

TABLE OF CONTENTS

17 – COMMUNITY INFRASTRUCTURE AND SERVICES 17-1

17.1 INTRODUCTION 17-1

17.1.1 Regional Setting 17-1

17.1.2 Rationale for VC Selection 17-1

17.2 ASSESSMENT BOUNDARIES 17-2

17.2.1 Local Study Area 17-2

17.2.2 Regional Study Area 17-2

17.2.3 Temporal Boundaries 17-2

17.3 BASELINE CONDITIONS 17-2

17.3.1 Municipal Infrastructure 17-3

17.3.2 Housing 17-6

17.3.3 Educational Services 17-9

17.3.4 Health and Social Services 17-11

17.3.5 Protective Services 17-14

17.3.6 Transportation 17-15

17.4 PROJECT-SPECIFIC EFFECTS 17-18

17.4.1 Project Interactions and Potential Effects 17-18

17.4.2 Identification of Mitigation Measures and Potential Residual Effects 17-27

17.4.3 Significance of Residual Effects 17-36

17.4.4 Discussion of Significance 17-39

17.5 CUMULATIVE EFFECTS ASSESSMENT (CEA) 17-41

17.6 SUMMARY AND CONCLUSIONS 17-41

LIST OF TABLES

Table 17.3-1: Overview of Available Water and Sewage Treatment Services in the LSA 17-4

Table 17.3-2: Housing Characteristics, 2006 17-8

Table 17.3-3: RCMP and Fire Protection Services in the LSA communities 17-15

Table 17.4-1: Potential Interactions between the Project and Community Infrastructure and Services 17-20

Table 17.4-2: Potential Effects on Community Infrastructure and Services 17-25

Table 17.4-3: Proposed Mitigation Measures and Potential Residual Effects for Community Infrastructure and Services 17-29

Table 17.4-4: Determining Significance of Residual Effects for Community Infrastructure and Services 17-36

Table 17.4-5: Significance of Residual Effects for Community Infrastructure and Services 17-38

Table 17.4-6: Summary of Residual Effects for Community Infrastructure and Services 17-40

17 – COMMUNITY INFRASTRUCTURE AND SERVICES

17.1 INTRODUCTION

This section assesses the potential effects of the Project on community infrastructure and services in terms of six key indicators. These indicators were selected to capture concerns expressed by First Nations and communities in the study area and comprise Municipal Infrastructure (water supply, water/sewage treatment, landfills, power supply, and recreational facilities); Housing; Transportation; Educational Services; Health and Social Services; and Protective Services.

The data sources used in this analysis include both secondary and primary data. Secondary data were collected from Statistics Canada, Yukon Bureau of Statistics, and Yukon Socio-Economic Web Portal as well as individual communities. A number of other key information sources were consulted, including Canada Mortgage and Housing Corporation (CMHC), the Canadian Homelessness Research Network Press, Inukshuk Planning and Development, Natural Resources Canada, Yukon Health Care Review Committee, Official Community Plans, the Canadian Encyclopaedia, and civic and municipal websites. Other sources of secondary data included the Yukon Environmental and Socio-economic Assessment Board (YESAB).

Primary data were collected through one-on-one interviews conducted mostly in 2012 and 2013 with representatives from the Yukon Government, City of Whitehorse, Whitehorse and Yukon Chambers of Commerce, Yukon Mine Training Association, the Yukon Housing Corporation, Wildland Fire Management, Energy Mines and Resources, Whitehorse International Airport, Selkirk First Nation (SFN), Little Salmon/Carmacks First Nation (LSCFN), Village of Carmacks, Carmacks Renewable Resource Council members, and Tantalus School. Primary information was also gained from community meetings.

17.1.1 Regional Setting

The Project is a proposed open pit mine located approximately 300 kilometres (km) northwest of Whitehorse, Yukon Territory, on Crown land that is administered by the Yukon Government. The property is located within SFN traditional territory. The proposed Project will require construction of a road access, including upgrades to the existing Freegold Road and construction of the Freegold Road Extension on land that falls partially within the SFN and LSCFN traditional territories. The Freegold Road Extension and proposed Freegold Road Upgrade extend for approximately 200 km southeast from the Project to the village of Carmacks.

17.1.2 Rationale for VC Selection

The Community Infrastructure and Services VC was identified based on consideration of the information and issues communicated by the public, Aboriginal groups, local communities, and government stakeholders during the engagement process conducted in support of this Proposal. This VC and specific indicators were also selected based on professional judgement and experience in conducting socio-economic effects assessments.

The potential socio-economic effects of the proposed Project on communities in the study region will ultimately depend on the extent to which proposed Project activities and Project-related population growth will result in increased demands on community infrastructure and services and the ability of these infrastructure and services to cope with increasing demands.

17.2 ASSESSMENT BOUNDARIES

The socio-economic study area for the proposed Project has been defined to include the rural and urban communities that are most likely to experience proposed Project-related effects. Communities were selected based on proximity to the proposed Project and related access routes and potential relationship with the Project development and operations. The socio-economic study area has been broken down into two types: the Local Study Area (LSA) and the Regional Study Area (RSA).

17.2.1 Local Study Area

The LSA includes those communities closest to the proposed Project mine site and proposed access route. These communities represent the closest and most accessible potential sources of direct labour, goods, and services needed for the Project and, therefore, are expected to experience direct Project socio-economic effects. The LSA is shown on Figure 13.1-1 includes the following communities:

- Community of Pelly Crossing (Selkirk First Nation);
- Village of Carmacks and the community of LSCFN; and
- City of Whitehorse.

Whitehorse is included in the LSA due to its potential to contribute supplies, services, and labour to the Project. Given its size and proximity, Whitehorse is likely to serve as a major supply centre and transportation hub for the Project, which has the potential to cause direct socio-economic effects on its residents.

17.2.2 Regional Study Area

Although it is expected that the Project could interact with other socio-economic VCs, such as employment and income, employability, and economic development and business sector within a larger RSA (Yukon), no effects are expected on the Community Infrastructure and Services VC outside the LSA. As such, the focus of both the baseline and the effects assessment on Community Infrastructure and Services VC will be on the LSA.

17.2.3 Temporal Boundaries

The temporal boundaries for the effects assessment are defined in Section 5.2. Details of activities associated with the construction, operation, closure and decommissioning, and post-closure phases of the Project are provided in Section 4.

17.3 BASELINE CONDITIONS

This section presents an overview of baseline conditions for each of the key indicators chosen to assess the potential effects of the Project on Community Infrastructure and Services. The key indicators are:

- Municipal Infrastructure (water supply, water/sewage treatment, landfills, power supply, and recreational facilities);
- Housing;
- Educational Services;
- Health and Social Services;
- Protective Services; and

- Transportation.

Baseline information is presented for each of the three communities included in the LSA: Pelly Crossing, Carmacks, and Whitehorse. Baseline conditions for Yukon are included for comparison purposes. A detailed baseline for this VC is available in the Socio-economic Baseline report (Appendix 13A).

17.3.1 Municipal Infrastructure

17.3.1.1 Yukon

The majority of Yukon residents get their water from private wells, 2,000 of which exist in Yukon (Government of Yukon 2009). Whereas municipalities regulate water services, which are either supplied locally or delivered by truck, most rural communities depend on self-haul or trucked water. Outside of municipal facilities, water treatment is regulated by the Health and Social Services branch of the Yukon Government, which offers free well water testing services. Water supplies are managed by the Community Services department of the Community Development Branch; municipal and private water management and licensing is overseen by the Yukon Water Board, regulated under the Waters Act (Government of Yukon 2002).

Sewage systems in Yukon consist of a combination of private septic as well as piping and treatment systems where available (Government of Yukon 2009). Solid waste, which is regulated under the *Public Health and Safety Act*, consists of a number of community landfill locations throughout Yukon (Government of Yukon 2009). Maintenance of each facility outside of Whitehorse is provided by private contractors or community members. Waste collection is primarily managed by municipal/community staff, although private contractors are used in Whitehorse (EBA 2009).

17.3.1.2 Whitehorse

Whitehorse supplies water to its residents via local government or municipal means from primarily groundwater sources (Government of Yukon 2009). Water is treated with chlorine and distributed by pipe through the city from five reservoirs; this system includes a pumping and booster station. Rural areas around the city are not supplied from the Whitehorse system and rely upon private wells or truck-delivered water.

The Whitehorse wastewater system services the urban part of Whitehorse. Rural areas outside of the city use in-ground septic systems and rely upon private disposal.

The solid waste disposal facility for the Whitehorse area is located north of the city along the Alaska Highway at the War Eagle Landfill. The landfill is expected to have a 60-year lifespan (EBA 2009). The site services approximately 23,000 users from Whitehorse and the surrounding communities (Government of Yukon 2009). A recycling centre is located in town, and the municipality also collects household compost.

Table 17.3-1 presents an overview of the water and sewage treatment services available in Pelly Crossing, Carmacks, and Whitehorse.

Table 17.3-1: Overview of Available Water and Sewage Treatment Services in the LSA

	Pelly Crossing	Carmacks	Whitehorse
Water	Supply is via private wells and truck-delivered water.	Rely on private wells and truck delivered water. LSCFN has a water plant to provide water to membership and non-LSCFN residents outside the municipality boundaries. LSCFN has identified lack of safe drinking water as an issue for many of its members.	Wells draw from underground aquifers. Piped water system distributes water from five reservoirs to the city. Rural areas are served by private wells and truck delivered water. Adequate supply is available for the foreseeable future (20 years).
Liquid Waste	Septic system is available. Sewage trucked to primary filtration treatment pit operated by SFN. No piped sewage is available.	A new secondary treatment facility has a design capacity for twice Carmacks current population but currently serves just the core part of the community. Parts of Carmacks not served by the new sewage facility utilize septic fields. LSCFN residents currently use septic systems for liquid waste treatment.	Wastewater system consists of three separate networks. Rural areas use in-ground septic systems and rely on private disposal. Liquid waste is transferred to treatment facility and lagoon system. The treatment of waste currently involves approximately 4.4 million m ³ /year with a system capacity of 5 million m ³ /year.
Solid Waste and Waste Management	No curbside pickup is available. Residents drop off garbage to transfer station or municipal dump. Solid waste is transported to landfill outside the community, where waste is burned weekly.	The only garbage collection available is private collection for housing units owned by Yukon Housing. Solid waste is transported to landfill located outside the community, which operates as a non-burn facility. There is a new recycling facility in the Village of Carmacks. The landfill is expected to have an 18-year lifespan. Private garbage collection is arranged for residents of the community of LSCFN.	Solid waste is transported to landfill located north of the city. Landfill operates as a non-burn facility. The city has a recycling centre and municipality collects household compost.

