential Cumulative Effects and Mitigation

Project residual effects are not likely to interact with any past projects as the effects are not expected to continue beyond project closure.

There is no potential for the Project to create cumulative effects to access to childcare services and quality of childcare services with other projects that do not or will not have a workforce in LSA communities. Projects with current or future workforces outside of LSA communities include: Peace Canyon Dam, WAC Bennett Dam, Coastal Gaslink Project, Northern Gateway Pipeline, and Site C Clean Energy Project.

Cumulative effects are expected to be negligible for projects having relatively small employment projections, including: three certain projects (Thunder Mountain Wind Park, Tumbler Ridge Wind Project, Wartenbe Wind Project); four reasonably foreseeable projects (Meikle Wind Energy Project, Rocky Creek Project, Sundance Wind Project, and Wildmare Wind Energy Project); and three hypothetical projects (including Babcock Creek Wind Projects, Moose Lake Wind Power, and Septimus Creek Wind Power Project).

The Project is expected to create moderate cumulative effects on access to and quality of childcare services in LSA communities due to interaction with one present project (Trend Mine), three certain future projects (Herman Mine, Quintette Mine, and Roman Mine Project), three reasonably foreseeable projects (Echo Hill Mine, Horizon Mine, and Sukunka Coal Mine Project), and four hypothetical projects (Belcourt Saxon Coal Project, Huguenot Mine, Suska Mine, and Wapiti River Coal Project).

These projects are located close to LSA communities and require sizable workforces for construction and operations. Current and future projects hire local workers and induce population growth in the LSA communities, resulting in increased demands on childcare services. If childcare service capacity has not been increased in LSA communities by the time that future projects begin construction, the increased demand on childcare services produced by them will combine with the increased demand on childcare services produced by the Murray River Coal Project, resulting in a moderate cumulative effect during the life of the Murray River Coal Project. The cumulative effect is predicted to be moderate rather than major as LSA communities will be aware of increased childcare needs before projects commence and can plan to increase capacity. For example, a Tumbler Ridge District Council task force is currently assessing childcare needs and seeking options to increase capacity.

Table 15.11-2. Example of Ranking Potential for Residual Effects to Interact Cumulatively with Effects of Other Human Actions on a VC

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
LSA community members will have reduced access to child care services	-	-	-	-	-	-	O	M	O	-	O	-	M	M	M	L	L	L
Children in child care facilities will experience decreased quality of child care services	-	-	-	-	-	-	O	M	O	-	O	-	M	M	M	L	L	L
Tumbler Ridge will experience a decreased level of social integration	-	-	-	-	-	-	O	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	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	
LSA community members will have reduced access to child care services	M	-	M	L	-	L	-	M	L	L	L	M	M	L	L	M	M	
Children in child care facilities will experience decreased quality of child care services	M	-	M	L	-	L	-	M	L	L	L	M	M	L	L	M	M	
Tumbler Ridge will experience a decreased level of social integration	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Notes:

-	*No spatial or temporal overlap.*
O	*Spatial and temporal overlap, but no interaction 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.*

In order to help LSA communities plan their childcare services, the Proponent will share information about its own projected workforce needs. Depending on the ability of LSA communities to increase childcare capacity to match projected future demand, there may be residual cumulative effects on access to and quality of childcare services. Table 15.11-3 describes these potential residual effects.

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

The residual cumulative effects to VCs are described in Table 15.11-4 and characterized using the same criteria described in Section 5.9 and Table 15.9-1 (e.g., Magnitude, Geographic Extent, Duration, Frequency, Reversibility, Context). Significance, probability and confidence are also assessed using the same criteria described in Section 15.9.

The residual cumulative effect of the Project on access to and quality of child care services will be not significant (minor). This assessment is based on the small magnitude of the effect, its sub-regional extent, its medium-term duration, and its reversibility.

15.12 SOCIAL EFFECTS ASSESSMENT CONCLUSIONS

Table 15.12-1 summarizes residual effects, mitigation measures, and significance for residual effects and cumulative residual effects.

The Project has the potential to affect childcare in LSA communities. Project-related population growth and increased employment in these communities will increase demand on already limited childcare services, thereby reducing the ability of primary caregivers to secure childcare spaces for their children. Increased demand on childcare services could also reduce the quality of services rendered, as it will adversely impact the childcare giver-to-child ratio, which is a determinant of childcare outcomes. Moreover, LSA communities are aware of current childcare strains and are actively seeking to address them. Consequently, this assessment finds that residual effects of the Project on childcare access and quality will be not significant (minor).

This Project effect could interact with other current and planned projects that will increase population and employment in LSA communities to create cumulative effects on childcare access and quality. To address these potential effects, the Proponent will provide information about its projected workforce needs to elected officials and childcare services providers. This information will help communities to further plan for their childcare service needs. Given the low magnitude of potential cumulative effects on childcare access and quality, the significance of these potential effects is assessed as not significant (minor).

Table 15.11-3. 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
Childcare Services	Hiring and Management of the Workforce	Trend Mine, Herman Mine, Quintette Mine, Roman Mine Project, Meikle Wind Energy Project, Rocky Creek Project, Sundance Wind Project, Wildmare Wind Energy Project, Belcourt Saxon Coal Project, Huguenot Mine, Suska Mine, and Wapiti River Coal Project	LSA community members may have reduced access to child care services.	The Proponent will share information about the its projected workforce needs.	LSA community members may have reduced access to child care services.
Childcare Services	Hiring and Management of the Workforce	Trend Mine, Herman Mine, Quintette Mine, Roman Mine Project, Meikle Wind Energy Project, Rocky Creek Project, Sundance Wind Project, Wildmare Wind Energy Project, Belcourt Saxon Coal Project, Huguenot Mine, Suska Mine, and Wapiti River Coal Project	Children in child care facilities will experience decreased quality of child care services.	The Proponent will share information about its projected workforce needs.	Children in child care facilities may experience decreased quality of child care services.

Table 15.11-4. Characterization of Residual Cumulative Effects, Significance, Confidence and Likelihood

	Effect Characterization								
Residual Cumulative Effect	Magnitude	Duration	Frequency	Geographic Extent	Reversibility	Context	Significance	Probability	Confidence
LSA community members may have reduced access to child care services	Minor	Medium-term	Continuous	Sub-regional	Reversible Short-term	Low	Not Significant (minor)	High	High
Children in child care facilities may experience decreased quality of child care services	Minor	Medium-term	Continuous	Sub-regional	Reversible Short-term	Neutral	Not Significant (minor)	Medium	Medium

Table 15.12-1. Summary of Residual Effects, Mitigation, and Significance

Residual Effects	Project Phase	Mitigation Measures	Residual Effect Significance	Residual Cumulative Effect Significance
Families				
LSA community members may have reduced access to child care services	Construction Operation	The Proponent will share information about its projected workforce needs with elected officials and childcare service providers.	Not significant (minor)	Not significant (minor)
Children in child care facilities may experience decreased quality of child care services	Construction Operation		Not significant (minor)	Not significant (minor)

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