HARDROCK PROJECT
Final Environmental Impact Statement / Environmental Assessment

Chapter 15.0: Assessment of Potential Environmental Effects on Community Services and Infrastructure

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15.0 ASSESSMENT OF POTENTIAL ENVIRONMENTAL EFFECTS ON COMMUNITY SERVICES AND INFRASTRUCTURE

Community services and infrastructure includes housing and temporary accommodations, municipal and provincial services and infrastructure, and transportation services and infrastructure. Community services and infrastructure was selected as a Valued Component (VC) for assessment because the in-migration of Project workers and their families, Project-related business growth and Project activities will increase demands for community services and infrastructure during construction, operation and active closure.

In addition, the Project will result in alteration to the alignment of Highway 11, and the removal of tourism and recreation facilities, which may affect the capacity of transportation, as well as tourism and recreation services and infrastructure, to accommodate current and additional demand.

This Chapter describes the assessment of the potential environmental effects on the present capacities of community services and infrastructure.

Community services and infrastructure is linked to other VCs:

- groundwater (Chapter 9.0) and surface water (Chapter 10.0)- changes in groundwater and surface water levels and quality have the potential to directly affect residential, municipal, industrial and commercial water supplies.

In terms of the assessment of potential effects on recreation, the community services and infrastructure VC assesses tourism and recreation infrastructure within the Municipality of Greenstone, including sport facilities, community centres, municipal parks and visitor centres while the land and resource use VC (Chapter 17.0) addresses effects on areas where land and resource use activities, including fishing, trapping, hunting, camping, snowmobiling and boating, occur.

15.1 SCOPE OF ASSESSMENT

15.1.1 Regulatory and Policy Setting

15.1.1.1 Environmental Impact Statement Guidelines and Terms of Reference Requirements

The environmental effects assessment for community services and infrastructure has been prepared in accordance with the requirements of the federal Environmental Impact Statement (EIS) Guidelines (Appendix A1) and provincial Terms of Reference (ToR; Appendix A2). Concordance tables demonstrating where EIS Guidelines and ToR requirements have been addressed are provided in the concordance tables (Appendix B).

15.1.2 Influence of Consultation on the Identification of Issues and the Assessment Process

Consultation has been ongoing prior to and throughout the EA process, and will continue with government agencies, local Aboriginal communities, and stakeholders through the life of the Project. Chapter 3.0 (community and stakeholder consultation) provides more detail on the consultation process covering open houses, site visits, targeted meetings, newsletters, questionnaires, presentations, and capacity funding for technical reviews and community-based studies, among other areas. The Record of Consultation (Appendix C) includes detailed comments received during the development of the Final EIS/EA. As part of the information sharing throughout the consultation process, Project-related information was provided by Aboriginal communities in the form of traditional knowledge and traditional land and resource use (TLRU) studies and other forms of information sharing. This information was considered in the environmental effects assessment as described in Section 15.1.3.

Consultation feedback related to community services and infrastructure has been addressed through direct responses (in writing and follow up meetings), updates to baseline information, and in the Final EIS/EA, as appropriate. An overview of the key comments that influenced the community services and infrastructure effects assessment between the Draft and Final EIS/EA is provided below.

Existing Infrastructure

Aroland First Nation (AFN), Animbiigoo Zaagi'igan Anishinaabek (AZA), Bingwi Neyaashi Anishinaabek (BNA), Long Lake#58 First Nation (LLFN), Hydro One Networks Inc. (Hydro One), the Ministry of Natural Resources and Forestry (MNRF), the Ministry of Transportation (MTO), the Municipality of Greenstone (Municipality) and members of the public requested additional clarification with regard to effects on existing infrastructure as a result of the Project (the Discover Geraldton Interpretive Centre, Longlac Transformer Station [TS] [a Hydro One substation], Ontario Provincial Police (OPP) station, golf course, MacLeod-Cockshutt Mining Headframe, Highway 11, local roads, MacLeod Provincial Park and other municipal and recreational assets).

In response, Greenstone Gold Mines GP Inc. (GGM) has revised Sections 15.4.3.2 and 15.4.3.3 to include confirmation that the plans for the existing municipal facilities that will be removed as a result of the Project rest with the Municipality. As further described in Section 5.6.1.3 of Chapter 5.0 (Project description), an agreement has been signed between the Municipality and GGM to support the Municipality's future plans with respect to these facilities. With respect to the golf course, GGM has committed to avoid using the contingency waste rock storage area (WRSA) A/C to preserve the golf clubhouse and the front nine holes unless needed.

GGM is working with Hydro One and MTO regarding the relocation of facilities. These agencies have been consulted on the new locations and designs for their infrastructure. Effects on use of MacLeod Provincial Park are assessed in Chapter 16.0 (land and resource use VC). Existing conditions related to police services, recreation, transportation, and power are described in Sections 15.2.2.2, 15.2.2.4, 15.2.2.6, and 15.2.2.7. An assessment of the effects of the Project includes consideration of recreation facilities (Section 15.4.3) and traffic and the existing road network (Section 15.4.4). Relocation of the existing Hydro One Longlac TS and portions of the existing transmission and distribution lines are assessed in Section 15.4.3.

Relocation of Hydro One's Geraldton Operations Centre is discussed in the Project description (Chapter 5.0). The new location for the operations centre will be located on land which is appropriately zoned within the Municipality as vacant commercial land and is not part of the EA.

Existing Services

Ginoogaming First Nation (GFN), LLFN and the Ministry of Northern Development and Mines (MNDM) requested additional clarification regarding the demands on existing services, including health care and emergency services, housing/rental stock, community and recreational services for children and increased highway traffic as a result of the Project.

The Métis Nation of Ontario (MNO), GFN, MNDM and the Ministry of the Environment and Climate Change (MOECC) requested additional information on how the sewage needs of the temporary camp will be accommodated and consideration of whether increased demand due to Project-related population or business growth could exceed the capacity of existing water and sewer infrastructure. MNRF and MOECC also requested that more detail on Project waste needs be provided, including waste volumes, storage, and disposal of waste. Additional detail on expected waste volumes has been incorporated into Chapter 5.0 (Project description).

The Project includes a temporary camp to house workers during construction and has committed to providing some basic services, thereby reducing potential pressure on some community services and infrastructure. The number of operation employees and family members who may reside in the local and regional assessment areas (LAA/RAA) has been estimated to provide a clearer understanding of the increased demand on existing services and infrastructure as a result of the Project. The location of the temporary camp has been refined to the south side of Old Arena Road based on consultation with surface rights owners. Further clarification is provided in the description of existing conditions in Sections 15.2.2.1 to 15.2.2.9 and in an assessment of the effects in Sections 15.4.2, 0 and 15.4.4.

Based on stakeholder input, GGM has held additional discussions with the Municipality, and has obtained confirmation that GGM can connect the temporary camp to the municipal sanitary sewer system. The Municipality has confirmed that existing capacity is available, and the temporary treated effluent discharge location to Barton Bay has been removed from the Project design. An assessment of the effects on municipal servicing in Section 15.4.3.

15.1.3 Consideration of Aboriginal Information and Traditional Knowledge

GGM understands the importance of community services and infrastructure to Aboriginal communities through information sharing during the consultation process (Chapter 3.0). Project-specific TK and TLRU studies (Appendix J) have been considered in Project planning, including baseline studies, alternatives, assessment approach, mitigation and monitoring where appropriate. However, only non-confidential TK and TLRU information is presented in the Final EIS/EA, where applicable to the Project, to respect the preferences of Aboriginal communities. An overview of the key Aboriginal information that influenced the community services and infrastructure effects assessment between the Draft and Final EIS/EA is summarized below.

Consultation input received from AFN and LLFN noted the importance of considering potable water security. Information provided by communities confirms that Aboriginal communities typically have their own water services on-reserve which will not be changed by the Project. In addition to the information provided by Aboriginal communities, community services and infrastructure located on-reserve is also discussed in the community profiles provided in Chapter 3.0 (community and stakeholder consultation). Information includes recreational facilities, housing and health care services located on-reserve. Project-specific studies and consultation input from Aboriginal communities including AFN, GFN, MNO and Eabametoong First Nation (EFN) indicate that quality, affordable housing, condition of roads, water and sewer, and other utilities are commonly cited as being inadequate and in need of improvement. Community-wellness concerns, including substance abuse, mental illness and depression, unemployment and chronic illness are also regarded as challenges to available social and health care services.

Project activities will not interact directly with any community services and infrastructure located on the 14 Aboriginal reserves shown on Figure 15-1. During construction it is anticipated that the in-migrant workers will stay at the temporary camp and during operation they will live in/around Geraldton (off-reserves). GGM has considered the information provided by Aboriginal communities in the description of baseline conditions for community services and infrastructure and in the assessment of potential indirect positive and/or negative effects to community services and infrastructure located on-reserve as a result of Project employment. GGM has held and will continue active discussions with local Aboriginal communities to identify potential issues and ways to address them throughout the life of the Project as outlined in Appendix C8 (Community Specific Consultation Plans).

15.1.4 Selection of Potential Environmental Effects and Measurable Parameters

Table 15-1 summarizes the potential environmental effects of the Project on community services and infrastructure, the measurable parameters, and the rationale for their selection. These potential environmental effects and measurable parameters were selected based on professional judgment, recent environmental assessments (EAs) for mining projects in Ontario, and comments provided during consultation.

Table 15-1: Potential Environmental Effects and Measurable Parameters for Community Services and Infrastructure

Potential Environmental Effect	Measurable Parameter(s) and Units of Measurement	Notes or Rationale for Selection of the Measurable Parameter
Change in capacity of housing and accommodations.	Housing and accommodations availability.	The Project may result in local population growth which has the potential to exceed the capacity of existing housing and accommodations.
Change in capacity of municipal and provincial services and infrastructure (police, fire, medical, recreation, education, water/sewer, power and waste).	Health care facility and services capacity. Crime severity index. Criminal code violations per 100,000 population. Emergency Medical Services (EMS) response times. Recreational facility and services capacity. School capacity.	Project activity and Project-related population and business growth may create demands that exceed the capacity of existing municipal and provincial (health and emergency, recreation, education, water/sewer, power and waste) services and infrastructure.
Change in capacity of transportation services and infrastructure.	Road and air transportation capacity.	The Project will result in the relocation of some transportation infrastructure, and Project-related activities and population growth may create demands that exceed the capacity of existing transportation services and infrastructure.

These effects were selected for assessment because Project activities and Project-related population growth have potential to place additional demands on community services and infrastructure, such as housing and other accommodations, municipal and provincial services and infrastructure (e.g., fire, health, education, police, recreation, water/sewer, power and waste), and transportation services and infrastructure.

15.1.5 Boundaries

15.1.5.1 Spatial Boundaries

The areas applied for the assessment of potential environmental effects on community services and infrastructure are described below and shown in Figure 15-1.

Project Development Area

The Project development area (PDA) encompasses the Project footprint and is the anticipated area of physical disturbance associated with the construction, operation and closure of the Project. The PDA is approximately 2,200 hectares (ha) in size.

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Local and Regional Assessment Areas

The LAA and RAA for community services and infrastructure were selected to include the communities which may experience increased demand as a result of the Project. The LAA/RAA are the same geographically because both potential residual and cumulative effects may affect the same communities, therefore this chapter refers to the LAA/RAA. The communities in question are mostly located within the Municipality, an amalgamated municipality that includes the former municipalities of the Town of Geraldton, Town of Longlac, the Township of Nakina and the Township of Beardmore, and an extensive area of unincorporated territory including settlement areas such as Caramat, Jellicoe and MacDiarmid. The LAA/RAA is used to provide regional context for the significance of residual effects and is also the area within which potential for cumulative effects of the Project in combination with other past, present or reasonably foreseeable projects or activities are considered.