Source: Government of Yukon 2009; Village of Carmacks 2013; LSCFN 2013

Whitehorse offers a variety of outdoor activities including fishing, hunting, skiing (cross-country and downhill), snowmobiling, dog mushing, canoeing, hiking, biking, camping, baseball, soccer, football, track and field, racquet

sports, and orienteering. There are also a number of venues in which residents can enjoy a variety of outdoor recreation. Recreation services in Whitehorse, both indoor and outdoor, have good capacity and can accommodate additional moderate population growth (Rapp 2013, pers. comm.).

17.3.1.3 Selkirk First Nation / Pelly Crossing

The community of Pelly Crossing utilizes private wells and truck-delivered water to some areas of the community. Additionally, SFN owns a private water well (Infrastructure Development 2012, pers. comm.). Selkirk First Nation built a pump house for water distribution around the community of Pelly Crossing, primarily to membership (Infrastructure Development 2012, pers. comm.). Piped water is now provided to some parts of the community (Infrastructure Development 2012, pers. comm.).

The community of Pelly Crossing uses septic systems, which employ disposal services that truck waste to a primary filtration treatment pit located near the landfill (Government of Yukon 2009). The pit is operated by SFN. At present, there is no piped sewage available in Pelly Crossing (Infrastructure Development 2012, pers. comm.).

Public waste facilities in Pelly Crossing are provided by the Yukon Government and are located at 458 on the Klondike Highway, south of the community. Garbage collection occurs at a transfer station, and there is a municipal dump in the community (Infrastructure Development 2012, pers. comm.).

Although Pelly Crossing is a small community, it accommodates several community and recreational facilities, including a Heritage Centre, community library, community hall, recreational vehicle campground, and a renovated recreation centre housing an arena and curling rink.

17.3.1.4 Little Salmon/Carmacks First Nation and Carmacks

The Village of Carmacks does not provide treated water to community residents (Village of Carmacks 2013, pers. comm.) The residents obtain drinking water from truck delivery and from private, self-haul wells (Government of Yukon 2009; Infrastructure Development 2012, pers. comm.; Tantalus 2013, pers. comm.).

Representatives of LSCFN also noted that the community has a new water treatment plant on LSCFN community land, which started operations two years ago and provides fresh drinking water to LSCFN residents outside the Village of Carmacks boundary and living in the LSCFN community (LSCFN 2013, pers. comm.). Water is also provided to some non-Aboriginal residents in the Village of Carmacks from this source (Village of Carmacks 2013, pers. comm.). Little Salmon/Carmacks First Nation has identified continuing challenges in providing safe drinking water to its citizens.

Sewage in the core section of Carmacks is treated at the Carmacks Sewage Treatment plant, located to the north of the village. This primary treatment facility removes large, solid, and inorganic materials from the water (Government of Yukon 2009, Village of Carmacks 2013, pers. comm). The system utilizes sewer mains (servicing the core of the Village of Carmacks) and discharges into the Yukon River. The community has a new treatment plant that was developed with assistance from the Yukon Government and the Government of Canada (Village of Carmacks 2013, pers. comm.). The Carmacks sewer system serves only the core portion of the town where sewer pipes have been installed, but it has the capacity to serve twice the current population (Village of Carmacks 2013, pers. comm.).

The residents of LSCFN community use septic tanks or septic fields. Little Salmon/Carmacks First Nation government has expressed interest in partnering with the Village of Carmacks to develop additional community infrastructure to service both the Village of Carmacks and the LSCFN community (LSCFN 2013, pers. comm.).

A landfill is located 1.2 km southeast of the Village of Carmacks along the Alaska Highway, which services the Village of Carmacks and the community of LSCFN. The Carmacks landfill does not take waste from other communities and operates as a non-burn facility (Village of Carmacks 2013, pers. comm.). A separate recycling centre was recently constructed. The lifespan of the landfill facility is considered to be at least 18 years.

The Village of Carmacks offers many recreational activities throughout the year. The community has a recreation centre that provides access to a curling rink, rental facilities, an outdoor ice rink, a covered outdoor pool during summer, and several parks and playgrounds. The centre offers extensive programming, including after school programs for children, family dinners, and teen nights. The centre is perceived as having good capacity to serve the Village of Carmacks and surrounding residents (Village of Carmacks 2013 pers. comm.; Tantalus 2013, pers. comm.).

17.3.2 Housing

17.3.2.1 Yukon

Yukon Housing Corporation links families, communities, and the housing industry with programs and services that work to support the housing needs of Yukon residents. The corporation was created due to concern over the quality and availability of affordable housing throughout Yukon. It provides social and staff housing, lending programs, community and industry partnering, and information resources for all aspect of housing in Yukon. As of March 2012, the total number of units under Yukon Housing Corporation management included 669 social units and 153 staff housing units (Yukon Housing 2012). . Eleven staff units were provided in Pelly Crossing, and 16 were provided in Carmacks in addition to 14 social units (Yukon Housing 2013). See Table 17.3-2 for additional data on Yukon Housing.

17.3.2.2 Whitehorse

The 2011 Census reported 9,649 private dwelling units in Whitehorse. This represents an 11.8% increase from 2006. Of the total housing, 9,309 units were occupied by local residents, suggesting that the remainder were being used as temporary or seasonal accommodation or were vacant. The occupancy rate for Whitehorse in 2011 was 96.5%, which was higher than occupancy rates for all the other LSA communities and Yukon as a whole. See housing conditions in Table 17.3-2.

Between 2004 and 2010, the lack of supply affected property values, with the average price of a single family home increasing by 114.5% from 2004 to 2010 (from \$188,700 to \$404,800). Another recent report estimates that house prices in Whitehorse have increased by 80% between 2005 and 2011, even after adjusting for inflation (Falvo 2012).

However, recent discussions with the City of Whitehorse, Yukon Housing Corporation, and Whitehorse Chamber of Commerce suggest that housing concerns have eased (City of Whitehorse 2012a, pers. comm.; Yukon Housing Corporation 2012a, pers. comm.; Whitehorse Chamber of Commerce 2012, pers. comm.).

Whitehorse experienced increased activity in the housing market in recent years. Housing starts in the city reached a record high in 2011 of 332 units, up 42% from the previous year. Development of existing housing lots such as the Whistle Bend Development (a new subdivision in Whitehorse that will eventually house 8,000 people) has reduced the primary driver (lack of building sites) on housing pressures in the city (City of Whitehorse 2012a, pers. comm., Yukon Housing Corporation 2012a, pers. comm., Whitehorse Chamber of Commerce 2012, pers. comm.). The Whistle Bend project, comprising 20 acres, is set to be Yukon's biggest residential land development project, and will consist of five phases through which 3,000 units will be built. During the next two years up to

1,500 lots for development will be available. As such, the housing market will have good capacity to accommodate moderate population growth (MacDonald 2013, pers. comm.).

Other private developments are also taking place in Whitehorse, including a development of 150 new affordable units at 18 Azure Road. This project received final zoning approval in March 2012 and unit prices will range between \$250,000 and \$275,000 (Falvo 2012).

Yukon representatives have expressed concerns about rental costs and lack of affordable rental housing in the City of Whitehorse (City of Whitehorse 2012a, pers. comm.; Yukon Housing Corporation 2012a, pers. comm.; Whitehorse Chamber of Commerce 2012, pers. comm.). Average rent, however, has not experienced the same magnitude of increase as the average house price. The average rent in Whitehorse only increased by 6% between 2001 and 2011, after adjusting for inflation (Falvo 2012). More recent statistics show that the average and median rent have continued to increase during the last year. The median rent in Whitehorse increased by a total of 28.8% in the eight-year period between December 2004 and December 2012. After adjusting for inflation the total median rent net increase was 9.9% for the same eight-year period. This indicates an average annual increase rate of 1.2% (Yukon Bureau of Statistics 2012b, 2013b). The median rent in Whitehorse as of March 2013 was \$856 (up from \$825 in March 2012 and from \$700 in March of 2008) (Yukon Bureau of Statistics 2013a, 2013b). This is the highest median rent on record.

As of March 2013, the vacancy rate was 1.5%, down from 4.1% in March 2008 (Yukon Bureau of Statistics 2012d, 2013c). Vacancy rates have slightly recovered since 2010 but remain below 2%. There are also concerns with respect to the state of rental housing, with representatives noting that some rental units are aging and there have been conflicts with landlords over deteriorating conditions. Representatives noted that the Government of Yukon is currently reviewing the Residential Landlord and Tenant Act to rectify these disputes (City of Whitehorse 2012b).

Lack of social housing and affordable rental apartments appears to be an existing concern for the Yukon Government, which has identified homelessness and housing inadequacy as an issue. In 2010, the Yukon Government conducted a survey that identified more than 100 homeless people (0.37% of Whitehorse population). Whitehorse's only emergency shelter is operated at the Salvation Army in downtown Whitehorse (Falvo 2012). More than 250 people stay one or more nights per year at the shelter, and conditions at the shelter are strained. On a typical night, shelter residents may have to sleep on a mat or even on a chair (Falvo 2012).

17.3.2.3 Selkirk First Nation / Pelly Crossing

The 2011 Census reported 145 private dwelling units in Pelly Crossing, approximately 15% more than in 2006. Of these, 132 (or 91.0%) were considered to be permanently occupied by usual residents, suggesting that the remainder were being used as temporary or seasonal accommodation or were vacant. There are no developed lots available for future building, as SFN first decides if or when to build and then the lot is developed for the intended purpose (SFN 2013, pers. comm.). More detailed information on housing in the study communities is available from the 2006 Census and is provided in Table 17.3-2.

Table 17.3-2: Housing Characteristics, 2006

Population Segment	LSA				RSA
	Pelly Crossing	Carmacks	Whitehorse	Total LSA	Yukon
2011 Census					
Total Private Dwellings (Count)	145	246	9,649	10,040	16,259
Occupied Dwellings	132	196	9,309	9,637	14,117
Occupancy Rate (%)	91.0	79.7	96.5	96.0	86.8
2006 Census					
Total Private Dwellings (Count)	126	221	8,631	8,978	15,296
Occupied Dwellings	115	173	8,280	8,568	12,615
Occupancy Rate (%)	91.3	78.3	95.9	95.4	82.5
Percent Rented (%)	66.7	44.0	32.6	32.9	32.3
Constructed Before 1986 (%)	29.2	41.2	64.1	63.2	59.9
Needs Major Repair (%)	34.8	32.4	11.7	12.5	14.9
Average Number of rooms	4.7	5.2	6.3	6.3	5.9
Average Value (\$)	n/a	135,647	224,673	n/a	211,008

Source:

Statistics Canada 2007, 2012a.

Note:

Due to the small population numbers data may contain rounding errors and/or omissions derived from original source.

A 2011 SFN newsletter suggests that lack of housing continues to be a major issue in Pelly Crossing. During the last few years, SFN built more than 20 homes in Pelly Crossing but these are insufficient to meet demand (SFN 2011). To address continued demand, the SFN chief and council are considering forming a Housing Authority to meet the needs for new home construction. The newsletter also suggests that increasing home ownership among SFN members is a priority.

