5.10 Socioeconomic Conditions

5.10.1 Rationale for Valued Component Selection

The NSECC requires proponents to provide information on current socioeconomic conditions that could potentially be affected by the Project and an assessment of potential effects and proposed mitigations to address identified issues. The rationale for inclusion of various socioeconomic conditions included in this VC for the Project follow:

- **Economy**: The Project will make a strong contribution to the local and provincial economies resulting from employment and business activity throughout all phases of the life of the mine.
- **Land and Resource Use**: Land and resource use is important to economics and lifestyle in rural areas. Lands and resources within and near the PA may be used for commercial, and/or recreational purposes. Land use is governed by the MODG Planning Strategy and Land Use By-Laws. Various commercial and recreational land and resource uses are also subject to provincial or federal regulations.
- **Public Safety**: Development activities can result in changes that affect public safety. Potential changes include increased traffic and the presence of a non-resident workforce in temporary accommodations.
- **Human Health**: Human health may be affected by environmental and social factors and the types of industries that exist or are introduced to an area.

Various aspects of this EA that may affect human communities are discussed in other VC chapters that address related topics such as changes to air, light, noise, groundwater, and surface water. In addition, human activities may be affected directly or indirectly by the effects development on fish, animals, birds, or plants and the habitats that support these species (Table 5.10-1). For brevity of the EARD, these related effects are not repeated in this VC chapter.

Table 5.10-1 Relationship to Other VCs

VC	Section
Air	5.1
Light	5.2
Noise	5.3
Groundwater Resources	5.5
Surface Water Resources	5.6
Fish and Fish Habitat	5.8
Terrestrial Environment	5.9
Indigenous Peoples	5.11
Cultural and Heritage Resources	5.12

5.10.2 Baseline Program Methodology

The Socioeconomic Conditions VC chapter includes data and information obtained through desktop research and analysis, along with information gathered through consultation and observations of field staff while in the Goldboro area. Also, the following reports were important to understanding effects on this VC:

- NI 43-101 Technical Report and FS for the Goldboro Gold Project, Eastern Goldfields District, Nova Scotia. 2022, prepared by Nordmin Engineering Ltd. January 11, 2022
- Socioeconomic Impact of the Goldboro Gold Project, prepared by Group ATN Consulting Inc. February 18, 2022
- Viewshed Analysis, Goldboro Gold Project, prepared by GHD. April 28, 2022

- Human Health and Ecological Risk Assessment. Goldboro Gold Project, prepared by GHD. May 27, 2022

Data related to population were obtained from Statistics Canada 2016 and 2021 censuses. Population health data were obtained from Statistics Canada National Health Survey. Labour Market Indicator data and Indigenous employment data were also obtained from Statistics Canada. Information on land and resource use was obtained from land users, provincial data sources, and various other websites. Some data and information were obtained from other studies conducted in Goldboro such as environmental assessments for Pierdae Energy's Goldboro LNG Project and Realignment of Marine Drive Highway 316.

5.10.3 Baseline Conditions

Goldboro and nearby communities are small villages distributed along Highway 316. The nearest larger communities are the town of Guysborough, which is 61 km northeast of Goldboro and the urban centre of Antigonish, 76 km north. No census data are available for the village of Goldboro, which is within MODG. In 2021, the population of MODG and of Guysborough County had declined since the last census (Table 5.10-2). Comparatively, population gain was experienced in the town of Guysborough and the province generally. NS has a lower median age than the other jurisdictions shown in Table 5.10-2. Median age, which is an indicator of potential workforce availability, was not included in available 2021 census data at time of writing.

Table 5.10-2 Population

Jurisdiction	Population			Median Age (2016)
	2016	2021	Change	
MODG	4,670	4,585	-1.8%	56.5
Guysborough County	7,625	7,373	-3.3%	55.5
Town of Guysborough	363	397	9.4%	58.3
Nova Scotia	923,598	969,383	5.0%	45.5

Statistics Canada, 2021; Statistics Canada, 2016

5.10.3.1 Economy

Like many jurisdictions in Canada, and particularly rural areas, NS has experienced outmigration, population ageing, and low birth rate, which affect labour availability and economic productivity. In 2014, the NS Commission on Building Our New Economy released the report: "Now or Never: An Urgent Call to Action for All Nova Scotians" a 10-year action plan identifying goals aimed at economic renewal (One Nova Scotia, 2021). This report emphasizes the importance of increasing population, improving labour force participation by underrepresented groups, enhancing new business start-ups and capitalization, improving research and development, and reducing debt. Focus industries included tourism, fisheries, and agriculture. A key goal is to increase export activity and value, which is critical for bringing new money into an economy. The latest update indicates that while the number of firms participating in export trade has increased, the value of exports falls short of objectives. Information on mining, which is an important export industry, is provided in Section 5.10.3.1.2.

The Eastern Strait Regional Enterprise Network includes MODG, the Town of Antigonish, the Municipality of the County of Antigonish, the Municipality of the District of Saint Mary's, the Town of Mulgrave, and the Town of Port Hawkesbury (ESRN, 2022). The regional economy of this broad area is largely based on traditional industries (e.g., fishing and agriculture), but also includes emerging sectors such as renewable energy. Educational assets include St. Francis Xavier University and the Strait Area Campus of the NS Community College. The region has natural and/or industrial assets related to important sectors such as oil and gas, transportation, manufacturing, and tourism.

Fishing and forestry/silviculture have long been mainstays of the economy of Guysborough County in general. Currently, the economy of MODG is focussed on natural resource-based industries. Initiatives include aggregate extraction near Mulgrave and a major wind energy project at Hazel Hill (MODG, nd). The Municipality has other economic development proposals such as a deep-water port at Melford, mining for gold and rare earth minerals, and

eco-tourism/outdoor recreation. MODG has sanctioned the creation of the Guysborough District Business Partnership (GDBP), which is mandated to develop tourism offerings and small business opportunities in the Municipality (MODG, 2022a).

Presently, the economy of the Goldboro area is mainly dependent on fishing and forestry activities but the community has a history of gold mining and industrial development in the recently decommissioned ExxonMobil Goldboro Gas Plant. Goldboro is also the location of the planned Pieridae LNG project, which has received regulatory approval in the EA process but is currently stalled due to economic conditions (MODG, nd). If it proceeds, the Pieridae LNG project will bring up to 3,500 jobs in construction and 200 positions once production begins.

5.10.3.1.1 Employment by Industry Sectors

The North American Industry Classification Systems (NAICS) is used to categorize business activity in Canada, the United States, and Mexico. The 2016 census data (Statistics Canada, 2016a, Statistics Canada, 2016b) shows that in Guysborough County the largest numbers of individuals were employed in the following sectors based on NAICS: "Agriculture, Forestry, Fishing and Hunting" "Health Care and Social Assistance" and "Retail Trade" (Table 5.10-3). The largest numbers of individuals in NS were employed in the following NAICS sectors: "Health Care and Social Assistance" "Retail Trade" and "Construction". For both Guysborough County and the province, "Health Care and Social Assistance" and "Retail Trade" were among the largest NAICS sectors for labour force. The fact that "Agriculture, Forestry, Fishing and Hunting" is the largest employment sector in Guysborough County is consistent with the County's primarily rural geography. Conversely, this NAICS classification was the 11th largest employment sector in NS.

The industry (NAICS) showing the largest employment for women in Guysborough County in 2016 was "Health Care and Social Assistance". This is consistent with employment of women in NS. Men in Guysborough County were primarily employed in the "Agriculture, Forestry, Fishing and Hunting" NAICS classification, while the "Manufacturing" classification was the largest sector employing men in NS. While labour force size in the "Mining, Quarrying, Oil and Gas Extraction" classification was relatively low for Guysborough County and NS in 2016, the County had more than double the labour force in this classification than NS. This is likely due to employment at the Goldboro Gas Plant, which was decommissioned beginning in 2018. Men in Guysborough County were four times more likely than women to be employed in the "Mining, Quarrying, and Oil and Gas Extraction" classification, whereas men in NS were five times more likely to work in this sector than women.

Table 5.10-3 Employment by Industry

North American Industry Classification System (NAICS) 2012	Guysborough County			Nova Scotia		
	Total	Male	Female	Total	Male	Female
Agriculture, Forestry, Fishing and Hunting	18.0%	28.4%	6.4%	3.5%	5.3%	1.5%
Mining, Quarrying, and Oil and Gas Extraction	1.8%	3.5%	0.8%	0.7%	1.6%	0.3%
Utilities	0.4%	0.7%	0.0%	0.6%	1.4%	0.4%
Construction	6.4%	11.7%	0.8%	11.7%	11.0%	1.3%
Manufacturing	6.8%	7.8%	5.7%	6.8%	12.2%	4.7%
Wholesale Trade	1.3%	1.4%	0.8%	2.9%	4.5%	1.7%
Retail Trade	9.2%	6.4%	12.1%	13.0%	11.6%	13.7%
Transportation and Warehousing	5.0%	7.1%	2.6%	4.2%	6.9%	2.5%
Information and Cultural Industries	1.7%	1.1%	2.3%	2.0%	2.1%	1.6%
Finance and Insurance	0.9%	0.7%	1.5%	3.4%	2.3%	4.8%
Real Estate and Rental and Leasing	1.3%	1.8%	1.9%	1.5%	1.2%	0.9%

Table 5.10-3 Employment by Industry

North American Industry Classification System (NAICS) 2012	Guysborough County			Nova Scotia		
	Total	Male	Female	Total	Male	Female
Professional, Scientific and Technical Services	2.9%	2.8%	3.4%	5.8%	5.2%	4.3%
Management of Companies and Enterprises	0.0%	0.0%	0.0%	0.1%	0.1%	0.1%
Administrative and Support, Waste Management and Remediation Services	1.8%	3.2%	0.0%	4.6%	5.0%	4.5%
Educational Services	6.1%	3.2%	9.1%	7.9%	4.6%	10.1%
Health Care and Social Assistance	15.8%	2.1%	30.2%	14.5%	4.5%	24.7%
Arts, Entertainment and Recreation	1.8%	1.4%	2.3%	1.8%	1.5%	1.4%
Accommodation and Food Services	7.0%	3.2%	10.9%	6.8%	4.4%	8.7%
Other Services (except public administration)	4.0%	5.3%	3.0%	4.2%	4.5%	4.9%
Public Administration	7.7%	8.2%	7.2%	9.0%	10.0%	7.9%

Statistics Canada, 2016

5.10.3.1.2 Mining in Nova Scotia

The NS mining industry is an important contributor to gross domestic product (GDP) and exports. Annually, the province produces approximately 9 M tonnes of construction aggregates for domestic consumption and approximately 4 M tonnes for export (NS Mineral Resources Branch, 2021). Building stone is also produced in several locations. The province has 11 operating mines, which produce salt, coal, limestone, silica sand, gypsum, and/or anhydrite. Several gold mining projects (e.g., Beaver Dam, Fifteen Mile Stream) are in the pre-development permitting process (NSECC, 2022a) while the Touquoy gold mine is in operation.

According to a recent study prepared for Mining Association of NS (MANS) and Mining NL, (MNL), just over 21% of Atlantic Canadian mining sector workers were NS-based in 2020 (MANS and MNL, 2022). These are mainly employed in support activities followed by stone mining and quarrying (Table 5.10-4).

Table 5.10-4 Number of Employees per Mining Industry Sub-sector (2020)

North American Industry Classification System (NAICS)	Nova Scotia
Coal Mining [2121]	5
Gold/Silver Ore Mining [21222]	140
Stone Mining and Quarrying [21231]	445
Sand, Gravel, Clay, and Ceramic Refractory Minerals Mining and Quarrying [21232]	35
Other Nonmetallic Mineral Mining and Quarrying [21239A]	165
Support Activities for Mining [21311B, 213117, 213119]	700
Total	1,490

MANS and MNL, 2022

Atlantic Canada's mining industry is supported by companies engaged in drilling, fabrication, geochemical analysis, environmental/engineering consulting, and other products and services. Nearly 50% of identified suppliers to the provincial mining industry were NS-based.

5.10.3.1.3 Employment and Income

Labour force participation (i.e., those actively seeking employment and/or employed), employment and unemployment rates are common metrics of economic vitality. This section examines labour indicators for Guysborough County and NS. Where disaggregated data are available, this analysis includes information on women. No Statistics Canada data were available on the African Nova Scotian labour force.

Labour force participation and employment are lower in Guysborough County than the province by approximately 11%and 14%, respectively (Table 5.10-5). The County also has lower personal, family, and household incomes.

Table 5.10-5 Employment and Income

Indicator	Guysborough County	Nova Scotia
Total Labour Force (2016)	3,355	474,595
Population Age 15-64 (2016)	6,675	774,750
Participation Rate (2016)	50.3%	61.3%
Employment Rate (2016)	41.0%	55.2%
Unemployment Rate (2016)	18.3%	10.0%
Median Personal Income (2015)	$26,502.00	$31,813.00
Median Family Income (2015)	$64,976.00	$77,529.00
Median Household Income (2015)	$49,253.00	$60,764.00

Statistics Canada, 2016

African Nova Scotians experience lower employment and income than the provincial work force generally (Government of NS, 2018). African Nova Scotian men and women have similar incidences of low income, but women's income is generally lower (Table 5.10-6).

Table 5.10-6 African Nova Scotian Income

Income	Nova Scotia	African Nova Scotians		Nova Scotians	
		Female	Male	Female	Male
Average Total Income	$41,479	$29,622	$33,456	$34,132	$49,413
Prevalence of Low Income	7.8%	18.5%	18.7%	7.8%	7.8%

Government of NS, 2018

Women in Guysborough County have the lowest labour market participation and employment rates compared to men in the same County and to men and women in the province of NS (Table 5.10-7). Similar differences are observed in both the employment rate and median personal income. Labour market outcomes are less favourable for women.

Table 5.10-7 Employment and Income by Gender

Indicator	Guysborough County			Nova Scotia		
	Total	Male	Female	Total	Male	Female
Total Labour Force (2016)	3,355	1,805	1,550	474,595	242,775	231,820
Participation Rate (2016)	50.3%	55.5%	45.4%	61.3%	65.2%	57.6%
Employment Rate (2016)	41.0%	43.5%	38.7%	55.2%	57.7%	52.8%
Unemployment Rate (2016)	18.3%	21.3%	14.8%	10.0%	11.4%	8.4%
Median Personal Income (2015)	$26,502	$33,724	$21,549	$31,813	$38,379	$26,750

Statistics Canada, 2016

More than 50% of the population in Guysborough County and NS, have obtained a form of post-secondary education certification. However, as indicated in Table 5.10-8, the level of attainment for the province was greater than that of the County. Women had a higher university certificate, diploma or degree at bachelor level or above than men in both the County and NS. Likewise, a higher percentage of men had no certificate, diploma or degree, at both the County and provincial levels, compared to women.

The difference in post-secondary education attainment between the County and the province can be explained in part by the large labour force participation of County workers in the "Agriculture, Forestry, Fishing, and Hunting" sector, where post-secondary education accreditations are not likely to be a requirement of employment. Still, this only accounts for male workers in the County who make up 28.4% of the "Agriculture, Forestry, Fishing and Hunting" sector compared to only 6.4% of female workers in the County (Table 5.10-8). Female workers in the County, have the highest representation in the "Health Care and Social Assistance" sector where post-secondary education attainment is more likely to be a requirement compared to occupations in natural resource harvesting.

Table 5.10-8 Postsecondary Education by Gender (2016)

Indicator	Guysborough County			Nova Scotia		
	Total	Male	Female	Total	Male	Female
No Certificate Diploma or Degree	40.4%	42.3%	38.5%	20.8%	23.1%	18.8%
Postsecondary Certificate, Diploma or Degree	50.4%	50.4%	50.5%	57.5%	57.0%	57.9%
University Certificate, Diploma, or Degree at Bachelor Level or Above	9.1%	7.3%	11.0%	21.8%	20.0%	23.3%

Statistics Canada, 2016

Regarding postsecondary field of study," Architecture, Engineering, and Related Technologies" was the dominant field in Guysborough County, with this education being dominantly chosen by men compared to women (Table 5.10-9). Women were more likely to study in " usiness, Management and Public Administration". For NS, the dominant fields of study were "Architecture, Engineering, and Related Technologies" for men and " usiness, Management and Public Administration" for women with the gender split between these two majors mirroring what was observed at the County level. These findings provide greater context to the income differences between the median personal income of men and women irrespective of whether they are in the County or the province. Specifically, higher incomes are often associated with employment in" Architecture, Engineering, and Related Technologies" compared to employment requiring " usiness, Management and Public Administration" certifications (Chan et al., 2021).

Table 5.10-9 Major Field of Study by Gender (2016)

Indicator	Guysborough County			Nova Scotia		
	Total	Male	Female	Total	Male	Female
No Certificate Diploma or Degree	40.4%	42.3%	38.5%	20.8%	23.1%	18.8%
Education	8.8%	5.6%	11.7%	7.9%	4.4%	10.3%
Humanities	3.8%	3.2%	4.0%	4.8%	3.9%	5.1%
Social and Behavioural Sciences and Law	3.6%	1.4%	5.8%	10.2%	6.2%	12.7%
Business, Management and Public Administration	19.3%	4.2%	35.0%	23.5%	14.1%	29.7%
Physical and Life Sciences and Technologies	1.4%	2.1%	1.0%	3.9%	4.0%	3.5%
Mathematics, Computer and Information Sciences	1.8%	2.1%	1.5%	4.0%	4.9%	2.9%

Table 5.10-9 Major Field of Study by Gender (2016)

Indicator	Guysborough County			Nova Scotia		
	Total	Male	Female	Total	Male	Female
Architecture, Engineering, and Related Technologies	31.6%	59.2%	2.9%	23.5%	45.4%	2.5%
Agriculture, Natural Resources and Conservation	2.5%	3.5%	2.2%	2.0%	2.4%	1.4%
Health and Related Fields	15%	2.8%	27.7%	16.9%	5.5%	25.3%
Personal, Protective and Transportation Services	12.3%	15.8%	8.4%	8.2%	9.2%	6.7%
Other	0%	0%	0%	0.0%	0.0%	0.0%

Statistics Canada, 2016

The National Occupational Classification (NOC) is Canada's system for differentiating occupations. The most common NOC at both the County and provincial levels for male workers was "Trades, Transport, and Equipment Operators and Related" occupations whereas female workers in the County and province were dominantly represented in the NOC category for "Sales and Service" (Table 5.10-10). This finding corresponds to gender differences for field of study, which showed women as dominantly represented in " usiness, Management, and Public Administration" studies, while men were dominantly represented in "Architecture, Engineering, and Related Technologies" majors.

Table 5.10-10 Employment by Occupation and Gender (2016)

NOC 2016	Guysborough County			Nova Scotia		
	Total	Male	Female	Total	Male	Female
All Occupations	50%	50.1%	50.0%	50.0%	54.2%	50.0%
Management	3.2%	3.3%	3.1%	4.9%	6.2%	4.0%
Business, Finance and Administration	5.9%	1.0%	11.8%	7.3%	4.1%	10.9%
Natural and Applied Sciences and Related	1.6%	2.8%	0.0%	2.9%	5.0%	1.2%
Health	3.4%	1.0%	6.6%	4.0%	1.4%	6.9%
Education, Law and Social, Community and Government Services	4.1%	1.8%	6.6%	6.3%	4.8%	8.2%
Art, Culture, Recreation and Sport	1.1%	1.0%	1.6%	1.3%	1.3%	1.5%
Sales and Service	9.1%	4.4%	14.6%	12.2%	10.3%	14.9%
Trades, Transport and Equipment Operators and Related	10.6%	19.2%	1.0%	7.3%	14.6%	1.0%
Natural Resources, Agriculture and Related Production	8.2%	12.9%	2.6%	2.0%	3.6%	1.0%
Occupations in Manufacturing and Utilities	2.7%	3.2%	2.1%	1.9%	2.9%	1.0%

Statistics Canada, 2016

5.10.3.2 Land and Resource Use

The following sections describe land and resource use including land use planning, property ownership, mining, forestry, energy, tourism, and recreation. While fishing is an important industry in Guysborough County and NS, commercial fishing generally occurs in marine areas. Thus, Project activities will not overlap spatially with fishing

areas. However, alteration of Gold Brook due to the Project may affect fisheries downstream. The effects of the Project on fish and habitat as discussed in Section 5.8.

5.10.3.2.1 Land Use Planning

The MODG is presently undergoing a review of its Municipal Planning Strategy and Land Use By-Law. The land containing the PA is presently zoned as Industrial Resource (I-3), Natural Resource (NR-1), and Mixed Use Rural Residential (MRR-1) (MODG, 2018).

- The Municipality has established a Mineral Opportunity District (MOD) in the vicinity of Goldboro as an area of potential mining and quarrying where new gold mining activities are anticipated to operate without affecting the underlying land use zones (MODG, 2022b). A Mineral Opportunity Overlay (MOO) Zone has been established within the MOD area to permit land uses related to resource extraction in addition to underlying zones. These uses include pits, quarries, and mineral extraction, employee accommodations, and accessory uses.

5.10.3.2.2 Property Ownership

To facilitate development of the Project, access to private and Crown lands will be required. The PA is 32% Crown land with the remainder held privately. Property owners affected by the Project include private owners and NS Department of Natural Resources (Crown land) (Figure 5.10-1).

5.10.3.2.3 Mining

Exploration at Goldboro dates to 1861 when gold was discovered in quartz veins in the Isaac's Harbour anticline. In 1892, Howard Richardson was the first to identify gold occurrences in the slate belt (slate and quartz). The Boston-Richardson belt was mined from the underground between 1893 and 1912 and mine production has been recorded as 414,887 short tons grading 0.132 oz/T for a total production of 54,871 ounces of gold.

Due to historic mining and a lack of environmental controls in the past (previous to any involvement by Signal Gold) the surrounding area and watersheds have been contaminated to various levels, with the most notable contaminants being Mercury (Hg) and Arsenic (As). More information on the effects and management of historical mining at Goldboro is also included in Section 2.3.

No mineral extraction has been undertaken in this area since the 1910s. Currently, exploration drilling is ongoing and bulk sampling activities were undertaken in 2019.

5.10.3.2.4 Forestry

The forests of northeastern NS are characterized as having softwood and hardwood vegetation associations (NS Natural Resources, 2010). The Province has a Forest Utilization License Agreement with PHP, which operates a paper production facility at Port Hawkesbury (NS Natural Resources, 2021). In 2015, the Department of Natural Resources initiated a pilot project with PHP to develop and implement a landscape management framework on Crown lands under PHP licence.

PHP holds fibre rights to Crown land within the PA and is permitted to harvest and construct access roads as required on associated lands. Softwood and pulpwood have been harvested in the Goldboro area with silviculture treatment to improvement forestry yield.

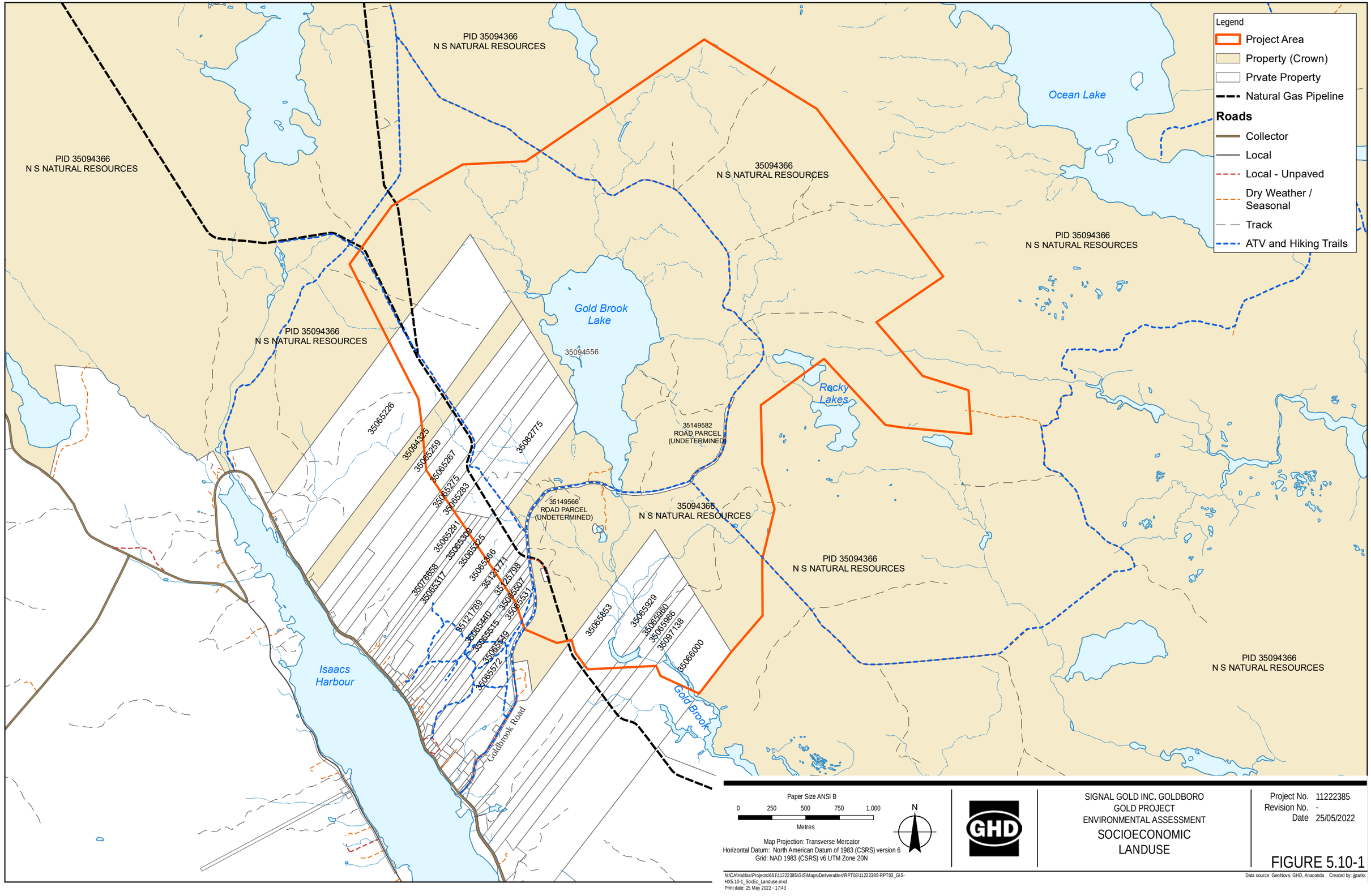
5.10.3.2.5 Industrial Development

The MODG has established large areas (more than 15,000 acres) zoned as industrial parks with the goal of attracting industries to establish long-lasting businesses in the area (MODG, nd). The 850 acre Goldboro Industrial Park is near the Project and the M&NP network. Following closure of the Goldboro Gas Plant, MODG purchased the remaining 49 ha of industrial land and plans to lease property to industry (Guysborough Journal, 2021).