The LAA/RAA also includes the following First Nation reserves, which are located within Greenstone municipal boundaries:

- AZA
- Biinjitiwaabik Zaaging Anishinaabek (BZA)
- BNA
- LLFN

The following First Nation reserves are near the Greenstone municipal boundaries and have also been included in the LAA/RAA:

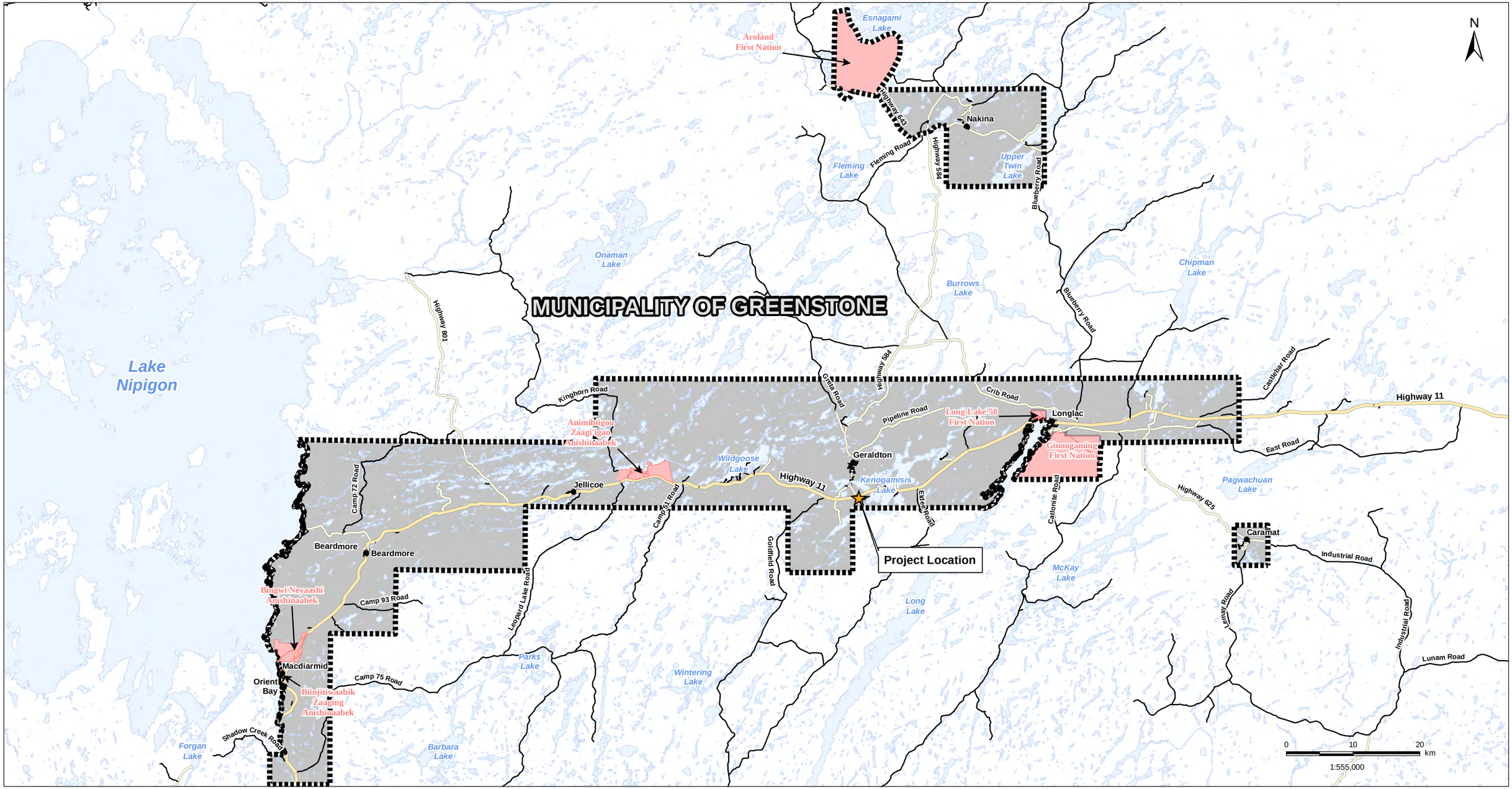
- AFN
- GFN

15.1.5.2 Temporal Boundaries

The temporal boundaries for the assessment of community services and infrastructure are:

- Construction: Years -3 to -1 with early ore stockpiling commencing after the first year of construction.
- Operation: Years 1 to 15, with the first year representing a partial year as the Project transitions from construction to operation.

- Closure:
  - Active Closure: Years 16 to 20, corresponding to the period when primary decommissioning and rehabilitation activities are carried out.
  - Post-Closure: Years 21 to 36, corresponding to a semi-passive period when the Project is monitored and the open pit is allowed to fill with water creating a pit lake.



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Revised: 2017-03-16 By: dharvey

March 2017
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Stantec

Legend

- Project Location
- Local/ Regional Assessment Area
- Highway
- Major Road
- Local Road
- First Nation Reserve Land*
- Municipality of Greenstone
- Waterbody

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2013.

* Boundary of the Aroland First Nation settlement is based off of mapping created by Four Rivers, Matawa Environmental Services Group

Client/Project

Greenstone Gold Mines GP Inc. (GGM)
Hardrock Project

Figure No.
15-1

Title
Spatial Boundaries for Community Services and Infrastructure

15.1.6 Residual Environmental Effects Description Criteria

Table 15-2 summarizes how residual environmental effects are characterized in terms of direction, magnitude, geographic extent, timing, frequency, duration, reversibility and ecological and socio-economic context. Quantitative measures or definitions for qualitative categories are provided.

Table 15-2: Characterization of Residual Environmental Effects on Community Services and Infrastructure

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The relative change compared to baseline conditions.	**Positive** — an increase in capacity of community services and infrastructure. **Adverse** — a decrease in capacity of community services and infrastructure.
Magnitude	The amount of change in either the measurable parameters or the VC relative to baseline conditions.	**Low** — a change in capacity of community services and infrastructure will be at or near to baseline conditions. **Moderate** — a change in capacity of community services and infrastructure approaches current capacity, standard or threshold but will not result in a reduction in standards of service. **High** — a change in capacity of community services and infrastructure exceeds current capacity, standard or thresholds that result in a reduction in standards of service.
Geographic Extent	The geographic area in which the residual environmental effect occurs.	**PDA** — the residual environmental effect is restricted to the PDA. **LAA/RAA** — the residual environmental effect extends into the LAA/RAA.
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant.	**Not Applicable (N/A)** — seasonal aspects are unlikely to affect capacity of community services and infrastructure. **Applicable** — seasonal aspects may affect capacity of community services and infrastructure.
Frequency	Identifies how often the residual environmental effect occurs within a given time.	**Single Event** — the residual environmental effect occurs once. **Multiple Irregular Events (no set schedule)** — the residual environmental effect occurs sporadically, at an irregular interval, and is not predictable. **Multiple Regular Events** — the residual environmental effect occurs regularly, and may be at predictable intervals or specific times. **Continuous** — the residual environmental effect occurs continuously.

Table 15-2: Characterization of Residual Environmental Effects on Community Services and Infrastructure

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Duration	The length of time required until the residual environmental effect can no longer be measured or perceived.	**Short-term** — the residual environmental effect is limited to construction or active closure (0 to 5 years). **Medium-term** — the residual environmental effect extends through the operating life of the Project. **Long-term** — the residual environmental effect extends beyond closure.
Reversibility	Pertains to whether a measurable parameter or the VC can return to its baseline condition after the Project activity ceases.	**Reversible** — the residual environmental effect is likely to be reversed after activity completion. **Irreversible** — the residual environmental effect is permanent and the VC is unlikely to return to its baseline condition.
Ecological and Socio-economic Context	Considers uncommon characteristics of the area, a community and/or ecosystems that may be affected by the Project and/or whether the VC is important to the functioning of an ecosystem or community of people.	**Low Capacity** — infrastructure and services have limited capacity to accommodate increased demand. **Moderate Capacity** — infrastructure and services can accommodate some levels of increased demand. **High Capacity** — infrastructure and services have capacity to accommodate increased demand.

15.1.7 Significance Thresholds for Residual Environmental Effects

A significant adverse residual environmental effect on community services and infrastructure is one that results in demands on services or infrastructure above current capacity, such that standards of service are routinely and persistently reduced below current levels for an extended period and are unlikely to recover to existing conditions.

This significance threshold considers all of the characterizations described in Table 15-2 when making a determination of significance. Direction of the residual environmental effect is important to the significance determination because it indicates whether a positive change or negative change will occur to the capacity of community services and infrastructure as a result of the Project. Magnitude is considered since it refers to the change in the capacity of services and infrastructure relative to the existing condition and whether or not the change will result in an increase or reduction in the standard of service. Reversibility of the effect contributes to the significance determination because it refers to the ability of the service and/or infrastructure to recover once the activity has ceased. The existing socio-economic context also contributes to the determination of significance because it considers the context within which a change in the capacity of community services and infrastructure may occur.

The remaining characterizations (i.e., geographic extent, timing, frequency, and duration), while important in terms of understanding where and when the effect will occur, do not refer to the capacity of the existing community services and infrastructure to accommodate additional demands, their ability to recover from increases in demand, or how the standards of their service will be affected.

15.2 EXISTING CONDITIONS FOR COMMUNITY SERVICES AND INFRASTRUCTURE

This section provides a summary of existing conditions for community services and infrastructure and the methods used to characterize baseline conditions. Additional details are provided in the "Environmental Baseline Data Report – Hardrock Project: Socio-Economic" (Baseline Report – Socio-Economic) (Appendix E10).

15.2.1 Methods

The primary source of socio-economic existing conditions (baseline) data was Statistics Canada (2012, 2013), in particular the 2011 Census of Canada and the National Household Survey, which includes the Aboriginal Population Profile (2011). These resources provided baseline information on such topics as demographics, labour force and housing. Additional information was collected from:

- municipal corporations
- provincial agencies, boards and commissions
- planning boards and boards of trade
- school and health boards
- district social services administration boards
- community development corporations
- police and other emergency response organizations
- housing agencies
- Non-confidential Project-specific Aboriginal socio-economic and community well-being information.

The information from these sources provides a reliable description of baseline conditions. It is used in the assessment to provide regional context for the Project and to assess the Project effects on the capacity and use of services and infrastructure in the LAA/RAA.

Recently available data on baseline conditions and trends for the socio-economic environment are presented in Sections 15.2.2.1 to 15.2.2.9 and in the Baseline Report – Socio-Economic (Appendix E10). This includes information on current capacities and hence the ability of the communities to handle additional demands. Baseline conditions are described mainly for the

Municipality and include information on airports, roads and highways, rail, water and wastewater, solid waste management, housing, temporary accommodations, health services and infrastructure, recreation infrastructure, and policing. Details on community services and infrastructure are not provided for First Nation reserves since Project workers are not likely to place demands on services and infrastructure in those communities.

15.2.2 Overview

The following sections describe existing conditions for community services and infrastructure in the LAA/RAA.

Many of them are provided by the Municipality, within which the Project is located. The Municipality's Public Services Department has three divisions: Public Works, Facilities and Parks, and Airports. Each division oversees operational and maintenance functions of infrastructure and equipment to meet standards imposed by agencies.

The largest division, Public Works, is responsible for the following services and infrastructure:

- water supply and distribution (i.e., water and sewage treatment, sanitary sewers, hydrants and water mains)
- roads (including lanes, sidewalks, streetlights, drainage and snow removal)
- sanitary landfills (i.e., garbage collection and waste disposal)
- cemeteries.

The Facilities and Parks division maintains all municipal buildings and oversees the operations of recreation complexes and municipal parks, while the Airports division is responsible for the operation and maintenance of the Greenstone Regional Airport in Geraldton and the R. Elmer Ruddick Nakina Airport (Municipality of Greenstone n.d.).

More detailed information on community services and infrastructure in the LAA/RAA can be found in the Baseline Report - Socio-Economic (Appendix E10).