In discussions with Yukon Housing Corporation, representatives noted there may be a lack of housing supply in Pelly Crossing. This could be exacerbated by a lack of sufficient land base for construction, prohibitive construction costs associated with more remote Yukon communities, and CMHC lending regulations, which may limit lending in industry towns (Yukon Housing Corporation, 2012).

17.3.2.4 Little Salmon/Carmacks First Nation and Carmacks

In 2011, there were approximately 246 private dwelling units in Carmacks, 11% more than in 2006. Of these, 196 (or 79.7%) were considered to be permanently occupied by usual residents. This represents the lowest occupancy rate among the LSA communities, which has almost remained invariant since the 2006 Census (Table 7-1 in Appendix 13A). Census data for 2006 also shows that Carmacks had a higher percentage of rented housing (44.0%) than the overall LSA (32.9%). The average value of housing in Carmacks was \$135,647, approximately 36% below the Yukon average. There is land available for development that would serve both single family and multiple residential needs within the Village of Carmacks (Village of Carmacks 2013, pers. comm.).

During interviews, LSCFN representatives identified high construction costs as the main driver for high housing prices and a main barrier for housing development. The average price of a home in the community is estimated to reach \$250,000 to \$300,000 (LSCFN 2013, pers. comm.). This price is almost twice the average value reported in the 2006 census. Representatives also noted that access to housing loans is limited for aboriginal communities.

In discussions with Yukon Housing Corporation, representatives noted there may also be a lack of housing supply in Carmacks. This could be exacerbated by a lack of suitable land, prohibitive construction costs, and CMHC lending regulations (Yukon Housing Corporation 2012a). It was also noted that there is a shortage of single family dwellings and apartments in the community and in particular there is a lack of housing for seniors (Tantalus 2013, pers. comm.). Another informant noted that there are many abandoned houses in Carmacks, but that they cannot be rented out since they are on First Nations land (EMR 2013, pers. comm.) LSCFN has informed CMC that lack of housing for its members is a continuing problem.

17.3.3 Educational Services

17.3.3.1 Yukon

There are 28 primary and secondary schools in Yukon, with 14 in Whitehorse and 14 situated in the rural communities. Enrolment numbers range from less than 10 students to more than 600.

Yukon College is the only post-secondary institution in Yukon. It is based in Whitehorse (Ayamdigt Campus) and has campuses located in 12 other communities in Yukon, including Dawson City, Carmacks, Mayo, and Pelly Crossing. Each of the 12 community campuses offers online courses and video-conferencing capabilities (Yukon College 2012).

Enrolment at Yukon College has continued to grow by approximately 5%–10% per year (Yukon College 2012) and representatives noted that there are some funding constraints. Representatives also noted that mining activity has increased in Yukon and it is viewed as key to economic development. As a result, the college recently created a School of Mining and Technology (Yukon College 2012). In addition, a new Mining Industry Advisory Committee was created to assist Yukon College in being more responsive to mining-related trends in the region. The Advisory Committee, which comprises representatives primarily from mining organizations in the region, assists the college in identifying gaps, technologies, skills shortages, and mining trends (Yukon College 2012).

Apprenticeship training is offered extensively at Yukon College. Although the college has not experienced challenges in attracting students to the program, it is facing constraints in finding businesses that are willing to provide on-the-job training to apprentices (Yukon College 2012).

The Yukon College is equipped with mobile training infrastructure equipment and is capable of providing training directly to mining workers on site. Underground and surface mine training services / simulators are available from the college. Additional funding was approved in 2013 and the college is prepared to accommodate the training of additional mining tradespersons and employees (Rowles 2013, pers. comm.).

A number of labour-related training programs exist in Yukon, many of which focus on the mining industry, as well as on building skills within Aboriginal communities. The following are several examples of these educational initiatives.

Centre for Northern Innovation in Mining: Yukon College's new Centre for Northern Innovation in Mining (CNIM) was recently announced by the federal and Yukon governments. Prime Minister Steven Harper and Yukon Premier Darrell Pasloski on August 19, 2013. It is expected to provide comprehensive skills and trades training as well as facilitating access to applied research specific to the Northern minerals and mining industry.

The CNIM has dedicated trades facilities at the Ayamdigut Campus in Whitehorse. It also offers a mobile trades school, making comprehensive trades training possible anywhere in Yukon that is accessible by road. The Centre for Northern Innovation in Mining is planning to offer heavy equipment operator, underground mining, pre-apprenticeship heavy equipment mechanic, industrial electrical and industrial welding programs. Casino Mining Corporation expects to work closely with the CNIM in delivering training programs for future Yukon-based workers.

Yukon Mine Training Association: The Yukon Mine Training Association (YMTA) links Yukon First Nations with some of Yukon's mining and resource-related industries. The central goal is the training and development of a skilled workforce made up of First Nations and Yukon residents to meet the current and future needs of the mining and resource sectors. Yukon Mine Training Association partners with communities, corporations, and industry to offer courses and on-the-job learning opportunities (YMTA 2010). A new funding agreement of \$2 million over two years was confirmed early in 2013 and sources the Federal Skills and Partnership Fund. This new funding is client-driven and focuses on providing life and career coaching and training. Once training is finished, clients search for employment and can access a wage subsidy (YMTA 2013, pers. comm.).

Aboriginal Labour Market Programs: Aboriginal Labour Market Programs are available to increase workforce participation and help Aboriginal people prepare for, find, and maintain jobs. These programs are delivered across Canada by Aboriginal agreement holders (Human Resources and Skills Development Canada (HDRDC) 2013). In Yukon, the Council of Yukon First Nations and the Aboriginal Labour Force Alliance are Aboriginal agreement holders and receive funding through this program.

Yukon Department of Education: The Advanced Education branch of the Yukon Department of Education also provides programs and support services for the Yukon labour force. The branch develops and implements programs in partnership with other Yukon government departments, the federal government, businesses, labour organizations, Yukon College, First Nations, equity groups, and other provincial jurisdictions. Programs include apprenticeship and trades training programs, student training and employment, student financial assistance, community training funds, literacy programs, targeted initiatives for older workers, Yukon nominee program for critical impact worker and skilled worker, and registration of trades schools (Yukon Department of Education 2011a).

17.3.3.2 Whitehorse

There are 14 public schools located in the City of Whitehorse, including 10 elementary schools, three secondary schools, and one kindergarten to grade 12 French Language School. Like all schools in Yukon, the curriculum is based on BC Ministry of Education curriculum, and students are eligible to write BC departmental exams. As of 2011, total primary and secondary enrolment in Whitehorse schools was 4,100 students and capacity for students in Whitehorse is not identified as being a constraint as there has been declining enrolment (Yukon Department of Education 2013).

17.3.3.3 Selkirk First Nation / Pelly Crossing

There is one school in Pelly Crossing. The Eliza Van Bibber School offers education from kindergarten to grade 12. According to the school's website, overall student enrolment is at 65 for 2012, with professional staff numbering 15.

The Pelly Crossing Yukon College campus is located in SFN's previous administration office and was constructed in 2011. The cost of the building was approximately \$1.4 million and was funded by the federal government (Yukon College 2012). The facility offers three classroom spaces, with capacity for 12 to 15 students per

classroom, as well as office space. Representatives from Yukon College estimated that there is capacity to teach nearly 400 students per year (three to four classes per day in addition to the potential for weekend classes).

The campus at Pelly Crossing has a Northern Tutchone name, Hets'edan ku', which means "learning house." Staff at Hets'edan ku', in partnership with SFN, offer programming that is locally relevant (SFN 2012). In addition, courses are available through video-conferencing and include credentialed courses such as early childhood education, accounting, or academic upgrading.

17.3.3.4 Little Salmon/Carmacks First Nation and Carmacks

The Tantalus School in Carmacks offers education from kindergarten to grade 12. School amenities include a gymnasium, library, and computer lab. According to the school's website, student enrolment for 2012 exceeds 104 students. Approximately 98% of students are of First Nation Ancestry (Tantalus 2011, 2013, pers. comm.). The school employs nine teachers, two educational assistants, two learning assistant teachers, two administrative assistants, and a principal (Tantalus 2013, pers. comm.).

School programs reflect the Northern Tutchone values and follow the BC curriculum and BC exams. Currently the school has 5 to 10 graduates per year. School representatives noted that most students who complete grade nine are very likely to graduate. Representatives also noted that the school can accommodate considerably more students, in particular, in the kindergarten and high school programs. Currently there are 35 students in high school, but it could easily enrol up to 150 to 175 students (Tantalus 2013, pers. comm.). The school has a new building and is undergoing additional renovations, including adding another classroom.

Yukon College also has a campus in the Village of Carmacks, providing adult education programs to the community. The local campus staff work with the LSCFN, developing and delivering training courses and programs designed to enhance local administrative capacity. Other programs at the campus include academic upgrading, employability skills, craft and small business, computer skills, first aid, accounting, pre-trades and trades, and youth employment training.

17.3.4 Health and Social Services

17.3.4.1 Yukon

Health services in the Yukon are delivered and administered out of Whitehorse General Hospital (WGH). The hospital serves as a regional referral center for the Yukon and serves the rural nursing stations through a system of ground and air ambulance as well as other communication means such as tele-medicine.

The sustainability of Yukon's health care system appears to be a concern. A recent health care review commissioned by the Premier and the Minister of Health found that Yukon residents believe the quality of health care in the Yukon is being jeopardized by such issues as extended wait times; a lack of family doctors; inadequate access to long-term, palliative and home care; fraudulent use of Yukon's health care system; limited substance abuse treatment and programming; patient transport issues; limited mental health services; and lack of prevention programs and human resources in communities (Yukon Health Care Review Committee 2008).

17.3.4.2 Whitehorse

A full range of health care services is available in Whitehorse, including services provided by WGH (e.g., medical daycare, visiting clinics for specialist doctors, gynaecology, medical imaging, cancer care and chemotherapy, and emergency clinic care) (WGH 2012, pers. comm.). Fifteen visiting specialist physicians provide clinic services such as ophthalmology, orthopaedics, and ear, nose, and throat on a regular basis. First Nations Health

Programs are also provided at the hospital, and they aim to provide care that is culturally sensitive. Dentists' services are readily available, as is a full-time ambulance service. There are also three extended-care facilities, seniors' housing, and a senior citizens' centre. In addition, there are a number of family doctors and four walk-in clinics available (WGH 2012, pers. comm.).

Whitehorse General Hospital has an average annual operating budget of \$70 million, providing approximately 55 beds with a staff of 111 nurses. Representatives from WGH noted that there is an average of 100 patients per day visiting the emergency room (WGH 2012, pers. comm.). Expansion plans to increase the size of the emergency department and add an additional 10 beds were approved in 2013 and are expected to be completed by 2020 (Sapronak 2013, pers. comm.).