5.10.3.2.6 Tourism

Guysborough County aligns with the Eastern Shore tourism region (Tourism NS, 2022). The Goldboro Interpretative Centre on Highway 316 is the nearest tourist amenity to the Project. Historic photos and artifacts from early mining activity are displayed at the Centre.

Attractions in the town of Guysborough (37 km from Goldboro) include the historic waterfront, old courthouse, waterfront trail, and nature trail. Tor Bay Provincial Park, which includes unsupervised sandy beaches, a picnic area, boardwalks and interpretative panels, is approximately 33 km from Goldboro.



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Map Projection: Transverse Mercator
Horizontal Datum: North American Datum of 1983 (CSRS) version 6
Grid: NAD 1983 (CSRS) v6 UTM Zone 20N

SIGNAL GOLD INC. GOLDBORO
GOLD PROJECT
ENVIRONMENTAL ASSESSMENT
SOCIOECONOMIC
LANDUSE

Project No. 11222385
Revision No. -
Date 25/05/2022

FIGURE 5.10-1

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Print date: 25 May 2022 - 17:43

Data source: GeoNova, GHD, Anaconda . Created by: jjparks

Limited tourist accommodations are listed for the Goldboro to Guysborough area (Tourism NS, 2022). Murphy's Inn in Larry's River is a 4-bedroom bed and breakfast. Accommodations are listed for Guysborough: 10 yurts at Authentic Seacoast (39 km from Goldboro), 10 rooms at DeBarres Manon Inn (37 km from Goldboro), and 10 motel rooms at Distillery House (39 km from Goldboro).

Paddling adventures are available at Isaacs Harbour (Guysborough County, 2022). The Isaacs Harbour Paddle Route goes from Goldboro to Red Head. The Drum Head to Coddles Harbour Paddle Route begins near Larry's River.

5.10.3.2.7 Recreation

From February to April 2022, Signal Gold met with various recreational land users including all terrain vehicles (ATV) riders (i.e., ATV association leaders/members and others), cabin owners and community members to gain information regarding use of the PA for recreation purposes. Discussions included activities, species harvested, consumption, access, and the proposed rerouting of a dirt road around the PA. On at least five occasions, interview participants also discussed opportunities for employment and procurement with the Project.

Participants identified six cabins on Ocean Lake. One person indicated they use the area year-round for approximately 12 days per month but most appeared to be more casual users of this area.

The area is currently accessed by ATVs and/or vehicles via Goldbrook Road, Sable Road, Eight Mile Lake Road, north of Oak Hill Lake, trails, and pipeline routes. Trails also exist on private properties in Goldboro. Some also access the area via Ocean Lake by boat or snowmobile depending on season. A series of ATV trails originate at Goldbrook Road and cross the PA and beyond (Figure 5.10-1). Though some users had hesitations about the proposed bypass road, discussions generally resulted in users indicating that the proposed reroute would either cause them no inconvenience or result in better access to the area.

Hunting, trapping and fishing were identified as recreational activities that take place in and around the PA. Fishing for brook trout occurs on Rocky Lakes, Ocean Lake, Big Beech Hill Lake, and Oak Hill Lake. Four users indicated that they sometimes fish in Gold Brook Lake, which is the only lake in the PA, but all indicated they do not consume fish from Gold Brook Lake. A participant stated that the pipeline is used for deer hunting and coyote trapping. Identified species included bear, deer, snowshoe hare, grouse, and waterfowl. One user indicated they hunt on the west side of Ocean Lake.

Individuals were aware of effects of industrial activity on hunting and access. Several noted fewer moose and deer are observed in the area due to logging. It was also stated that trails have been degraded because of forestry activity. Once user indicated that they hoped the Project would result in more deer to the east of Ocean Lake.

While on site, Signal Gold staff have recorded incidental observations of land users in the PA. From January to May 2021, observations included people travelling via Goldbrook Road and through the area apparently for the purposes of fishing, ATV riding, and possibly forestry-related activities. In 2021, no users were observed from June to September and November to December. In October, one user of an ATV was observed with a rifle and it was assumed they were hunting. Users were seen fishing via ATV on two occasions in April 2022. At least half of all observed users were riding ATVs.

Signal Gold's information from groups and individuals regarding use of land and resources, and observations on site, have concluded that a small number of people use this area and mostly for ATV riding, hunting, and fishing. The PA is less important than other areas due to perceived contamination of fish in Gold Brook Lake and animal disturbance/displacement due to forestry.

5.10.3.2.8 Visual Aesthetics

The various archaeological studies outlined in Section 5.12 and included in Appendices L.1 through L.4, provide descriptions of the physical environment of the region and within the PA. This information is summarized below specific to the visual landscape of inland areas.

The Project is in the Guysborough Harbours Unit, natural history theme region (#842), which is characterized by a submerged coastline with drowned estuaries separated by headlands. Long narrow, relatively straight valleys have

been inundated by the sea and form long narrow inlets. A thin layer of quartzite till overlays bedrock with several areas of exposed bedrock. Several lakes and a few small freshwater wetlands are present. In better-drained areas, forests are dominantly softwood of white spruce, balsam fir, maple and birch. Black spruce, larch, and balsam fir dominate in wetter soils, such as those around Gold Brook Lake. Huckleberry is common on the barren and semi-barren areas.

Within the PA, the west side of Gold Brook Lake has been heavily impacted by historic gold mining activity. The east side of this lake, which has not been impacted by mining, shows rocky shoreline features with some angular quartz cobbles. Within the surrounding landscape, the terrain is heavily undulating and somewhat wet, with isolated exposed rocks, scrub spruce, rhodora, pitcher plants, and tamarack trees.

5.10.3.3 Public Safety

NS Public Works is responsible for building and maintaining 90 percent of the province's public roads (NS Public Works, 2022). No major highway construction, construction/improvement, asphalt, or bridge replacement/rehabilitation projects are planned for Guysborough County in 2023-2024 when the Project will be under construction. An asphalt project is planned for 6.4 km of Trunk 7 from the Antigonish/Guysborough County line southerly to West Side Lochiel Lake Road in the 2024-2025 construction season.

The Project is located off Highway 316 and accessed via Goldbrook Road in the community of Goldboro (Figure 5.10-2). Goldbrook Road is a gravel road that connects to some backwoods roads and trails. The most efficient route to the Project for motorists departing Highway 104 at Antigonish is to use Trunk 7 to Route 276 and Highway 316 to Goldboro, a total distance of about 77 km. Most of these roads are two-lane highways with a speed limit of 80 km/h and speed reductions through communities. The travel time from Highway 104 to the Project is approximately one hour.

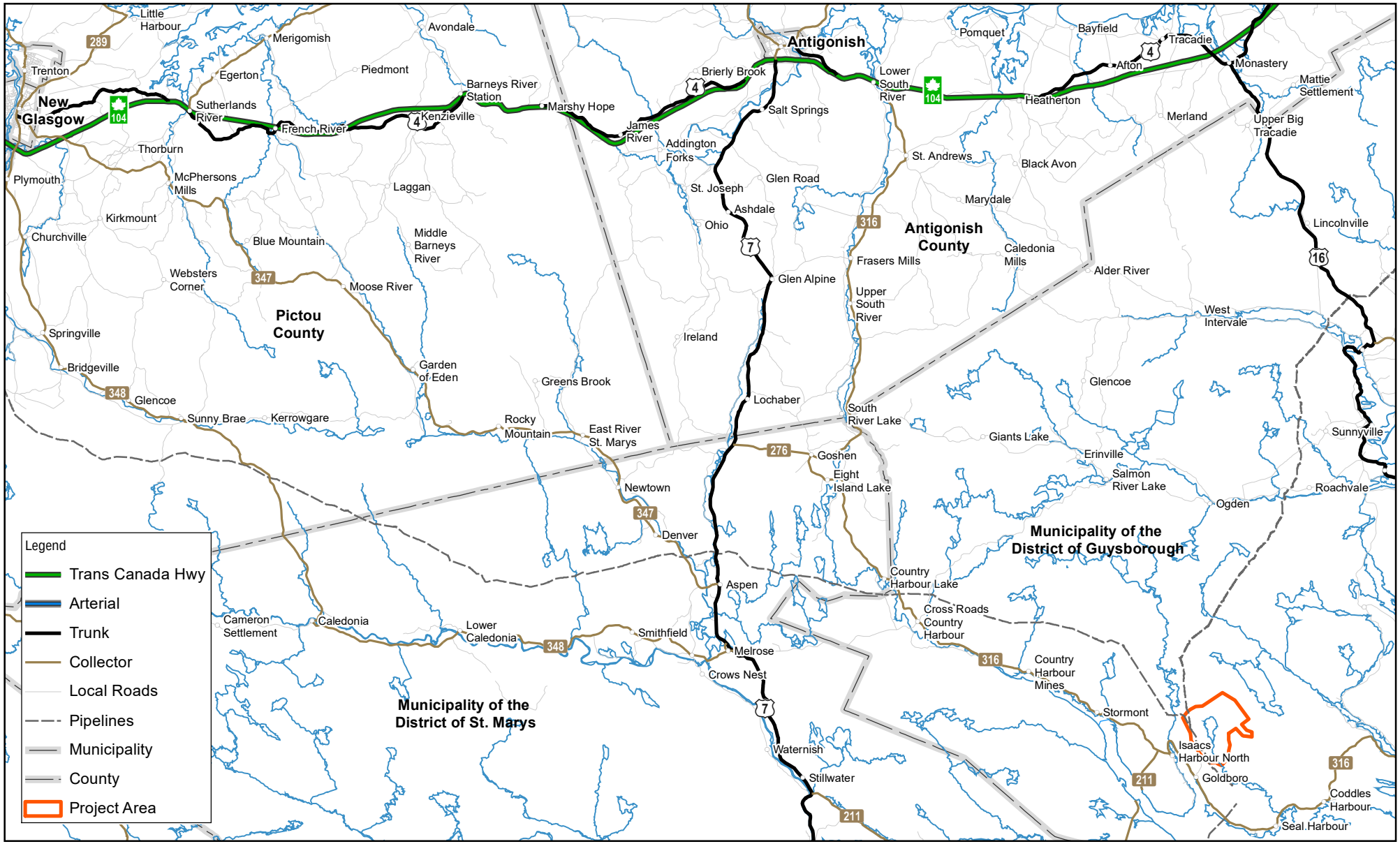
NSTIR collects traffic data at locations along Highway 7, Route 276 and Highway 316 (Pierdae, 2021). Historical Annual Average Daily Traffic (AADT) data showed that Background Design Hourly Volumes (DHVs) for 2013 were considered low to moderate for a primary trunk highway and traffic on Route 276 and Highway 316 was low for collector roads.

Emergency services are available regionally and provincially. The Royal Canadian Mounted Police (RCMP) has three detachments in MODG: Canso, Guysborough, and Sherbrooke (RCMP, 2022). MODG has nine volunteer Fire Departments with Emergency Health Services at Country Harbour, Guysborough, and Canso (MODG, nd). Guysborough County has 18 fire departments including the Harbourview Fire Department, which has stations at Drum Head, Isaac's Harbour, New Harbour, Country Harbour (FONS, nd)

5.10.3.4 Human Health

Health Care is provided by the NS Health Authority (NSHA, 2020). Regional hospitals include Guysborough Memorial in Guysborough, Eastern Memorial in Canso, and St. Mary's Memorial in Sherbrooke. St. Martha's Regional Hospital is in Antigonish. The Health Authority works closely with organizations such as the Eastern Zone Community Health Board, which serves Guysborough and Antigonish Counties and Cape Breton (NSHA, nd).

This section discusses the health status of residents, based on available information. Detailed data were not available for Goldboro or Guysborough County. Information is available from the Statistics Canada National Health Survey for the former Guysborough Antigonish Strait Health Authority. Specific indicators have been selected for this analysis due to the availability of data as many data sets were supressed due to small populations. Respiratory illnesses and cancers are included as they may be affected by environmental factors such as the quality or air, water, and food. Prevalence of certain types of illnesses and injuries may also be the result of heredity, age and/or poor health practices.



SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

SOCIOECONOMIC ACCESS & TRANSPORTATION

Project No. 11222385
Revision No. -
Date 25/05/2022

FIGURE 5.10-2

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Data source: GHD, GeoNOVA, ANCONDA, NR Canada . Created by: jjparks

Health indicators are meant to provide a snapshot of the overall vitality or well-being of a population with health being one of many factors that may affect labour force participation. Following an analysis of data retrieved from the 2013 National Health Survey (Statistics Canada, 2013a), it was found that injuries were the primary reason for hospitalizations in Guysborough Antigonish Strait Health Authority's jurisdiction and in NS (Table 5.10-11). However, both men and women in the health care jurisdiction experienced higher incidences of hospitalization than men and women across the province. The leading cause of death at the jurisdictional and provincial levels was premature mortality with greater occurrences reported for men in the province than men in the County. Conversely, greater occurrences of premature mortality were reported for women in the County than the province.

Table 5.10-11 Health Indicators (2013)

Indicator	Guysborough Antigonish Strait Health Authority			Nova Scotia		
	Total	Male	Female	Total	Male	Female
Health Conditions (*per 100,000)						
- Injury Hospitalization*	586	722	449	491	548	427
- Cancer Incidence*	463	530	411	456	539	392
- Lung Cancer Incidence*	76	100	55	69	85	57
Deaths						
- Life Expectancy at Birth (years)	79	78	81	80	78	82
- All Cancers*	187	249	144	189	238	154
- Lung Cancer*	52	65	42	54	71	42
- Circulatory Diseases*	182	251	130	180	230	141
- Respiratory Diseases*	64	85	55	54	69	45
- Unintentional Injuries*	34	52	17	32	45	21
- Premature Mortality*	271	313	229	281	351	215

Statistics Canada, 2013a.

5.10.4 Consideration of Consultation and Engagement Results

Signal Gold has undertaken a consultation program with stakeholders, regulators, and the public. These activities are described in more detail in Section 3 and Appendix C.1. Through this process, Signal Gold has gained an understanding of community concerns regarding the Project. For the Socioeconomic Conditions VC, various opportunities and issues have been identified in relation to the Project:

- Positive effects of the Project including employment, business opportunities, and other community benefits.
- Controlled access to the Project preventing access to land and resource use areas, roads, and trails.
- Timing of renewed access to the PA following mining.
- Transportation of workers, equipment, and materials for the Project.
- Presence of non-resident workers in employee accommodations near communities.
- Effects of dust on animals and plants that are hunted or gathered.

The results of consultation and engagement have been considered in planning of the Project and the effects assessment. Specific to the Socioeconomic Conditions VC, these include Signal Gold's commitment to ongoing consultation and engagement with MODG and other stakeholders including the CLC. Engagement with Indigenous organizations including KMKNO and Mi'kmaq First Nations is described in Section 3.3.

5.10.5 Effects Assessment Methodology

5.10.5.1 Boundaries

The assessment of Project effects requires consideration of various boundaries. Due to the diversity of conditions included in this assessment, the spatial boundary for assessment of potential effects includes the PA, LAA, and RAA.

Spatial Boundaries

PA - The PA encompasses the immediate area of the Project where any physical disturbance associated with construction, operations and closure would occur (Figure 5.10-3). Some areas within the PA may not be physically disturbed but will be inaccessible to land and resource users for portions of the Project lifetime. The PA is also the spatial boundary for assessment of effects on human health.

LAA - The LAA encompasses Guysborough County for the purposes of assessing the effects of the Project on local communities. These include economy and public safety.

RAA - The RAA encompasses all of NS. This boundary captures all potential socioeconomic considerations relating to the province, which will gain from Project employment, procurement, mining taxes, income and taxes, direct and indirect.

Temporal Boundaries

The temporal boundaries used for the assessment of effects on the socioeconomic components of the Project includes the construction, operations, and closure phases.

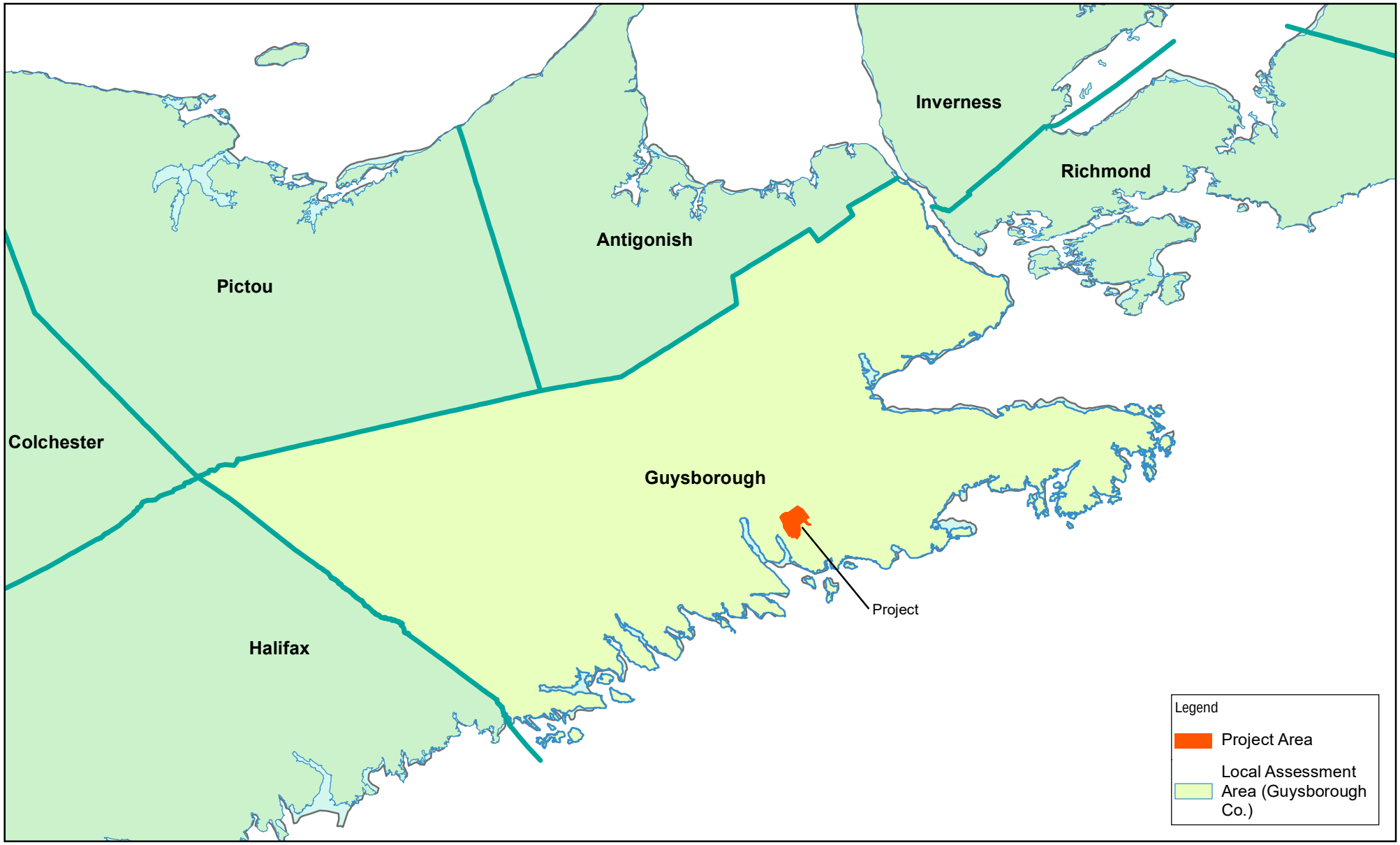
Technical Boundaries

The following technical boundaries were identified for Socioeconomic Conditions. Firstly, detailed 2021 census data were not available at time of writing. No data are available for Goldboro and various data are suppressed for MODG due to confidentiality. The most recent National Health Survey was undertaken in 2013. Data on Indigenous employment were available for Atlantic Canada but not for NS. Detailed statistical data were not available for Indigenous people, African Nova Scotians and other groups typically underrepresented in economic opportunities.

The HHERA was conducted to determine if aspects of the Project (construction, operation, or closure or post-closure) have the potential to generate contaminants that pose a risk to human health beyond baseline conditions. Due to historic mining and a lack of environmental regulations and controls in the past, prior to the involvement of Signal Gold, the surrounding area and the Gold Brook watershed have been contaminated to various levels, with the most notable of contaminants being Hg and As. As such, the HHERA did not specially evaluate potential risk to human health from exposure historical contamination but evaluated any potential changes to the environment (if any) related to the Project.

Administrative Boundaries

The Project is in MODG, which is empowered through the NS *Municipal Government Act (1998 c.18 s.1*) to establish and enforce a Municipal Planning Strategy (MPS) that governs land use planning and development permits including for industrial development. Various land uses (i.e., use of Crown lands, mining, forestry, tourism, recreation) and transportation considered for this VC are governed by Provincial regulations such as the *Crown Lands Act*, *Mineral Resources Act*, *Forests Act*, *Wildlife Act, Trails Act*, and *Off-Highway Vehicles Act*. The Canadian *Migratory Birds Convention Act, 1994* and *Migratory Birds Regulations* govern hunting of migratory birds. Fishing and angling activities are governed by the Canadian *Fisheries Act* and *Regulations*.



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Kilometres

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Map Projection: Transverse Mercator
Horizontal Datum: North American Datum of 1983 (CSRS) version 6
Grid: NAD 1983 (CSRS) v6 UTM Zone 20N

GHD

SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

SOCIOECONOMIC EFFECTS ASSESSMENT BOUNDARIES

Project No. 11222385
Revision No. -
Date 25/05/2022

FIGURE 5.10-3

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Data source: GHD, GeoNOVA, ANCONDA, NR Canada . Created by: jjparks

5.10.5.2 Modelling

Signal Gold has undertaken various studies that include modelling relevant to the Socioeconomic Conditions VC. These include a viewshed analysis and HHERA. Modelling for other VCs, potentially relevant to the Socioeconomic Conditions VC, are discussed in relevant effects assessment chapters related to air, noise, groundwater resources, surface water resources, fish and fish habitat, and terrestrial environment.

5.10.5.2.1 Viewshed Analysis

Geographic information system (GIS) software (ESRI ArcGIS© and ESRI 3D Analyst©) was used to create projective (views-from) and reflective (views-to) mapping of the area. The Viewshed Analysis Area for the analysis was defined by the topography and the potential distance to the horizon from the Project. The viewshed analysis used a 360° view from an observer location due to the elevation of the Project (high point) but mainly focusses on the potential impact to the south and west of the Project, which has a higher aesthetic value due to the location of residential receptors.

Projective mapping (inside looking out) was initiated from four viewpoints on the proposed TMF (2 locations) and WRSAs (Southeast and Northwest) to reveal the potential extent of visibility of the Project to the surroundings, and therefore, inferring from where the Project, or components of it, would be potentially visible. The two tallest buildings, the Mill Building (26 m) and the Reagents Building (13 m), are more than 40 m lower than the adjacent WRSA and have not been considered in the analysis. Reflective mapping (outside looking in) was initiated from chosen viewpoints in the landscape with the objective of determining whether, and to what extent, Project development is visible from its surroundings. These methods assume that the Project is cleared of trees and has fully developed infrastructure. To summarize, the following assumptions and factors were built into the model.

- No vegetative cover would remain within disturbed areas of the proposed Project.
- Forest cover and vegetation height would be as per the current digital surface model (DSM) (GeoNova 2021).
- The footprint of the Project would be completely developed.
- No progressive reclamation of the Project would have occurred.
- Observer viewing would be at a radius is 360°.

Using these assumptions and factors, the model is intended to be a worst-case scenario, since the Project will be developed in a gradual manner and other factors such as viewing direction and weather can greatly affect visibility. For example, a foggy or snowy day may result in less than 1 kilometre viewing distance over prolonged periods.

A DSM was used to support the viewshed assessment. The DSM provides a dataset of both natural and anthropogenic features (e.g., buildings, tops of trees) within the landscape. Utilizing the DSM provides additional screening between the observer and the Project and could aid in developing future screening mitigation. The Project infrastructure described in Signal Gold's Project FS was added (or subtracted for the open pits) to complete the terrain model used for the viewshed analysis. The ArcGIS tool Visibility (ESRI 2020) was used to determine the surface locations visible to a set of observer features. Each observer location was analyzed independent of other locations.