15.2.2.1 Housing and Accommodations

Housing

In 2011, the Municipality had 2,629 private dwellings, 1,992 of which were occupied. Most dwellings [86 percent (%)] were single-detached houses (StatCan 2012).

The population of the LAA/RAA declined from 5,662 in 2001 to 4,724 in 2011, a drop of almost 20%. This has created unused capacity in a number of services and infrastructure; the Municipality of Greenstone Growth Plan (2013) indicates that there is an abundant supply of vacant residential property in all of the neighborhoods of Greenstone. It is estimated that roughly 150 of the 500 homes in Longlac were vacant (TF&A 2011). The housing stock in the

Municipality is generally old (97% of houses are more than 20 years old, compared with the Ontario average of 69%), and more properties (9.3%) require major repairs than the provincial average (6.6%). Housing values are also considerably lower in Greenstone ($83,832) than in the Thunder Bay District ($137,923) or in Ontario ($297,479) (GEDC and MF&A 2010).

Some communities within the Municipality, including Beardmore, Longlac, Nakina and Geraldton, have underdeveloped designated residential areas that could accommodate larger scale future growth. In Longlac and Geraldton, for instance, there are 78 and 250 vacant residential lots, respectively. There are plans for a subdivision in Geraldton with a total of 147 lots on approximately 53 acres of land (Municipality of Greenstone 2013b).

Social housing is available in Geraldton, Longlac and Nakina. As is common in the District of Thunder Bay, the social housing portfolio is relatively small considering the population size it serves, and is primarily housing for seniors and families. There are 134 social housing units throughout Greenstone; 43 seniors' units, and 91 non-senior units (TBDSSAB 2014).

While existing social housing could be renovated to better serve the current population, there is limited demand for social housing, in general, within the Municipality of Greenstone (TF&A 2011). A plan for social housing in the Thunder Bay District reports that Geraldton contains the largest number of such units in the Municipality and it only has 15 applicants on the waiting lists for both seniors' and non-seniors' units (TBDSSAB 2014).

Temporary Accommodations

Temporary accommodations include hotels and other commercial forms of accommodations, and also emergency shelters for displaced or abused individuals.

Temporary accommodations and operations are typically small in scale, such as bed-and-breakfasts, and many are geared toward tourism associated with hunting and fishing (e.g., fly-in outfitters). The Municipality has over 40 temporary accommodations, including hotels, motels, bed-and-breakfasts, resorts, and tourism operators (ranging from hotels and motels to seasonal camps and fly-in accommodations), which provide 280 rooms. Various projects aimed at generating tourism investment have been proposed for the Municipality, including a five-star ecolodge within the BNA community, and lakefront cottage development lots along Lake Nipigon in partnership with three surrounding First Nations (MDB 2012).

The Geraldton Family Resource Centre is the only emergency shelter in the Municipality. It has 10 beds for women and children, and it operates 24 hours a day, 365 days of the year. It serves the areas of Fort Hope, Marten Falls, Aroland, Nakina, Geraldton, Longlac, Jellicoe, Beardmore, Caramat, GFN and LLFN, and any clientele who require access to its services, regardless of jurisdiction. In addition to safe short-term housing, the centre offers a 24-hour crisis line, safety planning, outreach services, counselling for women and children, transitional housing and support services, court accompaniment, advocacy and resource dissemination (Municipality of Greenstone n.d).

15.2.2.2 Policing

Policing services in the Municipality is provided by the OPP Greenstone Detachment based in Geraldton (Municipality of Greenstone 2012). The Greenstone Detachment is staffed by 30 police officers who are dispatched to the surrounding communities of Greenstone and provide support to the Aboriginal Policing Services in Greenstone, as requested. Between 2012 and 2013, the Municipality's crime severity index, which tracks the seriousness of police-reported crimes from year to year, decreased nearly 4% (StatCan 2014a). The rate of actual incidents of criminal code violations per 100,000 population decreased in the Municipality by 10.7% (StatCan 2014b).

The Anishinaabek Police Service (APS) provides policing services to 16 First Nations communities across Ontario, extending from Kettle First Nation and Stony Point First Nation in the south to Fort William First Nation in the north. The APS Headquarters is located in Garden River First Nation near Sault Ste. Marie, Ontario. Twelve detachments serve the 16 First Nations communities. The APS has 62 sworn officers and 21 civilian members. The APS is divided into three regions, north, south and central, with a director for each region and a sergeant in each detachment. There are detachments in AFN and in GFN. The crime severity index in the region covered by the APS decreased 5.8% between 2012 and 2013 and the rate of criminal incidents fell by almost 3% (StatCan 2014a, 2014b).

An existing OPP station (Geraldton Detachment) will be removed during Project construction but a new station will be constructed before the existing facility is removed. The new OPP station is anticipated to be similar in size to the existing station. As stated in Section 5.5.3, the OPP station is managed by Infrastructure Ontario but rented from a private landowner. As the OPP station is privately owned, there are no EA requirements associated with relocation of the station. GGM will continue to work with Infrastructure Ontario and the landowner outside of the EA process to complete the relocation process.

15.2.2.3 Health and Emergency Services and Infrastructure

Health

The North West Local Health Integration Network (North West LHIN) is a non-profit organization that was established in June 2005. It is headquartered in Thunder Bay and covers the Thunder Bay and Rainy River Districts and most of the Kenora District. AFN, AZA, BZA, BNA, GFN and LLFN fall within the North West LHIN. The North West LHIN does not directly provide health care services but works with health care providers, communities and the public to set priorities and plan health services in northwestern Ontario. It oversees the integration and coordination of local health services to make it easier for clients/patients to access the care they need (LHIN 2013).

The North West LHIN is also responsible for allocating funding for the following health services in northwestern Ontario:

- hospitals
- community care access centres
- community support service organizations (e.g., homemaking and personal assistance)
- long-term care homes
- community health centres
- community mental health and addictions agencies

The large geographic area and relatively small, dispersed population of the North West LHIN creates challenges for health service delivery, including access to care, and human health resources. Additionally, extensive travel is required, and costs of care per capita are higher. The North West LHIN is the largest health integration network, geographically, within Ontario (it covers 47% of the province), and it has the smallest population (approximately 231,000).

Acute care hospitals in the Thunder Bay District are located in Nipigon, Marathon, Manitouwadge, Geraldton and Terrace Bay. The North West LHIN has the highest rate of acute hospital use in Ontario and a lower usage of out-patient programs and ambulatory clinics than elsewhere in the province (LHIN 2013). To address these issues, the North West LHIN identified the following four priority areas for change between 2013 and 2016:

- building an integrated health care system
- building an integrated eHealth framework
- improving access to care
- enhancing chronic disease prevention and management (LHIN 2013)

Relative to the province (based on 2009–2010 Canadian Community Health Survey data for ages 12 and over), the North West LHIN has a higher proportion of people who smoke daily, are heavy drinkers, are overweight or obese, and have a strong sense of community belonging.

In 2012, 27,300 physicians were working in Ontario, and the physician-to-population ratio was 201:100,000, which was slightly lower than the national average of 214:100,000. In 2012, Ontario had 100 family doctors per 100,000 population, while the ratio for specialists was 102:100,000. In that same year, the North West LHIN had 124 family doctors per 100,000 population, while the ratio for specialists was 72:100,000. Between 2008 and 2012, the number of family physicians and specialists in the North West LHIN increased by 27.9% and 23.4%, respectively (CIHI 2012).

The North West LHIN has had issues with retention of physicians in recent years. Between 2007 and 2008, the number of active physicians fell from 431 to 417; specifically, the number of family medicine physicians dropped from 265 to 253. However, initiatives such as the Northern and Rural Recruitment and Retention Initiative (NRRRI), which was created in 2010, are helping attract physicians to northern Ontario communities. Between 2009 and 2010, the number of physicians practicing in the northern LHINs increased by 19, compared with an increase of 35 between 2010 and 2011 after the NRRRI began (OHHRRN 2012). The Geraldton District Hospital plays the central role in the recruitment of physicians, nurses and allied health professionals in the community, with other organizations supporting as necessary, such as through the Healthcare Committee of the Greenstone Community Adjustment Committee (MDB 2012).

Geraldton District Hospital provides health services to approximately 8,000 residents of Greenstone and the surrounding Aboriginal communities. It was constructed in 1963. A heliport was added in 1986 and extensive renovations were made in 1989 with the addition of the John Owen Evans Residence.

The hospital has 23 acute-care beds, 26 long-term care beds and a 24-hour emergency department. Services provided include clinical nutrition, diagnostic imaging (x-ray and ultrasound), laboratory, low risk obstetrics, outreach chemotherapy, rehabilitation, social work and telemedicine. The hospital is more than 50 years old, and in need of improvements. These have been planned, including improvements to ventilation systems and the roof, and the Emergency Department may be relocated to provide more space and accommodate more outpatient services, such as mental health counselling (GDH 2010).

The Northern Horizon Health Center, built adjacent to the Geraldton District Hospital in 2000, provides a centralized location for the following:

- Community Care Access Centre
- Dental office
- Diabetes Education Centre
- Geraldton Medical Group
- Greenstone Family Health Team
- Nutrition services
- Thunder Bay District Health Unit

The NorWest Community Health Centres in Longlac provide primary care services and health promotion programs to that community, Caramat, LLFN and GFN. The health care team at the NorWest Community Health Centres includes family physicians, nurse practitioners, nurses and a dietitian. The Nakina Clinic has a full-time registered nurse and a receptionist. Physicians from the Geraldton Medical Group provide scheduled services. It services the far north and surrounding Aboriginal communities (GDH 2013). The AFN, AZA and BZA's Band Offices each manage a health office that promotes physical and mental health for community members.

Greenstone is designated as an underserviced area by the Ministry of Health and Long-term Care, which allows the community to access incentive funds for the recruitment and retention of family physicians. Primarily though, it means that the existing community is underserviced by health care professionals (MDB 2012).

Emergency Services

The Greenstone Fire Department has six sector fire stations that respond to fire alarms, fires, auto extrications/rescues and hazardous material spills. Fire stations are located in Beardmore, Geraldton, Longlac, Nakina, Caramat and Jellicoe and they are staffed by approximately 120 Volunteer Firefighters (Greenstone 2014). The Fire Department has 10 pumpers, five rescue units and other scout and command units, specialized rescue and extrication equipment, and tools/equipment required for structural fires. Within recent years, the Department has responded to various calls in regards to assistance from the community, train derailments, aircraft accidents, prolonged highway closures and internal evacuations of residents in emergencies (Greenstone 2014).

The Municipality has an Emergency Plan to protect the safety and welfare of its residents. The plan was formally adopted by Council in By-law 13-77 (Municipality of Greenstone 2013c). The Emergency Plan covers initiatives such as training, public education, awareness and mitigation strategies, and is the responsibility of the Community Emergency Management Coordinator to upgrade and advance (Greenstone 2014).

During natural disasters in other communities, Greenstone Fire Department personnel provide food, shelter and security for evacuees from the other communities. To date, the Municipality has hosted over 12,000 evacuees from communities experiencing floods or fires (Greenstone 2014). Geraldton Ward has housed over 15,000 residents of First Nation and non-First Nation communities over the years, serving as a Provincial Emergency Reception Centre (Municipality of Greenstone 2013c).

Longlac, Beardmore, Nakina and Geraldton each have one EMS station. The Longlac, Beardmore and Nakina EMS stations each had eight full-time staff in 2012 while the Geraldton station had seven full-time staff (Superior North EMS 2012). Medical emergency response and ambulance services for AFN are provided by the Township of Nakina (approximately 22 kilometres (km) from AFN). In the event that Nakina is unable to provide assistance, the Township of Geraldton (approximately 80 km from AFN) provides ambulance services (Aroland First Nation 2008).