Whitehorse General Hospital provides maternity care as well. Whitehorse General Hospital representatives noted that in 2011 there were 420 births at the hospital. It is expected that this number will continue to grow (WGH 2012 pers. comm.); however, high-risk pregnancies are not accommodated at the hospital and are transferred out to hospitals in larger centres in British Columbia and Alberta.

In addition to WGH, Whitehorse also has several private medical dental and optometry clinics available throughout the city.

The Yukon Family Services Association and the Yukon Housing Corporation provide services from their main offices in Whitehorse, and the Yukon Government Health and Social Services department provides a range of services in the Whitehorse area. A women's transition house, Kaushee's Place, provides emergency shelter as well as longer-term housing assistance and counselling services.

The Kwanlin Dun First Nation and Ta'an Kwach'an Council provide a range of social services to their members, including social assistance and elder care.

17.3.4.3 Selkirk First Nation / Pelly Crossing

Pelly Crossing has a local community health centre with regular hours from Monday to Friday, as well as a 24-hour emergency service. An informal discussion was held in the early summer of 2012 regarding the temporary nurse who is stationed at the health centre, and additional discussions about Pelly Crossing's nursing support continued in 2013. To date, the following aspects about the community health centre have been noted:

- There has been no permanent nurse based in the community, with staffing provided by temporary staff who work under contract and who temporarily live in the community for the duration of their contract;
- The operational hours were respected by the community members and there was a positive relationship with the health staff;
- Specialist services are provided on an infrequent basis by doctors or other health providers who periodically visit the community;
- The ability exists to obtain remote, real-time medical advice by contacting staff in Whitehorse; and
- Patients in need of emergency care are transported to hospitals either by ambulance or aircraft from the local airstrip.

There is one social worker in town that is stationed at the SFN office while a Yukon Government employee provides health and social services on a half-time basis (the health and social services worker divides her time between Pelly Crossing and Mayo).

A representative from the Yukon Government Health and Social Services department was interviewed regarding services available in Pelly Crossing. Services provided by the Yukon Government include child welfare (e.g., responses to reports of child abuse or neglect), foster home services, family support services, social assistance (assessments for benefits), youth justice–related services, youth probation services, and adult protection–related services (Government of Yukon Health and Social Services 2012, pers. comm.).

The SFN Department of Health and Social Programs provide services to members in the areas of social assistance, recreation, community wellness, and elder home care and benefits. Programs offered are tailored to expecting parents, elders, students, and youth. Native court worker services are administered through the Northern Tutchone Council in Pelly Crossing.

Representatives noted that a hospital is being constructed in Dawson City and was set to open in April 2013 (WGH 2012), though this has been delayed until the December 2013. It is likely that residents of Pelly Crossing would receive emergency services at the hospital in Dawson City, once it is open.

17.3.4.4 Little Salmon/Carmacks First Nation and Carmacks

The Village of Carmacks offers a community health centre that operates from Monday to Friday, 8:00 a.m. to 4:30 p.m. The centre also provides after-hours emergency service and ambulance dispatch. Occasionally, dental clinics are offered by dentists from Whitehorse (Village of Carmacks 2013 pers. comm.). A visit to the health centre and interviews with key representatives during 2012 and 2013 reveal the following aspects about the community health centre (ibid):

- The current health centre is not large enough to accommodate the Village of Carmacks. The centre has two exam rooms: one can be used for trauma as required and only one room is available to see patients. The centre also has an x-ray machine, a laboratory, and a pharmacy. Each room has cameras that allow conferencing with doctors in Whitehorse.
- The centre has two nurses stationed in the community and is currently lobbying to have a third nurse. It was noted that staffing for community centres in Pelly Crossing and Carmacks are lower than in other Yukon communities such as Mayo or Faro with comparable populations.
- Major health concerns in the community include diabetes, high blood pressure, and injuries from motor vehicle accidents.
- The centre offers specialized programming for women such as the Well Woman Program (provides preventative health screening services to women) and pre-natal care.
- The Minto Mine is more likely to use the Carmacks health centre to treat injuries than the centre in Pelly Crossing.

Other community social services include Yukon Health and Social Services social workers (estimated to be three staff committed to this community as of 2013), a Yukon Housing Corporation part-time office, a safe house for women and children, and a daycare centre. The Yukon Family Services Association provides itinerant services from its Whitehorse office. Probation services are also provided from Whitehorse. The types of services provided in Carmacks from Yukon Health and Social Services include child welfare (e.g., responses to reports of child abuse or neglect), foster home services, family support services, social assistance (assessments for benefits), youth justice–related services, youth probation services, and adult protection–related services (Health and Social Services 2012, pers. comm.).

Little Salmon/Carmacks First Nation also offers social services to its members, including counselling, social assistance, adult care, and homecare, and the Yukon Health and Social Services department is currently looking for opportunities to partner with LSCFN in Carmacks (Health and Social Services 2012, pers. comm.). Native court worker services are administered through the Northern Tutchone Council in Pelly Crossing.

In 2007, the Integrated Community Sustainability Plan (ICSP) noted the health and social service building was too small to meet the needs of the First Nation community. Aspects of the services provided require a degree of privacy that was difficult to accommodate in the building. A newly constructed community health and social service building has been recently opened. Staffing and staff continuity were also noted as an issue. The report identified a need for more family support workers to relieve some of the burden on the current social workers and families under care by providing a respite during stressful times.

It is likely that residents of Carmacks would also receive emergency services at the new regional hospital in Dawson City, once it is open.

17.3.5 Protective Services

17.3.5.1 Yukon

The Yukon headquarters of the RCMP operates in Whitehorse and provides policing with approximately 40 officers, including an inspector and First Nation community constables. An aircraft section of the RCMP, based out of Whitehorse, has one aircraft. The RCMP also has a satellite office in McIntyre subdivision. Services provided by the RCMP include:

- Community policing;
- Prevention and enforcement of criminal activity that involves violent, criminal, or property crime;
- Volunteer victim's assistance programs;
- Awareness training in schools to prevent drug and alcohol abuse; and
- Basic policing services (Whitehorse RCMP 2012, pers. comm.).

Probation services are provided in Whitehorse, which is also the location for Yukon's main correctional centre, a secure facility for young offenders, and a halfway house.

The Yukon Workers' Compensation Health and Safety Board (YWCHSB) administers workers' compensation and occupational health and safety in Yukon. The organization promotes safety awareness, provides training and education, and conducts inspections, compliance, and investigations.

17.3.5.2 Whitehorse

Key issues in the city include family violence, drug and alcohol abuse, mischief, and petty crime (Whitehorse RCMP 2012, pers. comm.). These issues were not limited to any particular ethnic or age group, but criminal activity was noted to increase in the summer due to a rise in activity resulting from increased tourism.

The City of Whitehorse has a fire department staffed by a chief, 20 full-time employees, and approximately 30 volunteer firefighters. The fire department operates 24 hours a day from two well-equipped fire halls. The fire department responds to approximately 500 to 600 incidents per year, which averages out to 5 to 10 calls per week and fluctuates throughout the year (Whitehorse Fire Department 2013). The fire department is not running at capacity and can accommodate moderate population growth (ibid).

The fire department provides fire suppression, rescue, hazardous material response and fire prevention, and public education services to the community:

A 911 service is available in Whitehorse and surrounding areas to respond to emergency police, fire, and ambulance situations in the city and surrounding community.

Table 17.3-3 summarizes the RCMP and fire services available in Pelly Crossing, Carmacks and Whitehorse.

Table 17.3-3: RCMP and Fire Protection Services in the LSA communities

Community	No. of RCMP Staff	Fire Department	
		No. of Firefighters	Average No. of Calls per Year
Pelly Crossing	1 corporal and 2 constables	1 fire chief and 6 volunteers	Not available
Carmacks	1 sergeant and 2 constables	10 volunteers	Not available
Whitehorse	40 officers, including 1 inspector and First Nation community constables	1 fire chief, 20 full-time employees, and approximately 30 volunteers	500–600

Source: Whitehorse RCMP 2012; Whitehorse Fire Department 2013, pers. comm.

17.3.5.3 Selkirk First Nation / Pelly Crossing

In terms of protective services, the RCMP operates a detachment in Pelly Crossing, which is staffed by a corporal and two constables. Probation officer and native court worker services are provided from Mayo. A chief and six volunteers provide fire department services.

17.3.5.4 Little Salmon/Carmacks First Nation and Carmacks

Responsibility for protective services and policing in Carmacks is provided by one sergeant and two constables out of the local RCMP detachment. Probation services are delivered from Whitehorse, and fire and ambulance services are provided through a volunteer service. There are 10 volunteer firefighters in the community, and known challenges include finding volunteers, retention, and training (Village of Carmacks 2013, pers. comm.). Community representatives noted that search and rescue services are disorganized. Volunteers lack of appropriate training and there are concerns over liability (EMR 2013, pers. comm.).

Public safety concerns mentioned in the ICSP for Carmacks include the lack of a street numbering system and pedestrian movement along the Klondike Highway and across both bridges (Inukshuk 2007).

The Wildland Fire Management Division of the Department of Community Services provides wildfire management services. Pelly Crossing and Carmacks are served by the Tatchun Regional Fire Management Area. The division has 11 staff in Carmacks (only 1 permanent) and 3 staff in Pelly Crossing. Most positions are seasonally filled through 4–6-month contracts that run from May to August or April to September. The division mandate is to protect the communities, and it is heading towards an all-risk protection strategy that also includes flood management and other community protection services (Wildland Fire Management 2013, pers. comm.).

17.3.6 Transportation

17.3.6.1 Highways

There are 12 primary highway routes in Yukon, totalling 2,027 km of core, northern, and remote networks (Transport Canada 2008, Government of Yukon 2009). The Klondike Highway (Highway 2) and the Alaska

Highway (Highway 1) are most closely associated with the LSA and RSA (Government of Yukon's Department of Highways and Public Works 2012, pers. comm.). Approximately 1,900 km of roads in Yukon have a bituminous surface treatment, as an inexpensive sealed surface alternative to asphalt. Bituminous surface treatment is used as an asphalt replacement for general road repairs and has been utilized since the 1970s in Yukon due to its ease of use and the road system's frequent need of maintenance caused by annual freeze / thaw damage (Government of Yukon's Department of Highways and Public 2008).

Because much of the Yukon highway system is exposed to extreme freezing and thawing episodes throughout the year, roadways are subject to more damage from truck traffic than normal paved roads. As a result, the Yukon Government imposes seasonal weight restrictions on highway traffic in the spring when the frost is coming out of highways and other public roads. Weight restrictions to 75% of maximum legal weight (63.5 tonnes) are typically in effect from the second week in April to second week in May on the Klondike and Alaska Highways; these dates are variable depending on weather conditions and are set by Highways and Public Works each year. However, it is possible to secure a special bulk commodity permit for heavy haul vehicles throughout the year and during the weight restriction period to enable the carrier to increase the maximum gross weight of the (ALCAN RailLink Inc. 2008).