5.10.5.2.2 Human Health and Ecological Risk Assessment

The purpose of the HHERA was to assess the potential risks to human health and ecological receptors from exposure to chemicals in various media associated with the Project. The first step in the HHERA process is to determine conditions or concentrations of chemicals in various media for comparison to predicted concentrations associated with the Project. As such, between 2018 and 2021, samples of soil, air, surface water, sediment and biological tissue were collected from the PA and surrounding area and analyzed for specific chemicals, specifically metals. Results of the sampling were considered to represent existing or baseline conditions in the PA and surrounding area that are unrelated to Project activities. Details on the baseline sampling program are provided in Section 5.1 (Air), 5.4 (Geology, Soil and Sediment, and 5.6 (Surface Water Resources) and included in the HHERA report (provided in Appendix J.3).

To carry out a Project related HHERA, predicted chemical concentrations in environmental media including soil, air, surface water, sediment, vegetation tissue, and animal tissue, at different locations associated with each phase of the

Project were needed for comparison to baseline conditions. Project phases included baseline, construction, operation, closure, and post-closure, which were assigned the designations Scenarios 1 through 5 in the HHERA. The predicted concentrations also term “Exposure Point Concentrations” (EPCs) estimated for each Project phase were based on methodologies developed by the US EPA (2005). The USPEA methodologies involved calculating EPCs in environmental media based on deposition of particulate from an anthropogenic process (in this case, the proposed Project activities) across the environment in a receiving area. GHD completed Project specific air modelling for the various activities expected to occur with each phase of the Project with the modeling results used as input into the US EPA equations for calculated EPCs (refer to Section 5.1). The air modelling was supplemented by the surface water modelling and water balance evaluation detailed in Sections 5.6 and included in Appendices F.7.

The modelling proceeded in four stages:

– The estimation of metal concentrations in dust generated by the Project
– The estimation of metal concentrations in soil due to dust deposition, which were then used to determine exposure/intake estimates for the surface soil exposure pathway for human and ecological receptors.
– The estimation of metal concentrations within terrestrial plants, terrestrial invertebrates, prey animals, and wildlife, which were then used to determine exposure/intake estimates for ingestion of these organisms by human and ecological receptors.
– The estimation of metal concentrations within surface water, sediment, fish, aquatic plants, and benthic invertebrates, which were then used to determine exposure/intake estimates for human and ecological receptors such as benthic invertebrates and freshwater aquatic life.

At each phase, when concentrations of metals in environmental media were estimated, the results (the sum of baseline and incremental change) were compared to an upper bound estimate of baseline (90th percentile, 95th percentile and/or the maximum baseline concentrations in those media) to determine whether predicted concentrations differed from baseline. Baseline concentrations were used as predicted concentrations in cases where predicted concentrations were equal to or below baseline. Details on the models used to evaluate current and predicted concentrations of constituents in various media is provided in the HHERA report included in Appendix J.3.

Using these predicted concentrations, a separate Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA) were carried out and documented in the HHERA report (see Appendix J.3). A summary of the HHRA and ERA methodologies are provided below.

Human Health Risk Assessment

The HHRA assessed the potential Project related impacts on metals accumulation in or on vegetation or other selected country foods that may be consumed by humans. In addition, the HHRA also provided an assessment of other potential exposure pathways for humans, including inhalation of Project related emissions in air, incidental ingestion and dermal contact with soil, sediment, and surface water. The HHRA evaluated risks through these exposure pathways to residents in Goldboro, Indigenous people and recreational visitors that may use the are surrounding the PA and workers from exposure to contaminants of potential human concern (COPHCs) in various media associated with the Project. Overlap between Project activities and Mi’kmaq land and resource use is minimal in comparison to the surrounding areas (refer to Section 5.11 for additional details). Indigenous people were included in the study as receptors and conservative assumptions were applied in the HHRA as the area is not known to be used for subsistence purposes related to country food collection and consumption. There are currently no residences or potable groundwater use within the PA. However, residences are located west and southwest of the PA and have the potential to be exposed to Project related COPHCs. The atmospheric dispersion and deposition of releases from Project activities may impact outdoor air and surface soil within the residential areas surrounding the PA, specifically the residential area of Goldboro. Therefore, residents of the Goldboro, and Indigenous people, were included in the HHRA as receptors for all Project related scenarios for conservatism. The HHRA process followed a recognized framework that progresses from a qualitative initial phase (i.e., problem formulation), through exposure and toxicity (effects) analysis, and culminates in a quantitative risk characterization.

To select the COPHCs for the HHRA, predicted chemical concentrations (baseline plus incremental of all scenarios and locations) in each environmental medium were compared to applicable screening benchmarks that were protective of human health as well as baseline concentrations. If a chemical was selected as a COPHC in one medium, it was carried through the HHRA for all media. The COPHCs carried through the HHRA based on the results of the human health screening are summarized in Table 5.10-12.

Table 5.10-12 Summary of Contaminants of Potential Human Concern

Selected based on surface soil	Selected based on outdoor air	Selected based on surface water	Selected based on sediment
Aluminum	Chromium, lithium, $PM_{2.5}$, PM_{10}, TSP and NO_x	Lithium	Aluminum

The potential for non-carcinogenic health effects from exposure to a COPHC was evaluated by deriving a hazard quotient (HQ) according to Health Canada (2010) guidance. For each exposure Scenario, incremental HQs representing the contribution of the proposed Project to the total potential health risk were derived and compared to a target HQ of 0.2. Similarly, the potential for carcinogenic health effects from exposures to COPHCs was evaluated by deriving an Incremental Lifetime Cancer Risk (ILCR), also according to Health Canada (2010) guidance, representing the contribution of the proposed Project to the total potential health risks. This ILCR was compared to a target of one in one hundred thousand (1E-5) consistent with risk assessment practices in NS. Incremental risk estimates less than these targets (0.2 and 1E-5) were assumed to indicate that potential health risks due to Project activities are insignificant or negligible, and that no further assessment is required.

Ecological Risk Assessment

The ERA assessed predicted Project related emissions and the potential for adverse effects to immobile ecological receptors such as vegetation and invertebrates or upper trophic level organisms that may use the habitats in the vicinity of the Project as a food source. The ERA also evaluated potential incremental increases in risk to aquatic ecological receptors compared to current conditions.

As with the HHRA, the ERA process followed a recognized framework that progresses from a qualitative initial phase (i.e., problem formulation), through exposure and toxicity (effects) analysis, and culminates in a quantitative risk characterization. The framework used for this ERA considered effects at the community level for common plants, terrestrial and benthic invertebrates, and fish, at the population level for mammals and birds, and at the individual level for wildlife species identified as endangered, threatened, or extirpated (*at risk*) under the *SARA*, COSEWIC and NS *Endangered Species Act*, as well as wildlife SOCI identified by the ACCDC.

Baseline and predicted concentrations of chemicals in soil, surface water, and sediment were screened against available regulatory guidelines to identify contaminants of potential ecological concern (COPECs) in those media. A chemical was identified as a COPEC if it was present at a predicted concentration above a screening value or baseline conditions in at least one of these media. The contaminants of COPECs carried through the ERA based on the results of the ecological screening are summarized in Table 5.10-13.

Table 5.10-13 Summary of Contaminants of Potential Ecological Concern

Selected based on soil	Selected based on surface water	Selected based on sediment
Lithium and vanadium	Boron	Beryllium

Receptors were assessed in two exposure areas, being Gold Brook Lake and its catchment area, and Gold Brook and its catchment area. Potential ecological risks were assessed from exposure to COPECs in various media associated with the Project in these areas. For each exposure area, quantitative estimates of potential ecological risk (Exposure Ratios, ERs; and HQs) were estimated at each stage of the Project and incremental risk estimates between each stage were compared to baseline, representing the increase in potential health risks due to the presence of the Project. The incremental ERs and HQs were compared to a value of one. Incremental risk estimates less than this

target were assumed to indicate that potential health risks to ecological receptors due to the Project activities is considered insignificant or negligible, and that no further assessment is required.

5.10.5.3 Thresholds for Determination of Significance

The following criteria will be used to evaluate the effects of the Project on Socioeconomic Conditions (Table 5.10-14). Some of these criteria are generic to the effects assessment generally while others are specific to Socioeconomic Conditions.

Table 5.10-14 Characterization Criteria for Environmental Effects

Characterization	Quantitative Measure or Definition of Qualitative Categories
Magnitude	**N** – no detectable direct or indirect adverse effects. HHERA - no predicted changes above baseline **L** – short or medium-term effects within the context of mitigations and consultation with appropriate regulators, communities, and user groups. HHERA - above baseline but below risk-based threshold **M** – long-term effects within the context of mitigations and consultation with appropriate regulators, communities, and user groups HHERA – for the HHRA if the HQ are approximately equal to or marginally exceeding 0.2 for non-carcinogenic effects and 1E-05 for carcinogenic effects. ERA – HQ are approximately equal to or marginally exceeding 1. **H** –permanent effects within the context of mitigations and consultation with appropriate regulators, communities, and user groups. HHERA – for the HHRA if the HQ significantly greater than 0.2 for non-carcinogenic effects and 1E-05 for carcinogenic effects. ERA - an HQ significantly greater than 1
Geographic Extent	**PA** – direct and indirect effects from Project activities are restricted to the PA **LAA** – direct and indirect effects from Project activities are restricted to the LAA **RAA** – direct and indirect effects from Project activities are restricted to the RAA
Timing	**N/A** – seasonal aspects are unlikely to affect VCs **A** – seasonal aspects may affect VCs
Duration	**ST** – effects are limited to occur from as little as 1 day to 12 months **MT** – effects can occur beyond 12 months and up to 3 years **LT** – effects extend beyond 3 years **P** – valued component unlikely to recover to baseline conditions
Frequency	**O** – effects occur once **S** – effects occur at irregular intervals throughout the Project **R** – effects occur at regular intervals throughout the Project **C** – effects occur continuously throughout the Project
Reversibility	**RE** – VCs will recover to baseline conditions before or after Project activities have been completed **PR** – mitigation cannot guarantee a return to baseline conditions **IR** – effects to VCs are permanent and will not recover to baseline conditions

A significant adverse effect to Socioeconomic Conditions from the Project is defined as:

- A Project-related effect that results in permanent loss of lands and resources used by other industry sectors or community users.
- A Project-related effect that results in long-term adverse health or safety conditions for relevant communities.
- A Project-related effect that results in a moderate to high in magnitude and partially reversible to irreversible for Human and Ecological Health.

5.10.6 Project Interactions and Potential Effects

Mining activity has the potential to result in adverse effects on Socioeconomic Conditions. This includes the various activities listed in Table 5.10-15 as physical works for construction, operations, and closure may result in loss of access to lands used for natural resources harvesting including for other industries.

Table 5.10-15 Project Activities and Socioeconomic Interactions

Project Phase	Duration	Relevant Project Activity
Construction	2 years	- Clearing, grubbing, and grading - Drilling and rock blasting - Topsoil, till, and waste rock management - Surface infrastructure installation and construction - Haul road construction - TMF construction - Collection ditch and settling pond construction - Watercourse and wetland alteration - Environmental monitoring - General waste management
Operations	11 years	- Drilling and blasting - Open pit dewatering - Ore management - Waste rock management - Surface water management - Reagent management - Petroleum products management - Site maintenance and repairs - Tailings management - Water treatment - Environmental monitoring - General waste management
Closure	24 years	- Demolition - Earthworks - Water treatment - Environmental monitoring - General waste management

5.10.6.1 Direct Impacts

5.10.6.1.1 Economy

All phases of the Project will provide direct and indirect employment opportunities, as well as taxation revenue for municipal, provincial, and federal governments, and increases to the provincial GDP. A socioeconomic impact study was completed for the Project in February 2022. The results of financial analysis are summarized below.

Direct economic benefits arising from this Project include (Table 5.10-16):

- Over 15 years, Signal Gold will spend $1.7 billion on goods and services.
- Most Project spending will occur in NS, resulting in a $2.1 billion contribution to provincial GDP.

- Total household income in NS will increase by nearly $1.1 billion because of the Project.
- -538 direct fulltime jobs will be created during the two year construction period, including 325 jobs directly on site.
- Once operational, the Project will provide fulltime employment for approximately 215 workers annually at the site, in a region where unemployment is 14.2% above the provincial average.
- Over the life cycle of the Project, including construction, operations and closure, the Project has the potential to create 735 new jobs a year in NS for 15 years.

Based on the current plan outlined in the FS, the Project is estimated to generate $528 million in income and mining taxes at the federal, provincial and municipal level from direct and spin-off economic activity. More than 80% of tax revenue will be collected by the Province, supporting important public programs and services such as health care and education, as well as infrastructure including roads, schools, and recreational facilities.

Table 5.10-16 Economic Impact of the Goldboro Gold Project

Benefit Source	Construction	Operations	Total Impacts to Nova Scotia
GDP	$198.7 M	$1,927.5 M	$2,126.2 M
Employment (person years, year-round positions)	1,504	9,517	11,021
Household Income	$151.5 M	$955.6 M	$1,107.2 M
Total Government Tax Revenues	$45.9 M	$481.6 M	$527.5 M
- Federal	$19.8 M	$189.2 M	$209.0 M
- Provincial	$19.8 M	$254.4 M	$274.2 M
- Municipal	$6.3 M	$38.1 M	$44.3 M

Based on the projections of the FS completed for the Project, the estimated initial capital cost for the Project is $271 million. Sustaining capital, including rehabilitation and closure, fish habitat and wetland compensation, and reversal of upfront working capital, is estimated at $113.4 million over the life of the Project.

At initiation, construction positions would likely be filled by contractors hired by Signal Gold. Industry forecasting for 2022 to 2027 indicates NS is entering a period of increased employment in the construction industry (Buildforce Canada, 2022). This short-term growth is anticipated to occur due to new home construction along with major capital projects including health care facilities and road infrastructure. These projects will result in increased job opportunities and potential recruitment challenges in 2023 and 2024. In addition, The NS labour force is ageing and anticipated retirements are resulting in recruitment challenges.

To meet workforce requirements, the construction industry must increase recruitment of individuals from alternative sectors of the population (e.g., women, Indigenous people, and immigrants) traditionally underrepresented in the current construction labour force (Buildforce Canada, 2022). In 2021, approximately 3,880 women were employed in the NS construction industry, of which 26% worked directly on construction projects, and the remaining 74% worked primarily in administrative and management-related occupations. Women, who made up 4% of the 28,800 tradespeople employed, worked in all construction sectors but accounted for a higher share of total in residential construction and residential construction maintenance. The dominant trades and occupations for women were trades helpers and labourers, carpenters, painters and decorators, contractors, and supervisors, and construction managers.

Immigrants are a potential source of labour for the construction industry (Buildforce Canada, 2022). In 2018, immigrants (mainly from Europe, North America, and Asia) made up approximately 6% of the NS construction workforce. The province is expected to gain an additional 40,280 international migrants between 2022 and 2027. As immigrants are anticipated to become a larger portion of the labour force, they may be recruited for construction.

It is estimated that approximately 215 people will be employed directly on-site during operations. Based the MANS and MNL data, this Project will approximately double the number of individuals working in gold/silver ore mining in NS. During operations, the workforce will expand and contract as requirements change.

Signal Gold has prepared an overview of the types of anticipated positions for mine operations, which is the period of peak permanent employment opportunities (Table 5.10-17). This information outlines the various types of skilled employment opportunities that will be available at the Project. This information will be updated and refined as the Project employment plan is completed.

Table 5.10-17 Anticipated Types of Project-Related Trades and Professions during Operations

Administrative	Operations	Other
- Mine Controller - Assistant Mine Controller - Payroll and Benefits Coordinator - Office Manager A/P Clerk - Environment Supervisor - Environmental Technician - Health and Safety Supervisor - Health and Safety Coordinator - Human Resource Manager - Human Resource Coordinator	- General Manager - Mill Manager - Mine Manager - Mill Maintenance Supervisor - Procurement and Warehouse Supervisor - Purchaser - Lead Hand - Maintenance Planner - Journeyperson Millwright - Mill Foreman - Mine Engineer - Warehouse Inventory Attendant - Metallurgist - Mine Geologist - Mine Technician - Millwright - Electrician	- Mill Operator 1 - Mill Operator 2 - Mill Operator 3 - Mill Operator 4 - Mill Process Operator/Entry Trainee - Crusher Maintenance Operator - Crusher 1 - Crusher 2 - Crusher 3 - Crusher 4 - Refiner 1 - Refiner 2 - Refiner 3 - Refiner 4 - Laboratory Assay/Senior Technician - Laboratory Technician 1 - Laboratory Technician 2 - Laboratory Technician 3 - Laboratory Technician 4 - Labour Entry/Labour - Pit Labourer 1 - Pit Labourer 2 - Pit Labourer 3 - Pit Labourer 4 - Pit Labourer Entry/Labour - Trade Person (certified) - Trade Apprentice 1 - Trade Apprentice 2 - Trade Apprentice 3 - Trade Apprentice 4 - Maintenance Clerk - Warehouse Attendant 1 - Warehouse Attendant 2

The Project will have a positive impact in Guysborough County due to employment opportunities and the possibility of retaining and/or gaining new residents. Residents are skilled in industrial settings due to recent work at the now decommissioned LNG facility and may be available for work. In addition, MODG residents experience higher unemployment than NS generally meaning that individuals are likely seeking work. Through consultation and

engagement activities, Signal Gold has met residents enquiring about employment opportunities. In addition, the Project may present an opportunity to employ those normally underrepresented in the mining industry in NS.

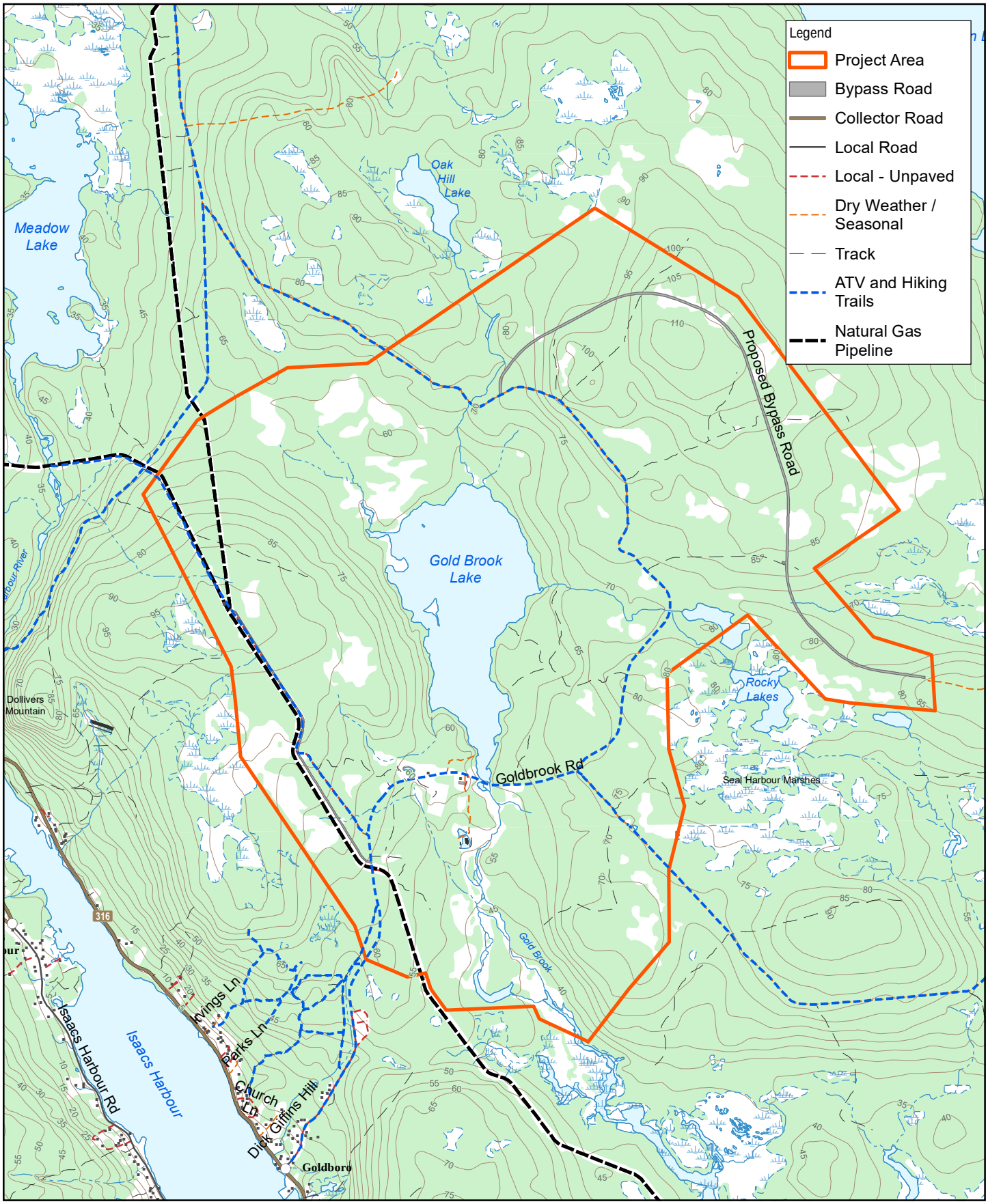
5.10.6.1.2 Land and Resource Use

The current land use planning in the revised MPS is appropriate for the Goldboro Gold Mine development consequently no changes will be required for the Project.

Access to private and Crown lands will be required to accommodate the development (Figure 5.10-3). Consequently, the Project will require acquisition of privately owned property. Signal Gold has engaged a third-party, Turner Drake & Partners Ltd. (Turner Drake), to complete property assessments, negotiate acquisitions, and manage and document the process. Signal Gold is not seeking to acquire any dwellings and will continue to work collaboratively with property owners, through its third-party service provider, for mutually agreeable outcomes. Turner Drake has contacted the 25 applicable landowners, with all but one of the appraisal valuation reports completed. To date, seven appraisals have been presented to landowners, seven purchase offers have been made, and four have been accepted.

The Project will have minimal impact upon the use the lands and resources since commercial (e.g., forestry, mining and industrial) and recreational use in the PA is limited. Gold Brook Lake does not appear to be as valued for fishing (and consumption of fish caught) as other lakes. Hunting is diminished in the PA due to forestry activities. Signal Gold will construct a bypass road around the secured area for the Project to allow access to ATV trails and lands (Figure 5.10-4). Based on consultation with users and user groups, rerouting around the site will not adversely affect most users and will benefit some.

The Project is not anticipated to have an adverse affect on tourism.



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Map Projection: Transverse Mercator
Horizontal Datum: North American Datum of 1983 (CSRS) version 6
Grid: NAD 1983 (CSRS) v6 UTM Zone 20N

GHD

SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

SOCIOECONOMIC BYPASS ROAD

Project No. 11222385
Revision No. -
Date 25/05/2022

FIGURE 5.10-4

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Visual Aesthetics

A viewshed analysis prepared to illustrate the visual effects of the Project is included as Appendix J.2. Selected observer locations were based on the results of projective view analysis and proximity of observers to the Project, especially residents in the communities of Goldboro, Isaacs Harbour North and Issacs Harbour. The results of the viewshed analysis indicate there is low potential of visibility of Project infrastructure from locations on the western shore of Isaacs Harbour, especially along Isaacs Harbour Road. The analysis also shows that existing forest cover provides effective screening. Analysis shows that the tops of the WRSAs and west end of the TMF may potentially be visible but given the topography and distance to the horizon, they may not be discernible from other features.

Based on the viewshed analysis, it is expected that there is a low potential for impact to the view from many areas surrounding the Project. The distance between Project infrastructure and each selected observer location ranged from 1 km to more than 5 km. The viewshed analysis indicates prominent Project infrastructure (e.g., TMF and WRSAs) will be visible from observer locations at lakes and other open areas where vistas have low horizons. As a result, recreational observers, such as boaters on lakes, ATV riders on trails, or hikers in almost any location, may see Project components. However, the view may be negligible due to forest heights (0-10 m), topography, or distance.

5.10.6.1.3 Public Safety

Signal Gold acknowledges that an increase in traffic due to the Project is inevitable. Construction will require mobilization of heavy equipment for earthworks and site preparation, as well as mobilization of site infrastructure (e.g., components of the mill, office buildings, employee accommodations units). Similarly, during closure much of this infrastructure will be removed, and a second period of increased earthwork activity (e.g., final sloping, grading, and placement of organic materials) occurs. It is expected that during operations, traffic will increase when compared to current traffic levels, but that this phase will be less challenging than construction and closure due to the more consistent nature of operations. Recognising these potential challenges, Signal Gold is preparing a Traffic Management Plan, and Project-specific mitigations will be developed once traffic projections are available. In the interim, Signal Gold will commit to mitigations and controls as described in Section 5.10.7.

The presence of non-resident work forces in dedicated accommodations facilities in remote areas may result in potential benefits and/or negative impacts. Benefits include employment opportunities at the facility, with individuals gaining new skills, pursuing training, or acquiring transferable skills (Gibson et al, 2017). Potential business opportunities (e.g., infrastructure construction/installation, catering, janitorial, site services) and joint ventures may also be available to local/regional businesses. Local service providers may experience increased sales.