In 2012, the Superior North EMS responded to 1,219 total calls for service. Of these, the greatest percentage (49%) was categorized as emergency (Code 4) calls. This was an increase from 1,181 in 2011 and 1,056 in 2010. First Responders responded to 90% of calls within the Municipality in 2012 within 17 minutes. This was an increase from 11.42 minutes in 2010 and 10 minutes in 2011. In Geraldton, the 90th percentile response times were 8.27 minutes in 2011, 7.24 minutes in 2011 and 8.12 minutes in 2012 (Superior North EMS 2010, 2011, 2012). Response time refers to the time from notification of the emergency to departure from the EMS station.

15.2.2.4 Education

Public education in the Municipality is managed by the Superior-Greenstone District School Board. In 2016, there were 11 elementary schools and five secondary schools in the communities of Beardmore, Geraldton, Longlac, Nakina, Dorion, Nipigon, Red Rock, Schreiber, Terrace Bay, Marathon and Manitouwadge. The main office is located in Marathon (SGDSB 2016).

Total enrolment for the Superior-Greenstone District School Board in 2013-2014 was 1,545 students. In the last 10 years, enrolment within the school board has declined by 40%, resulting in very small class sizes and multiple grade groupings (SGDSB 2016). Between the 2003-2004 and 2012-2013 school years, the majority of elementary schools in the Superior-Greenstone District had class sizes of 20 or fewer students (Ontario Ministry of Education 2014).

The Municipality has three public elementary schools (all English), four private elementary schools (including two English/French and one French), and two public high schools (one French), as well as First Nations schools at the BZA and AFN.

Elementary schools throughout Greenstone operate at levels above their budgeted enrolment (252 budgeted full-time equivalent (FTE) spaces versus an actual 266.5 FTE students at the four schools). Geraldton Composite High School operates just below budgeted capacity (240 FTEs budgeted to accommodate 224.5 actual FTEs). Based on accommodations and population trends, the majority of these schools operate well below their theoretical physical capacity, or the number of students that could reasonably be accommodated with a higher level of resources. Similar pressures are likely being felt in the French language schools and the First Nations schools in Greenstone. Space does not appear to be an issue because the majority of schools have the physical capacity to accommodate additional students.

Some members of the GFN and LLFN attend Migizi Wazisin - Eagle Nest Elementary School in LLFN. The Elementary School is Band operated with four classrooms for grades junior kindergarten to eight. There is a Training Centre in the LLFN community that aids in developing life skills and offers Adult Learning.

Biinjitiwaabik Zaaging Anishinaabek Education Authority operates the Biinjitiwaabik Zaaging School in that community. Secondary students are transported by a private bus company to and from Red Rock to attend Nipigon-Red Rock District High School. There is a Distance Education office located in the community recreation centre.

Within the Municipality, post-secondary education is available at Confederation College campus in Geraldton. Confederation College offers a one-year program in Mining Techniques and it may develop two- and three-year Mining Technician and Technology programs. There are considerations to potentially expand additional programming, specifically programming related to the mining sector at the Geraldton Campus of Confederation College (MDB 2012).

Contact North offers distance education throughout Northwestern Ontario, and includes a variety of programs relevant to the mining sector and support services, such as Mining Engineering Technician, Building Environmental Systems, and Electro Mechanical Technician Certificate (MDB 2012).

The Greenstone Regional Skills Centre (GRSC) is a secondary training institution that has been developed by the Municipality, in collaboration with its regional partners in economic development. The GRSC is located at the Greenstone Regional Airport and will provide trades and related training to prepare the Greenstone workforce for employment in the mining sector. In January 2014, the Ontario and federal governments announced a joint investment of $3.5 million to help build the Regional Skills Centre (MNDM 2014). The Municipality is also working with Collège Boréal, Cambrian College, Confederation College, Northern College, Université de Hearst, and Connect North on a range of different initiatives related to training capacity and accessibility of programming (MDB 2012).

15.2.2.5 Recreation

In terms of the assessment of potential effects on recreation, this VC assesses recreation infrastructure within the Municipality of Greenstone, including sport facilities, community centres, municipal parks and visitor centres while Chapter 16.0 (land and resource use VC) addresses effects on areas where land and resource use activities, including fishing, trapping, hunting, camping, snowmobiling and boating, occur.

The Municipality has three community centres; one each in Beardmore, Nakina and Geraldton. The Geraldton Community Centre is approximately 54,779 square feet and includes a hockey rink, a four-sheet curling rink (with lounge), senior's club, and weight room. The facility operates year-round, with an ice season of six months. The Beardmore and Nakina Community Centres also have arenas for skating, hockey and ringette and facilities for curling. The Longlac Sportsplex operates an ice rink where it offers public skating, figure skating lessons and hockey programs and leagues. It also has a four-sheet curling rink and a craft/activity room. Swimming is offered at the Geraldton pool. In 2015, the Beardmore Multi-Purpose Centre opened, which houses a community library, health centre, community room, and a municipal office (NetNewsLedger 2015).

Winter outdoor activities include predominantly cross-country skiing, snowmobiling, snowshoeing and ice fishing in the Municipality. Warm weather activities include fishing, baseball, hiking, kayaking, canoeing and camping at the four municipal parks (Greenstone 2014). Golf is available at the Kenogamisis Golf Club, which is located along the Kenogamisis Lake. This golf course has 18 holes, which were designed by Stanley Thompson (front nine) and Les Furber (back nine) (KGC 2015). GGM owns the golf course property and leases it to the Municipality of Greenstone.

Other recreation and land uses (trapping, guide outfitting, bait harvesting, hunting, fishing, snowmobiling, and hiking) that are not formally linked to municipal infrastructure, such as a community centre, park, sports facility, are discussed in the land and resource use VC (Chapter 16.0).

Geraldton offers recreational programs, such as card making, craft classes, dance classes, watercolour instruction, and yoga and meditation classes. Longlac offers recreational programs in firearm safety and hunter's training (Greenstone 2014). The Geraldton Discovery Centre, on Highway 11, is a tourist attraction that has exhibits on the area's forestry and mining history, and current practices in both industries.

In the Municipality of Greenstone's Corporate Strategic Plan (Millier Dickinson Blaise 2013), most Greenstone residents (80%) either strongly or somewhat agreed that Greenstone needs additional recreational facilities, services and programs for its children and youth; residents are generally satisfied with recreational facilities in the community and highlighted the importance of continued access and availability of recreational facilities and programming. Many residents feel that child and youth-friendly programming requires improvement.

15.2.2.6 Transportation

Roads and Highways

The main roads in the LAA/RAA are Highway 11 and Michael Power Boulevard (which becomes Highway 584 north of Geraldton). Highway 11 is the responsibility of the MTO. According to the Plan, all proposed development located near provincial highways or intersections within the MTO's permit control area must be approved by the MTO as per the Public Transportation and Highway Improvement Act (Tunnock 2010). AFN, AZA, BZA, BNA, GFN and LLFN are accessible by road year-round.

Highway 11 has undergone a number of upgrades in recent years, including in 2010, two four-laning projects on Highway 11/17 between Greenstone and Thunder Bay, and resurfacing of a number of sections. In 2014, 27 km of Highway 11 between Geraldton and Jellicoe were repaved. In 2010, annual average daily traffic on sections of Highway 11 around Greenstone ranged between 1,200 and 1,900 vehicles (MTO 2010).

The most recent daily traffic volume data shows that the section of Highway 11 within the LAA/RAA carries less than 2,000 vehicles per day. This is considered to be a very low volume highway, and one that operates well within capacity. For context, a two-lane highway that exhibits near capacity or capacity conditions during the peak hours would typically have a daily traffic volume in the order of 15,000 vehicles per day. Historical traffic volumes indicate that this area has not experienced growth in traffic since the year 2000, as presented in the "Traffic Impact Study, Premier Gold Mines Limited, Hardrock Property" (Traffic Impact Study; Appendix F9).

Several local roads, including Lahtis Road and Hardrock Road, that intersect highways within the LAA/RAA provide access to residential and commercial properties. Hardrock Road intersects Highway 11 south of the intersection with Michael Power Boulevard. It provides access to the Hardrock Townsite, located adjacent to Kenogamisis Lake. Under existing conditions, the Highway 11/Michael Power Boulevard intersection operates at a very good level of service and well within capacity during the weekday a.m. and p.m. peak hour, as noted in the Traffic Impact Study (Appendix F9).

The other important local road within the PDA is Sunset Drive. It intersects Michael Power Boulevard, which provides access to several properties in the MacLeod Townsite.

The Municipality of Greenstone Official Plan classifies municipal roads as those which are maintained year-round and those which are seasonally maintained. Unassumed roads include public roads that have not been maintained by Council (Tunnock 2010).

Airports

The Greenstone Regional Airport is owned and operated by the Municipality of Greenstone, and is located in the ward of Geraldton. The airport has a 1,524 metre (m) (5,000 foot [ft]) runway and has approximately 4,000 recreational and commercial aircraft movements per year. Activity at the airport includes medical flights, and private and commercial flights. The airport is also used by the Ministry of Natural Resources and Forestry (MNRF) Fire Management Centre and by Recon Air Corporation as an aircraft maintenance and rebuilding centre.

The R. Elmer Ruddick Nakina Airport, located in Nakina, is owned and operated by the Municipality. It has a 1,067 m (3,500 ft) runway and is used for recreational and commercial purposes. Nakina Air Service provides scheduled air service with approximately 6,500 aircraft movements per year. The airport also hosts Skyservices, an aircraft service and maintenance company (Municipality of Greenstone n.d.).

Demand for air service out of Nakina has been increasing as a result of prospecting throughout northern Ontario. In 2009, a review of the Municipality's infrastructure identified upgrades required at the Nakina airport to accommodate the increase in demand (GEDC and MF&Al 2010), including:

- an extension of the runway from the existing 1,067 m (3,500 ft) to 1,524 m (5,000 ft)
- an increase in the fuel storage capacity at the airport from the current 50,000 litres (L) (1½ day supply) to at least two tanks of 70,000 L each
- the development of commercial/industrial building lots at the airport to serve additional air service companies operating in the north.

Railways

Many Greenstone communities are accessible by rail. The Canadian National Railway runs through Caramat, Longlac and Nakina on its route between Toronto and western Canada. Passenger service is also available through Via Rail in Longlac and Nakina.

As part of potential future planning for mineral development in the Far North of Ontario, there is a concept to develop a new rail line serving Nakina to the Ring of Fire mineral region. It would potentially serve to transport mine products, materials and equipment to Nakina for interchange with Canadian National. Proposed new rail lines in the region would allow increased exploration and investment in northern Ontario and for providing access and improved infrastructure to isolated communities (MDB 2012).

15.2.2.7 Power

The Greenstone-Marathon sub-region is currently serviced by the 115 kilovolt (kV) system from the Alexander Switching Station near Nipigon and Marathon Transformer Station in the Town of Marathon. The Greenstone-Marathon 115 kV system consists of five single-circuit 115 kV lines. Hydro One owns and operates the transmission facilities in the sub-region and services the distribution connected loads in the sub-region (Northwest Regional Planning Working Group 2015). AFN, AZA, BZA, BNA, GFN and LLFN are serviced by Hydro One.

Local generation provides additional supply to the area. There is a local transmission-connected generating facility at Nipigon Customer Generating, a 40 megawatt gas-fired combined-cycle generating facility with a Non-Utility Generator contract for its output. This contract is due to expire in December 2022. There is also a transmission-connected generating facility at Aguasabon Generating Station, which is a hydroelectric plant with an installed capacity of 47 megawatts (Northwest Regional Planning Working Group 2015).

A Greenstone-Marathon Integrated Regional Resource Plan (IRRP) has been developed to address the electricity needs for the sub-region over the next 20 years and outline options for providing the required electrical supply in the near-, medium- and long-term.

From data submitted by Hydro One, customer demand is forecast to experience growth of about 1.0% per year over the next 10 years. If no new industrial customers need to be supplied from the transmission grid, the existing transmission system is adequate to meet electrical capacity requirements in the Greenstone sub-system and no new facilities are required (IESO 2016).