The Klondike Highway runs south–north, from the BC border south of Carcross to Dawson City, and is approximately 630 km long. South of Carcross, the highway passes through a small section of BC before entering Alaska via Highway 9 that ends at the Port of Skagway. The road distance from Skagway to Carmacks is approximately 356 km.

In 2011, sections of the Klondike Highway experienced an annual average daily traffic (AADT) volume ranging from 241 vehicles at the US border crossing near Skagway to 2,045 vehicles near Whitehorse and to 625 vehicles near Carmacks. The average summer daily traffic (ASDT) volumes at these locations increased to 477, 2,550, and 425 vehicles respectively (Government of Yukon's Department of Highways and Public Works 2011).

The Yukon Department of Highways and Public Works has indicated that the Klondike Highway is currently in good condition and no upgrades are planned because traffic volumes are well below the design capacity of this highway. The design capacity of the highway is 1,500 vehicles per hour per lane but the capacity can range from 1,200 to 1,800 vehicles per hour per lane depending on road geometry, terrain, and other factors (Government of Yukon's Department of Highways and Public Works 2012, pers. comm.).

The Alaska Highway runs east–west from Watson Lake, through Whitehorse, west to Haines Junction, and then northwest into Alaska. East of Watson Lake the Alaska Highway enters BC and becomes Highway 97. The first major community in BC on Highway 97 is Fort Nelson.

In 2011, AADT volumes on the Alaska Highway (Highway 1) ranged from 561 vehicles at Watson Lake to 2,045 vehicles near Whitehorse. ASDT volumes increased to 786 and 2,550 at these locations on the Alaska Highway (Government of Yukon's Department of Highways and Public Works 2011).

As is the case with the Klondike Highway, the design capacity of Highway 1 is 1,500 vehicles per hour per lane but can range from 1,200 to 1,800 vehicles per hour per lane depending on road geometry, terrain, and other factors (TRB 2010). Sources with the Yukon Department of Highways and Public Works indicate that the Alaska Highway is in good condition but there will be upgrades in 2013.

17.3.6.2 Freegold Road

The Freegold Road is a two-lane gravel resource access road that extends approximately 83 km west from the Village of Carmacks. It was developed in the late 1970s by the Yukon Government as part of the Access to Resources Yukon initiative.

In 2008, a pneumatic counter placed at Kilometre 0 on the Freegold Road near Carmacks recorded average daily traffic of 26 vehicles but traffic on the road largely occurred during the period from April to October. Short-term traffic counters placed on the road during summer months in prior years recorded average daily traffic that ranged from 11 vehicles to 41 vehicles (Government of Yukon's Department of Highways and Public Works 2008).

In 2012, the condition of the Freegold Road was reported to be poor and only suitable for exploration-type projects with low intensity and low activity on the road (Government of Yukon's Department of Highways and Public Works 2012, pers. comm.).

17.3.6.3 Commercial Trucking / Hauling

At least 30 commercial trucking companies serve Yukon, providing ground transport and logistics services throughout the territory and other parts of Canada. The majority of companies are based out of Whitehorse and provide truck freight, bus, dump truck, food transport, towing, or specialized services such as heavy equipment moving. In order to ship goods within or outside of Yukon a Freight Vehicle pass is required from the Yukon Department of Highways and Public Works.

17.3.6.4 Air

Yukon's airport infrastructure includes 29 landing strips of which 16 are classified as aerodromes. There is one international, three regional, and nine community airports operated by the Yukon Government (Department of Highways and Public Works 2008c, Transport Canada 2008). The majority of airstrips in Yukon are gravel surfaced.

The Erik Nielsen International Airport at Whitehorse is the largest airport and the primary air transportation hub in Yukon. It has three asphalt runways (548 m, 1,225 m, and 2,896 m long) that are equipped for aircraft instrument approach. The original airport terminal built in 1920 was replaced in 1985 and further expanded in 2012. The airport can accommodate up to 280 passengers at peak volume times (Government of Yukon 2013).

Between 1987 and 2012 the annual total of air passengers using the airport increased from 110,000 to 295,000 respectively (Seaman 2013, pers. comm.). In 2012 the airport handled 19,711 aircraft movements (flights from one airport to another) compared to air traffic volumes of 17,312 in 2009 and 22,810 in 2011.

Air services provided out of the Whitehorse airport includes commercial passenger and cargo services to major urban centres beyond Yukon and passenger, freight, and charter services to regional and community airstrips within Yukon. Commercial air carriers with scheduled service to Whitehorse from Vancouver, Calgary, Edmonton, Dawson City, and Kelowna include Air Canada, and Air North. Seasonal flights are provided by Condor, West Jet, and Air North to such destinations as Frankfurt, Mexico, and Las Vegas.

There is a community airstrip at Carmacks (EX4) and four other airstrips located near the Project area between Carmacks and Mayo: McQuesten (FP4), Minto (no indicator), Pelly Crossing (FQ6), and Ft. Selkirk (no indicator).

There is a small airstrip at the Casino mine site that will be replaced during Project construction with a larger airstrip. It will have a 1,600 m gravel runway with 60 m overruns at either end. The airstrip is designed to accommodate a Hawker-Sidley HS 748 turbo-prop aircraft and/or a Bombardier Dash 8-100 or 200 turbo-prop

aircraft. The Hawker-Sidley aircraft can be configured to carry 48–56 passengers while the Bombardier Dash 8-100 or 200 have 37–39 seats.

The new airstrip engineering and design will conform to the most current version of the Transport Canada Aerodrome Standards and Recommended Practices (TP 312).

17.3.6.5 Port Facilities

The Port of Skagway has been used as the main industrial ocean shipping point for Yukon industries since the late 1960s. Starting in the 1990s, Skagway has catered to the cruise ship tourism business.

The Port of Skagway includes:

- A deep water port with year-round ice-free docking facilities;
- Nahku Ore Terminal – a barge dock with about 1,114 m² of open storage space;
- Ore dock – 487 m in length for barges transporting ore and bulk fuel;
- AML barge dock – for weekly resupply barge service from Seattle;
- White Pass railroad dock – 538 m in length to accommodate two large cruise ships at one time;
- Broadway dock – 198 m in length for small cruise ship and timber hauling vessels; and
- Petro Marine Bulk Fuel Storage – 24.2 MM litres of storage tankage for petroleum products.

The port has historically exported up to 600,000 tonnes annually of lead and zinc concentrates to other locations on the west coast and Asia. Currently, the port exports copper concentrates from Capstone Mining, Minto operation. It is also the primary point for inbound marine freight and fuel for Yukon. The current port infrastructure has the capacity to export up to 3 million tonnes of mineral concentrates and coal per year.

The Yukon Government considers Skagway the most viable option for port re-development, given its existing infrastructure and ability to handle moderate traffic (KPMG LLP and Gartner Lee 2006).

Skagway is connected to BC and Yukon by Highway 9 in Alaska and the Klondike Highway (Highway 2) in BC and Yukon, starting at the US/Canadian border crossing.

17.4 PROJECT-SPECIFIC EFFECTS

17.4.1 Project Interactions and Potential Effects

Table 17.4-1 shows potential interactions between the Project components and activities (as defined in Section 4) and the Community Infrastructure and Services VC. The identified interactions warrant further analysis because they may result in positive or negative effects on local infrastructure and services during the Project life. These potential effects are evaluated and describe in subsequent sections.

Project components that may affect directly or indirectly this VC during the mine construction, operations, and closure and decommissioning phases include:

- Mine Staffing;
- Contracted Employment;
- Freegold Road Upgrade;

- Freegold Road Extension;
- Traffic (equipment and materials to site); and
- Mine Development.

These Project components are expected to interact with the Infrastructure and Services VC through two mechanisms: population changes and traffic changes and project activities.

Project Employment Demands and Related Population Changes

The Project will result in considerable direct employment as well as contracted employment, which could cause population changes on the local communities (e.g., encourage an influx of new residents into local communities). This increase in population will, in turn, increase demand for local infrastructure and services. The Project population effects would depend on whether Project-related jobs are filled by residents or by non-residents, and on whether non-residents relocate to the area or commute to work. This will also depend on the current capacity of the local infrastructure and services and their ability to handle increasing demands. Some out-migration is anticipated following a decline in employment opportunities, specifically towards the end of operations and during decommissioning and closure, which would decrease the demand for local infrastructure and services.

Traffic Changes

The transportation of equipment, supplies, materials, consumables, mine products, and labour will be an essential component throughout all phases of the proposed Project, and this activity will directly interact with the regional transportation infrastructure. Transportation activities will create additional vehicle traffic and workforce traffic and additional demand on transportation infrastructure.

Mine Development and Project Activities

Accidents at worksite could increase demand for regional health services and interact with regional infrastructure and services.

Freegold Road Extension and Upgrade

The Project includes upgrading the existing 83 km Freegold Road and construction of the Freegold Road Extension for approximately 120 km southeast from the Project to the existing Freegold Road, which extends to the village of Carmacks. This component was identified because the upgrade and extension will create additional infrastructure. The extension will be a controlled access resource road, in which use is carefully controlled by CMC. Some projects may have right of access that predates this road.