5.10.6.1.4 Human Health

Human Health Risk Assessment

Based on the results of the HHRA, none of the incremental HQs estimated for any receptors during any of the stages of mine life as represented by the five exposure scenarios of baseline, construction, operations, closure, and post-closure exceeded their target of 0.2, which indicates that the non-carcinogenic risks related to the Project are negligible for the COPHCs. Total HQs for workers, for whom Baseline risk were not available due these workers not being present without the Project, did not exceed their target of 0.2. In addition, ILCRs for all receptors did not exceed their target of 1E-05, which indicates that the carcinogenic risks related to the Project are negligible for the COPHCs.

However, the predicted TSP concentration at the south and west PA boundary exceeded the Maximum Permissible Ground Level Concentration (MPGLC) associated with visibility (this is not a human health related guideline). In addition, the number of days per year exceeding the MPGLC during the operation phase was limited to 19 days and the concentrations are elevated near the PA boundaries only. Elevated concentrations of TSP exceeding the MPGLC do not extend to the PPB which extends further to the south and the west of the PA and the compliance point for the Project will be the PPB. Concentrations of TSP are predicated to be within the MPGLC at the PPB and will be confirmed through future compliance monitoring. A Fugitive Dust Best Management Practice Plan will be implemented for the Project to mitigate risks associated with fugitive dust including TSP and further action or risk management with respect to human health is not considered warranted.

Ecological Risk Assessment (ERA)

No incremental ERs exceeded their target of 1, which indicates that the risks related to the Project are negligible for the COPECs. As such, potential risks to ecological health for the two exposure areas (Gold Brook Lake and its catchment area, and Gold Brook and its catchment area) due to the presence of the Project can be ruled out, and no further assessment is required.

5.10.6.2 Indirect Impacts

Tax revenue will be generated through direct government tax revenues paid by the Proponent, as well as its contractors and suppliers. Indirect employment will be generated by the Project through use of external contractors and suppliers.

- 538 direct fulltime jobs will be created during the approximately two-year construction period, including 325 jobs directly on site
- Once operational, the Project will provide fulltime employment for approximately 215 workers annually at the site, in a region where unemployment is 14.2% above the provincial average.
- Over the life cycle of the Project, including construction, operations and closure, the Project has the potential to create 735 new jobs a year in NS for 15 years.

No indirect effects are anticipated on land use or human health.

The presence of non-resident work forces may result in issues especially for vulnerable populations. In remote areas of Canada and elsewhere, industrial accommodations have been known to have a hyper-masculine culture that may lead to increased alcohol and drug consumption (Gibson et al, 2017). The culture of non-resident worker populations has been linked to violence, discrimination, and sexual harassment and/or assault along with pressures on community and regional services and infrastructure. It is important to note that these effects are related to complex underlying social issues that may become exacerbated in the presence of a non-resident work force.

5.10.7 Mitigation

Signal Gold has considered the beneficial and adverse effects of the Project on Socioeconomic Conditions and designed the Project to avoid adverse issues wherever possible. Where not possible, Signal Gold has developed mitigations to minimize any effects. The following sections outline mitigations to enhance benefits and reduce potential adverse effects.

5.10.7.1 Economy

Signal Gold has entered into a Community Benefits Agreement with MODG to outline commitments to deliver sustainable social and economic benefits through local recruitment and employment, local labour market training, procurement and service opportunities, financial incentives to purchase or build homes within the Municipality, bursaries for local high school students, co-op students work term and apprenticeship placements, grants for community groups/organizations/projects, a local Project Information Office, a local Operational Office, and ongoing dialogue with MODG.

Signal Gold is committed to employee education, training, and mentoring. In addition to regulatory requirements, Signal Gold provides specialty in-house training as well as funding for employee education initiatives and professional certification. The company has formal and informal mentoring programs and makes a point of hiring people who have a goal of personal and professional advancement. Signal Gold also has an innovative and comprehensive internal training system. This system supports innovation and development of new ideas, provide motivation to the workforce, and retain and attract high quality talent.

Signal Gold is an equal opportunity employer focused on equality and believes in diversity of race, gender, sexual orientation, religion, ethnicity, national origin, and all the other characteristics. Signal Gold believes that the most

important assets are its employees and has a strong desire is to provide a safe, healthy, and rewarding workplace where employees receive fair treatment in return for their services and are given opportunities to improve their skills.

5.10.7.2 Land and Resource Use

Signal Gold will comply with all regulations and permitting requirements for the Project. In addition, Signal Gold has adopted best management practices for establishing and maintaining relationships with the community and other land users. This includes:

- Working with MODG regarding land use planning and permitting and other matters of interest.
- Working with NS Natural Resources to gain access to Crown land for the Project.
- Negotiating with all affected property owners regarding purchase of land.
- Working with PHP regarding effects of the Project on forestry harvesting.
- Working with M&NP regarding potential effects of the Project on pipelines.
- Using an accommodations facility to house workers onsite to avoid effects on the tourism industry.
- Continuing to engage with user groups and individuals, including the CLC, to discuss land use and access.
- Constructing a bypass road around the PA so that users may access sites outside the secure area for the Project.

5.10.7.3 Public Safety

Given the proximity of the Project to a residential area, it is imperative that precautions are established to ensure the safety of the community. The importance of situational awareness when traveling through residential areas, as well as abiding by set speed limits (provincial or project-related), will be communicated to all Signal Gold personnel, contractors, subcontractors, and vendors through site-wide Project orientation, training, toolbox talks, and other forms of communication.

Signal Gold, in conjunction with contractors, will conduct a Risk Assessment on equipment/vehicle movement for each area potentially impacted by the Project. A Traffic Management Plan will be developed prior to initiating operating Project equipment or vehicles to mitigate any identified risks. The Traffic Management Plan will be communicated to all relevant parties for all Project modes of transportation and will include the following: driver training, competency assurance, and vehicle selection and maintenance, at a minimum.

- Signal Gold has implemented a Project/employee specific speed limit (e.g., 40km/hr on Goldboro Road).
- Signal Gold will investigate the potential for employee bussing to/from local communities and the work site.
- Signal Gold will provide an employee accommodations facility, which will reduce daily Project-related travel/traffic associated on local roads.
- Wherever possible, Signal Gold will schedule delivery of equipment/supplies that might impede traffic flow outside of peak travel times and during daylight hours.
- Wherever possible, equipment operation will be scheduled during daylight hours to maximize visibility and reduce the need for supplemental lighting.

Signal Gold employees, contractors, and subcontractors will:

- Make every effort to keep delays to motorists to a minimum. If delays are required:
  - In heavy/peak traffic, delays will be split equally between the opposing lanes of traffic.
  - In typical conditions, traffic will not be delayed more than five (5) minutes per direction.
- Signal Gold will communicate potential traffic interruptions to the community through the CLC or other established platforms, as determined through on-going community consultation.
- At all times, priority shall be given to pedestrians/motorists to proceed through the construction zone. Travel and equipment operations will not be permitted in severe weather conditions. Site management and safety personnel will determine if/when equipment is not permitted to operate. Equipment will remain off roads and highways when required to do so by relevant authorities.

- Equipment lights will be used at all times. Posted speed limits are the maximum allowable speed. Weather, potential for pedestrian traffic, animal strikes, fog, darkness, and increased traffic will be taken into consideration and speeds reduced accordingly. All equipment will be operated within the guidelines of all manufacturers established specifications, rating and limitations.

Signal Gold has committed to measures to proactively address concerns regarding public safety as well as the safety of the workforce. Regarding the employee accommodations facility and general workplace culture, these measures include:

- Containing the facility within the secure area for the Project.
- Engaging a reputable company to install and manage the facility to minimize effects on the community.
- Prohibiting alcohol and drug consumption at the Project and employee accommodations facility.
- Requiring mandatory Indigenous Cultural Awareness Training for all employees and contractors.
- Working with KMKNO, Paqtnkek First Nation and Indigenous women's groups to ensure employee accommodations policies and infrastructure addresses their potential concerns.
- Providing mandatory Respectful Workplace Training.

5.10.7.4 Human Health

Signal Gold is committed to providing a safe and healthful work environment for its employees and is dedicated to the objective of eliminating the possibility of injury and illness. Signal Gold has developed innovative in-house learning programs such as a safety based behavioral micro-learning program. This program consists of five minutes of video-based learning a day and includes certifications from the Mining Industry Human Resource Council (MIHR) and is recognized industry wide.

Mitigation measures to reduce human and ecological health are presented in detail in Section 5.1.7 (Air) and Section 5.6.7 (Surface Water Resources). Key mitigations are:

- Implementation of a Fugitive Dust Best Management Practice Plan to minimize dust dispersion.
- Collection and treatment of mine contact water.

5.10.8 Monitoring and Follow-up

It is not anticipated that ongoing monitoring will be required for Socioeconomic Conditions such as economy, land use, public safety, or human health. The proponent may choose to conduct monitoring studies.

5.10.9 Company Commitments

Signal Gold is making the following commitments to help maximize the benefits of the Project and to minimize adverse effects. Advancement on these commitments will proceed with approval of the Project.

5.10.9.1 Economy

Signal Gold has entered into a Community Benefits Agreement with MODG with a focus on sustainable economic growth. Such benefits include:

- Targeted measures for local recruitment and employment at both at the construction and operational stages of the Project by collaborating to assess local labour market training and employment opportunities.
- Working with contractors and suppliers to identify opportunities to hire locally and support business activities in the Municipality, including procurement and service opportunities with the Project.
- Contribution of annual grants for community groups, organizations, and community projects within the Municipality.

- Establishment of bursaries for local high school students and the development of co-op work term opportunities students and apprenticeship placements.
- Maintenance of a local operational office within the Municipality and provision of financial incentives for Project personnel to relocate to the region.

5.10.9.2 Land and Resource Use

Signal Gold will construct a bypass road around the area secured for the Project to enable access to areas for land use activities.

5.10.9.3 Public Safety

Prior to operating equipment or vehicles for construction of the Project, Signal Gold will develop a Traffic Management Plan to identify any risks and to identify appropriate mitigations.

Signal Gold is also committed to maintaining an alcohol and drug free employee accommodations as part of its focus on community health.

Signal Gold acknowledges the documented link to missing and murdered Indigenous women (MMIW) and employee accommodation complexes in the resource extraction industry. Signal Gold has engaged – and will continue to engage – female Indigenous community members to understand and incorporate appropriate safety measures (prior to any design) to ensure the safety of community members, as well as workers.

5.10.9.4 Human Health

No company commitments related to surface water are proposed for the Project beyond the mitigation and monitoring described herein.

5.10.10 Residual Effects and Significance

This Project will make a strong contribution to the economy of Guysborough and NS. It will generate new employment in all Project phases (and related income and taxation benefits). Contracting and sub-contracting for required goods and services (i.e., equipment and supplies) and associated expenditures will provide business opportunities for qualified firms. Creation of new employment will benefit businesses as spending flows through the economy.

A significant adverse effect on the Socioeconomic Conditions VC was defined in Section 5.10.6 as:

- A Project related effect that results in permanent loss of lands and resources used by other industry sectors or community users.
- A Project related effect that results in long term adverse health or safety conditions for relevant communities.
- A Project related effect that results in a moderate to high in magnitude and partially reversible to irreversible for Human and Ecological Health.

As illustrated through the preceding analysis, the effects of the Project on the economy are predicted to be positive. The Project is not likely to result in significant adverse residual effects on other aspects of Socioeconomic Conditions once mitigation measures are applied. Tables 5.10-18 through 5.10-21 outline characterization of residual effects by Project phase. For clarity, each aspect of the Socioeconomic Conditions (i.e., economy, land and resource use, public safety, and human health) is included in a separate table.

Table 5.10-18 Residual Effects on Socioeconomic Conditions: Economy

Project Phase	Mitigation and Compensation Measures	Nature of Effect	Residual Effects Characteristics						Residual Effect	Significance
			Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility		
Construction	Signal Gold's approach to employment, procurement, and benefits is based on hiring/buying local/regional wherever possible; education, training, and mentorship; and equality and diversity.	P Beneficial effects are anticipated from direct and indirect employment opportunities, in addition to other positive economic benefits for local, regional, and provincial economies from procurement, taxes, and royalties.	H	RAA	N/A	MT Construction will be for ~2 years	C	RE	Direct and indirect employment and training opportunities, and other positive benefits for the local, regional, and provincial economies from procurement, taxes, and royalties.	Primarily positive and beneficial to the economy No significant adverse residual effects
Operations						LT Operations is estimated to be 11 years				
Closure						LT Closure is planned to be 24 years				
Legend (refer to Table 5.10-14 for definitions)										
Nature of Effect A – Adverse P – Positive	Magnitude N – Negligible L – Low M – Moderate H – High	Geographic Extent PA – Project Area LAA – Local Assessment Area RAA – Regional Assessment Area	Timing N/A – Not Applicable A – Applicable	Duration ST – Short-Term MT – Medium-Term LT – Long-Term P – Permanent	Frequency O – Once S – Sporadic R – Regular C – Continuous	Reversibility RE – Reversible IR – Irreversible PR – Partially Reversible				

Table 5.10-19 Residual Effects on Socioeconomic Conditions: Land and Resource Use

Project Phase	Mitigation and Compensation Measures	Nature of Effect	Residual Effects Characteristics						Residual Effect	Significance
			Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility		
Construction	Signal Gold will construct a bypass road around the PA so that users may access trails and sites. Signal Gold is continuing to engage with recreational user groups and individuals, including the CLC, to discuss land use and access. Signal Gold is engaging with other commercial users such as PHP and M&NP on land use.	A Signal Gold will limit access to the PA to ensure security and public safety, which will exclude an area from land and resource use.	L Land use activity in the PA is limited. For instance, some hunting and fishing occurs, but users indicate they do not consume fish from Gold Brook Lake. Other commercial land use in the PA is limited to a pipeline and forestry harvesting.	PA Loss of access is limited to the PA.	N/A	MT Loss of access to the PA will continue throughout construction. The bypass road will be constructed and available.	C	RE	Signal Gold is engaging with other commercial users to manage residual effects on land use. Recreational users will lose access to an area during construction.	Not significant
Operations						LT The bypass road will be continue throughout the life of the Project and beyond.				
Closure						LT As areas are reclaimed, access to the PA will be granted where and when it is safe to do so.		Access will gradually be restored.		

Legend (refer to Table 5.10-14 for definitions)

Nature of Effect	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
A – Adverse P – Positive	N – Negligible L – Low M – Moderate H – High	PA – Project Area LAA – Local Assessment Area RAA – Regional Assessment Area	N/A – Not Applicable A – Applicable	ST – Short-Term MT – Medium-Term LT – Long-Term P – Permanent	O – Once S – Sporadic R – Regular C – Continuous	RE – Reversible IR – Irreversible PR – Partially Reversible

Table 5.10-20 Residual Effects on Socioeconomic Conditions: Public Safety

Project Phase	Mitigation and Compensation Measures	Nature of Effect	Residual Effects Characteristics						Residual Effect	Significance
			Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility		
Construction	Signal Gold will prepare a Traffic Management Plan eliminate or minimize issues. Signal Gold will maintain communications with the community and the CLC on traffic and other issues. Signal Gold will ensure its worker accommodations facility is managed to minimize effects on the community.	A The Project will result in increased traffic above present with some nuisance effects.	L	LAA	N/A	ST Traffic effects will occur at the beginning and end of work days and shift changes along with deliveries of construction materials and large equipment.	R	RE	Traffic effects will be minimized through proactive management. Worker accommodations facility will be managed to minimize effects	Not significant
Operations						ST Traffic effects will occur at the beginning and end of work days and shift changes.				
Closure						ST Traffic effects will be limited compared to construction and operations.	S		Effects of traffic and from worker accommodations will be limited compared to construction and operations.	

Legend (refer to Table 5.10-14 for definitions)

Nature of Effect	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
A – Adverse P – Positive	N – Negligible L – Low M – Moderate H – High	PA – Project Area LAA – Local Assessment Area RAA – Regional Assessment Area	N/A – Not Applicable A – Applicable	ST – Short-Term MT – Medium-Term LT – Long-Term P – Permanent	O – Once S – Sporadic R – Regular C – Continuous	RE – Reversible IR – Irreversible PR – Partially Reversible

Table 5.10-21 Residual Effects on Socioeconomic Conditions: Human Health

Project Phase	Mitigation and Compensation Measures	Nature of Effect	Residual Effects Characteristics						Residual Effect	Significance
			Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility		
Construction, Operations and Closure Human Health effects related to potential changes in air quality from haul roads, drilling and blasting, waste rock handling etc.	Dust suppression, regular equipment maintenance, stockpile stabilization. Implementation of the Fugitive Dust Best Management Practice Plan.	A	L No adverse effects predicted above risk threshold.	PA	N/A	L Changes are anticipated to occur during construction and operations.	C	RE Reclamation activities will eliminate the pathway.	No residual effect	Not significant
Construction, Operations and Closure Ecological effects related to dust deposition on vegetation and changes to sediment and surface water quality.	Dust suppression, regular equipment maintenance, stockpile stabilization. Implementation of the Fugitive Dust Best Management Practice Plan. Water management infrastructure including effluent treatment.	A	L No adverse effects predicted above risk threshold.	PA	N/A	L Changes are anticipated to occur during construction and operations.	C	PR Concentrations marginally above baseline at closure. However, the concentrations are below ERA adverse effects threshold.	No residual effect	Not significant

Legend (refer to Table 5.10-14 for definitions)

Nature of Effect	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
A – Adverse P – Positive	N – Negligible L – Low M – Moderate H – High	PA – Project Area LAA – Local Assessment Area RAA – Regional Assessment Area	N/A – Not Applicable A – Applicable	ST – Short-Term MT – Medium-Term LT – Long-Term P – Permanent	O – Once S – Sporadic R – Regular C – Continuous	RE – Reversible IR – Irreversible PR – Partially Reversible

5.11 Indigenous Peoples

5.11.1 Rationale for Valued Component Selection

Assessment of the potential of the Project to affect Indigenous Peoples is included as a VC due to the following:

- The historic presence of the Mi'kmaq throughout NS
- Recognition of established Aboriginal and treaty rights
- The duty of the Crown (i.e., Canada and provincial/territorial governments and agencies) to consult with Indigenous Peoples regarding decisions, or taking actions, that might adversely affect their established or potential Aboriginal rights and treaty rights
- The potential for the Project to affect the Mi'kmaq's ability to access some lands and or to alter the presence or availability of animals or plants the Mi'kmaq rely upon for traditional purposes
- Reconciliation with Indigenous Peoples

In 2004 and 2005, the Supreme Court of Canada (SCC) passed three landmark decisions, which established the Crown's duty to consult with Indigenous Peoples as outlined in the Updated Guidelines for Federal Officials to Fulfill the Duty to Consult (Government of Canada, 2011). In 2007, the governments of NS, Canada, and the Mi'kmaq of Nova Scotia established the Mi'kmaq-Canada-Nova Scotia Consultation Terms of Reference, which establishes the process for the Mi'kmaq, NS, and Canada to resolve issues related to Aboriginal rights and treaty rights (UNSM, 2021; NSOLA, 2011). As outlined in the Proponents' Guide: Engagement with the Mi'kmaq of Nova Scotia, the Province's *Environmental Assessment Regulations* require proponents to identify the concerns of Indigenous Peoples regarding potential Project effects and to describe steps taken or proposed to address issues (Province of NS, 2012). The Crown may delegate procedural aspects of consultation to project proponents. However, the duty to consult, and ultimate decision-making authority remains with the Crown.

Various aspects of this EA that may affect Indigenous Peoples are discussed in other VC chapters that address related topics such as air, light, noise, groundwater, surface water, socioeconomic conditions, and cultural and heritage resources. In addition, Indigenous activities may be affected directly or indirectly by the effects of a project on species of fish, animals, birds, or plants on which they rely and the habitats that support relevant species. An overview is presented in Table 5.11-1. For brevity, these related effects are not repeated in this VC.

Table 5.11-1 Relationship to Other VCs

VC	Section
Air	5.1
Light	5.2
Noise	5.3
Groundwater Resources	5.5
Surface Water Resources	5.6
Fish and Fish Habitat	5.8
Terrestrial Environment	5.9
Socioeconomic Conditions	5.10
Cultural and Heritage Resources	5.12

5.11.2 Baseline Program Methodology

Signal Gold commissioned Membertou Geomatics Solutions (MGS) to prepare a MEKS for the Project, which was conducted in 2017 in accordance with the Mi'kmaq Ecological Knowledge Study Protocol 2nd edition, on an area

defined as the MEKS Study Area. This 196 km^2 area was roughly based on a 5 km buffer around a preliminary Project configuration. It extends between 2.3 to 9.2 km beyond the present PA. The MEKS and PA are shown in Figure 5.11-1.

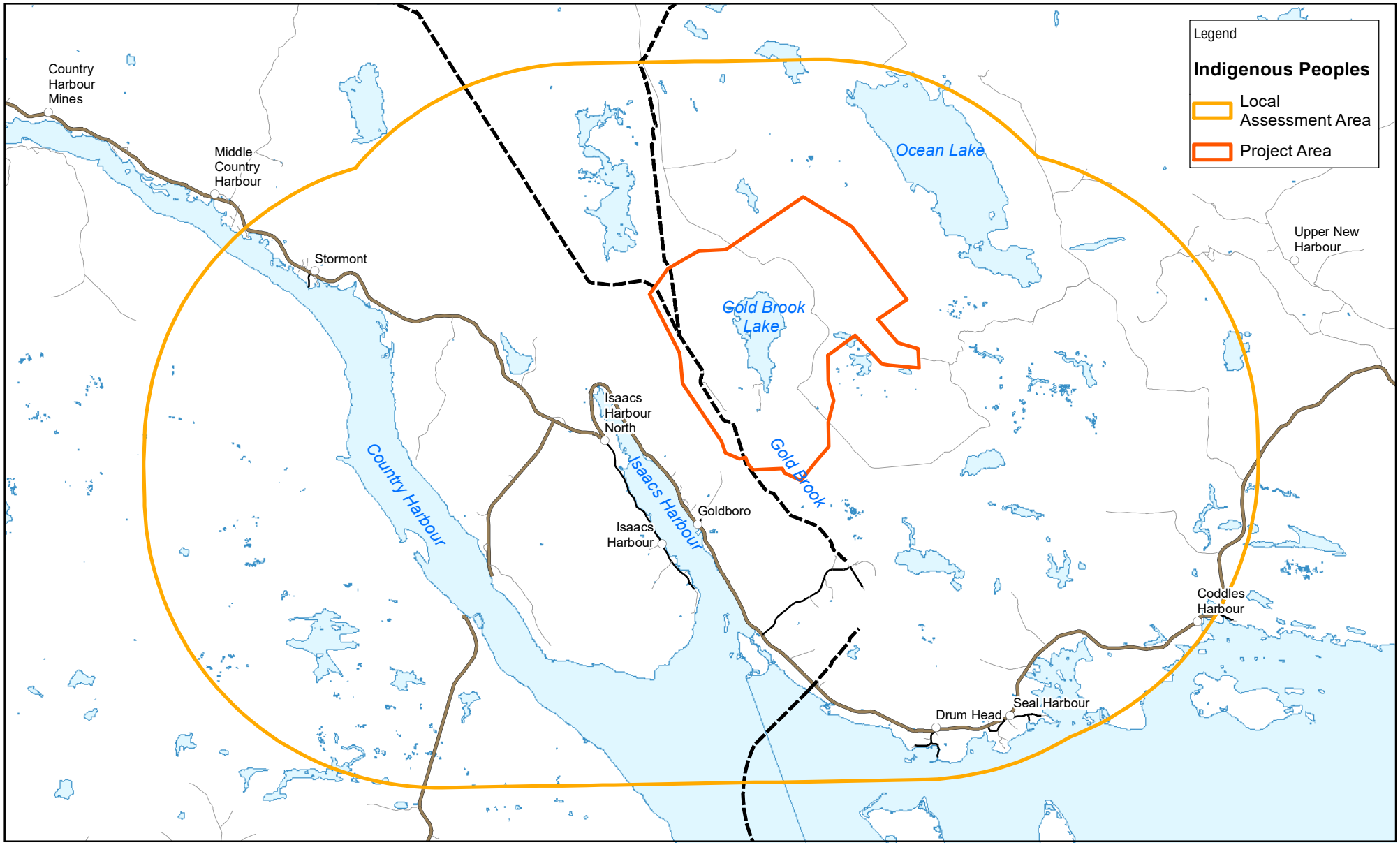
The purpose of a MEKS was to identify and document land and resource use. Historical review and research of the MEKS Study Area was conducted to identify any areas of significance to the Mi'kmaq people. In addition, this research and review allowed MGS to gain an understanding of Mi'kmaq use of the lands. The MEKS consisted of two major components:

– Mi'kmaq Traditional Land Use Activities, past and present
– A Mi'kmaq Significance Species Analysis, considering the resources that are important to Mi'kmaq use

Engagement and interviews were conducted in August and September 2017 with Mi'kmaq knowledge holders from the First Nations communities of Paqtnkek, Pictou Landing and Millbrook (Sheet Harbour), to seek ecological knowledge and information on the most recent and historic Mi'kmaq traditional land use in this area. MGS and Signal Gold staff also met with a Mi'kmaq knowledge holder and conducted a site visit of the MEKS Study Area in September of 2017. MGS conducted a Mi'kmaq Significant Species Survey to help gather information on significant species, which are used in a variety of ways including food/sustenance, medicinal/ceremonial, and/or arts/tools, which helps determine potential effects of the Project in the MEKS Study Area and surrounding areas. The resources were also considered for their use and importance to the Mi'kmaq as well as their availability or abundance within or adjacent to the MEKS Study Area. The complete MEKS Report is found in Appendix K.1.