The majority of forecast demand growth in the Greenstone-Marathon sub-region is anticipated to be driven by potential large industrial customers that may connect directly to the transmission system. In the near term, potential industrial projects other than the Hardrock Project include the pumping stations associated with a portion of a large gas to oil pipeline conversion project that generally follows the Highway 11 corridor. The life extension of an existing mine near Marathon,

and a proposed precious metals mine near Marathon are also considered. In the medium- and long-term, a potential gold mine near Beardmore, and potential new supply to mining and remote communities in the Ring of Fire area using a North-South corridor are considered in the forecast scenarios. A number of options for providing electricity to these projects have been outlined in the Greenstone-Marathon IRRP (IESO 2016).

15.2.2.8 Water and Wastewater

Greenstone has five drinking water systems, which are not connected, and each system consists of a water treatment plant (WTP) and a distribution system. Water for these systems is drawn from the Blackwater River (Beardmore), Caramet Lake (Caramat), Cecile Lake (Geraldton), Long Lake (Longlac), and two wells (Nakina) (OCWA 2013a).

The five WTPs have a combined capacity of 13,415.20 cubic metres (m^3)/day (Table 15-3). The total daily use was 2,825.20 m^3/day in 2012. In 2012, all of the drinking water systems in the Municipality were able to meet the demand for water use within each town without exceeding the Municipal Drinking Water Licence and Permit to Take Water (OCWA 2013b, 2013c, 2013d, 2013e; Municipality of Greenstone 2012). In March 2014, the Ontario government, through its Small, Rural and Northern Municipal Infrastructure Fund, announced that it will spend more than $700,000 to repair the water towers in Geraldton and Longlac (MNDM 2014).

Table 15-3: Water Treatment Plants, Municipality of Greenstone

Water Treatment Plant	Rated Capacity (m^3/day)	Average Daily Use (m^3/day)
Caramat Water Treatment Plant	75	15
Beardmore Water Treatment Plant	752	104
Geraldton Water Treatment Plant	6,048	1,329
Longlac Water Treatment Plant	4,540	994
Nakina Water Treatment Plant	2,000	383
Total	**13,415**	**2,825**

SOURCE: Municipality of Greenstone 2012; OCWA 2013b, 2013c, 2013d, 2013e

Three wastewater treatment facilities are located in the Municipality, in Geraldton, Longlac and Nakina. The capacity of these facilities is 2,500, 2,454, and 882 m^3/day, respectively (Table 15-4). In 2012, the average daily wastewater flow in each community was less than the capacity of its treatment facility (Municipality of Greenstone 2012).

Table 15-4: Wastewater Treatment Facility Capacity, Municipality of Greenstone

Wastewater Treatment Facility	Rated Capacity (m^3/day)	Daily Flow (m^3/day)
Geraldton	2,500	1,788
Longlac	2,454	1,608
Nakina	882	359
Total	**5,836**	**3,755**

SOURCE: Municipality of Greenstone 2012

15.2.2.9 Solid Waste

The Municipality of Greenstone operates four municipal sanitary landfills to meet the waste disposal needs of the communities of Beardmore, Geraldton, Longlac and Nakina under the regulating authority of the MOECC.

Discussions between GGM and the Municipality have confirmed that the Longlac landfill has sufficient capacity to accept the anticipated domestic waste generated by the Project. An estimated 115,700 m^3 of approved capacity remains, and the current estimated remaining lifespan is approximately 19 years, or to 2034.

The Geraldton waste disposal site is located along the north side of Highway 11, approximately 3 km southeast of Geraldton. For a number of years, the site has been accepting waste beyond its approved disposal area and waste volume. In 2013, the Municipality completed the environmental screening process as per Ontario Regulation 101/07 – Waste Management Projects under the Environmental Assessment Act, and initiated the Environmental Compliance Approval process (formerly the Certificate of Approval process) to bring the site into compliance. Consequently, the current footprint of the waste disposal site has been approved and will allow for an additional refuse placement of 100,000 m^3, approximately 86,000 m^3 of which has already been placed. Thus, this site will allow for placement of an estimated additional 14,000 m^3 of waste.

The Beardmore and Nakina landfill sites do not have remaining capacity to provide long-term disposal for the entire Municipality. The Municipality is in the process of obtaining approval for alternative waste disposal options so that it can continue servicing the future waste disposal needs of the Municipality in the long term (ENL 2012; Municipality of Greenstone 2013a).

15.3 PROJECT INTERACTIONS WITH COMMUNITY SERVICES AND INFRASTRUCTURE

Table 15-5 identifies Project physical activities that may interact with community services and infrastructure. These interactions are indicated by a check mark (✓) and are discussed in Section 15.4 in the context of effects mechanisms, mitigation and residual effects. Justification for non-interactions (-) is provided following Table 15-5.

Table 15-5: Potential Project Environmental Effects on Community Services and Infrastructure, Prior to Mitigation

Project Components and Physical Activities	Potential Environmental Effects (prior to mitigation)		
	Change in capacity of housing and accommodations	Change in capacity of municipal and provincial services and infrastructure	Change in capacity of transportation services and infrastructure
CONSTRUCTION			
Site Preparation (removal of existing buildings and associated infrastructure, timber harvesting, vegetation clearing, earthworks, overburden and topsoil stockpiling, temporary effluent treatment and discharge)	✓	✓	✓
Watercourse Crossings and Goldfield Creek diversion	-	-	-
Pre-Production Mining and Development of Mine Components (open pit, waste rock storage areas, ore stockpile, water management facilities, Phase 1 of TMF)	-	-	-
Buildings and Supporting Infrastructure (process plant, temporary camp, sewage treatment plant (STP), mine dry, administration building, truckshop, warehouse and offices, power plant)	-	-	-
Linear and Ancillary Facilities (site roads and parking areas, onsite pipelines, power lines/transformer station, fuel supply, storage and distribution)	✓	✓	✓
Highway 11 Realignment and MTO Patrol Yard Relocation	-	-	-
Aggregate Sources (excavation and dewatering related to aggregate source development and extraction)	-	-	-
Employment and Expenditure	✓	✓	✓

Table 15-5: Potential Project Environmental Effects on Community Services and Infrastructure, Prior to Mitigation

Project Components and Physical Activities	Potential Environmental Effects (prior to mitigation)		
	Change in capacity of housing and accommodations	Change in capacity of municipal and provincial services and infrastructure	Change in capacity of transportation services and infrastructure
OPERATION			
Open Pit Mining (drilling, blasting, loading and hauling of ore and waste rock)	-	-	-
Waste Rock Disposal	-	-	-
Ore Processing (ore crushing and conveyance, ore milling)	-	-	-
Water Management (contact water collection system, process water supply, effluent management and treatment, open pit dewatering)	-	-	-
Tailings Management (including excavation and removal of historical tailings)	-	-	-
Site Buildings, Linear Facilities and Associated Infrastructure (mine site roads, power plant, explosives facility, fuel supply, storage and distribution)	-	-	-
Employment and Expenditure	✓	✓	✓
CLOSURE			
Active Closure (primary decommissioning and rehabilitation)	-	-	-
Post-Closure (pit filling and monitoring)	-	-	-
Employment and Expenditure	✓	✓	✓

NOTES:

✓ Potential interactions that might cause an effect without mitigation.

– Interactions are not expected.

While activities for each Project phase will have labour requirements causing an increase in the local population, which could affect community services and infrastructure, it is not possible to isolate the effects of individual activities and so these effects are addressed collectively as part of an "employment and expenditure" activity. Population increase is not expected to interact with community services and infrastructure located on Aboriginal community reserve lands. It is anticipated that construction workers will mostly live in the temporary camp, while a few in-migrant workers (and their families) may choose accommodation in the Municipality and will not seek accommodation on reserve lands.

The Project physical activities that could affect community services and infrastructure are site preparation for the installation of various Project components and linear facilities. These will involve highway realignment and removal of existing buildings, including some residences and recreational facilities and, therefore, have the potential to adversely affect housing and accommodations, municipal and provincial services and infrastructure, and transportation services and infrastructure. These Project physical activities are not expected to interact with community services and infrastructure located on reserve lands. Other Project activities and physical works are not expected to interact with community services and infrastructure.

15.4 ASSESSMENT OF RESIDUAL ENVIRONMENTAL EFFECTS ON COMMUNITY SERVICES AND INFRASTRUCTURE

15.4.1 Analytical Methods

15.4.1.1 Analytical Assessment Techniques for Community Services and Infrastructure

Potential environmental effects on community services and infrastructure are qualitatively assessed by comparing anticipated Project demand with existing capacity, as established through baseline research. As was noted above, there is spare capacity as a result of recent population declines in the LAA/RAA. There may also be potential to expand existing capacity through mitigation. Characterization of environmental effects is used to evaluate residual environmental effects that remain after mitigation has been implemented; the significance of these environmental effects is determined by considering thresholds and methods, as outlined in Section 15.1.7.

15.4.1.2 Assumptions and the Conservative Approach

Limitations of information, data analyses and interpretation are addressed by taking a conservative approach in this assessment. For instance, the labour force estimates are based on the local and regional employment experience at similar types of mines developed in the past where minimal efforts were made to provide opportunities for local and regional residents and businesses to participate in Project employment and business related opportunities. This approach is likely to understate actual Project benefits, because based on GGM's consultation with stakeholders and Aboriginal communities, there is strong interest in local participation in terms of Project employment and business contracts, reducing the requirement for in-migrant labour. This approach therefore likely overstates the number of workers (and their families) who may move to the area for Project employment, and this serves as a conservative approach for estimating Project effects on community services and infrastructure.

Where uncertainty exists regarding the characterization of residual effects, a conservative approach has been followed (e.g., assuming high magnitude in cases where effects may be of moderate or high magnitude). Recommended mitigation measures have been designed and selected in order to address conservative-case scenario effects.

Change in the capacity of community services and infrastructure also applies to services and infrastructure used by Aboriginal community members.

15.4.2 Assessment of Change in Capacity of Housing and Accommodations

15.4.2.1 Project Mechanisms for Change in Housing and Accommodations

An increase in population in the LAA/RAA is expected as a result of the Project, which has potential to place additional demands on local availability of housing, accommodations and other community services and infrastructure. Details regarding the Project workforce are provided in Chapter 14.0 (labour and economy VC) and summarized as follows:

- On average, the construction labour force will consist of 650 workers (inclusive of construction workers plus other labour), and will peak at 975 workers. It is expected that LAA/RAA residents will account for about 27% of the Ontario portion of the construction labour force. Most construction workers will work on a rotational basis, for 10 to 12 hours per shift, one shift per day, and seven days per week. Most workers will work on a 20 days on, 10 days off rotation.
- Project operation will directly employ an average of 450 people per year, although the number of operational workers will vary throughout this period, with an estimated peak of 545 workers. It is expected that operation phase workers will reside in the LAA/RAA, and will consist of current residents as well as in-migrant workers who will relocate. Labour demand/supply matching according to skill requirements suggests that 36% (195 workers) of operation peak workforce (43% of average workforce) could be current residents of the LAA/RAA. Therefore, at peak operation, about 64% of Project workers (approximately 350 workers) are predicted to be in-migrants to the LAA/RAA from other areas and would therefore require housing within the LAA/RAA.
- Many in-migrant operation employees will bring family members with them, who will place additional demand on services and infrastructure. In Ontario, there are on average 3.0 persons, including 1.1 children, per family. If the in-migrant operation employee families are consistent with this pattern, the estimated average of 350 in-migrant employees will be accompanied by approximately 700 family members, including approximately 385 children, for a total Project-related population increase of 1,050 men, women and children.
- Project spending related to active closure is expected to create 200 person-years (PYs) of direct employment in the RAA over the 5-year active closure period. On an annual basis, 40 PYs of direct employment is predicted for LAA/RAA residents.
- It is anticipated that the MacLeod and Hardrock townsites will be removed during the construction phase. The PDA includes 37 residential properties in the MacLeod Townsite, and 12 within Hardrock Townsite. GGM will remove dwellings as required. Accommodations as a result of the removal of existing buildings is not expected to have an effect on capacity of housing in the LAA/RAA given the availability of existing housing.