Table 17.4-1: Potential Interactions between the Project and Community Infrastructure and Services

Project Components and Activities	Project Phase¹ (C, O, CD, PC)	Potential Interaction	Mechanism of Interaction (or Rationale for No Interaction)
Accommodations (Construction and Mine Staffing)	C, O, CD,	No	No specific interaction with this socio-economic VC
Aggregate sources / Borrow Sites	C,	No	No specific interaction with this socio-economic VC
Airstrip and Airstrip Access Road	C, O, CD,	No	No specific interaction with this socio-economic VC
Ancillary Buildings (Explosives Storage, Security Shed, Truck Shop etc.)	C, O,	No	No specific interaction with this socio-economic VC
Concentrate Transport and Loading	O,	No	No specific interaction with this socio-economic VC
Concrete Batch Plant Operation	C, O,	No	No specific interaction with this socio-economic VC
Contracted Employment	C, O, CD,	Yes	Proposed Project employment would encourage in-migration, which would in turn create demands on community infrastructure and services in the region.
Cyclone Sand Plant	C, O,	No	No specific interaction with this socio-economic VC
Dismantling of Facilities	CD,	No	No specific interaction with this socio-economic VC
Diversion of Canadian Creek	C, O,	No	No specific interaction with this socio-economic VC
Drilling and Blasting	C, O,	No	No specific interaction with this socio-economic VC
Fish Habitat Compensation Construction	C, O,	No	No specific interaction with this socio-economic VC
Freegold Road Extension	C, O, CD,	Yes	Improved access to the area for CMC. Other potential industrial users will be limited by the road being private and access controlled.
Freegold Road Upgrade	C, O, CD,	Yes	Improved access to the area from CMC and other users
Fuel Storage and Distribution System	C, O,	No	No specific interaction with this socio-economic VC
Gold Extraction Plant / Oxide Ore Processing	C, O,	No	No specific interaction with this socio-economic VC
Ground Preparation Activities (e.g. cut, fill, grub, etc.)	C,	No	No specific interaction with this socio-economic VC
Hazardous Materials Storage, Transport, and Disposal	C, O,	No	No specific interaction with this socio-economic VC

Project Components and Activities	Project Phase¹ (C, O, CD, PC)	Potential Interaction	Mechanism of Interaction (or Rationale for No Interaction)
Heap Leach Facility	C, O,	No	No specific interaction with this socio-economic VC
Heap Leach Pad	C, O,	No	No specific interaction with this socio-economic VC
Laydown Areas	C, O,	No	No specific interaction with this socio-economic VC
LNG Transport to site	C, O,	No	No specific interaction with this socio-economic VC
Main and Supplemental Power Plant (Gas Turbine and Diesel)	C, O,	No	No specific interaction with this socio-economic VC
Maximum Disturbance Area	C, O, CD,	No	No specific interaction with this socio-economic VC
Mine Development	C, O, CD,	Yes	Accidents at worksite could increase demand for regional health services.
Mine Staffing	C, O, CD,	Yes	Proposed Project employment would encourage in-migration, which would in turn create demands on community infrastructure and services in the region.
On-site Equipment and Vehicle Use	C, O, CD,	No	No specific interaction with this socio-economic VC
Open Pit Mining	C, O,	No	No specific interaction with this socio-economic VC
Ore Conveyors	C, O,	No	No specific interaction with this socio-economic VC
Ore Crushing	C, O,	No	No specific interaction with this socio-economic VC
Ore Hauling	C, O,	No	No specific interaction with this socio-economic VC
Ore Stockpiles	C, O,	No	No specific interaction with this socio-economic VC
Processing Facilities for Sulphide Ore	O,	No	No specific interaction with this socio-economic VC
Reagent Storage and Distribution	C, O,	No	No specific interaction with this socio-economic VC
Site Reclamation / Re-Vegetation	O, CD,	No	No specific interaction with this socio-economic VC
Site Security and Fencing	C, O, CD,	No	No specific interaction with this socio-economic VC
Surface Water Management (Contact Water)	C, O, CD,	No	No specific interaction with this socio-economic VC
Surface Water Management (Non-Contact Water)	C, O, CD,	No	No specific interaction with this socio-economic VC

Project Components and Activities	Project Phase ¹ (C, O, CD, PC)	Potential Interaction	Mechanism of Interaction (or Rationale for No Interaction)
Tailings Management Facility	C, O, CD,	No	No specific interaction with this socio-economic VC
Topsoil Stockpiles	C, O,	No	No specific interaction with this socio-economic VC
Traffic (Equipment and Materials to Site)	C, O, CD,	Yes	Transportation of workers, equipment, services, and materials to and from mine site will create additional vehicle traffic and workforce traffic and additional demand on transportation infrastructure.
Waste management: garbage and sewage waste facilities	C, O,	No	No specific interaction with this socio-economic VC
Waste Rock and Overburden Disposal	C, O,	No	No specific interaction with this socio-economic VC
Water Supply	C, O, CD, PC	No	No specific interaction with this socio-economic VC

Note:

1. C (Construction), O (Operation), CD (Closure and Decommissioning) and PC (Post-Closure) represent the Project phases when the potential interaction between the Project and valued component is anticipated to occur.
2. Potential mechanism(s) of interaction between the Project components and activities and the valued component are carried forward into the assessment by characterizing the potential effect(s).

The population assessment examined how the proposed Project will add to the existing and future expected population in the LSA. Non-residents who relocate to the LSA will create a population effect and by extension, increase the demand on Community Infrastructure and Services. Whether it is new home construction, rental activity or temporary accommodations in hotels, motels or recreational vehicle / camp sites, these new residents will require utilities, communication services, and recreation facilities.

As discussed in Section 16.4, the influx of people (due to direct or indirect effects) from outside the LSA is expected to be gradual and will begin during the construction phase. The rate of population growth within the LSA peaks in 2017 at 0.6% and declines thereafter to 0.0% from 2022 onward. Total change in population from all Project effects is estimated at 645 (or 248 families) by 2024. These effects are expected to decline and eventually turn negative as closure approaches and employment and income returns to baseline conditions.

Whitehorse is anticipated to receive the majority of migrants (96 of total migrants) due to its wider range of services and facilities and broader housing supply than any other community in the LSA. The city offers a full range of urban amenities and is the centre for health, education, transportation, shopping, and business in Yukon. It is estimated that up to 619 individuals (or 238 families) would relocate to Whitehorse. This would represent 2.0% of its projected population.

Pelly Crossing is anticipated to receive 1.7% of migrants or 11 individuals, which represents 2.9% of its projected population, while Carmacks would receive 2.4% of migrants (or 16 individuals), which represents 2.6% of its projected population.

There will be a limited increase in the demand for regional infrastructure associated with the increase in population due to in-migration of non-resident workers and their families. This demand will begin with the onset of construction; it will increase gradually and stabilize by the end of 2024. While there will be an adjustment period

between the second year of construction and the beginning of operations, demand will essentially remain continuous until the end of operations. At closure and decommissioning, there may be some drop-off in population and demand as conditions return toward the base case.

At the end of operations, some out-migration of operation workers and their families is expected. It is difficult to determine the magnitude of the population outflow, since this decision depends on the regional work opportunities available at the time of closure and personal and family interests. Project-related improvements to worker skills and experience will provide residents of the LSA with opportunities to pursue higher-paying jobs in the mining industry or transfer their skills to other industries. Casino Mining Corporation is committed to developing a Mine Closure Plan, which may include ongoing investment in workers to enhance employability and to help workers find new employment in the mining industry after production ends. Casino Mining Corporation will work with local service providers to incorporate decline in population in planning.

In general, effects are negative when reflecting increases in demand for a range of local infrastructure and services and positive when this demand declines. An increase in demand is predicted to be adverse mainly because of the strain that is expected to be placed on existing infrastructure, services, programs, and government resources. The additional demand has the potential to create congestion in public infrastructure and services. However, this would depend on the current excess capacity of the services and on the ability of expanding the supply of those services.

The LSA communities and, in particular, Whitehorse have a good capacity of infrastructure and services and approved expansion plans (Section 17.3) that can easily accommodate the potential additional demands created by the arrival of 645 people (619 people to Whitehorse, 16 to Carmacks, and 11 to Pelly Crossing). This population increase would represent 0.6% of the total LSA population. Attracting and retaining skilled residents has been identified as a priority of Yukon and local governments (Yukon Economic Development 2011, Village of Carmacks 2006). The magnitude of effects is low and represents a small change in each community population.

There will be an increase in demand for housing (238 families in Whitehorse, six families in Carmacks, and four families in Pelly Crossing). While vacancy rates are currently low, the availability of developed lots in Whitehorse and Carmacks and the ability to service and build based on demand in Pelly Crossing indicate that there is the existing potential to increase housing and rental accommodation. In Whitehorse, this is demonstrated by developers purchasing serviced lots in developments such as Whistle Bend. The duration of the YESAB review process, coupled with the duration of Project construction, allows the market to anticipate and position itself to accommodate additional families in Yukon. While there have been smaller mines developed, Casino is unique in the large scale of the mine and the mine life. Coupled with the emphasis on hiring local staff and encouraging staff to relocate to the Yukon, this suggests that no long-term significant effects are expected in housing prices or rents in the communities.

The transportation of equipment, goods, services, and workers to and from the mine would place demands on the regional transportation network. Construction at the proposed mine site and extension of the Freegold Road will require delivery of a range of freight, including construction equipment, permanent mining equipment, camp-related buildings, fuel and lubricants, and a range of materials, e.g., structural steel, pipe, concrete, gravel, aggregate, and mechanical products.

Over the four-year construction period, the average daily number of vehicles (all types and sizes) making return trips to the mine site via the Klondike Highway and the upgraded Freegold Road and Extension will increase from four in the first year of construction to 18 in the second year to 28 in the third and fourth years. Heavy trucks including Tridem trucks and B-Train Doubles will make up 85% of the average daily traffic in Year 1, about 52% in Year 2 and Year 3, and 37% in Year 4. Light vehicles include cars and light trucks with up to 10 ton capacity.

Peak traffic may approach 200%–250% of the average daily return trips; however, this will occur only for limited durations.

Annual daily vehicle return trips to the mine site via the Klondike Highway and the Freegold Road Extension, including light traffic, is estimated at 56 inbound loads per day, 68 outbound loads per day, and 72 outbound loads during peak periods (note that these numbers are referring to the number of loads, not vehicles; some trucks may return empty and are therefore not counted as a load). Buses, vans, and light trucks account for 20 inbound and outbound vehicles per day or 36% of the inbound loads and 29% of the outbound loads. Heavy trucks are primarily Tridem trucks and double trailer trucks.

Traffic estimates during decommissioning and closure have not been calculated because they will be well within the baseline traffic range on the Klondike Highway. Mine-related traffic during the post-closure phase would be undetectable. See Table 17.4-2 for more details on potential effects on Community Infrastructure and Services per Project phase.