Another MEKS was commissioned and MGS conducted a site visit in December 2021. However, community interviews for all MEKS have been postponed since March 2020 due to the COVID-19 pandemic and public health concerns. MGS has developed an online tool to support the interview process and is hoping to resume in-person interviews in 2022.

Information has also been gathered through on-going engagement with the Mi'kmaq of Nova Scotia and from publicly available sources. This information has been used to provide an overview of current First Nations communities in NS.



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Horizontal Datum: North American Datum of 1983 (CSRS) version 6
Grid: NAD 1983 (CSRS) v6 UTM Zone 20N

GHD

SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

INDIGENOUS PEOPLES MEKS STUDY AREA

Project No. 11222385
Revision No. -
Date 25/05/2022

FIGURE 5.11-1

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Data source: GHD, GeoNova, Anacinda . Created by: jjparks

5.11.3 Baseline Conditions

The present-day provinces of NS, NB and Prince Edward Island, as well as the Gaspé Peninsula, Quebec are founded on land historically occupied by the Mi'kmaq. The earliest documented evidence of Indigenous peoples in the Maritimes indicates that the ancestors of the Mi'kmaq existed on these lands up to at least 11,000 years ago (MHMC, 2013).

5.11.3.1 Mi'kmaq of Nova Scotia

Beginning in the 19th century, reserves were established throughout Atlantic Canada mainly on lands that were frequented by Indigenous groups, though not always on good quality land (CIRNAC, 2010). NS currently has 13 Mi'kmaq First Nations reserve communities that occupy one or more parcels of reserve lands (CIRNAC, 2022). The locations of First Nations communities and reserve lands are shown in Figure 5.11-2 in relation to historic Mi'kmaq political districts. No First Nation reserves are in the Goldboro area, PA, or MEKS Study Area. The 13 Mi'kmaq First Nation communities are as follows:

Acadia First Nation

Annapolis Valley First Nation

Bear River First Nation

Eskasoni First Nation

Glooscap First Nation

Membertou First Nation

Millbrook First Nation

Paqtnkek Mi'kmaw Nation

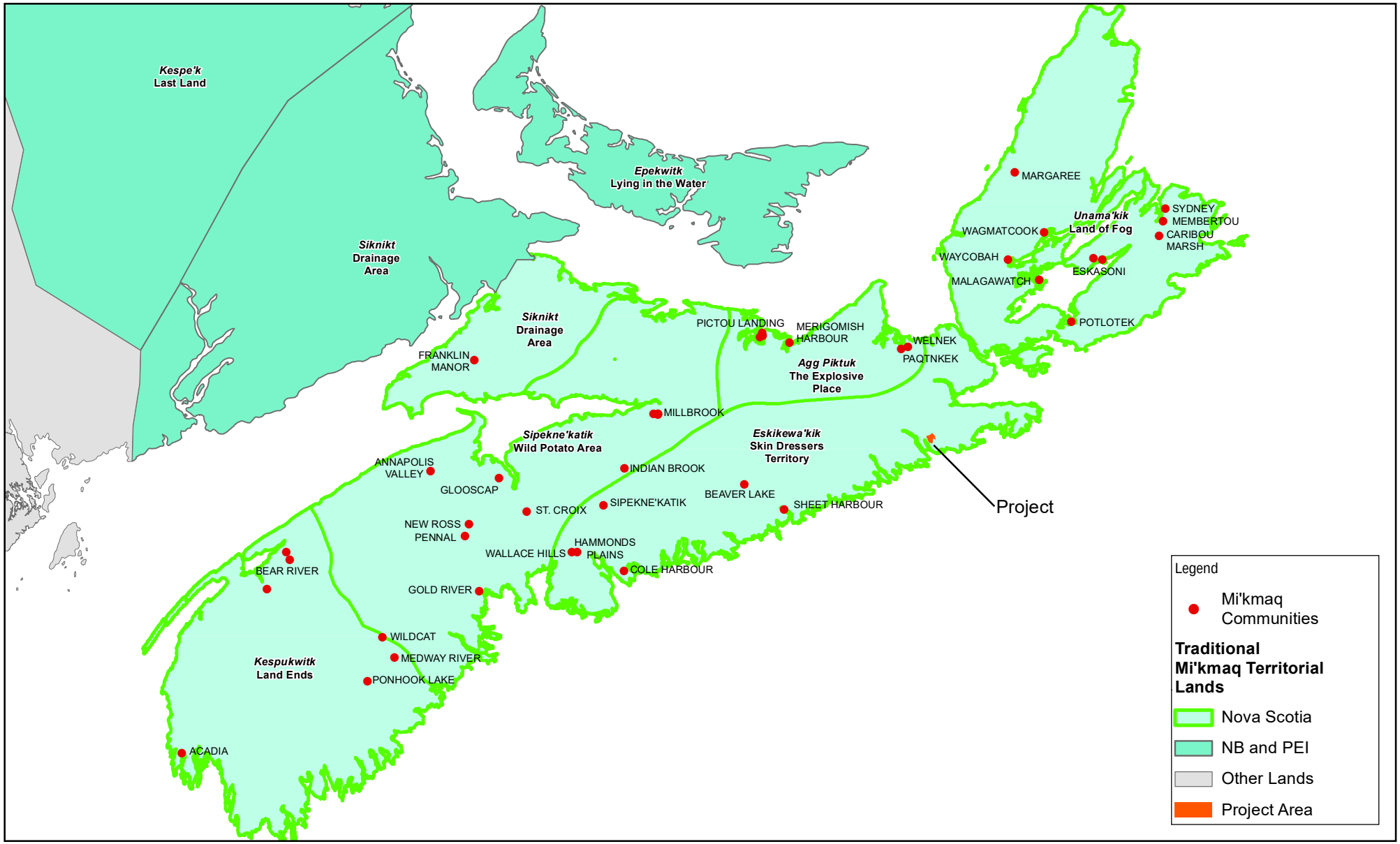
Pictou Landing First Nation

Potlotek First Nation

Sipekne'katik First Nation

Wagmatcook First Nation

We'koqma'q First Nation



Data Disclaimer

Territorial boundaries are approximate and based on several sources of information

Paper Size ANSI A

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Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: North American Datum of 1983 (CSRS) version 6
Grid: NAD 1983 (CSRS) v6 UTM Zone 20N

GHD

SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

INDIGENOUS PEOPLES RESERVE LANDS IN NOVA SCOTIA

Project No. 11222385
Revision No. -
Date 25/05/2022

FIGURE 5.11-2

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Print date: 25 May 2022 - 17:43

Data source: GHD, GeoNOVA, ANCONDA, NR Canada . Created by: jjparks

Signal Gold is engaging with Paqtnkek Mi'kmaw Nation as the nearest First Nation to the Project at approximately 75 km (Table 5.11-2). Signal Gold is also working closely with KMKNO, which represents 10 NS First Nations (including Paqtnkek) in consultation matters.

Table 5.11-2 Paqtnkek Mi'kmaw Nation Lands and Tribal Council

Location/Reserve Lands	Tribal Council/Affiliation
Afton, Antigonish County/Franklin Manor No. 22 (Part), Paqtnkek-Niktuek No. 23, Welnek No. 38	Confederacy of Mainland Mi'kmaq

CIRNAC, 2022

Various organizations support Mi'kmaq First Nations in NS. The KMKNO reports to the ANSMC, which provides governance for the Mi'kmaq of Nova Scotia, oversight for decision-making on common issues, and direction to KMKNO on the Made-in-Nova Scotia process concerning implementation of Mi'kmaq Aboriginal and treaty rights (KMKNO, 2022). The Union of Nova Scotia Mi'kmaq (UNSM) provides governance capacity services to member bands to improve economic and social conditions of the Mi'kmaq of Nova Scotia (UNSM, 2021). Mi'kmaw Kina'matnewey (MK) delivers education to Mi'kmaq of Nova Scotia (MK, 2021).

5.11.3.1.1 Demographic Information

Limited current demographic information is available to describe First Nations communities in NS. Crown-Indigenous Relations and Northern Affairs Canada provides monthly reports on registered population living on and off reserve. See Table 5.11-3 for March 2022 population. In 2016, Paqtnkek showed a younger median age than NS, which was 45.1 years (Statistics Canada, 2017).

Table 5.11-3 Paqtnkek Mi'kmaw Nation Demographic Information (March 2022)

Registered Population	On-Reserve Population	Median Age (2016)
603	421	24.4

CIRNAC, 2022

5.11.3.1.2 Education, Income, and Employment

In 1997, Canada signed an agreement with 12 Mi'kmaq First Nations in NS to facilitate self-governance in education (CIRNAC, 2021). As a result, Indigenous children are experiencing improved education outcomes. The MK, which provides education to 83% of First Nations students, reports improved numeracy and literacy rates, an attendance rate of 91%, and a high school graduation rate of nearly 94% (MK, 2021).

In 2021, more than 600 NS First Nation students were enrolled in post-secondary institutions (MK, 2021). Table 5.11-4 shows trades education for members of Paqtnkek. Those with post-secondary education (in 2016) mainly had certificates in trades, which was similar to NS (CIRNAC, 2022). This was particularly true for males, while females showed a stronger tendency to pursue university education. During meetings with Paqtnkek Mi'kmaw Nation, and at the open house in April 2022, representatives confirmed a large number of members are educated in skilled trades.

Table 5.11-4 Paqtnkek Mi'kmaw Nation Trades Education Rate (2016)

Certificate (Trades/Apprenticeship/ Other Non-University)		
Total	Male	Female
33%	40%	27%

CIRNAC, 2022

Table 5.11-5 shows income for those 15 years of age and over with income in 2016. Average total income was lower compared to NS where residents generally averaged $41,479 (CIRNAC, 2022). Income was higher for female members of Paqtnkek, which is likely attributable to higher education levels. Higher income may also be due to engagement in year-round rather than seasonal employment as women were more strongly represented in the health

care/education, business services, wholesale/retail, and other service sectors than men. Men showed stronger employment participation in the agriculture/resource based and manufacturing/construction sectors.

Table 5.11-5 Paqtnkek Mi'kmaw Nation Income (2016)

Average Total Income		
Total	**Male**	**Female**
$17,889	$14,771	$20,592

CIRNAC, 2022

Employment rates were lower compared to the province for which the rate was 55.2%. Generally, female members of Paqtnkek showed stronger employment rates than males (Table 5.11-6).

Table 5.11-6 Paqtnkek Mi'kmaw Nation Employment (2016)

Employment Rate		
Total	**Male**	**Female**
26.9%	36.4%	46.2%

CIRNAC, 2022

Data related to the Indigenous workforce were not available for Guysborough County or NS. In Atlantic Canada, the Indigenous employment rate steadily increased from 51.1% to 53.9% between 2017 and 2021 (Table 5.11-7). The Indigenous employment rate for Canada, although higher than Atlantic Canada, experienced a smaller increase between 2017 and 2021 while Canada experienced a larger decrease in the non-Indigenous employment rate compared to Atlantic Canada during the same period. Lower employment in 2020 is likely due to the COVID-19 pandemic.

Table 5.11-7 Indigenous Employment Rate

Year	Atlantic Canada		Canada	
	Indigenous	**Non-Indigenous**	**Indigenous**	**Non-Indigenous**
2017	51.2%	55.1%	56.4%	61.5%
2018	54.5%	55.3%	56.8%	61.5%
2019	52.3%	55.8%	56.8%	62.0%
2020	52.1%	53.1%	52.0%	58.1%
2021	53.9%	54.7%	56.4%	60.2%

Statistics Canada, 2022

The Indigenous population is underrepresented in the NS construction industry (Buildforce Canada, 2022). In 2021, Indigenous persons accounted for approximately 5% of Atlantic Canada's total working-age population. In 2021, an estimated 9.4% of Indigenous Canadians were employed in the construction industry, compared to 7.5% of the non-Indigenous population. Given the stronger tendency of Indigenous persons to pursue careers in construction, there is merit in focussing recruitment effort on Indigenous persons.

5.11.3.1.3 Economic Development

First Nations in NS participate in various types of economic development activities. These ventures provide employment for members and revenue to support programs such as health care, childcare, and education. The following information outlines business and economic development for Paqtnkek Mi'kmaw Nation.

- Paqtnkek Mi'kmaw Nation operates a variety of band-owned enterprises (Paqtnkek Mi'kmaw Nation, 2022)
- Bayside Travel Centre

- Paqtnkek Entertainment Centre (gambling casino) with derived revenue re-invested into the community, through social and economic development projects
- Paqtnkek Fisheries Enterprise owns five commercial communal fishing vessels. In 2020, a Mi'kmaq coalition including Paqtnkek acquired 50% of Clearwater Seafoods
- Paqtnkek Gas Bar
- Paqtnkek Smoke Shop

Wskijnu'k Mtmo'taqnuow Agency Ltd (WMA) is a corporate body wholly owned by all Mi'kmaq communities in NS. In 2020, a partnership of WMA and Black Diamond Group Limited and were selected for construction of worker accommodations and associated amenities for the proposed Goldboro LNG Facility in Guysborough County (Black Diamond Group, 2020). The estimated value of the contract is $720 million.

5.11.3.1.4 Indigenous Rights

etween 1726 and 1779, various Peace and Friendship Treaties were signed between Mi'kmaq, Maliseet, and Passamaquoddy Indigenous groups and the British government to facilitate trade of goods and enduring alliances (CIRNAC, 2010). Generally, the Indigenous Peoples agreed to accept established colonial settlements and the British, agreed to continued Indigenous use of traditional fishing, hunting, and planting grounds. However, the treaties included limited information on implementation and governance. As settlement increased and competition for resources grew, Indigenous groups petitioned government to uphold the treaties especially around harvesting.

Indigenous rights have been confirmed in Section 35 of the *Constitution Act, 1982*. These rights include Aboriginal rights to hunt, fish and gather for food, social and ceremonial (FSC) or traditional purposes, and treaty rights to harvest for a moderate livelihood. These rights and upheld in various decisions of the Supreme Court of Canada (SCC). For instance, in September 1999, the SCC issued an historic decision based on the Treaties of 1760-1761 (UNSM, 2021). In R. v. Marshall, the SCC affirmed the right of Mi'kmaq people in NS, N , and parts of Québec, to fish commercially and attain a "moderate livelihood".

5.11.3.1.5 Land Claims

Since 1973, Canada has signed 26 comprehensive land claims and four self-government agreements with Indigenous groups (CIRNAC, 2021). No land claims have been established in NS. The Government of Canada has committed to settling specific claims, which relate to administration of land and other First Nation assets as well as fulfilment of historic treaties and other agreements. In NS, seven claims are in active negotiation, 21 claims have been successfully concluded and eight claims have been closed (CIRNAC, 2021). Limited information was available on the location of specific claims, though one was identified at Wagmatcook and another at Annapolis Valley.

5.11.3.1.6 Historic and Current Use of Land and Resources for Traditional Purposes

The MEKS (completed by MGS in 2017) highlights the Mi'kmaq's long-standing relationship with, and attachment to, lands in and around Goldboro. This relationship between the Mi'kmaq and the lands is demonstrated through extensive knowledge of flora and fauna including the many culturally significant species of plants, fish, and game used by the Mi'kmaq people and likely their ancestors. Historically, the Mi'kmaq demonstrated local hunting, trapping, and gathering practices to European settlers of Eskikewa'kik, which includes the Eastern Shore from Sheet Harbour to Canso (MGS, 2017).

MGS conducted background research to identify areas of historic significance to Mi'kmaq communities, and surrounding areas including the MEKS Study Area (Figure 5.11-2). In addition, a Significant Species Survey was conducted to determine the presence of plant and animal species that play a key role to the Mi'kmaq community.

Based on the historical review and data documented from the MEKS, it was concluded that historic records show past Mi'kmaq occupation in the MEKS Study Area. Evidence is available to demonstrate traditional hunting territories and encampments, and Census records from the early 1900s show a population identifying themselves as Mi'kmaq. Data documented and analyzed indicate that some use by Mi'kmaq people is currently reported in the MEKS Study Area.

Members of the Paqtnkek, Millbrook, and Indian Brook (i.e., Sipekne'katik) First Nations are known to have been involved in resource harvesting in these lands and waters.

The Mi'kmaq traditional land use findings for the MEKS Study Area identified trout fishing areas and areas for deer hunting. Blueberries and goldenthread, as well as fir and spruce trees were identified, and notable gathering areas were located east of Country Harbour and west of Gold Brook Lake. Trout fishing and deer hunting were the most reported traditional use activities in the MEKS Study Area. Overall, the activities took place in the Historic Past and the Recent Past, as defined in the MEKS Report (Appendix K.1). However, there is still some current use in the area.

Other identified activities in inland and coastal areas include harvesting for salmon, bass, eel, blueberries, fir trees, rabbits, sea urchins, and spruce. The locations of these activities appear to be centred around Country Harbour (from Cook Cove to beyond the Country Harbour Ferry), the Isaacs Harbour area (from Goldboro to between Seal Harbour and Coddles Harbour), and around Meadow Lake to West Brook (including Gold Brook Lake and Seal Harbour Lake).

Mi'kmaq Significance Species Analysis considers the type of use, availability, and importance of resources. Species of significance to the Mi'kmaq are associated with three categories: food sustenance, medicinal ceremonial, tools art. The number of areas and species noted for the three types of use are summarized in Table 5.11-8, based on work completed as part of the MEKS in 2017.

Table 5.11-8 Significant Species in the MEKS Study Area

Type of Use	Number of Areas	Number of Species
Food/Sustenance	43	17
Medicinal/Ceremonial	10	7
Tools/Art	6	4

The MEKS concludes that use of the Goldboro area by the Mi'kmaq is presently limited, but there may be a future interest in fishing, hunting, and possibly gathering in the MEKS Study Area as land-use changes, urbanization, and other developments affect other areas currently used by Mi'kmaq hunters and fishers.

5.11.4 Consideration of Consultation and Engagement Results

Signal Gold has undertaken an engagement program with the Mi'kmaq of Nova Scotia, stakeholders, regulators, and the public including working with Indigenous organizations. Only Paqtnkek Mi'kmaw Nation and KMKNO have responded and expressed interest in the Project. Engagement activities are described in more detail in Section 3. This has included information exchange in direct communication with KMKNO. The results of consultation and engagement have been considered in planning of the Project and the effects assessment for this VC. Through this communication, no additional updates on traditional uses of lands and resources related to the Goldboro Gold Project have been identified. Throughout this process, various issues, concerns, and opportunities have been identified in relation to the Project. For the Indigenous Peoples VC, concerns include:

- Protection of Aboriginal and treaty rights.
- The ability to participate in land and resource use.
- Effects of dust on plants and animals used for traditional purposes.
- Loss of habitat and access for traditional activities (e.g., hunting, fishing, harvesting).
- Presence of non-resident workers in employee accommodations near communities.
- Incorporation of traditional knowledge in environmental monitoring and management.
- Mi'kmaq employment and training opportunities.
- Opportunities for Mi'kmaq companies to compete for work.
- Ongoing engagement with Mi'kmaq.

Signal Gold recognizes the Mi'kmaq of Nova Scotia hold Indigenous rights, including confirmed and asserted Aboriginal, and treaty rights in relation to the lands and natural resources that may be affected by the Project. Signal

Gold is engaged in ongoing consultation with the Mi'kmaq and negotiating a Mutual Benefits Agreement with KMKNO on behalf of Nova Scotia Mi'kmaq Chiefs.

5.11.5 Effects Assessment Methodology

5.11.5.1 Boundaries

Spatial Boundaries

The spatial boundaries used for the assessment of effects to Indigenous Peoples are shown in Figure 5.11-2 and defined below.

The PA is the immediate area of the Project where any physical disturbance associated with construction, operations and closure would occur. Some areas within the PA may not be physically disturbed but will be inaccessible to Indigenous Peoples and the public. Access will be restored gradually during closure.

The LAA is the MEKS Study Area, a 196 km^2 area around the PA (9.2 km to the west, 5.1 km to the south, 2.3 km to the north, 3.2-5.4 km to the east). The LAA encompasses the maximum the zone of influence from the Project and interactions with Mi'kmaq use of lands and resources. Based on the MEKS, members of the Paqtnkek, Millbrook and Sipekne'katik (Indian Brook) First Nations are known to have been involved in resource harvesting in the lands and waters of MEKS Study Area.

The RAA is defined as the province of NS. Mi'kmaq First Nations exist throughout the province and this boundary is also the RAA for general socioeconomic effects including Project employment and procurement.

Temporal Boundaries

The temporal boundaries used for assessment of effects on Indigenous Peoples includes Project construction, operations, and closure.

Technical Boundaries

The following technical boundaries were identified for the effects assessment on Indigenous Peoples. Firstly, detailed 2021 Census data were not available at time of writing. Current data on Indigenous employment were available from Statistics Canada for Atlantic Canada but not for NS.

Administrative Boundaries

The NS *Environmental Assessment Regulations* includes a requirement to identify concerns of Indigenous Peoples about potential adverse effects and steps proposed to identify concerns, and the steps taken by the proponent to address these concerns.

5.11.5.2 Modelling

No modelling was conducted for the assessment of Project effects Indigenous Peoples. The potential effects on traditional land and resource use is based on information from the MEKS study.

5.11.5.3 Thresholds for Determination of Significance

Table 5.11-9 provides the quantitative measure or definition of qualitative categories for magnitude, duration, and frequency, specific to cultural and heritage resources. Geographic extent, timing, and reversibility are consistent with the other VCs.

Table 5.11-9 Characterization Criteria for Environmental Effects

Characterization	Quantitative Measure or Definition of Qualitative Categories
Magnitude	**N** – no detectable direct or indirect effects on Indigenous Peoples. **L** – short or medium-term effects on traditional land use areas within the context of mitigations and consultation with appropriate regulators and Indigenous groups. **M** – long-term effects on traditional land and resource use within the context of mitigations and consultation with appropriate regulators and Indigenous groups **H** – permanent effects on traditional land and resource use or adverse effects on Indigenous communities without mitigations and consultation with appropriate regulators and Indigenous groups.
Geographic Extent	**PA** – direct and indirect effects from Project activities are restricted to the PA **LAA** – direct and indirect effects from Project activities are restricted to the LAA **RAA** – direct and indirect effects from Project activities are restricted to the RAA
Timing	**N/A** – seasonal aspects are unlikely to affect VCs **A** – seasonal aspects may affect VCs
Duration	**ST** – effects are limited to occur from as little as 1 day to 12 months **MT** – effects can occur beyond 12 months and up to 3 years **LT** – effects extend beyond 3 years **P** – valued component unlikely to recover to baseline conditions
Frequency	**O** – effects occur once **S** – effects occur at irregular intervals throughout the Project **R** – effects occur at regular intervals throughout the Project **C** – effects occur continuously throughout the Project
Reversibility	**RE** – VCs will recover to baseline conditions before or after Project activities have been completed **PR** – mitigation cannot guarantee a return to baseline conditions **IR** – effects to VCs are permanent and will not recover to baseline conditions

A significant adverse effect on Indigenous Peoples is defined as:

- A Project-related effect that results in permanent loss of lands and resources relied upon for traditional use.
- A Project-related effect that results in adverse socioeconomic conditions in an Indigenous community.

5.11.6 Project Interactions and Potential Effects

All phases of the Project will have the potential to provide socioeconomic benefits on Indigenous Peoples, including direct and indirect employment and procurement opportunities. Mining activity also has the potential to result in adverse effects on Indigenous Peoples. This includes the various Project activities listed in Table 5.11-10 as physical works for construction, operations, and closure may result in loss of access to lands used by Indigenous Peoples for traditional purposes and or disturbance or destruction of related natural resources. Effects on public safety are discussed in Section 5.10.

Table 5.11-10 Project Activities and Indigenous Peoples Interactions

Project Phase	Duration	Relevant Project Activity
Construction	2 years	- Clearing, grubbing, and grading - Drilling and rock blasting - Topsoil, till, and waste rock management - Surface infrastructure installation and construction - Haul road construction - TMF construction - Collection ditch and settling pond construction - Watercourse and wetland alteration - Environmental monitoring - General waste management
Operations	11 years	- Drilling and blasting - Open pit dewatering - Ore management - Waste rock management - Surface water management - Reagent management - Petroleum products management - Site maintenance and repairs - Tailings management - Water treatment - Environmental monitoring - General waste management
Closure	24 years	- Demolition - Earthworks - Water treatment - Environmental monitoring - General waste management

5.11.6.1 Direct Impacts

All phases of the Project will provide direct and indirect employment and procurement opportunities for the Mi'kmaq of Nova Scotia. A socioeconomic impact study, completed by Group ATN for the Project in February 2022, is included in Appendix J.1 which also outlines the potential indirect Project effects on Indigenous Peoples.

Cumulative impacts arising from construction and operational spending that accrue to the Mi'kmaq of Nova Scotia will be dependent on a number of factors including the nature of any agreements between the Mi'kmaq of Nova Scotia and Signal Gold, the interest/opportunity to form partnerships with other companies in the creation of purposeful Mi'kmaq corporations to conduct Project-related business, the capacity of community owned enterprises and/or Mi'kmaq owned enterprises to provide services needed, and the availability of the Mi'kmaq labour force.