15.4.2.2 Mitigation for Change in Capacity of Housing and Accommodations

A temporary camp will be in place for construction, and potentially early operation, when some construction activities may be ongoing. The temporary camp will have the capacity to house an anticipated average of 450 people to a maximum of 600 during peak construction, so non-local construction workers can be housed during their on-site rotation. No additional mitigation is required for housing operation or closure workers due to the availability of vacant housing in the LAA/RAA.

15.4.2.3 Characterization of Residual Environmental Effects for Change in Capacity of Housing and Accommodations

The removal of existing MacLeod Townsite and Hardrock Townsite housing, located in the PDA, is not expected to have an effect on capacity of housing in the LAA/RAA, given the small number of units involved (49) and available housing stock elsewhere in the LAA/RAA.

It is expected that the majority of construction workers will live in the temporary camp, and hence are not expected to place demand on current housing and accommodations. However, some construction workers may choose to stay in temporary accommodations in the LAA/RAA instead of the temporary camp, but this would place minimal additional demands on local available housing and accommodations. The Municipality has 40 temporary accommodations including hotels, motels, bed-and-breakfasts, resorts, and tourism operations (ranging from hotels and motels to seasonal camps), which have a total of 280 rooms that could be used by workers who choose to not stay at the temporary camp. During construction, residual adverse effects on housing and accommodations capacity are predicted to be low in magnitude, short-term, occur in the LAA/RAA, and be continuous and reversible.

For operation, an estimated 350 workers are expected to move to the LAA/RAA from other locations. These operation employees and their families will require housing within the LAA/RAA communities. The non-local closure workforce will be smaller than was the case during construction or operation. As was noted above, population decline in the area has led to an abundant supply of vacant residential properties in Greenstone, such that there is adequate vacant housing to accommodate Project workers who require a place to live. The residual adverse effect on housing and accommodations capacity during operation and closure is predicted to be low in magnitude, medium-term, occurs in the LAA/RAA, and be continuous and reversible and can accommodate moderate levels of increased demand.

The residual effects for a change in capacity of housing and accommodations apply to all users (Aboriginal and non-Aboriginal).

15.4.3 Assessment of Change in Capacity of Municipal and Provincial Services and Infrastructure

15.4.3.1 Project Mechanisms for Change in Municipal and Provincial Services and Infrastructure

As was discussed in Section 15.2.2.3, the Geraldton District Hospital has aging infrastructure in need of improvements, and Greenstone is underserviced by health care professionals. The addition of an average of 650 (and maximum of 975) non-local workers during construction, and an average of approximately 1,050 in-migrant workers and family members during operation, has the potential to increase demands on the need for medical services in the area.

Other emergency services may be required by Project employees and their family members moving into LAA/RAA communities, and/or related to accidents or malfunctions at the Project, including the potential need for First Responder and fire department services.

Policing services can be affected by interactions between construction workers and local residents, and by increases in the resident population and disposable income. Demands on local policing and other social service providers may increase if Project-related income is spent on illicit activities, or if it increases income differentials and hence tensions among community residents. It is also possible that non-local Project workers will have adverse interactions with local residents, placing demands on police services with the additional population.

The presence of non-local workers during construction, and in-migrant workers and their family members during operation, together with some Project activities, will place additional demands on utilities, including power, water and waste services and infrastructure.

Hydro One has confirmed there is insufficient capacity for operation phase of the Project. Heat and power for the Project operation phase will be supplied by an onsite natural gas-fuelled power plant and power generation heat recovery distribution systems. Prior to commissioning of the power plant, the limited power requirements for construction activities will be from a temporary grid connection via the local distribution system that currently services the Geraldton area (e.g., a new above ground 2.5 km 44 kV distribution line(s) from the Hydro One Longlac Transformer Station), and/or temporary generators.

Power for the temporary camp will be supplied by the local distribution system. Capacity and a connection point are assumed available along Old Arena Road (refer to Figure 5-13).

An existing Hydro One Longlac Transformer Station (Longlac Transformer Station), Geraldton Operations Centre, and portions of the existing 44 kV distribution line and 115 kV transmission line will be relocated as they are currently located within or proximate to the open pit. The current plan is for GGM to construct the new Longlac Transformer Station and associated assets on behalf of Hydro One and transfer ownership of the transformer station and associated assests to Hydro One. The dismantling of the existing Longlac Transformer Station will be done only when the new Longlac Transformer Station and distribution lines are ready to be energized.

There are four sanitary landfills in the Municipality: in Beardmore, Geraldton, Longlac and Nakina. The Municipality is in the process of obtaining approval for alternative waste disposal options so that it can continue servicing its needs in the long term. According to the 2015 Performance Report for the Longlac landfill, approximately 115,700 m^3 of approved capacity remains, and the remaining lifespan is currently estimated to be about 19 years, or to 2034 (exp Services Inc. 2016). In discussions between GGM and the Municipality, it has been confirmed that the Longlac landfill has sufficient capacity to accept anticipated non-hazardous, domestic waste from the Project.

The production of Project-related waste includes construction waste, routine kitchen and office waste, lubricants, used batteries and hazardous waste.

Waste management for the Project is outlined in the Conceptual Waste Management Plan (Appendix M4) and will be established at the onset of site preparation and construction and will consist of: a waste sorting facility; disposal of domestic waste at the Municipality of Greenstone Longlac landfill; use of a secure hazardous waste temporary storage area; permanent disposal of inert waste within WRSAs B and D; and selling or recycling of waste material.

Hazardous wastes generated by the Project will be stored onsite in designated storage areas, within a Sea-Can container, a building or appropriate containers for truck transport. Hazardous waste materials will be packaged for shipment off site to certified waste management facilities for appropriate handling, in accordance with Canadian and provincial regulations.

Non-hazardous inert and non-putrescible waste, including non-hazardous demolition material from properties in the PDA, may be disposed of in a waste disposal area to be located in WRSA B and D.

Wastes associated with vehicles, such as scrap metal, batteries, and broken parts will be collected and sold for scrap or recycled, when possible. During active closure, buildings and infrastructure will be removed as per the Closure Plan.

During all Project phases, Project waste will be sent to the Longlac landfill[1]. Approximately 70 m^3 of domestic waste is expected to be produced during construction per week. It is estimated that approximately 36 m^3 of waste will be transported via truck to the Longlac landfill on a weekly basis during operation and approximately 1,000 m^3 of waste in total will be sent to the Longlac landfill during active closure.

Project activities and employees may also place pressure on water and sewer services and infrastructure. The mine site and temporary camp will be connected to the Geraldton municipal potable water system. GGM plans to install a water pipeline system that will provide service water to buildings on the mine site. This system will also provide Project personnel with water for eyewash, hand washing, toilets, safety showers and drinking water.

[1] Volume estamates of waste are prior to compaction.

Through discussions with MOECC and the Municipality, GGM has confirmed there is sufficient capacity to connect the temporary camp to the Municipality's sanitary sewer system. Works associated with connecting the temporary camp to the municipal sanitary sewage system will be undertaken by the Municipality.

A third-party sewage disposal contractor will provide portable washroom facilities during early construction until the STP and sewage discharge line is set up. During operation, to service the Project offices, mine dry building as well as the process plant, a package modular sewage treatment facility will be constructed in the vicinity of the process plant area (Figure 5-2). The system will be sized to handle 300 persons at any given time, based on a design flow rate of up to 250 L/person/day, for a total estimated sewage flow of 75,000 L/day. There will be no direct interaction between the Project and the municipal wastewater system during operation.

Non-local workers during construction, and in-migrant workers and their families during operation, will require recreation, education and other services in the LAA/RAA. In addition, the following existing recreation facilities will be removed as a result of the Project: the historical MacLeod-Cockshutt Mining Headframe, the Discover Geraldton Interpretive Centre and a municipal park and playground which currently service the MacLeod and Hardrock townsites. The back nine holes of the Kenogamisis Golf Club will also be removed and the front nine holes and the club house will be maintained as long as possible.

15.4.3.2 Mitigation for Change in Capacity of Municipal and Provincial Services and Infrastructure

Mitigation measures to reduce potential effects on capacity of municipal and provincial services and infrastructure are presented in Table 15-6.

Table 15-6: Mitigation Measures for a Change in Capacity of Municipal and Provincial Services and Infrastructure

Mitigation Measure for a Change in Capacity of Municipal and Provincial Services and Infrastructure	Construction	Operation	Closure
GGM will maintain communication with relevant agencies and organizations, including municipal authorities, health agencies and school boards, to provide Project information, to identify and address potential Project-related implications for services and infrastructure, and to support responsible organizations in planning for, adapting to, or benefitting from changing demand as a result of the Project.	✓	✓	✓
GGM will provide notice to the local school board regarding Project scheduling and human resources planning in order for the school board to prepare for the enrollment of additional students.	✓	✓	-

Table 15-6: Mitigation Measures for a Change in Capacity of Municipal and Provincial Services and Infrastructure

Mitigation Measure for a Change in Capacity of Municipal and Provincial Services and Infrastructure	Construction	Operation	Closure
GGM will develop cooperative protocols with responsible agencies to deal with temporary construction and closure worker access to emergency and other medical services. During construction most workers will continue to receive general health care in their home communities. Minor injuries or health problems will be addressed through the provision of first-aid at the worksite.	✓	-	-
GGM will offer its employees an Employee Assistance Program, and require pre-employment physicals. Workforce education to encourage healthy lifestyle choices, sensitivity training and strict enforcement of GGM's health and safety policies will also help mitigate adverse social effects. For example, sensitivity training will raise the level of awareness about the potential effects that workers can have on the community and their families through drug and alcohol use or other social concerns.	✓	✓	✓
Demands on emergency response services will be managed by having Project rescue vehicles and trained First Responders at the worksite.	✓	✓	✓
Safety orientations will be mandatory and provided for new employees, and select employees will be trained in fuel handling, equipment maintenance, and fire prevention and response measures. Fire prevention and suppression systems will be maintained onsite, including water supplies, sprinklers, fire extinguishers and other firefighting equipment. Flammable material (such as fuels and explosives) will be carefully controlled within the PDA.	✓	✓	✓
GGM will consult with local emergency providers so that roles and responsibilities are understood, and the necessary resources are in place.	✓	✓	✓
Project planning and management strategies, including in-design mitigation measures and environmental protection measures, will reduce the likelihood of accidents and potential fires to as low a level as is reasonably practical. Environmental Management and Monitoring Plans, such as a Spill Prevention and Response Plan, are provided in Appendix M.	✓	✓	✓
Demands on police services due to Project activities will be managed by controlling access to the mine site through the use of a security gate and guard house, and by employing onsite security staff. The use of a temporary camp, along with the work rotation, will limit interactions among local residents and non-local Project construction workers as some of the workforce will return to their home communities during their time off.	✓	✓	✓
Heat and power for Project operation will be supplied by an onsite natural gas-fuelled power plant and power generation heat recovery distribution system.	-	✓	-
Implementation of a Waste Management Plan, that sets out procedures for reducing Project-related waste and limiting demands on local landfills. A Conceptual Waste Management Plan is provided in Appendix M4 and includes conceptual strategies. A Conceptual Closure Plan is provided in Appendix I.	✓	✓	✓

Table 15-6: Mitigation Measures for a Change in Capacity of Municipal and Provincial Services and Infrastructure

Mitigation Measure for a Change in Capacity of Municipal and Provincial Services and Infrastructure	Construction	Operation	Closure
GGM will install a package modular STP for the mine site and there will be no direct interaction between the mine site and the municipal wastewater system.	-	✓	-
A third-party sewage disposal contractor will provide portable washroom facilities during early construction until the STP and sewage discharge line is set up and during active closure when facilities are decommissioned.	✓	-	✓
GGM will provide Project information to the Municipality and local service providers to prepare for increased waste, water, or sewer infrastructure demand.	✓	✓	✓
The temporary camp provided by GGM will include dining services and a basic recreation area, which may include a pool table and/or ping pong table, television and exercise equipment.	✓	-	-
GGM will maintain access and use of the front nine holes of the golf course and club house. In the event the contingency WRSA A/C is required during the Project life, GGM will discuss its requirements with the Municipality.	✓	✓	✓

NOTES:
✓ Mitigation measures are applicable.
– Mitigation measures are not applicable.