Table 17.4-2: Potential Effects on Community Infrastructure and Services

Mechanism of Interaction	Key Indicator(s)	Project Phase (C, O, CD, PC)	Potential Effect	Direction
Construction and Operation Phases				
Project Employment Demands and Related Population Changes	Municipal Infrastructure: water supply water/sewage treatment landfills power supply recreational facilities	C,O, CD	Population change will alter demand for municipal infrastructure. The arrival of up to 248 families or 645 people (619 to Whitehorse, 16 to Carmacks, 11 to Pelly Crossing) to the LSA will create additional demand on municipal infrastructure.	Adverse
Project Employment Demands and Related Population Changes	Housing and Temporary Accommodation	C, O, CD	The arrival of up to 248 families or 645 people (619 to Whitehorse, 16 to Carmacks, 11 to Pelly Crossing) to the LSA will create additional demand on housing and temporary accommodation.	Adverse
Project Employment Demands and Related Population Changes	Education Services	C, O, CD	Project hiring requirements will increase incentive for educational attainment, which in turn will increase demand for education training services (college education, training programs, apprenticeship programs, etc.). The arrival of up to 248 families or 645 people (619 to Whitehorse, 16 to Carmacks, 11 to Pelly Crossing) to the LSA will create additional demand both for schools and higher education services. If 16% of in-migrants are below 15 years of age based on existing Canadian trends, approximately 103 additional children will be requiring primary and secondary education.	Adverse / Beneficial
Project Employment Demands and Related Population Changes	Health and Social Services	C, O, CD	The arrival of up to 248 families or 645 people (619 to Whitehorse, 16 to Carmacks, 11 to Pelly Crossing) to the LSA will create additional demand on health and social services.	Adverse

Mechanism of Interaction	Key Indicator(s)	Project Phase (C, O, CD, PC)	Potential Effect	Direction
Construction and Operation Phases				
Mine Development and Activities	Health and Social Services	C, O, CD	Accidents at worksite could increase demand for regional health services.	Adverse
Project Employment Demands and Related Population Changes	Protective Services	C, O, CD	The arrival of up to 248 families or 645 people (619 to Whitehorse, 16 to Carmacks, 11 to Pelly Crossing) to the LSA will create additional demand on protective services.	Adverse
Transportation of Workers, Equipment, Services and Materials to and from Mine Site	Transportation; Health and Social Services; Protective Services	C, O, CD	<p>Transport of, equipment, services, and materials will increase road traffic and the risk for motor vehicle collisions on the Klondike Highway and Freegold Road that provide access to the mine.</p> <p>Increase in Project-related traffic could create increased demand on first responders (RCMP, fire department, ambulance) along the access route and health services due to potential increase in motor vehicle accidents.</p> <p>Trucking of supplies and consumables to mine will increase risk of spill of non-hazardous and hazardous materials.</p> <p>Project-related traffic could result in increased road wear and maintenance on the Klondike Highway and Freegold Road that provide access to the mine.</p> <p>The arrival of workers to the LSA will create an increase in air passenger volumes and demands on air transportation infrastructure.</p>	Adverse
Freegold Road Upgrade and Extension	Transportation	C, O, CD	Road extension and upgrades will improve transportation infrastructure for CMC.	Beneficial

Note:

1. Key indicators are defined as measurable parameters or attributes to qualitatively or quantitatively evaluate the potential effect.
2. C (Construction), O (Operation), CD (Closure and Decommissioning) and PC (Post-Closure) represent the Project phases when the potential interaction between the Project and valued component is anticipated to occur.

17.4.2 Identification of Mitigation Measures and Potential Residual Effects

Discussion of appropriate mitigation measures is a shared responsibility between the Proponent, the government, and the public. Governments are responsible for planning and implementing social programs and delivering public services that address social effects concerns. Individuals and families must make lifestyle decisions that are consistent with enhanced social circumstances. The Proponent needs to fulfill its commitments in hiring from within Yukon and providing competitive work packages and training when relevant. As a result, all these parties must share responsibility for social effects management for it to be effective.

Mitigation and enhancement measures that CMC identified in order to reduce potential Project's effects on Community Infrastructure and Services in the LSA include the following:

- Local fresh water supply, sewage treatment plant, and power supply will be provided at the mine site. Potable water will be sourced from groundwater wells at the mine site. The Project Water Management Plan contains detailed information on the overall mine site water management approach. A permanent waste management facility will be established at the mine site during the construction phase. The pioneer accommodation camp and surface facilities on site will be serviced by the Supplementary Power Plant located at the accommodation camp. The pioneer camp will have indoor and outdoor recreation services.
- All construction and operation activities will follow best practices and are outlined in CMC's Environmental Health and Safety (EHS) Management System. CMC will provide, at the site and the camp, health and medical equipment and personnel and will make arrangements to med-evac workers with life-threatening illnesses or injuries to the nearest appropriate facility within the LSA.
- Casino Mining Corporation will work closely on an ongoing basis with WGH, local fire departments, RCMP, and Yukon Ambulance to ensure that the appropriate information on the changes in area transportation volumes, mine operations, and local population are considered.
- Casino Mining Corporation will provide contracted security services that will focus on ensuring a secure and safe work site with the following policies: no alcohol or drugs on-site, a respectful workplace, no harassment, safety and security measures, multi-cultural workforce considerations, and Aboriginal awareness training.
- Casino Mining Corporation will implement a hiring policy that encourages the employment of workers from Yukon and in particular the rural communities within the LSA.
- Casino Mining Corporation will implement a procurement process that gives preferences to the extent economically feasible to suppliers from the RSA and LSA.
- Casino Mining Corporation will employ a community liaison staff member who focuses on community relationships and working with community staff on infrastructure and services planning issues related to mine staff.
- Casino Mining Corporation will monitor project socio-economic effects and will adapt management measures where required.
- Casino Mining Corporation will provide on-the-job training to assist local and regional workers to develop mining-specific skills.
- Casino Mining Corporation will provide training and education for potential employees from Yukon and in particular the rural communities within the LSA.

- Casino Mining Corporation will implement career training and development opportunities for employees once hired.
- Casino Mining Corporation will partner with First Nation communities to access additional funding for training.
- Casino Mining Corporation will require cultural awareness training for employees and contractors.
- Casino Mining Corporation will implement a Road Use Plan.
- Casino Mining Corporation will implement an Emergency Response Plan.
- Casino Mining Corporation will build a new larger airstrip close to the proposed Project and provide transportation between the airstrip, the mine, and the camp.
- Casino Mining Corporation will implement a Mine Closure Plan in cooperation with LSA communities and Yukon Government.

Given the long duration of the Project, some operations workers may choose to relocate, with their families, to the LSA. According to the population assessment, up to 645 people (619 to Whitehorse, 16 to Carmacks, 11 to Pelly Crossing) may choose to move in permanently, with their families, to the LSA. The relatively small number of migrants (0.6% of the total LSA population), the current good capacity of community infrastructure and services in Whitehorse, and the communities' desires for attracting new residents suggest that the effects on Community Infrastructure and Services will be low and within the capacity of Whitehorse. If up to 16 people choose to live in Carmacks and up to 11 people choose to live in Pelly Crossing, these workers are expected to be original residents in these communities who are returning back to their residence due to job availability and will therefore place no additional demand on community infrastructure and services. More details on proposed Project effects and their mitigation and enhancement measures per each identified indicator are available in Table 17.4-3. Table 17.4-5 includes residual effects following mitigation and their significance and Table 17.4-6 includes a summary of all residual effects.

Table 17.4-3: Proposed Mitigation Measures and Potential Residual Effects for Community Infrastructure and Services

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
The arrival of workers and their families to the LSA will create additional demand on municipal infrastructure.	C, O, CD	Adverse	<p>Providing a fly in\fly out camp. The pioneer camp will have local water and power supply and on-site sewage treatment plant and indoor and outdoor recreation services, which will offset Project's demand for municipal infrastructure;</p> <p>Employing a community liaison staff member who focuses on community relationships and working with community staff on infrastructure and services/planning issues related to mine staff;</p> <p>Monitoring project socio-economic effects and adapting management measures where required.</p>	Moderate	Yes

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
The arrival of workers and their families to the LSA will create additional demand on housing and temporary accommodation.	C, O, CD	Adverse / Beneficial	Implementing priority hiring for qualified local residents; Providing incentives for workers hired from outside Yukon to relocate; Employing a community liaison staff member who focuses on community relationships and working with community staff on housing/planning issues related to mine staff; Providing a fly in/fly out camp to partially offset Project's demands for housing services; Monitoring project socio-economic effects and adapting management measures where required.	Moderate	Yes
The arrival of workers and their families to the LSA will create additional demand on education services.	C, O, CD	Adverse / Beneficial	Providing a fly in/fly out camp; Providing support programs and initiatives at local schools and Yukon College; Implementing a Recruitment, Training, and Employment Plan; Monitoring project socio-economic effects and adapting management measures where required.	Moderate	Yes

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
Population change will alter demand for health and social services.	C, O, CD	Adverse	<p>Providing a camp will partially offset Project's demands for regional health services;</p> <p>Employing a community liaison staff member who focuses on community relationships and working with community staff on infrastructure and services/planning issues related to mine staff;</p> <p>Monitoring project socio-economic effects and adapting management measures where required.</p>	Moderate	Yes

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
Accidents at worksite could increase demand for regional health services and emergency services.	C, O, CD	Adverse	<p>Requiring all construction and operation activities to follow best practices as outlined in CMC's Environmental Health and Safety (EHS) Management System;</p> <p>Providing, at the site and the camp, health and medical equipment and personnel as well as arrangements to med-evac workers with life-threatening illnesses or injuries to the nearest appropriate facility within the LSA;</p> <p>Providing full firefighting equipment and trained personnel to meet all on-site fire and rescue needs;</p> <p>Providing, at the mine site, trained mine rescue personnel and mine rescue equipment security;</p> <p>Monitoring project socio-economic effects and adapting management measures where required.</p>	High	Yes

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
The arrival of workers and their families to the LSA will create additional demand on protective services.	C, O, CD	Adverse	<p>Committing to work closely on an ongoing basis with WGH, local fire departments, RCMP, and Yukon Ambulance to ensure that the appropriate information on the changes in area transportation volumes, and the change to the local population are considered;</p> <p>Providing contracted security services that will focus on ensuring a secure and safe work site with the following policies: no alcohol or drugs on-site, a respectful workplace, no harassment, safety and security, multi-cultural workforce considerations, and Aboriginal awareness training;</p> <p>Monitoring project socio-economic effects and adapting management measures where required.</p>	High	Yes
Traffic volumes to and from mine site would increase demand for health services and protective services (RCMP, fire department, ambulance) along the access road if accidents occur.	C, O, CD	Adverse	<p>Developing a Materials Transport Plan and Emergency Response Plan;</p> <p>Controlling speed limits;</p> <p>Committing to perform regular vehicle maintenance and regular road maintenance to reduce risk to motor vehicle safety;</p> <p>Monitoring project socio-economic effects and adapting management measures where required.</p>	High	Yes

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
The arrival of workers and their families to the LSA will create additional pressure on traffic and transportation infrastructure.	C, O, CD	Adverse	Monitoring ground and air transportation infrastructure traffic and mitigation measures; Employing a community liaison staff member who focuses on community relationships and working with community staff on infrastructure and services planning issues related to mine staff; Monitoring project socio-economic effects and adapting management measures where required.		Yes
Commuting workers from outside the LSA will create additional air passenger volumes and demands on air transportation infrastructure.	C, O, CD		Socio-economic monitoring including monitoring ground and air transportation infrastructure traffic and mitigation measures; Liaising with Whitehorse Airport authority re. Worker Transportation Plan and evaluate peak passenger/aircraft volumes; as necessary, stagger work rotation schedule to minimize airport and passenger congestion; Monitoring project socio-economic effects and adapting management measures where required.		