Striking a balance between ambition and what may be achievable in the context of many other demands on and opportunities for Mi'kmaq businesses and workers, some basic options for Project participation include:

- Training and employment for Mi'kmaq of Nova Scotia

- Cultivating entrepreneurship and growth potential for new or existing Mi'kmaq companies through teaming arrangements with non-Indigenous companies or aggregating capacity across several Indigenous companies (including Atlantic Indigenous companies)
- Identifying contracts that Mi'kmaq already have capacity to undertake
- Encouraging teaming arrangements and Joint Ventures between Indigenous and non-Indigenous companies
- ursaries for Mi'kmaq youth in career opportunities related to - mining operations, including but not limited to engineering, environmental monitoring, safety, geology, etc.
- Review of current corporate policies and procedures to appropriately reflect Indigenous inclusion and Cultural Awareness
- All employees at the Project will receive Mi'kmaq developed and delivered cultural awareness training
- Funding for workforce development and community capacity building; and
- Regular reporting on results.

Recognizing the breadth of potential opportunities and intent to optimize Mi'kmaq collaboration and economic benefits, Signal Gold believes that the best path forward is to engage an Indigenous Coordinator as part of the Project Team. This position's mandate will include assessment of Project-related opportunities to optimize benefits through the Project phases. This position can provide other value-added inputs by tracking and reporting results and through continued liaison and engagement with Mi'kmaq communities. This proposed approach is based on leading practices of major projects aiming to have a positive impact local economic benefits for Indigenous communities.

The outcomes (i.e., age, education, employment) identified in Section 5.11.3 suggest members of Paqtnkek Mi'kmaw Nation are a potential source of workers in the construction and mining sectors including for this Project. Also, based on First Nations interest in business development, these communities are poised to take advantage of opportunities with developments such as this Project.

Based on the MEKS, the overlap between Project activities (the PA) and Mi'kmaq land and resource use is minimal in comparison with the broader MEKS Study Area as presented in Figure 5.11-1 above. The habitat and wildlife species observed within the LAA (MEKS Study Area) are consistent with conditions present in the adjacent regional landscape. No unique habitats were identified in the LAA. Therefore, any effects on use of land and resources are anticipated to be localized and minor though access to the PA will be limited during construction and operations and restored during closure when it is safe to do so.

Findings of the MEKS revealed that some Mi'kmaq traditional land use activities occur within the LAA. There is potential for mining operations to affect Mi'kmaq traditional land and resource use as identified in the MEKS. However, ongoing engagement and discussions with Mi'kmaq will aid in minimizing, and where possible, eliminating any potential effects to traditional land and resource use.

5.11.6.2 Indirect Impacts

The Group ATN report provides certain information on indirect Project effects on Indigenous Peoples. To illustrate the breadth of potential direct and indirect benefits, the report indicates that if the Mi'kmaq of Nova Scotia serviced 15% of all Project opportunities, it would result in a contribution of $319 million in GDP, 1,653 full time equivalent positions (110 full time jobs for 15 years) and a contribution to Mi'kmaq household income of over $166 million in direct and spinoff impacts combined.

No Project-related indirect adverse effects on Indigenous Peoples are anticipated.

5.11.7 Mitigation

As outlined in Section 3.3, discussion and engagement with the Mi'kmaq organizations is ongoing to minimize, and where possible, eliminate any potential adverse effects to traditional land and resource use. Further, Signal Gold is engaging with KMKNO on behalf of the ANSMC on a Mutual Benefits Agreement.

Signal Gold acknowledges hiring as local as possible, while ensuring that skilled workers are hired to maintain safe and productive operations. A working group has been established with Paqtnkek Mi'kmaw Nation to jointly develop a pre-employment essentials program through the MIHR. The company is also reviewing the potential for youth placements and preparing to deliver cultural awareness training for its management group and broader employee population.

Signal Gold has initiated conversations with contractors regarding efforts to seek Mi'kmaq applications for positions as they are posted. Further, Signal Gold has committed to ensure Mi'kmaq companies are considered in the contracting and purchasing process. Through conversations related to the Mutual Benefits Agreement, Signal Gold will define specific commitments to ensure access to employment opportunities for Mi'kmaq and opportunities for Mi'kmaq companies to participate in the supplier and procurement process. To that end, Signal Gold has recently become a member of CCAB and is committed to pursuing a PAR, as well as being Aboriginal Procurement Champions.

Table 5.11-11 Indigenous Peoples Mitigation Measures

Project Phase	Mitigation Measure
Construction, Operations, and Closure	Ongoing engagement with KMKNO and relevant Mi'kmaq First Nations.
	Mutual Benefits Agreement(s) with KMKNO (ANSMC).
	Signal Gold will implement a Mi'kmaq developed and Mi'kmaq lead educational module as a requirement for every person employed at the Goldboro Gold Project.
	Signal Gold will review corporate policies and practices including those related to respectful workplace and environmental monitoring, to ensure the consideration of Mi'kmaq culture.

5.11.8 Monitoring and Follow-up

Discussion and engagement with Mi'kmaq organizations will continue through the life of the Project. Signal Gold acknowledges the importance and value of effective engagement and envisions long and mutually beneficial engagement and benefits-sharing programs for the Project.

5.11.9 Company Commitments

Signal Gold has initiated conversations with contractors regarding efforts to seek Mi'kmaq applications for positions as they are posted. Further, Signal Gold has committed to ensure Mi'kmaq companies are considered in the contracting and purchasing process.

Through conversations related to the Mutual Benefits Agreement, Signal Gold will define specific commitments to ensure access to employment opportunities for Mi'kmaq and opportunities for Mi'kmaq companies to participate in the supplier and procurement process.

Signal Gold has recently become a member of CCAB and is committed to pursuing a PAR, as well as being Aboriginal Procurement Champions.

5.11.10 Residual Effects and Significance

The Project will generate new opportunities for employment, training, contracting, and sub-contracting for the Mi'kmaq of Nova Scotia. Signal Gold is negotiating a Mutual Benefits Agreement with KMKNO on behalf of the ANSMC. Increased employment and business revenue will also benefit the economy generally through indirect and/or induce effects.

A significant adverse effect on the Indigenous Peoples VC was defined in Section 5.11.6 as:

- A Project-related effect that results in permanent loss of lands and resources relied upon for traditional use.
- A Project-related effect that results in adverse socioeconomic conditions in an Indigenous community.

The effects of the Project on Indigenous Peoples are predicted to be primarily positive. The Project is not likely to result in significant adverse residual effects on Indigenous Peoples following implementation of mitigation measures (Table 5.11-12). Signal Gold is also committed to continued engagement with the Mi'kmaq of Nova Scotia to discuss any arising issues and to ensure that the Project does not have adverse effects on Indigenous rights.

Table 5.11-12 Residual Effects on Indigenous Peoples

Project Phase	Mitigation and Compensation Measures	Nature of Effect	Residual Effects Characteristics						Residual Effect	Significance
			Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility		
Construction Operations Closure	Signal Gold will construct a bypass road around the PA so that users may access harvesting areas. Signal Gold's engagement with Mi'kmaq organizations will continue throughout the life of the Project. Signal Gold will develop a Mutual Benefits Agreement with the Mi'kmaq of Nova Scotia through the KMKNO.	A/P Like other users, the Mi'kmaq will be restricted from access to secure areas. The Project will result in economic benefits for the Mi'kmaq of Nova Scotia.	L Overlap between Project activities and Mi'kmaq land and resource use is minimal.	PA For loss of access RAA For economic benefits	N/A	LT Loss of access will continue through construction, operations and to a lesser extent in closure. Benefits will be long term: construction, operations and closure.	C	RE Access will be gradually restored as it is safe to do so.	Access will be limited throughout the life of the Project. Benefits will continue through the life of the Project.	Primarily positive No significant adverse residual effects

Legend (refer to Table 5.11-9 for definitions)

Nature of Effect	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
A – Adverse P – Positive	N – Negligible L – Low M – Moderate H – High	PA – Project Area LAA – Local Assessment Area RAA – Regional Assessment Area	N/A – Not Applicable A – Applicable	ST – Short-Term MT – Medium-Term LT – Long-Term P – Permanent	O – Once S – Sporadic R – Regular C – Continuous	RE – Reversible IR – Irreversible PR – Partially Reversible

5.12 Cultural and Heritage Resources

Much of our knowledge of the past is based on historical documentation created over the last millennium. However, a full appreciation of human history and culture is dependant on learning from materials and artifacts that can be used to conceptualize and better understand older civilizations. In Canada, cultural and heritage resources provide information on Indigenous peoples and their connection to the land and environment in which they lived prior to European contact.

5.12.1 Rationale for Valued Component Selection

Cultural and heritage resources is identified as a VC due to its societal value and for regulatory reasons. Site preparation and construction activities for the proposed Project have the potential to affect cultural and heritage resources through damage or removal. Physical and cultural heritage are protected through the NS *Special Places Protection Act*, which supports the preservation, regulation, and study of archaeological, historical, and paleontological sites, and artifacts deemed to be important to the natural or cultural heritage of NS.

5.12.2 Baseline Program Methodology

The following four archaeological studies were conducted by Davis MacIntyre & Associates Limited (Davis MacIntyre) for the Project to identify any known cultural and heritage resources and areas of resource potential:

- Goldboro Mine 2017: Archaeological Resource Impact Assessment, Heritage Research Permit #A2017NS043
- Goldboro Mine 2019: Archaeological Resource Impact Assessment, Heritage Research Permit #A2019NS102
- Goldboro Mine 2020: Archaeological Resource Impact Assessment, Heritage Research Permit #A2020NS126
- Goldboro Mine 2021: Archaeological Resource Impact Assessment, Heritage Research Permit #A2021NS063

These studies covered several areas within the PA (and extending beyond) in consideration of various design options for the Project. The combined archaeological Study Areas (the areas surveyed by Davis MacIntyre in 2017, 2019, 2020, 2021) are shown in Figure 5.12-1.

The work included obtaining information from the Maritime Archaeological Resource Inventory (MARI) on known heritage resources and historic research to identify resource potential based on environmental setting, site history, and known historic Indigenous land use. Reconnaissance fieldwork included visual inspection of areas to be affected by the Project footprint. The various study reports are included in Appendices L.1 through L.4.

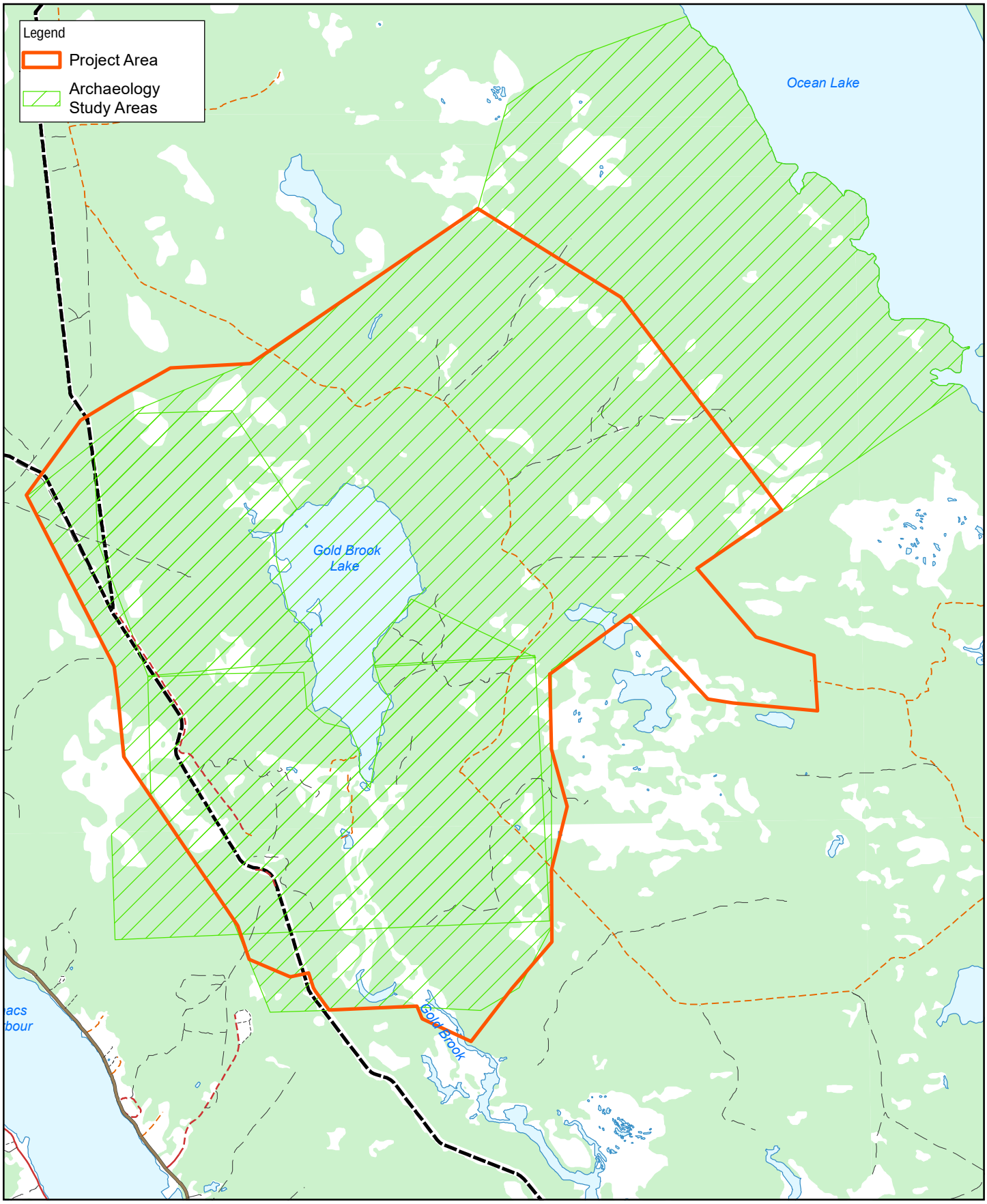
Some existing data and information used in these studies came from an archaeological assessment completed in 1988 (on a portion of the PA), by archaeologist Marc Lavoie, on behalf of the previous site operator Orex Exploration Inc. In the more recent studies, dense vegetation posed difficulty in locating and interpreting archaeological sites, as it appears that vegetation in some areas of the PA has become much denser since the 1988 survey.

In 2017, Signal Gold commissioned MGS to prepare a MEKS, which included historic research on traditional land use. The results of such studies may have bearing on the potential for cultural and heritage resources in an area.

5.12.3 Baseline Conditions

The lands of NS have been home to the Mi'kmaq and their ancestors for at least 11,500 years (Davis McIntyre, 2021). Prior to European contact and colonialization, the Mi’kmaq had a more dynamic relationship with the land, which is reflected in their language, legends, songs, dances, and oral traditions. The people used the land widely and site-specific land use may be difficult to ascertain. Historic European documentation and archaeological resources are used to supplement the oral history record to better understand the Mi’kmaq’s use of lands and resources.

Archaeological findings in the PA are shown in Figure 5.12-2. These include historic mining artifacts and areas of elevated potential for Indigenous archaeological resources. Various sites of modern origin, including a car wreck, hunting blinds, and indiscriminate waste dumping areas, are also evident throughout the PA but have not been considered further in this effects assessment.



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GHD

SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

ARCHAEOLOGY STUDY AREA

Project No. 11222385
Revision No. -
Date 25/05/2022

FIGURE 5.12-1

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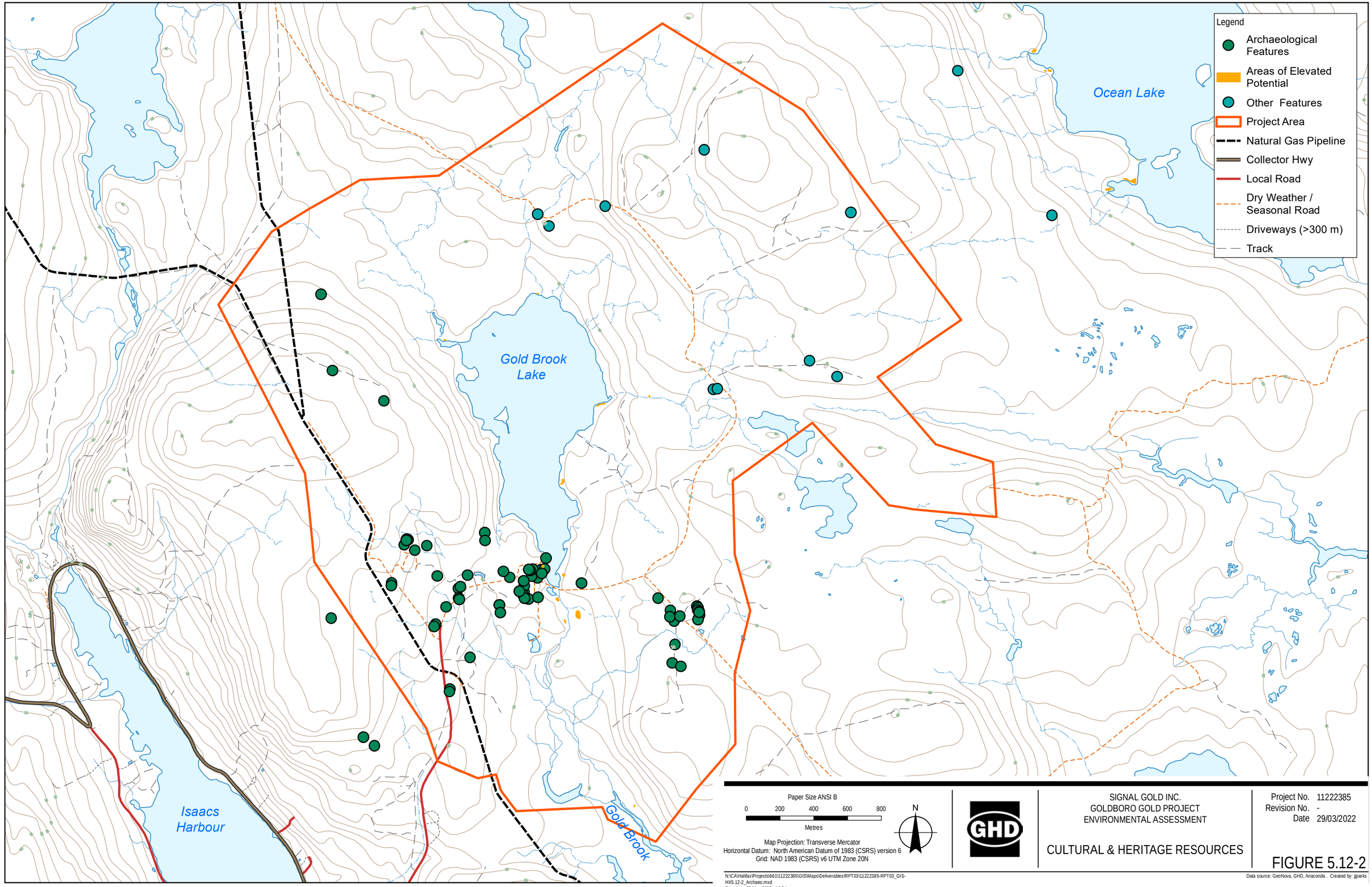

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GHD

SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT

CULTURAL & HERITAGE RESOURCES

Project No. 11222385
Revision No. -
Date 29/03/2022

FIGURE 5.12-2

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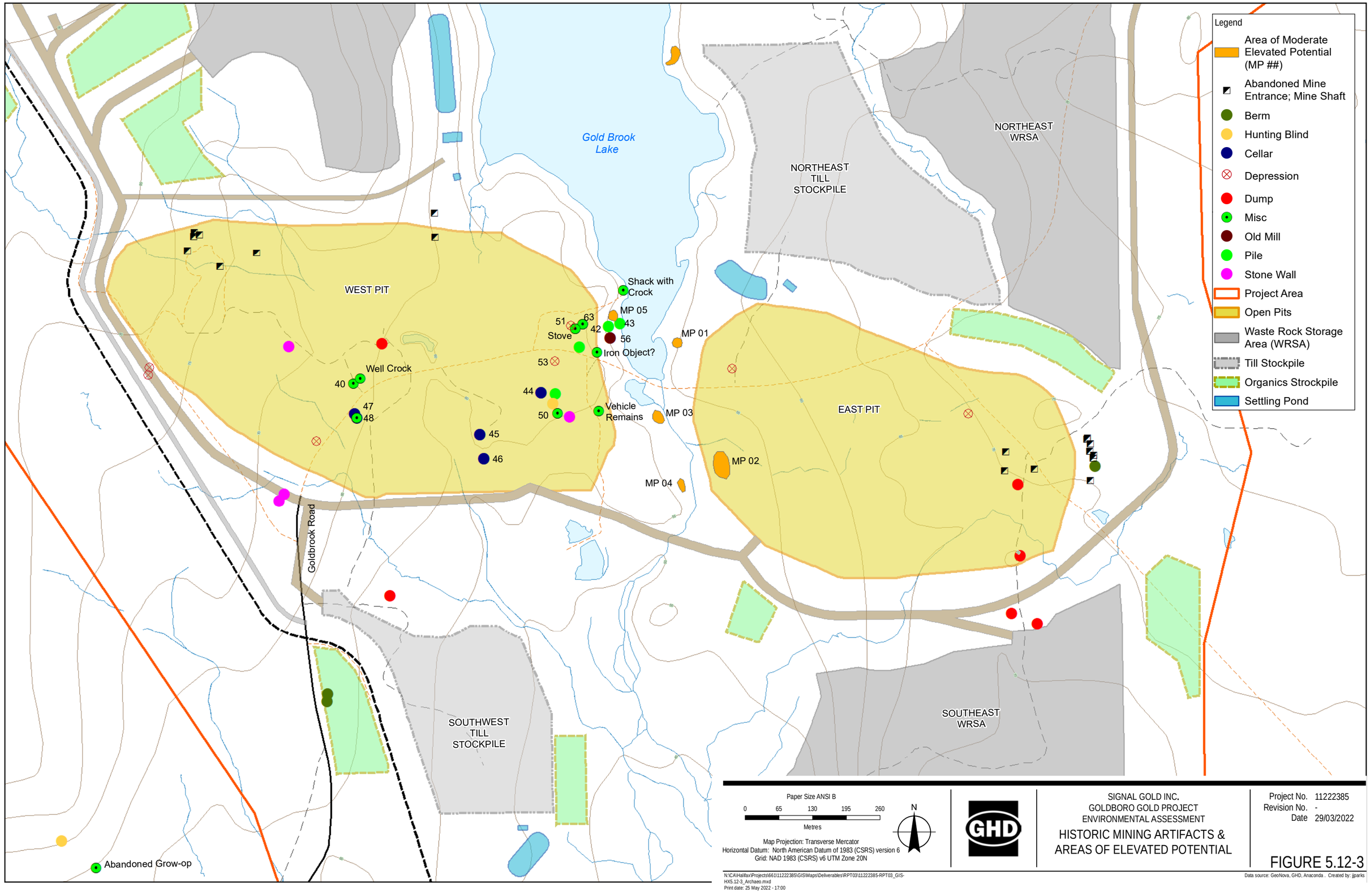
Gold Brook Lake
NORTHEAST WRSA
NORTHEAST TILL STOCKPILE
WEST PIT
EAST PIT
SOUTHWEST TILL STOCKPILE
SOUTHEAST WRSA
Goldbrook Road
Shack with Crock
MP 05
MP 01
MP 03
MP 02
MP 04
Stove
Iron Object?
Well Crock
Vehicle Remains
Abandoned Grow-op
40
42
43
44
45
46
47
48
50
51
53
56
63
Legend
Area of Moderate Elevated Potential (MP ##)
Abandoned Mine Entrance; Mine Shaft
Berm
Hunting Blind
Cellar
Depression
Dump
Misc
Old Mill
Pile
Stone Wall
Project Area
Open Pits
Waste Rock Storage Area (WRSA)
Till Stockpile
Organics Strockpile
Settling Pond
Paper Size ANSI B
0 65 130 195 260
Metres
N
Map Projection: Transverse Mercator
Horizontal Datum: North American Datum of 1983 (CSRS) version 6
Grid: NAD 1983 (CSRS) v6 UTM Zone 20N
GHD
SIGNAL GOLD INC.
GOLDBORO GOLD PROJECT
ENVIRONMENTAL ASSESSMENT
HISTORIC MINING ARTIFACTS & AREAS OF ELEVATED POTENTIAL
Project No. 11222385
Revision No. -
Date 29/03/2022
FIGURE 5.12-3
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Data source: GeoNova, GHD, Anaconda . Created by: jjparks

5.12.3.1 Historic Mining Artifacts

The 1988 archeological assessment identified the remains of the Boston Richardson Gold Mine and various artifacts from this site have been collected and retained for preservation (Davis MacIntyre, 2021). The MARI identifies this as a registered archaeological site with remains of mining activity from the late 19th and early 20th centuries. These include the mill, mine shafts, and remnants of domestic use attributed to mine workers and families (Figure 5.12 3). The mill complex is the most notable archaeological feature. Other items include stone ramps, cellars, brick scatters, an isolated iron object, and depressions of unknown function. Although evidence of more recent mining activity is present and has impacted some features, the isolated nature of the site has resulted in relatively good conservation.

Table 5.12-1 identifies archaeological resources in the PA for which Davis McIntyre provided information regarding significance and made recommendations for mitigations (Section 5.12.7). None of these resources are related to Indigenous heritage (Davis McIntyre, 2017). More information is available in the various reports found in Appendices L.1 through L.4.