An agreement has been signed between the Municipality and GGM to support the Municipality's future plans with respect to the Kenogamisis Golf Course (holes 10-18), MacLeod-Cockshutt Mining Headframe and the Discover Geraldton Interpretive Centre. The future of these facilities that will be removed rests with the Municipality and is not considered part of the Project. The assessment of potential effects on recreational land use of MacLeod Provincial Park is provided in Chapter 16.0 (land and resource use VC).

15.4.3.3 Characterization of Residual Environmental Effects for Change in Capacity of Municipal and Provincial Services and Infrastructure

The Project will bring construction workers, and operation workers and their family members to the LAA/RAA, and will see a range of industrial activities with potential health and safety effects. Greenstone is currently underserviced by health care professionals, and some health care infrastructure (e.g., Geraldton District Hospital) requires maintenance and upgrading. These challenges are recognized by the Ministry of Health and Long-term Care, which has designated Greenstone an underserviced area, providing access to special funding.

A range of initiatives, including health and safety plans and protocols, the Conceptual Emergency Response Plan, an Employee Assistance Plan and a healthy lifestyle education program, will manage the health care demands of Project employees. GGM will consult with health agencies to provide Project updates, to support planning for changes in demand. Construction workers will keep their health service providers in their home communities and will not need to rely on health services and infrastructure in the LAA/RAA. Additionally, the in-migrant operation workers will be required to undergo pre-employment physicals and therefore will be in generally good health.

Project planning and management strategies, including in-design and environmental protection measures, such as an Emergency Response Plan, will manage effects on fire services in the LAA/RAA (a Conceptual Emergency Response Plan is provided in Appendix M3). The Greenstone Fire Department has six well-equipped sector fire stations and the Municipality has an Emergency Plan which covers initiatives such as training, public education, awareness and mitigation strategies, implemented by a Community Emergency Management Coordinator.

Given that the crime severity index and the incidence of crime in the LAA/RAA communities have been decreasing (2012-2013), it is assumed that there is capacity to handle increases in demand for policing. GGM will provide Project information upon request to help in preparation efforts for potential Project-related increases in demand.

Increases in the LAA/RAA population and Project power requirement during construction and operation will place additional demands on power services and infrastructure. Hydro One has confirmed there is sufficient capacity to provide power for the Project during construction. Power for construction activities will be from a temporary grid connection via the local distribution system that currently services the Geraldton area (e.g., a new 2.5 km aboveground 44 kV distribution line(s)) from the Hydro One Longlac Transformer Station. Temporary generators may also be used as a power source during construction. Heat and power for Project operation will be supplied by an onsite natural gas-fueled power plant and power generation heat recovery distribution systems.

Project activities and increases in the LAA/RAA population during construction and operation will increase demands on waste, water and sewer services and infrastructure. However, there is adequate existing capacity for waste, water and sewer services in the LAA/RAA to handle new demand as a result of Project-related population growth.

During construction the temporary camp will be connected to the Municipality of Greenstone's sanitary sewer system. Through discussions with MOECC and the Municipality, GGM has confirmed there is sufficient capacity to connect the temporary camp to the Municipality's sanitary sewer system. No change in the demand on existing services and infrastructure is predicted with the installation of the package modular sewage treatment plant during operation at the mine site.

The mine site and temporary camp will be connected to the Geraldton municipal water system to provide potable water and service water to the surface buildings at the Project. The Municipality has confirmed that there is adequate capacity within the existing water supply system to service the Project.

The Municipality has also confirmed that the Longlac landfill has enough capacity to handle the limited quantities of Project-related non-hazardous domestic waste produced in accordance with the Conceptual Waste Management Plan.

With regard to demands on recreation services and infrastructure, there are four community centres in the Municipality and residents have indicated that, other than for a need for more child and youth recreation programming, they are generally satisfied with recreational facilities in the community. There is also a range of outdoor recreational facilities and opportunities. While there will be some additional recreational demand from construction workers, and operation workers and their family members, this generally will return demand levels towards those experienced prior to recent population declines. Some of this demand will also be on a user-pay basis.

Site preparation activities during construction will lead to the removal of some existing recreation facilities in the LAA/RAA, including removal of nine holes of the Kenogamisis Golf Club. As further described in Section 5.6.1.3 of Chapter 5.0 (Project description), an agreement has been signed between the Municipality and GGM to support the Municipality's future plans with respect to these facilities. With respect to the golf course, GGM has committed to avoid using the contingency waste rock storage area A/C to preserve the golf clubhouse and the front nine holes unless needed.

As noted above, in-migrant operation employees will be accompanied by an estimated 385 children, creating additional demand for education services and infrastructure. However, in the last decade the enrolment in the Superior-Greenstone District School Board in 2013-2014 has declined by 40%, to 1,545 students, resulting in small class sizes and multiple grade groupings. Schools in the LAA/RAA have capacity to accommodate new students, and GGM will provide Project information to school boards upon request to help them prepare for potential Project-related increases in demand.

With the application of mitigation and management measures, the residual adverse effects on the capacity of municipal services and infrastructure during all Project phases are predicted to be low in magnitude, and continuous throughout construction, operation and active closure. Active closure activities are anticipated to occur at a smaller scale and over a shorter time period than construction or operation. Effects are likely to be reversed following active closure. The exception to this is the removal of some recreation facilities, such as the back 9 holes of the golf course. Pending a decision by the Municipality to replace them, the residual adverse effect of the removal of these facilities is predicted to be low in magnitude, long-term, a single event and irreversible.

The residual effects for a change in capacity of municipal and provincial services and infrastructure apply to all users (Aboriginal and non-Aboriginal).

15.4.4 Assessment of Change in Capacity of Transportation Services and Infrastructure

15.4.4.1 Project Mechanisms for Change in Transportation Services and Infrastructure

Project construction and operation activities will have effects on transportation services and infrastructure. Access to the Project will be provided by the construction of a gravel access road connecting to Highway 11 and will be used by personnel and for material deliveries. It is expected that four to eight semi-trailer truckloads of construction material will be delivered to the Project each day, via Highway 11. It is also assumed that four to ten concrete mixer trucks travel to the mine site daily. The western leg of the existing Highway 11 will also provide access for personnel and material deliveries. More information regarding the effects of Project activity on the Highway 11/Michael Power Boulevard intersection and the proposed Project access intersection on Highway 11 is available in the Traffic Impact Study (Appendix F9).

All roads within the MacLeod and Hardrock Townsites, located within the PDA, will no longer be required and will be removed during construction (Figure 5-14). A portion of Michael Power Boulevard will remain open south from the realigned Highway 11 providing access to the Kenogamisis Golf Club. Although a portion of Lahtis Road will remain in place throughout the Project life, it will be closed to the public at Highway 11 at the start of construction for Project safety. The road will remain closed to the public to allow for the safe operation of the Project and public safety until after closure measures are implemented. Lahtis Road is anticipated to be re-opened to the public to provide access up to the Goldfield Creek diversion.

The ore deposit is located underneath Highway 11, requiring the realignment of approximately 4.2 km of road and the relocation of the MTO patrol yard. The realigned Highway 11 will include a new intersection with Michael Power Boulevard to maintain access to Geraldton. Details regarding the design of the realignment and new interchange are provided in Section 4.5.1 and the “Preliminary Design Report Highway 11 Realignment” (Appendix H2). Temporary delays and/or detours will be required for construction purposes that may require detours and temporary flagging.

Construction workers will be bussed from the temporary camp to the mine site. The approximately 450 operation workers will provide their own transportation between their homes and the Project. Project-related population increase of approximately 810 persons, through the in-migration of some operation workers and their families, will also generate additional road traffic.

Some specialized workers or management may be transported by plane to the Greenstone Regional Airport and transported by minibus to and from the Project, especially at the beginning of the Project life. Rail traffic is not anticipated to be affected by Project activities, or by Project-related population increase or the infrequent shipment of large Project components.

15.4.4.2 Mitigation for Change in Transportation Services and Infrastructure

Mitigation measures to reduce potential effects on transportation services and infrastructure are presented in Table 15-7.

Table 15-7: Mitigation Measures for a Change in Transportation Services and Infrastructure

Mitigation Measure for a Change in Transportation Services and Infrastructure	Construction	Operation	Closure
Implement standard construction procedures and a Traffic Management Plan to reduce traffic delays during construction of realigned Highway 11. The Traffic Management Plan will be developed during ongoing planning and engineering design to address traffic staging in order to reduce delays.	✓	-	-
Provide bussing services between the temporary camp and mine site.	✓	-	-
GGM will encourage carpooling among local resident construction and operation workers.	✓	✓	-
Schedule arrivals/departures of employee traffic to occur earlier than the existing observed a.m. peak hour for local traffic and later than the existing observed p.m. peak hour if needed.	✓	✓	✓
Schedule alternating work shifts so that all workers do not arrive in and leave the area at the same time to limit Project-related demands on both highway and air services and infrastructure.	✓	✓	✓

NOTES:
✓ Mitigation measures are applicable.
– Mitigation measures are not applicable.

15.4.4.3 Characterization of Residual Environmental Effect for Change in Capacity of Transportation Services and Infrastructure

Because the realigned highway will be constructed prior to closure of the existing one, access to the area will be uninterrupted and existing infrastructure will be able to accommodate Project-related traffic increases.

Most non-local construction workers will be housed at the temporary camp and bussed to and from the mine site, reducing the need for travel between employees' homes and the mine site during construction. Bussing non-local employees between the temporary camp and the mine site and encouraging carpooling among locally-resident construction and operation workers will limit daily traffic volumes.

According to the Traffic Impact Study (Appendix F9), Highway 11 is operating well within its capacity. Also, with the addition of employee commuter traffic and traffic delivering construction materials, supplies and services to the Project, and with the mitigation measures described above, the traffic associated with the Project can easily be accommodated at both the Highway 11/Michael Power Boulevard and Highway 11/site access intersections.

Some non-local construction workers will travel via the Greenstone Regional Airport and the R. Elmer Ruddick Nakina Airport. A number of upgrades to the Nakina Airport are under consideration, including an extended runway, increased fuel storage and development of commercial and industrial building lots to provide services to new air service companies.

The residual adverse effects of the Project on transportation services and infrastructure are therefore predicted to be low in magnitude and continuous throughout all phases of the Project. The scale and duration of closure activities are anticipated to be smaller than was the case during construction or operation. Effects are likely to be reversed following active closure.

The residual effects for a change in capacity of transportation services and infrastructure apply to all users (Aboriginal and non-Aboriginal).

15.4.5 Summary of Residual Environmental Effects on Community Services and Infrastructure

A summary of residual environmental effects that are likely to occur as a result of the Project is provided in Table 15-8.

Residual adverse effects are considered further in terms of their significance in Section 15.5 and are carried forward to the cumulative effects assessment (Chapter 20.0). A conceptual framework and scope for environmental management and monitoring plans, including follow-up and monitoring programs is provided in Chapter 23.0. Conceptual environmental management and monitoring plans are also provided in Appendix M.