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
<p>Transport of equipment, services, and materials to and from the mine site will increase traffic and the risk for motor vehicle collisions on Klondike Highway and Freegold Road that provide access to the mine.</p> <p>Trucking of supplies and consumables to mine will increase risk of spill of non-hazardous and hazardous materials. Project-related traffic could result in increased road wear and maintenance on Klondike Highway and Freegold Road that provide access to the mine.</p>	C, O, CD	Adverse	<p>Implementation of Casino Road Use Plan that includes:</p> <ul style="list-style-type: none"> Adherence to posted speed limits Regular truck inspection and maintenance Signage and verbal and written notification about wildlife crossings Truck traffic communications and codes on access road Travelling in convoys in extreme winter conditions Regular inspection, maintenance, dust suppression, and snow removal on Freegold Road and extension Implementation of Emergency Response and Spill Management Plan Carriers of dangerous goods will be in compliance with all international and territorial guidelines, acts, and regulation and will carry appropriate documentation Drivers of dangerous goods vehicles will be required to be familiar with all aspects of the Emergency Response and Spill Management Plan Monitoring of ground and air transportation infrastructure traffic and mitigation measures Building a new airstrip/access road at mine site and bussing workers from airstrip to onsite camp. 	High	Yes

Potential Effect	Project Phase (C, O, CD, PC)	Direction	Proposed Mitigation (or Enhancement) Measure ¹	Predicted Effectiveness	Residual Effect
Construction and Operations					
Freegold Road Extension and upgrade to all weather access will improve access and motor vehicle safety to the mine site.	C, O, CD	Beneficial	A 24/7 manned security and gate at start of Freegold Road Extension to control access to permitted users	High	Yes

Notes

1. C (Construction), O (Operation), CD (Decommissioning and Closure) and PC (Post-Closure) represent the Project phases when the potential interaction between the Project and valued component is anticipated to occur.
2. For beneficial potential effects, opportunities, where possible, to enhance potential environmental and socio-economic benefits are included as proposed enhancement measures.

17.4.3 Significance of Residual Effects

The criteria used to discuss residual effects are discussed in detail in Section 5, Assessment Methods and Frameworks. Table 17.4-4 outlines the seven criteria used to assess significance for the Community Infrastructure and Services VC.

Table 17.4-4: Determining Significance of Residual Effects for Community Infrastructure and Services

Criteria	Rating	VC Specific Definitions
Magnitude	Low	Effect that occurs might or might not be detectable but is within the normal range of variability
	Medium	Effect is unlikely to pose a serious risk or benefit to the VC or to represent a management challenge
	High	Effect is likely to pose a serious risk or benefit to the selected VC and, if negative, represent a management challenge
Geographical Extent	Localized	Within the identified LSA
	Widespread	Outside the identified LSA
Duration	Short Term	Effect is limited to the construction period
	Long Term	Throughout operations, closure and decommissioning
	Permanent	Effects measureable post-closure
Frequency	Infrequent	Effects occur occasionally
	Frequent	Effects are continuous and consistently applied over the period
Reversibility	Reversible	Effect will return to baseline condition after operations, closure and decommissioning
	Irreversible	Effect is persistent after operations, closure and decommissioning
Context	Low Resilience	Effects operate outside of regional experience and represent a challenge to local socio-economic management institutions
	High Resilience	Effects are familiar to local socio-economic management institutions
Probability of occurrence	Low	Effects are unusual under similar circumstances and are not expected to occur with this Project

Criteria	Rating	VC Specific Definitions
	Moderate	Effects has a reasonable risk of occurring under similar circumstances or there is not currently sufficient information to assess probability
	High	Effects have consistently occurred under similar circumstances and are expected to occur with this Project

The significance of potential residual effects from the Project on Community Infrastructure and Services VC are determined based on the criteria presented above in Table 17.4-4, and summarized below in Table 17.4-5.

Table 17.4-5: Significance of Residual Effects for Community Infrastructure and Services

Residual Effect	Predicted Degree of Effect After Mitigation (or Enhancement) Measures ¹								Significance of Residual Effect
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Context	Probability of Occurrence	
Increase in demands for municipal infrastructure that are within the current LSA capacity and approved expansion plans	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
Increase in housing demands that are within the current LSA capacity and approved expansion plans	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
Increase in demands for education services that are within the current LSA capacity; Project will expand education supply and enhance local qualifications	Beneficial	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
Increase in demands for health services that are within the current LSA capacity	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
Accidents at worksite could increase demand for regional health services and emergency services	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
The arrival of workers and their families to the LSA will create additional demand on protective services	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
The arrival of workers and their families to the LSA will create additional pressure on traffic and transportation infrastructure.	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant

Residual Effect	Predicted Degree of Effect After Mitigation (or Enhancement) Measures ¹								Significance of Residual Effect
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Context	Probability of Occurrence	
Traffic volumes to and from mine site would increase demand for health services and protective services (RCMP, fire department, ambulance) along the access road if accidents occur	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
Commuting workers from outside the LSA will create additional air passenger volumes and demands on air transportation infrastructure	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
Project transportation activities will increase traffic, road wear, and risk of accidents (e.g., collisions, spills, etc.) along the access road	Adverse	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant
Road extension and upgrades will improve transportation infrastructure	Beneficial	Low	Local	Long Term	Continuous	Reversible	High Resilience	High	Not Significant

Note:

1 For beneficial potential effects, opportunities, where possible, to enhance potential environmental benefits are included as proposed enhancement measures.

17.4.4 Discussion of Significance

Project construction effects on community infrastructure and services are characterized as low in magnitude, local, long-term, frequent, reversible, and highly probable (Table 17.4-5).

Approximately 96% of the population effects are expected to occur in the already rapidly growing City of Whitehorse. Whitehorse grew at an annualized rate of 2.6% between 2006 and 2011; in the year of the greatest effect (2017, when noticeable effects from construction begin) total migration is expected to be only 0.6% of the total population of the city.

Given the good capacity of infrastructure and services in Whitehorse, the effects of limited increase in demand associated with in-migration are considered to be Not Significant. The housing market is able to react to new housing demand given the large number of serviced lots either already purchased by developers or available to the public and given the adequate time for the market to respond to anticipated demand. The key residual effects of the Project, following mitigation, are anticipated to be slightly increased demand for protective services (ambulance services, first responders, and police) from the movement of workers and goods to the mine during construction and operations. In addition, any injury or illness will see workers transferred to health care services in

the LSA. There will also be arrangements made to med-evac workers with life-threatening illnesses or injuries to the nearest appropriate facility within the LSA. These effects are considered Not Significant because of their relatively low magnitude and proposed mitigation. Finally, there will be an enhancement of workforce experience and skills base resulting from additional training provided by the Project.

The duration of population effects and therefore increases in demand for local infrastructure and services are considered to be long term. Although the rate of change in population is only noticeable in the period 2017 to 2021, the Project sustains the higher level of population over the operations phase. Similarly, transportation effects will be continuous during the construction and operation phases, with only minor seasonal changes. The sustained and continuous character of population effects and transportation effects are why these effects are characterized as frequent.

All increases in demand for infrastructure and services are reversible, since they depend on population effects and mine activities that would be reversed post-closure. Within this context, population, traffic, and additional demand for Community Infrastructure and Services would return to baseline conditions over the period approaching closure to the post-closure period.

All identified residual effects, after mitigation, will have a final impact rating of not significant, and no additional mitigation is required. Demand for Infrastructure and Services will depend on the migration/movement of people to Yukon. We have high confidence in the capacity of infrastructure and services to meet needs but only moderate confidence in the actual number of people who move to the Yukon. See Table 17.4-6 for a summary.

Table 17.4-6: Summary of Residual Effects for Community Infrastructure and Services

Potential Residual Effects	Direction	Significance	Level of Confidence (Low, Moderate, High)
Construction			
Increase in demands for municipal infrastructure that are within the current LSA capacity and approved expansion plans	Adverse	Not Significant	High
Increase in housing demands that are within the current LSA capacity and approved expansion plans	Adverse	Not Significant	Moderate
Increase in demands for education services that are within the current LSA capacity; Project will expand education supply and enhance local qualifications	Beneficial	Not Significant	High
Increase in demands for health services that are within the current LSA capacity	Adverse	Not Significant	Moderate
The arrival of workers and their families to the LSA will create additional demand on protective services	Adverse	Not Significant	Moderate
The arrival of workers and their families to the LSA will create additional pressure on traffic and transportation infrastructure	Adverse	Not Significant	Moderate
Traffic volumes to and from mine site would increase demand for health services and protective services (RCMP, fire department, ambulance) along the access road if accidents occur	Adverse	Not Significant	High

The arrival of workers from outside the LSA will create additional air passenger volumes and demands on air transportation infrastructure	Adverse	Not Significant	High
Project transportation activities will increase traffic, road wear, and risk of accidents (e.g., collisions, spills, etc.) along the access road	Adverse	Not Significant	High
Road extension and upgrades will improve transportation infrastructure	Beneficial	Not Significant	High

17.5 CUMULATIVE EFFECTS ASSESSMENT (CEA)

The effects assessment of the Project on Community Infrastructure and Services takes into consideration past and existing actions and is based on forecasts for population growth incorporating those actions. Consequently, the assessment is already cumulative in nature. This, and the lack of VC-specific effects data from potentially overlapping projects, means it is impractical to conduct a cumulative effects assessment for this VC. For these reasons, cumulative effects are not considered further in this assessment.

17.6 SUMMARY AND CONCLUSIONS

The potential effects of the proposed Project on community infrastructure and services in communities in the LSA ultimately depend on the extent to which proposed Project activities and Project-related population growth result in increased demands on those services. Different indicators were used in this assessment. Municipal Infrastructure indicators included water supply, waster/sewage treatment, landfills, power supply, and recreational facilities, and Community Services indicators included Housing, Educational Services, Health and Social Services, Protective Services, and Transportation.

The assessment concludes that most of the population increase and associated increase in demand for Community Infrastructure and Services will be concentrated in Whitehorse. The LSA communities and, in particular, Whitehorse have a good capacity of infrastructure and services and approved expansion plans (Section 17.3) that can easily accommodate the potential additional demands created by the arrival of 645 people (619 people to Whitehorse, 16 to Carmacks and 11 to Pelly Crossing). This population increase would represent 0.6% of the total LSA population. Importantly, attracting and retaining skilled residents has been identified as a priority of Yukon and local governments (Yukon Economic Development 2011, Village of Carmacks 2006). The magnitude of effects is low and represents a small change in each community population.

The key residual effects of the Project are anticipated to be slightly increased demand for protective services (ambulance services, first responders, and RCMP) from the movement of workers and goods to the mine during construction and operations. In addition, any injury or illness will see workers transferred to health care services in the LSA. There will also be arrangements made to med-evac workers with life-threatening illnesses or injuries to the nearest appropriate facility within the LSA. These effects are considered Not Significant because of their relatively low magnitude and proposed mitigation. Finally, there will be an enhancement of workforce experience and skills base resulting from additional training.

At closure and decommissioning, there may be some drop-off in population and demand as conditions return toward the base case.

The assessment concludes that all identified residual effects following mitigations and enhancement measures were not significant. No additional mitigation is required.