Table 5.12-1 Known Archaeological Resources in the PA

ID #	Name/Description	Significance
40	Artifact Scatter - Ironstone	Low
42	Brick Pile 1	Unknown
43	Brick Pile 2	Unknown
44	Cellar #1 (House #1)	Moderate to High
45	Cellar #2 (House #2)	Moderate to High
46	Cellar #3 - Probably (Debris)	Unknown
47	Cellar #4 - Probable	Unknown
48	Cellar #4 Midden	Unknown
50	Depression - Possibly Privy for Cellar #1	Unknown
51	Depression - Mine Entrance or Building	Unknown
53	Depression - Unident. Square Feature	Unknown
54	Iron Object - Mine Mechanism	Unknown
56	Old Mill	Moderate to High
63	Stone Ramps	Unknown

5.12.3.2 Areas of Elevated Archaeological Potential

The MEKS indicates the PA is part of the historic Mi'kmaq political district of Eskikewa'kik, which includes the Eastern Shore from Sheet Harbour to Canso (MGS, 2017). The study concluded that there is little known physical archaeological evidence to indicate the presence of early peoples. The archaeological studies prepared by Davis MacIntyre from 2017 to 2021 also indicate that no Indigenous heritage resources have been recorded within the PA (Figure 5.12-2). The following information is a summary of the findings of the site investigations (2017 to 2021):

- Eleven areas of moderate elevated potential for Mi'kmaq and ancestral archaeological resources were identified in the PA (Figure 15.12-2).
- Of these sites, it is expected that only five could potentially to be impacted by the Project (Figure 15.12-3).

Moderate potential is described as an area where there is a chance the locations were utilized by Mi'kmaq or their ancestors for encampment or other activities. Determination of potential use is based on factors such as quality of the land (e.g., dry and elevated) and proximity to watercourses (e.g., accessible by canoe).

5.12.4 Consideration of Consultation and Engagement Results

Signal Gold has undertaken an engagement and consultation program with the Mi'kmaq of Nova Scotia, stakeholders, regulators, and the public. These activities are described in more detail in Section 3. Throughout this process, various issues, concerns, and opportunities have been identified in relation to the Project. For the Cultural and Heritage Resources VC, concerns included:

- Identification of a site with elevated archaeological potential near Gold Brook Lake
- Cooperation with KMKNO on identification and protection of archaeological resources

Signal Gold has been working with Indigenous organizations including KMKNO and Mi'kmaq communities. To support informed Mi'kmaq engagement, Signal Gold has provided the archaeological studies prepared by Davis MacIntyre from 2017 to 2021, along with PA and infrastructure shape files to KMKNO. The results of engagement have been considered in planning of the Project and the effects assessment for cultural and heritage resources.

5.12.5 Effects Assessment Methodology

5.12.5.1 Boundaries

Spatial Boundaries

The spatial boundary for the assessment of effects on cultural and heritage resources is the PA as the anticipated area where direct ground disturbance associated with the Project will occur and encompasses the archaeological Study Areas. An LAA or RA has not been identified for the Cultural and Heritage Resources VC, as damage or removal of cultural or heritage resources related to this Project could only occur within PA.

Temporal Boundaries

The temporal boundaries used for the assessment of effects to cultural and heritage resources are limited to the construction phase of the Project. Construction is estimated to take up to two years.

Technical Boundaries

The lack of known archaeological evidence to indicate the presence of early peoples in the PA may be the result of limited investigation and/or few accidental archaeological finds.

Administrative Boundaries

Cultural and heritage resources are provincially regulated through the *Special Places Protection Act*. To conduct any archaeological work, a Heritage Research Permit must be issued by the Minister of the Communities, Culture, Tourism and Heritage.

5.12.5.2 Modelling

This assessment is based on the results of the various archaeological resource studies conducted in 2017, 2019, 2020, and 2021. These studies used field surveys to locate any heritage resources. The archaeologists also used predictive modelling to identify known patterns of spatial relationships between archaeological sites and the physical environment to indicate potential locations of past human activities.

5.12.5.3 Thresholds for Determination of Significance

Table 5.12-2 provides the quantitative measure or definition of qualitative categories for magnitude, duration, and frequency, specific to cultural and heritage resources. Geographic extent, timing, and reversibility are consistent with the other VCs.

Table 5.12-2 Characterization Criteria for Environmental Effects on Cultural and Heritage Resources

Characterization	Quantitative Measure or Definition of Qualitative Categories
Magnitude	**N** – no direct or indirect effects on cultural and heritage resources. **L** – effects on historic mining features within the context of mitigations and consultation with regulators and no effects on Indigenous cultural or heritage resources. **M** – direct effects on cultural and/or heritage resources in the context of mitigations and consultation with appropriate regulators and Indigenous groups. **H** – direct effects on cultural and/or heritage resources without mitigations and consultation with appropriate regulators and Indigenous groups.
Geographic Extent	**PA** – direct and indirect effects restricted to the PA.
Timing	**N/A** – seasonal aspects are unlikely to affect VCs **A** – seasonal aspects may affect VCs
Duration	**ST** – effects are limited to occur from as little as 1 day to 12 months **MT** – effects can occur beyond 12 months and up to 3 years **LT** – effects extend beyond 3 years **P** – valued component unlikely to recover to baseline conditions
Frequency	**O** – effects occur once **S** – effects occur at irregular intervals throughout the Project **R** – effects occur at regular intervals throughout the Project **C** – effects occur continuously throughout the Project
Reversibility	**RE** – VCs will recover to baseline conditions before or after Project activities have been completed. **PR** – mitigation cannot guarantee a return to baseline conditions **IR** – effects to VCs are permanent and will not recover to baseline conditions

A significant adverse effect on cultural and heritage resources is defined as:

- A Project-related effect that results in unauthorized disturbance or destruction of an archaeologically, culturally, or historically important resource, within the context of the *Special Places Protection Act*, that cannot be mitigated.

5.12.6 Project Interactions and Potential Effects

Mining activity has the potential to result in adverse effects on cultural and heritage resources. This includes the various activities listed in Table 5.12-3 as physical works for construction may result in disturbance or removal of cultural and heritage resources. No Project interactions are predicted after site preparation and construction.

Table 5.12-3 Project Activities and Cultural and Heritage Interactions

Project Phase	Duration	Relevant Project Activity
Construction	2 years	- Clearing, grubbing, and grading - Drilling and rock blasting - Topsoil, till, and waste rock management - Surface infrastructure installation and construction - Haul road construction - TMF construction - Collection ditch and settling pond construction - Watercourse and wetland alteration

Table 5.12-3 Project Activities and Cultural and Heritage Interactions

Project Phase	Duration	Relevant Project Activity
Operations	11 years	N/A
Closure	24 years	N/A

5.12.6.1 Direct Impacts

Construction activities could potentially result in disturbance or removal of known or unknown cultural or heritage resources. Excavation of the East and West Pits and related works has the potential to result in damage or removal of historic mining features and/or areas of moderate elevated potential for archeological resources:

- Historic mining artifacts, located within the proposed West Pit footprint, will likely be disturbed through the development of the excavation and related infrastructure. These are identified as five cellars, two depressions, stone ramps, and an artifact scatter (Table 15.12-1 and Figure 5.12-3).
- An iron object of unknown origin, located within the proposed West Pit footprint, will be removed for further analysis (Table 15.12-1 and Figure 5.12-3).
- The old mill and three other historic mining artifacts (i.e., two brick piles and a depression), located east of the West Pit, can be protected through careful site development using micro-siting (Table 15.12-1 and Figure 5.12-3).
- Five areas of moderate elevated potential for archaeological resources are likely to be affected by mine pit excavation. One is within the footprint of the East Pit (Figure 15.12-3). While artifacts and/or evidence have not been identified in these areas, the possibility of historic Mi'kmaq activity cannot be ruled out and further investigation is warranted prior to undertaking site works.

Other Project-related activities involving ground disturbance also have the potential to interact with previously undiscovered cultural and heritage resources. All archaeological sites (including known and unknown sites) are protected from disturbance through the *Special Places Protection Act* unless this activity is conducted under the supervision of a qualified archaeologist working under a Heritage Research Permit issued by the Department of Communities, Culture, Tourism and Heritage.

No anticipated effects on cultural and heritage resources are anticipated from operations or closure as ground disturbance will have already occurred during site preparation, construction, and excavation.

5.12.6.2 Indirect Impacts

No indirect effects on cultural and heritage resources are anticipated.

5.12.7 Mitigation

Archaeological resources and areas of potential can be avoided in Project design and development. Signal Gold has proactively made changes to the Project footprint to prevent damage or removal of cultural and heritage resources. In the event ground disturbance is planned in the vicinity of identified archaeological resources, particularly those with known archaeological features or areas of potential, mitigation will be required.

ased on the results and recommendations from the archaeological resources studies and Mi'kmaq engagement, mitigation measures have been adopted to eliminate or reduce potential adverse Project effects on cultural and heritage resources (Table 5.12-4).

Table 5.12-4 Cultural and Heritage Resources Mitigation Measures

Project Phase	
Construction	Signal Gold will follow the recommendations provided in the 2017, 2019, 2020, and 2021 archaeological studies. These are summarized generally below.
	Areas of elevated archaeological potential likely to be impacted by mine site development will be investigated through archaeological shovel testing (with Mi'kmaq participation). Archaeological work/testing work will be completed before final engineering/infrastructure design and before any ground is disturbed, as recommended in the archaeological studies.
	Areas where historic mining artifacts would be potentially affected will be subject to monitoring within buffers, as recommended in the archaeological studies.
	If removal of the iron object is planned, it will be examined more closely by an archaeologist, and the Museum of Industry will be contacted, as recommended in the archaeological studies.
	Signal Gold will collaborate with professional archeologists and the Goldboro Interpretation Centre Committee to retain historic mining artifacts in the community.
	In the unlikely event that archaeological resources not previously identified are encountered, all work in the associated area(s) will be halted. Signal Gold officials will contact the Coordinator of the Special Places Program of the NS Department of Communities, Culture, Tourism and Heritage to determine a suitable method of mitigation.
	If further changes are planned to the Project footprint, and features/areas identified as having potential for Indigenous archaeological resources are to be affected, an archaeologist will be engaged to conduct further study including shovel testing, monitoring, or other mitigative procedures prior to development advancing.
	Signal Gold will maintain ongoing discussion and engagement with Mi'kmaq organizations, including KMKNO, to avoid or minimize any potential impacts on cultural and heritage resources. In the event of an accidental discovery of heritage resources of Indigenous provenance, KMKNO will be notified.
	Personnel involved in all ground disturbance related to site preparation, construction and excavation will be made aware of the potential for cultural and/or heritage resources throughout the PA. Site personnel will be provided with direction on appropriate actions including reporting procedures in case of accidental discovery of cultural and/or heritage resources.
Operations	N/A
Closure	N/A

5.12.8 Monitoring and Follow-up

Based on the archaeological studies conducted in the PA in 2017, 2019, 2020, and 2021, it has been determined that monitoring by a registered archaeologist may be required in areas where archaeological resources have been identified and ground disturbance is planned. In the unlikely event that an archaeological resource is encountered during Project activities, provincial regulations will be followed.

5.12.9 Company Commitments

Signal Gold has made the following commitments to eliminating or reducing effects of the Project on cultural and heritage resources at the Project:

- Complying with the NS *Special Places Protection Act* related to management of cultural and heritage resources related to the Project.
- Following recommendations in the various archaeological studies conducted for the Project.
- Continuing to engage with Mi'kmaq of Nova Scotia on cultural and heritage resource management related to the Project.

5.12.10 Residual Effects and Significance

A significant adverse effect on the Cultural and Heritage Resources VC was defined in Section 5.12.6 as:

- A Project-related effect that results in unauthorized disturbance or destruction of an archaeologically, culturally, or historically important resource, within the context of the *Special Places Protection Act*, that cannot be mitigated.

An overview of residual effects of the Project on cultural and heritage resources is presented in Table 5.12-5. The archaeological studies conducted identified one registered archaeological site and other areas of archaeological resources and potential resources within the PA. Based on these studies, Signal Gold has made modifications to the Project design to avoid cultural and heritage resources and areas of elevated potential to the extent possible.

Following mitigation, known historic mining artifacts will likely be damaged or removed during mine development. None of these resources are of Indigenous origin. By complying with regulations and implementing mitigation measures such as conducting additional archaeological testing if required, residual effects of the Project on cultural and heritage resources (including areas of moderate elevated potential) are predicted to be not significant. This is based on known information about cultural and heritage resources in the PA and configuration of the Project.

Table 5.12-5 Residual Effects on Cultural and Heritage Resources

Project Phase	Mitigation and Compensation Measures	Nature of Effect	Residual Effects Characteristics						Residual Effect	Significance
			Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility		
Construction	Signal Gold will follow recommendations of the relevant archaeological studies. Micro-siting will be used to avoid nearby artifacts. Movable objects will be removed for curation. Shovel testing will be conducted on areas of moderate elevated potential for Indigenous cultural resources. In case of an accidental discovery, all work in the associated area(s) will be halted and officials notified prior to any actions being taken. If further changes are planned to the Project footprint, an archaeologist will be engaged to conduct further study prior to development advancing. In the event of an accidental discovery of Indigenous heritage resources of, KMKNO will be notified. Personnel involved in ground disturbance will be made aware of potential for cultural and/or heritage resources and provided with direction on appropriate procedures in case of accidental discoveries.	A Various historic mining artifacts are likely to be removed or damaged through excavation of the West Pit. A registered archaeological site is outside of the development area.	L None of the known artifacts are of Indigenous origin. No registered archaeological sites will be damaged.	PA	N/A	MT Any effects are limited to construction.	O	IR	Some historic mining artifacts will be damaged or removed in development of the West Pit.	Not significant
Operations	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Closure	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Legend (refer to Table 5.12-2 for definitions)										
Nature of Effect A – Adverse P – Positive	Magnitude N – Negligible L – Low M – Moderate H – High	Geographic Extent PA – Project Area LAA – Local Assessment Area RAA – Regional Assessment Area	Timing N/A – Not Applicable A – Applicable	Duration ST – Short-Term MT – Medium-Term LT – Long-Term P – Permanent	Frequency O – Once S – Sporadic R – Regular C – Continuous	Reversibility RE – Reversible IR – Irreversible PR – Partially Reversible				

5.13 Other Undertakings in the Area

Existing or proposed industrial projects within an approximate 30 km radius of the PA are identified and described below. A radius of 30 km was applied as it includes the nearest large communities (i.e., Sherbrooke, Guysborough) where it is expected that most development/activities would occur.

The region is known for historic gold mining and current mineral exploration licenses include the Goldboro (Upper Seal Harbour), Isaacs Harbour, Forest Hill, and Lower Seal Harbour deposits (NSDNRR, 2009). Forestry operations occur on Crown land near the Project, as are evident from aerial photos. One hundred and thirty-three ha of land within the PA is categorized as either clear cut or partially depleted in the NS Forest Inventory (NSDNRR, 2021). The M&NP and the proposed Bear Paw Pipeline intersect the PA. The Goldboro LNG Project is proposed southeast of the PA. The Sable Offshore Energy Project (SOEP) onshore gas plant was decommissioned in 2019-2020 (ECP, 2020). These developments within the 30 km radius are discussed below.

Maritimes & Northeast Pipeline (M&NP): Enbridge Inc./Emera Inc./ExxonMobil Canada Properties

The M&NP was built to deliver natural gas from offshore NS to markets in Atlantic Canada and the northeastern United States (M&NP 2022). The M&NP is a joint venture of Enbridge Inc. (77.53%), Emera Inc. (12.92%), and ExxonMobil (9.55%).

The M&NP crosses the western side of the PA. A 40 m offset will be maintained between the M&NP natural gas pipeline and the pits. Blasting will be completed in accordance with the National Energy Board *Regulations for Pipeline Damage Prevention* and the NS *Blasting Safety Regulations* made under the *Occupational Health and Safety Act*. In addition, Signal Gold has met several times with M&NP representatives to facilitate a cooperative working relationship, coordination of access to the pipeline, and blasting notification procedures.

Sable Offshore Energy Project: ExxonMobil Canada Properties

The SOEP LNG plant was approximately 1.6 km southwest of the PA. Decommissioning of the land-based SOEP facilities and infrastructure began in 2019 (ECP 2020). Above-ground structures were removed, and the land has undergone reclamation. In 2020, the onshore plant at Goldboro was dismantled and remaining materials were transported for recycling or disposal. This project is no longer relevant to the Project.

Goldboro LNG Project: Pieridae Energy Ltd.

In the fall of 2020, Pieridae Energy Ltd. signed an engineering, procurement, construction, and commissioning (EPCC) agreement with an engineering firm (OGJ, 2020) and initiated installment of a construction worker accommodations (CBC, 2020). In May 2021, Pieridae received conditional approval for the realignment of Marine Drive (Highway 316) to accommodate the LNG project (NSECC, 2021). However, the planned LNG complex was placed on hold in July 2021. The timeline for this development is currently uncertain.

The proposed LNG Project and road realignment would be approximately 1.9 km and 1.4 km southeast of the PA, respectively. If this project intersects temporally with the Goldboro Project, Signal Gold will establish a working relationship with the proponent and appropriate mitigation measures will be implemented to manage concerns regarding potential increased traffic and a non-resident workforce, particularly during construction. These developments are not expected to have effects as a result.

Bear Paw Pipeline: Bear Paw Pipeline Corporation Inc.

The proposed Bear Paw Pipeline is a 62.5 km natural gas pipeline from Goldboro to the planned Bear Head LNG facility in Richmond County, NS (BPPC, 2016). Bear Paw was to interconnect with existing and proposed natural gas projects and infrastructure including those near Goldboro. Bear Paw was approved by the NS Minister of Environment in December 2016.

The proposed Bear Paw Pipeline would intersect the PA, as the proponent intended to use existing infrastructure such as the M&NP. The future of this development is uncertain. Attempts have been made by Signal Gold to discuss the

Project with Bear Paw representatives, however no response has been received to date. Signal Gold is committed to working with Bear Paw representatives to minimize Project interactions if the Bear Paw project proceeds.

In summary, the M&NP and the proposed Bear Paw Pipeline intersect the PA. The proposed Pieridae LNG Project including the realignment of Highway 316 are within the 30 km radius. Adverse Project-related effects in conjunction with other undertakings are not likely to occur, given the status of proposed initiatives and the anticipated effectiveness of mitigative measures identified for the Goldboro Project.

5.14 Accidents and Malfunctions

Accidents and malfunctions refer to events that are not part of any planned activity or normal operation of the Project as has been proposed by Signal Gold. Even with the implementation of best management practices and preventative measures, accidents and malfunctions still have the potential to occur and create adverse effects to the environment and worker health and safety. Many accidents and malfunctions are preventable, and their consequences are limited by applying a precautionary approach during planning and design, developing thorough emergency response procedures, and ensuring mitigation measures are incorporated into standard operating procedures. By identifying likely worst-case accidents and malfunctions and assessing their effects should they occur, Signal Gold can develop preventative and responsive procedures to eliminate, reduce, or control adverse effects caused by accidents and malfunctions. Prevention and response procedures will be developed via the following principles:

- Best management practices will be implemented over the life of the Project and all releases to the environment and their effects will be controlled.
- Worker health and safety will be the primary focus of process and mine safety management.
- Procedures and training will be developed to promote safe operation of mining equipment and facilities.
- Emergency response procedures will be developed that will reduce and control the adverse effects of an accident or malfunction.

In order to decrease the likelihood of occurrence and level of magnitude should accidents or malfunctions occur, Signal Gold will implement a preventative system approach to environmental protection and worker health and safety. Signal Gold will be able to leverage its existing robust, best practice operating procedures in place at its Point Rousse operation in Baie Verte, NL. Contractors will be subject to the same health, safety, and environmental policies and procedures, and all personnel (employees and contractors) will receive site-specific training to prevent and mitigate workplace accidents and malfunctions.

An ERT facility will be located in the mill area. This building will house a two-vehicle garage for the ERT and a medical examination room to treat any medical emergencies. A helipad on the north side of the mill area is proposed in the case of a medical evacuation, or for helicopter arrivals to the PA.

5.14.1 Structural Failures

5.14.1.1 Open Pit Slope Failure

All phases of the Project have the potential for structural failures of slopes within the East and West Pits. The potential slope failures are as follows:

- Failure of overburden slopes caused by erosion from vegetation stripping and surface water runoff; and
- Failure of bedrock faces caused by improperly designed benches and erosion/fracturing from groundwater inflow.

A worst-case scenario is the severe collapse of areas directly adjacent to the open pits and ground surface slump of the surrounding area possibly affecting adjacent Project infrastructure and the M&NP natural gas pipeline. During the initial stages of construction, potential slope failures caused by erosion from vegetation stripping and surface water runoff will be limited to overburden; however, as blasting, and ore and non-ore bearing waste rock extraction commences, bedrock faces have the potential to fail if not properly designed and groundwater inflow is not properly managed. Based on the current delineation of ore, the East and West Pits will be excavated through bedrock to end

depths of approximately 190 and 250 m below ground surface, respectively. Operational bench heights of 8 m are proposed for the East and West Pits, with a double bench of 16 m for the final pit walls and long period pushbacks, with 8 m wide berms.

Signal Gold retained Optimize Group Inc. (Optimize) to develop a geotechnical study of the East and West Pits. Optimize completed kinematic and limit equilibrium stability analysis to evaluate the overall slope stability of the proposed pit slopes and generate design recommendations. A 3D geomechanical model was produced using data from geotechnical boreholes drilled between 2019 and 2021. Laboratory analysis was also completed to determine the uniaxial compressive strength (USC) and elastic properties of all rock types encountered in geotechnical drilling (Nordmin, 2021).

The geotechnical study completed by Optimize concluded that the proposed final slopes of the operational open pits meet the required security level. The slope stability analyses and geomechanical geometries proposed have a satisfactory Factor of Safety (FoS).

Data from pit development will be used for on-going slope stability analyses and design optimization. A pit slope monitoring program will be developed prior to construction of the Project and will include the following:

- Frequent inspections of benches and crests for tension cracking and other signs of instability
- Survey scanning
- Movement detection systems
- Groundwater monitoring

5.14.1.2 Stockpile Slope Failure

All phases of the Project have the potential for structural failures of WRSAs and till and organic material stockpile slopes. Failure of these slopes may be caused by improperly designed lifts, and erosion from surface water runoff.

The worst-case scenario resulting from a stockpile slope failure would be risk to workers safety, disturbance to the surrounding area, including the potential for waste rock, till, and organic material to enter nearby watercourses and wetlands, and damage to infrastructure. As discussed below, all stockpiles within the PA will be constructed in a manner to reduce the consequences of slope failure.

Foundations underneath WRSAs and stockpiles will be designed and constructed to address any geotechnical concerns. Organic material in the WRSA and stockpile footprints will be removed and transported to the organic material stockpiles for later use during closure. Waste rock and till will be end dumped from the haul trucks forming lifts. WRSA lifts will be constructed such that the final storage areas have an overall slope angle of 27º. Till stockpiles will be constructed with an overall slope angle of 25º. Geotechnical investigations of the WRSA and till stockpile slopes will confirm the long-term stability for the planned slope geometry.

WRSAs will have top elevations ranging between 100 and 145 masl and will contain between 6.3 and 14.3 M m^3 of waste rock. All WRSAs will be completed by Year 8 of Project operations; re-sloping of the final lifts, placement of a soil cover, and revegetation treatments will be completed at this point.

Till stockpiles will have top elevations ranging between 95 and 110 masl and will contain between 1.8 and 2.8 M m^3 of till. Till stockpiles will be removed through use in progressive reclamation during the operations and closure phases.

5.14.1.3 Settling Pond Failure

The operations and closure phases of the Project have the potential for settling pond failure. A failure of the settling pond is defined as a breach of the banks through overflow or bank structure failure resulting in the release of sediment laden water to the environment. A worst-case scenario would be complete failure of a settling pond, resulting in uncontrolled discharge of sediment laden water into the surrounding environment. The capacity demand of the settling ponds will increase as the depth of the East and West Pits increases and more infiltrated groundwater is pumped out of the pits.

The settling ponds will be lined with an HDPE liner, underlain by geotextile. A layer of sand will be placed on top of the HDPE liner to protect against punctures and a layer of riprap will be placed on top of the sand layer. The riprap is to act as ballast to prevent the liner from being impacted by buoyancy forces of the nearby groundwater as well as provide erosion protection.

The settling ponds will each contain an emergency overflow spillway, and all ponds except the east settling pond will contain a concrete outlet structure. Effluent from the east settling pond will be pumped to the central settling pond under normal operations. The concrete outlet structures have been designed to control storm events up to and including the 1 in 100-year 24-hour climate change adjusted storm event through a series of orifices to achieve a minimum detention time of 24-hours for TSS settling. The concrete outlet structure will be surrounded by a layer of riprap to reduce exit velocities and further assist with TSS settling. The emergency overflow channels will convey flows resulting from storm events greater than the 1 in 100 year, 24-hour climate change adjusted design storm event, up to and including Hurricane Beth. The central settling pond and the east settling pond will direct the emergency overflow spillway toward the West and East Pits respectively to reduce the risk of uncontrolled discharge.

Effluent from the east settling pond will be pumped to the central settling pond. Effluent from the central settling pond will pass through the WTS prior to discharge into Gold Brook Lake. Effluent from the north settling pond will discharge into Gold Brook Lake. Effluent from the southeast settling pond will pass through an engineered wetland to reduce nitrate and nitrite concentrations, prior to discharge into Gold Brook. Effluent from the southwest pond will discharge directly into Gold Brook.

The final design of the settling ponds and additional water management infrastructure will be submitted as part of the IA process. Settling ponds will be monitored regularly during storm events.