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
CHANGE IN CAPACITY OF HOUSING AND ACCOMMODATIONS											
Additional demands on housing and accommodations	✓	-	-	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Short-term**	**Reversible**	**Moderate Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause a decrease in capacity of housing and accommodations. **Magnitude**: Low. The change in capacity of housing and accommodations will be at or near to baseline conditions. During construction, the average labour force will consist of 650 workers (with a peak at 975 workers, inclusive of construction workers plus other labour). Workers will be housed at the temporary camp during their on-site rotation and will therefore not require housing accommodations elsewhere. The Municipality has an adequate number of temporary accommodations to absorb additional demand from workers that may live outside of the temporary camp. **Geographic Extent**: LAA/RAA. The majority of construction workers will come from outside of the LAA/RAA. Although all construction workers can be accommodated at the temporary camp, some may choose instead to live in LAA/RAA communities. **Timing:** N/A. Seasonal aspects are unlikely to affect capacity of housing and accommodations. **Frequency**: Continuous. The additional demands on housing and accommodations will occur continuously throughout the construction phase. **Duration:** Short-term. The additional demands on housing and accommodations is limited to the construction phase of the Project. **Reversibility**: Reversible. The residual environmental effect is likely to be reversed after the construction phase is completed and workers leave the area to seek work elsewhere. **Ecological and Socio-Economic Context:** Moderate Capacity. Housing and accommodations can accommodate moderate levels of increased demand. It is anticipated that the small number of construction workers that may choose instead to live in LAA/RAA communities can be accommodated.							

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
	-	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Medium-term**	**Reversible**	**Moderate Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause a decrease in capacity of housing and accommodations. **Magnitude**: Low. The change in capacity of housing and accommodations will be at or near to baseline conditions. During operation, the predicted in-migrant workforce (350 workers) and their families are estimated to total 1,050 people that may move to the LAA/RAA. However, with the surplus in vacant housing due to trending population declines, the Municipality is expected to be able to absorb the increase in workers without putting pressure on housing and accommodations. **Geographic Extent**: LAA/RAA. A portion of operation workers will come from outside of the LAA/RAA. These operation employees, and their families, will live within communities located in the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect capacity of housing and accommodations. **Frequency**: Continuous. The additional demands on housing and accommodations will occur continuously throughout the operation and closure phases. **Duration:** Medium-term. The additional demands on housing and accommodations will extend throughout the operation and closure phases of the Project. **Reversibility**: Reversible. The residual environmental effect is likely to be reversed after the operation and active closure of the Project is completed and workers leave the area to seek work elsewhere. **Ecological and Socio-Economic Context:** Moderate Capacity. Housing and accommodations can accommodate moderate levels of increased demand. It is anticipated that the operation workers that may choose instead to live in LAA/RAA communities can be accommodated.						

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
CHANGE IN CAPACITY OF MUNICIPAL AND PROVINCIAL SERVICES AND INFRASTRUCTURE											
Additional demands on health services and infrastructure	✓	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Long-term**	**Reversible**	**Low Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on health services and infrastructure. **Magnitude**: Low. The change in capacity of health services and infrastructures will be at or near to baseline conditions after proposed mitigation and management. **Geographic Extent**: LAA/RAA. The additional demands on health services and infrastructure will occur within the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect the additional demands on health services and infrastructure. **Frequency**: Continuous. The additional demands on health services and infrastructure will occur continuously throughout the Project. **Duration:** Long-term. The additional demands on health services and infrastructure will continue throughout all phases of the Project. **Reversibility**: Reversible. The residual environmental effect will be reversed following active closure when workers leave the area. **Ecological and Socio-Economic Context:** Low Capacity. Health services and infrastructure have limited capacity to accommodate additional demands.						

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
Additional demands on police services	✓	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Long-term**	**Reversible**	**Moderate Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on police services. **Magnitude**: Low. The change in capacity of police services will be at or near to baseline conditions after proposed mitigation and management. **Geographic Extent**: LAA/RAA. The additional demands on police services will occur within the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect the additional demands on police services. **Frequency**: Continuous. The additional demands on police services will occur continuously throughout the Project. **Duration:** Long-term. The additional demands on police services will occur on multiple occasions at irregular intervals during all phases of the Project. **Reversibility**: Reversible. The residual environmental effect on police services will be reversed following active closure when workers leave the area. **Ecological and Socio-Economic Context:** Moderate Capacity. Police Services have moderate capacity to accommodate additional demands.						

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
Additional demands on fire services	✓	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Long-term**	**Reversible**	**Moderate Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on fire services. **Magnitude**: Low. The change in capacity of fire services will be at or near to baseline conditions after proposed mitigation and management. **Geographic Extent**: LAA/RAA. The additional demands on fire services will occur within the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect the additional demands on fire services. **Frequency**: Continuous. The additional demands on fire services will occur on multiple occasions at irregular intervals during the Project. **Duration:** Long-term. The additional demands on fire services will continue throughout all phases of the Project. **Reversibility**: Reversible. The residual environmental effect will be reversed following active closure when workers leave the area. **Ecological and Socio-Economic Context:** Moderate Capacity. Fire services have moderate capacity to accommodate additional demands.						

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
Additional demands on power and municipal servicing	✓	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Long-term**	**Reversible**	**Low Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on power and municipal servicing including water and waste services and infrastructure. **Magnitude**: Low. The change in capacity of power and municipal servicing will be at or near to baseline conditions after proposed mitigation and management. The Municipality confirmed there is sufficient capacity to connect the temporary camp to the municipal sanitary sewer system. The Municipality also confirmed adequate capacity within the Geraldton municipal water system to provide potable water for the mine site and temporary camp. Other Project design plans, including the potential use of generators as a power source during construction, a sewage treatment plant at the mine site, and the use of a natural gas-fuelled power plant during operation will reduce effects on provincial and municipal services and infrastructure. **Geographic Extent**: LAA/RAA. The additional demands on power and municipal servicing will occur within the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect the additional demands on power and municipal servicing. **Frequency**: Continuous. The additional demands on power and municipal servicing will occur continuously throughout the Project. **Duration:** Long-term. The additional demands on power and municipal servicing will continue throughout all phases of the Project. **Reversibility**: Reversible. The residual environmental effect will be reversed following active closure. **Ecological and Socio-Economic Context:** Low Capacity. Power and municipal servicing have low capacity to accommodate additional demands.							

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
Removal of recreation services and infrastructure	✓	-	-	**Adverse**	**Low**	**PDA**	**N/A**	**Single Event**	**Long-term**	**Irreversible**	**Low Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, the Project will cause the removal of the Kenogamisis Golf Course (holes 10-18), MacLeod-Cockshutt Mining Headframe and the Discover Geraldton Interpretive Centre. **Magnitude**: Low. The change in capacity of recreation services and infrastructure will be at or near to baseline conditions after proposed mitigation and management. An Agreement has been signed between the Municipality and GGM to support the Municipality's future plans with respect to these facilities. With respect to the golf course, GGM has committed to avoid using the contingency WRSA A/C to preserve the golf clubhouse and the front nine holes unless needed. **Geographic Extent**: PDA. The removal of recreation services and infrastructure will occur within the PDA. **Timing:** N/A. Seasonal aspects are unlikely to affect the removal of recreation services and infrastructure. **Frequency**: Single Event. The removal of recreation services and infrastructure will occur once during construction. **Duration:** Long-term. The residual effect will continue throughout all phases of the Project. **Reversibility**: Irreversible. The removal of recreation services and infrastructure is permanent. **Ecological and Socio-Economic Context:** Low Capacity. Due to the removal of certain recreational infrastructure, recreation services and infrastructure has low capacity to accommodate additional demands.							

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
Additional demand on recreation services and infrastructure	✓	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Long-term**	**Reversible**	**Moderate Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on recreation services and infrastructure. **Magnitude**: Low. The change in capacity of recreation services and infrastructure will be at or near to baseline conditions after proposed mitigation and management. **Geographic Extent**: LAA/RAA. The additional demands on recreation services and infrastructure will occur within the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect the additional demands on recreation services and infrastructure. **Frequency**: Continuous. The additional demands on recreation services and infrastructure will occur continuously throughout the Project. **Duration:** Long-term. The additional demands on recreation services and infrastructure will continue throughout all phases of the Project. **Reversibility**: Reversible. The residual environmental effect will be reversed following active closure when workers leave the area. **Ecological and Socio-Economic Context:** Moderate Capacity. Recreation services and infrastructure have moderate capacity to accommodate additional demands.						

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
Additional demands on education services and infrastructure	✓	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Long-term**	**Reversible**	**Moderate Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on education services and infrastructure. **Magnitude**: Low. The change in capacity of provincial and municipal services and infrastructure will be at or near to baseline conditions after proposed mitigation and management. Schools in the LAA/RAA have physical capacity to accommodate new students and GGM will provide Project information to school boards to help them prepare for potential increases in demand. **Geographic Extent**: LAA/RAA. The additional demands on education services and infrastructure will occur within the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect the additional demands on education services and infrastructure. **Frequency**: Continuous. The additional demands on education services and infrastructure will occur continuously throughout the Project. **Duration:** Long-term. The additional demands on education services and infrastructure will continue throughout all phases of the Project. **Reversibility**: Reversible. The residual environmental effect will be reversed following active closure when Project workers and their families leave the LAA/RAA. **Ecological and Socio-Economic Context:** Moderate Capacity. Education services and infrastructure have moderate capacity to accommodate additional demands.							

Table 15-8: Summary of Residual Environmental Effects on Community Services and Infrastructure

Residual Effect	Activity			Residual Environmental Effects Characterization							
	Construction	Operation	Closure	Direction	Magnitude	Geographic Extent	Timing	Frequency	Duration	Reversibility	Ecological and Socio-economic Context
CHANGE IN CAPACITY OF TRANSPORTATION SERVICES AND INFRASTRUCTURE											
Additional demands on transportation infrastructure	✓	✓	✓	**Adverse**	**Low**	**LAA/RAA**	**N/A**	**Continuous**	**Long-term**	**Reversible**	**Moderate Capacity**
				Direction: Adverse. Taking into consideration proposed mitigation and management measures, it is predicted that the Project is likely to cause additional demands on transportation infrastructure. **Magnitude**: Low. The change in capacity of transportation services and infrastructure will be at or near to baseline conditions after proposed mitigation and management. Since the Highway 11 realignment will be constructed prior to closure of the existing Highway 11 alignment, access to the area will be uninterrupted and existing infrastructure will be able to accommodate Project-related traffic increases. **Geographic Extent**: LAA/RAA. The additional demands on additional demand on transportation infrastructure will occur within the LAA/RAA. **Timing:** N/A. Seasonal aspects are unlikely to affect the additional demand on transportation infrastructure. **Frequency**: Continuous. The additional demands on transportation infrastructure will occur continuously throughout the Project. **Duration:** Long-term. The additional demands on transportation infrastructure will continue throughout all phases of the Project. **Reversibility**: Reversible. The residual environmental effect will be reversed following active closure when Project-related traffic ceases. **Ecological and Socio-Economic Context:** Moderate Capacity. Transportation infrastructure has moderate capacity to accommodate additional demands.							

NOTES:
See Table 15-2 for detailed definitions.
✓ Residual effect anticipated.
– No residual effect anticipated.

15.5 DETERMINATION OF SIGNIFICANCE

A significant effect on community services and infrastructure is defined as one that results in demands on services or infrastructure above and beyond current capacity, such that standards of service are routinely and persistently reduced below current levels for an extended period such that they are unlikely to recover to existing conditions.

During all Project phases, effects are assessed as adverse, of low magnitude, occur continuously in the LAA/RAA and be reversible. Effects will be short-term during construction and during operation and closure they will be medium-term. The exception is the effect on capacity of recreation services and infrastructure, which will be permanent and irreversible during all phases due to the removal of the Kenogamisis Golf Course Holes 10-18, MacLeod-Cockshutt Mining Headframe and the Discover Geraldton Interpretive Centre. The socio-economic context varies between low and moderate capacity, depending on the capacity of the services and infrastructure.

Because residual adverse effects on community services and infrastructure do not result in demands on services or infrastructure above and beyond current capacity such that standards of service are routinely and persistently reduced below current levels for an extended period, they are considered to be **not significant** for all phases of the Project.

15.6 PREDICTION CONFIDENCE

With the proposed management and mitigation measures, including careful implementation of normal planning procedures by the relevant authorities, and liaison between GGM and those local authorities, the residual environmental effect of a change in capacity of community services and infrastructure has been determined with a high level of confidence.

15.7 REFERENCES

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