5.14.1.4 Tailings Management Facility Failure

The TMF embankment will be constructed using NPAG waste rock extracted from the East Pit. The embankment will be constructed of zoned earthfill and rockfill (i.e., finer materials at the core of the embankment with coarser materials upstream and downstream) with a geosynthetic lining system installed along the TMF basin floor and on the upstream (i.e., interior) face of the perimeter embankment to minimize seepage exiting the facility. Transition/filter zones will be established between the liner and the embankment rockfill to ensure internal stability.

The TMF design includes an initial starter embankment followed by subsequent stages. TMF stages will be expanded using downstream construction methods throughout the operations phase. The downstream slope of the TMF embankment will be 2.5H:1V. The upstream slope will be 2.5H:1V with 3 m of the previous stage's crest left as a bench when the next stage is constructed, to facilitate and tie-in the geomembrane liner, resulting in an overall slope for the ultimate upstream embankment of 2.8H:1V. The crest width will be 15 m and the maximum embankment height above original ground is 49 m.

The TMF embankments have been classified based on industry accepted guidelines published by the CDA (CDA, 2019; CDA, 2013). The TMF is classified as having a Dam Classification of Extreme. The Earthquake Design Ground Motion and IDF thresholds used for the design of the facility were selected based on these classifications.

The TMF and PAG1 waste rock is required to be stable under the design loading conditions. The stability of the embankment and PAG1 waste rock was evaluated considering loading conditions and minimum target FoS values recommended for mining dams (CDA, 2019). The FoS targets are met or exceeded for all sections and loading conditions evaluated (Nordmin, 2021).

The potential leakage through the geomembrane lining system was estimated with the operating pond and tailings at the maximum level at different operating scenarios. The seepage analyses considered leakage due to the presence of geomembrane defects. Seepage was estimated using the method of Bonaparte and Giroud (Bonaparte, & Giroud, 1989) and Giroud (Giroud, 1997). The seepage rates are within a range that is manageable with the seepage collection system (Nordmin, 2021).

TMF embankments were designed to provide sufficient storage capacity to temporarily store runoff resulting from the EDF and safely convey runoff resulting from the IDF. The estimated runoff volumes from the EDF (1 in 200 year,

72-hour storm event) and IDF (24-hour Spring PMP plus the corresponding melt of the 1 in 100-year snowpack) were used to determine the storage volume and corresponding wet freeboard depth required within the TMF to manage each event. The estimated peak flows for the IDF were used to design the emergency overflow spillways.

The polishing pond has been designed to meet the CDA Technical Guidelines for Mining Dams (CDA 2013; CDA 2019) and includes freeboard and design earthquake ground motion considerations to minimize operational risks. The polishing pond has been identified as having a Dam Hazard Classification of Significant based on the foreseeable consequences.

A Failure Modes and Effects Analysis (FMEA) will be completed for the TMF prior to construction to identify and characterize potential risks associated with the TMF for the construction, operations and closure phases. The FMEA will include a risk evaluation matrix including the likelihood and consequence for each of the identified risks and appropriate design mitigation measures. A dam breach analysis will also be completed prior to TMF construction to estimate the potential flood inundation zones that could result if the embankment were to fail. The estimated downstream inundation zone will help identify any residences, infrastructure and/or receptors that are at risk downstream of the TMF.

5.14.2 Accidents

5.14.2.1 Fuel Spills

All phases of the Project have the potential for fuel spills to occur. The risk of a spill is highest during the following Project activities:

- Fueling haul trucks at the diesel fuel station
- Filling the two 100,000 L fuel storage tanks at the diesel fuel station
- Maintaining haul trucks and other mobile equipment at the truck shop
- Regular operation of haul trucks and other mobile equipment

Spills associated with these activities may occur through failure of storage tanks, improper fuel transfer procedures, fuel/hydraulic line breaks or leaks, spillage or failure of storage containers, and/or mobile equipment and refueling truck accidents.

A worst-case scenario would be a transportation collision causing the entire amount of material being transported to be spilled into a water body. The effects of the spill would vary depending on the material spilled; diesel fuel and gasoline are toxic to aquatic life and would have the great impact to the environment.

A cardlock diesel fuel station will be installed in the mill area to refuel haul trucks. The station will be located just off the main haul road, near the truck shop. The station will consist of two 100,000 L fuel storage tanks, each outfitted with high flow suction dispensers, fuel cardlock system, and environmental monitoring system. In addition to the leak detection instruments that make up the environmental monitoring system, the dispensing data can be used to reconcile fuel consumption with the delivery quantities and the fill level of the tank to ensure no fuel is unaccounted for. The maximum safe capacity of the storage tanks will allow for 190,000 L of diesel fuel to be stored.

Fuel storage tanks will be installed according to manufacturer specifications and regulatory requirements. Delivery will be on an as needed basis and will comply with the suppliers permitting. Spill kits will be available at a nearby storage/fueling station and all mobile equipment will have spill kits installed. Disposal of used spill kits will follow the procedures in the SDS sheet, applicable legislation and as described in the EMP (Appendix B.2).

5.14.2.2 Chemical Spills

All phases of the Project have the potential for chemical spills to occur. Hazardous materials in use within the PA will include sodium cyanide, caustic soda, hydrochloric acid, and other process reagents. Chemical spills may occur through failure of storage tanks and totes, improper transfer procedures, and/or vehicle accidents.

All hazardous materials and dangerous goods within the PA will be managed and accounted for under the applicable regulations, including the *Nova Scotia Dangerous Goods Management Regulations*. All persons involved in handling or usage of hazardous materials and dangerous goods will be required to complete adequate training. Safety data sheets will be made available and the locations of such materials will be identified in the Emergency Response Plan. All hazardous materials and dangerous goods storage will require regular inspection, completed by a qualified person.

An area northwest of the mill has been reserved for hazardous waste storage; this will be used to store waste such as oil barrels, soil or materials contaminated with fuel, and chemical containers before being removed from the PA and disposed of at external facilities. Other buildings and facilities within the mill area may also contain hazardous materials, including the truck shop, wastewater treatment plant, and process plant.

Process reagents will be stored in a fabric building located in the mill area prior to use. Each set of compatible reagents will be located within curbed containment areas to prevent incompatible reagents from mixing. Reagent storage tanks will be equipped with level indicators, instrumentation, and alarms to ensure spills do not occur during normal operation. Sumps and sump pumps will be provided for spillage control.

Sodium cyanide will be delivered in bags, which will be lifted using a frame and hoist, into the sodium cyanide bag breaker on top of the mixing/storage tank. The solid reagent will discharge into the tank and be dissolved in freshwater to achieve the required dosing concentration of 20% sodium cyanide (w/v). After the mixing period is complete, cyanide solution will gravitate to the cyanide storage tank. Sodium cyanide will be delivered to the leach circuit and elution circuit with dedicated dosing pumps.

CIP tailings will flow by gravity to the cyanide destruction tanks, which operate in parallel. The tanks will provide a total residence time of approximately 120 minutes to reduce weak acid dissociable cyanide concentration from 100 mg/L to less than 0.5 mg/L. Total cyanide is expected to be 0.5 mg/L due to limited iron species present in the leach feed.

Cyanide destruction will be undertaken using the SO_2/air method. The reagents required are air, lime, copper sulphate, and sodium metabisulphite. Each cyanide destruction tank will be equipped with air addition points and an agitator to ensure that the reagents are thoroughly mixed with the tailings slurry.

Signal Gold is a participating company in the ICMC Program. The ICMC is an industry voluntary program for cyanide producers and cyanide consumers such as mining companies. It focuses on the safe management of cyanide and cyanidation mill leach solutions and tailings. Companies that adopt the ICMC must have their mining operations, that use cyanide, audited by an independent third party to determine the status of ICMC implementation. Those operations that meet the ICMC requirements can be certified and a unique trademark symbol can be utilised by the certified operation. Audit results are made public to inform stakeholders of the status of cyanide management practices at the certified operation.

The goals of the ICMC are to improve management of cyanide used in gold mining and assist in the protection of human health and reduction of environmental effects. The ICMC is structured along nine principles each with standards of practice. The principles are in sequence:

1. Production
2. Transportation
3. Handling and Storage
4. Operations
5. Decommissioning
6. Worker Safety
7. Emergency Response
8. Training
9. Dialogue

Preliminary plant layout designs were developed for the Project FS. The design of cyanide facilities is aligned with the guidelines of the ICMC.

To have the Project certified under the ICMC, Signal Gold will have three years to meet the standard. This includes purchasing cyanide from certified producers and using certified cyanide transporters. The TMF is to be inspected annually by a professional engineer who will attest to its condition. Being a signatory to the ICMC requires that the operation be subject to an independent audit once a year.

5.14.2.3 Unplanned Explosive Event

An unplanned explosive event is limited to the construction and operations phases of the Project. The worst-case scenario would be bodily harm as a result of improperly handling explosives.

The explosives storage pad will be located north of Gold Brook Lake. The necessary size of this magazine will abide by the *Nova Scotia Blasting Regulations* as well as the *Canadian Federal Explosives Regulations* regarding quantity-distance requirements and construction parameters.

All blasting materials will be kept secured in appropriately sized explosive magazines provided by the explosives supplier. The magazines will be located on surface, at a safe distance from buildings and other infrastructure, to comply with the blast materials storage permit limits. Delivery will be weekly or on an as needed basis and will comply with the suppliers permitting. Management and use of the magazines will comply with the requirements of the explosives license. Therefore, once secured, only designated individuals will be able to access the blasting materials. Designated persons will have authority to carry and use the key, after undergoing background checks. Transportation of blasting materials will be completed under the *Nova Scotia Blasting Safety Regulations*, as well as the *Canadian Federal Explosives Regulations.*

5.14.2.4 Mobile Equipment Accident

All phases of the Project will have the potential for vehicular accidents to occur. A worst-case scenario would be a severe accident causing injury or death. Guided traffic patterns, speed limits, right-of-way signage, and training will minimize the risk of vehicular accidents.

Haul roads will be constructed between the East and West Pits, ROM stockpile, WRSAs, and TMF. Haul roads between the East and West Pits, WRSAs, and ROM stockpile will be double-laned and wide enough to accommodate two 90-tonne haul trucks at 16.5 m. The road to and from the TMF will be 11 m wide for one-way traffic. Haul roads will have grades no greater than 10%.

Haul roads within the East and West Pits were designed to accommodate three times the width of the largest haul truck (6.1 m) for double-lane roads and two times the width of the largest haul truck for single-lane roads. In-pit haul roads will also have safety berms measuring at least 1 m in height and 3.5 m in width, 2.5 m drainage ditches, and will have grades no greater than 10%.

5.14.3 Other Malfunctions

5.14.3.1 Water Treatment System Failure

As discussed in the Surface Water Resource Section 5.6.6.2.1, certain constituents are predicted to exceed regulatory limits either in effluent discharge or within the receiving watercourse due to impacts of the Project on the water quality of the runoff. During times where there are predicted exceedances of regulatory limits occurring, treatment of the effluent will be required to ensure water quality entering as well as the fully-mixed COC concentrations in the receiving water body are below regulatory limits. Active water treatment will be required for the first 13 years of the mine life (beginning in operations). Following 13 years of active treatment, passive treatment is predicted to be required for the following 5 years for a total treatment period of 18 years. No treatment is predicted to be required following Year 18.

As the operations phase and the initial two years of the closure phase require active water treatment, there is the potential for mechanical or power failure in the WTSs. Treatment of TMF effluent will include a polishing pond as an equalization basin for further clarification prior to discharge to Gold Brook Lake. Similarly, effluent produced from WRSA runoff will enter either a polishing pond or settling pond following active treatment measures and prior to

discharge to the environment. In the event of a mechanical or power failure within the WTSs, diesel powered pumps will be used to pump effluent from the settling ponds and polishing ponds to either the TMF, the East Pit, or the West Pit and will not be released to the environment.

To further mitigate and reduce the risk of adverse impacts to fish and fish habitat downstream of the settling ponds, all pond outlet structures will be equipped with emergency shut off valves that can be closed if any water quality parameter exceedances are triggered. The ponds will be designed with enough freeboard to accommodate the inflow while the shut off valves are closed. To this end, each pond will be designed with enough capacity to hold the runoff volume generated by the 5 year 24 hour storm event plus 5% climate change factor, with the emergency shut off valves closed (emergency operating conditions). In the event pond capacity is reached during an emergency shut off, the impacted water will be pumped, or collected in a vacuum truck, and transported to the nearest settling pond with available capacity, or to the nearest open pit where it will be held until settling pond capacity becomes available. During an emergency shut off at the central settling pond or the east settling pond, excess water from the ponds will be conveyed over the emergency spillways into the open pits. From there it will be pumped back into the ponds using the pit dewatering system once capacity becomes available. During an emergency shut off at either of the south ponds or at the northwest settling pond, the weather forecast will be monitored, and the ponds will be drained (into the central or northeast ponds) ahead of any storm event expected to be greater than a 5 year storm (98.4 mm). This will minimize the risk of unauthorized discharge to the environment.

5.14.3.2 Tailings Pipeline Failure

The operations phase of the Project will have the potential for a tailings pipeline failure to occur. Tailings will be pumped as a conventional thickened tailings slurry from the process plant to the TMF via approximately 4.3 km of pipelines. A worst-case scenario would be failure of a tailings pipeline resulting in an uncontrolled release of tailings slurry to a watercourse or wetland.

The tailings pipeline will be double-walled and will run in HDPE-lined trenches. Pipeline trenches will be graded to direct any potential tailings release to an HDPE-lined emergency spill pond sized to contain the entire volume of the tailings pipeline. A leak detection monitoring system will be implemented for the tailings pipeline which will trigger shutdown procedures in the event of a release.

5.14.3.3 Erosion and Sediment Controls Failure

All phases of the Project will have the potential for failure of erosion and sediment control measures, including silt fencing, check dams, and ditches. Potential settling pond failure is discussed in Section 5.17.1.3. A worst-case scenario would be failure of erosion and sediment control measures resulting in an uncontrolled release of sediment laden water to a watercourse or wetland.

Monitoring of the erosion and sediment control measures will take place daily during each day of active construction. A detailed examination of erosion and sediment control measures will be carried out prior to and immediately after a rainfall event; a snowmelt event; or a combination of the two (where the combined total is greater than 15 mm). Areas to be routinely monitored include:

- Areas of exposed soils
- Erosion and sediment control measures including silt fencing and check dams
- Areas adjacent to the watercourses and wetlands

Check dams and settling ponds require sediment removal when the sediment reaches the lesser of a height of 0.3 m or one third of the effective height of the control measure. Monitoring of TSS in the downstream environment may suggest existing Project erosion and sediment controls are ineffective or additional controls need to be implemented.

6. Effects of the Environment on the Project

The provincial *Guide to Preparing an EA Registration Document for Mining Developments in Nova Scotia* identifies climate and meteorological conditions as environmental factors to be considered in an EARD. For this Project, Signal Gold has considered climate change, extreme weather, slope stability and earthquakes as environmental conditions/events that could potentially affect components and/or activities during construction, operation, or closure. These potential hazards are discussed below. Project design will reduce the potential for substantial adverse effects of the environment on the Project. Applicable mitigation measures to reduce potential occurrence and severity of adverse effects are presented in Sections 5.

6.1 Climate Change

Climate change is anticipated to result in increased frequency and intensity of extreme weather events, warmer average temperatures, higher sea levels, and more extreme rainfall and flooding events (NSECC, 2020). More frequent and intense extreme weather events could cause an increased risk of flooding and snow and ice storms. Increased flood events would also escalate the risk of erosion. The Project will be designed to withstand more extreme precipitation events, including the effects of these events (e.g., flooding and erosion).

NSECC has published projections for future climate variables based on 30-year time periods for 13 regions within NS. The historical baseline was set as 1961-1990, and future projections are available for the 2020s (2011-2040), 2050s (2041-2070) and 2080s (2071-2100) (NSECC, 2014). These projections include seasonal average temperature, seasonal total precipitation, and change factors for short period rainfall intensity. Modelling completed for the Project incorporated these projections to add contingency to the design of the mine water infrastructure. Change factors were also applied to daily temperature and precipitation data using seasonal projections to evaluate potential impacts to the Project's hydrologic model in post-closure conditions.

Historical and projected average annual temperatures, precipitation, and days with rain for Guysborough are presented in Table 6.1-1.

Table 6.1-1 Historical and Project Climate Data, Guysborough

Metric	Historical 1980s (1961-1990)	Projected 2020s (2011-2040)	Projected 2050s (2041-2070)
Average Annual Temperature (°C)	5.8	6.7	7.8
Annual Precipitation (mm)	1,425.8	1,452.8	1,461.3
Annual Days with Rain	137.1	143.9	147.4

(NSECC, 2022b)

Due to the relatively short duration of the Project, and the contingencies added to mine water infrastructure design, climate change is not anticipated to affect the Project. Short period events, including heavy rainfall, blizzards or thunderstorms, may temporarily shut down operations for safety reasons. Precipitation and associated runoff may cause temporary delays in some Project activities.

6.2 Extreme Weather

Extreme weather events may result in either drought or surplus of water conditions. The effects of a drought on the Project may include increased dust and decreased availability of water for Project activities. A reduction in availability of potable water sourced from Gold Brook Lake is another potential adverse effect of drought. Potential effects of extreme precipitation include damage to Project infrastructure and production delays in the event the open pits

become flooded. The haul roads could also become flooded or eroded and the transportation of ore may temporarily be suspended.

Several severe storms have impacted the Atlantic coast of NS in the past 15 years including Hurricane Igor (2010), Hurricane Irene (2011), Hurricane Leslie (2012), Hurricane Arthur (2014), Hurricane Matthew (2016) and Hurricane Dorian (2019) (ECCC, 2020). Historically, the two highest rainfall amounts recorded during a hurricane in NS, were from Hurricane Beth (August 15-16, 1971) and Hurricane Matthew (October 10, 2016). A total of 296 mm of rain was recorded in Halifax over a period of 48 hours during Hurricane Beth, while 228 mm of rain were recorded in Sydney over 48 hours during Hurricane Matthew. For this Project, the emergency overflow spillways connected to the settling ponds were designed to convey flows resulting from storm events up to and including Hurricane Beth. Settling ponds will be monitored regularly during storm events.

TMF embankments were designed to provide sufficient storage capacity to temporarily store runoff resulting from the EDF and safely convey runoff resulting from the IDF. The estimated runoff volumes from the EDF (1 in 200 year, 72-hour storm event) and IDF (24-hour Spring PMP plus the corresponding melt of the 1 in 100-year snowpack) were used to determine the storage volume and corresponding wet freeboard depth required within the TMF to manage each event. The estimated peak flows for the IDF were used to design the emergency overflow spillways.

6.3 Slope Stability

All phases of the Project have the potential for slope failures within the open pits, the WRSAs, and the till and organic material stockpiles. Signal Gold will use geotechnical analysis in the final design of Project related infrastructure constructed from waste rock and till, to produce features with appropriate safety factors to reduce the possibility of landslides, slope erosion, and subsidence. Stockpiling organic material may result in short-term subsidence creating an uneven landscape. This approach aligns with NSDNRR guidance for reclamation, which indicates that landscapes with variable terrain offer long-term stability.

6.4 Earthquakes

Approximately 450 earthquakes occur annually in Eastern Canada, with approximately 30 exceeding magnitude 3 (NRCan 2016). All of NS is within a next-to-lowest hazard zone, with moderate to high hazard zones located offshore in the southern Bay of Fundy and along the Laurentian Slope (NRCan, 2016). No significant earthquakes (magnitude >5.0) were recorded in NS between 1600 and 2006 (Lamontange et al., 2008). Goldboro does not fall within a designated seismic zone and the closest recorded seismic event in NS in the last 10 years (2012-2022), a magnitude 2.2 earthquake southwest of Truro (NRCan, 2016), was 136 km from the Project. Based on this information, there is little likelihood of earthquakes having an adverse effect on the Project.

7. Environmental Assessment Summary and Conclusions

Signal Gold proposes to develop the Goldboro Gold Project (the Project) near Goldboro, Guysborough County, NS. The Project consists of conventional open pit mining operation and a 4,000 tpd processing facility based on a combined gravity and leaching circuit using carbon-in-pulp technology. The Project also includes an engineered, fully lined TMF, three WRSAs, till and organic material stockpiles, and associated infrastructure. The Project is based on the technical report and FS dated January 11, 2022 and titled “NI 43-101 Technical Report and Feasibility Study for the Goldboro Gold Project, Eastern Goldfields District, Nova Scotia”. In addition to technical studies to support the FS, Signal Gold has, over the last five years, collected and assessed baseline environmental data to support an EA, undertaken community and Mi’kmaq engagement, and evaluated the socioeconomic effects of the Project.

This EARD has been prepared to facilitate the Project's review as a Class I Undertaking in accordance with the *Environmental Assessment Regulations* made under the NS *Environment Act*. Through use of the EA process as a planning tool and the extensive experience of Signal Gold's senior management team and its consultants, Signal Gold has developed and assessed several iterations of the Project layout to reduce potential impact to the environment. The design of the two open pits (East and West Pits), instead of a single larger open pit, was selected to avoid any direct disturbance to both Gold Brook Lake and Gold Brook. Other Project infrastructure has also been micro-sited where possible to avoid watercourses, wetlands, blue felt lichen, areas of historic mine tailings, and historic archaeological resources.

7.1 Project Overview

The scope of the Project includes activities associated with construction, operation, and closure. Construction is anticipated to start in late 2023, commissioning in 2025, operations until 2035, and initiation of closure in 2036.

The construction phase will begin with clearing and grubbing the mill area, TMF, and East and West Pit areas. Stripped till and organic material will be stockpiled and utilized for reclamation activities during the closure phase. NPAG waste rock extracted from the East and West Pits will be used for construction of new roads, modification of existing roads, initial construction of the TMF, and general construction. Waste rock not used as a construction material will be stockpiled in the WRSAs. Water management infrastructure, including collection ditches, culverts, settling ponds, and water treatment systems, will be constructed during this period. Employee accommodations will be constructed within the PA. The employee accommodations will be equipped with several features to increase the safety and security of employees, contractors, and surrounding communities. At a minimum, the facility will be drug and alcohol free and a key card system will be in place to control access.

During the operations phase of the Project, the East Pit will be mined to a bench floor elevation of approximately -128 masl and will operate for eight years. The West Pit will be mined to a bench floor elevation of approximately -184 masl and will operate for 11 years. Three WRSAs will be developed throughout the operations phase as waste rock is extracted from the open pits. Following full extraction of the East Pit (Year 8 of operations), a portion of the waste rock generated during West Pit extraction will be backfilled into the East Pit. The TMF design includes an initial starter embankment followed by subsequent stages of expansion using downstream construction methods throughout the operations phase.

The closure phase will begin with earthworks and demolition activities and will be completed over an approximate three year period to return the PA to a safe, stable, and vegetated state. Progressive reclamation will also be completed during the operations phase to promote early revegetation, assist with erosion and dust control, and minimize the total disturbed footprint. The East and West Pits will be allowed to flood following operations, creating two open waterbodies. The East Pit is expected to be filled in Year 19 and the West Pit is expected to be filled in Year 35. Surface and groundwater monitoring is planned to continue at select locations within the PA throughout the pit filling period and will be terminated once water quality and quantity stabilize, and following consultation with applicable regulators. Signal Gold is committed to minimizing the environmental impact of the Project and reclaiming the land to ensure safe use in the future following Project activities.

7.2 Consultation and Engagement

Signal Gold is committed to stakeholder and public engagement. Through its key values of integrity, reliability, responsibility, and respect, Signal Gold has endeavoured to work with the local community, Indigenous groups, NGOs, regulatory agencies, and interested members of the public. Potential effects and mitigation measures were identified throughout this EARD to address concerns identified through consultation and engagement, which was undertaken in accordance with the NS *Environmental Assessment Regulations*. Signal Gold is committed to maintaining stakeholder engagement throughout the life of the Project, which extends well beyond the EA process.

Signal Gold has engaged with KMKNO, as well as community members, staff, and Chief and Council of Paqtnkek, the closest Mi'kmaq community to the Project. The information gathered during engagement with Indigenous groups and organizations help contribute to Government's understanding of any potential adverse impacts of the Project on

potential or established Aboriginal or treaty rights, title and related interests, and the effectiveness of measures proposed to avoid or minimize any impacts. Information shared through on-going Mi'kmaq engagement as well as the completion of a MEKS in 2017 has been reflected in the design of the Project. An updated MEKS is in progress pending community interviews and will reflect any new information or considerations related to the Project footprint. Signal Gold's engagement program has been consistent with the NS Proponent's Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia.

Public engagement activities have occurred to support the EA process for the Project since early 2017. This includes community and virtual open house events, on-going two-way information sharing with the CLC for the Project, and meetings with interested local stakeholders. Signal Gold has held two in-person and one virtual open house events in advance of the submission of the EARD. The open house events were held at the Goldboro Interpretive Centre on October 17, 2019 and April 21, 2022. A virtual open house event occurred on May 3, 2022. Signal Gold has and will continue to meet with local community groups in smaller sessions.

7.3 Environmental Effects Assessment

This EARD has been prepared to identify and address potential environmental effects resulting from proposed Project activities. Signal Gold has applied a comprehensive approach to effects assessment by investigating and documenting baseline conditions since 2017 and completing modelling and other analyses to provide conservative, science-based effects predictions. Micro-siting of Project infrastructure has occurred where possible to avoid watercourses, wetlands, blue felt lichen, areas of historic mine tailings, and historic and cultural archaeological resources. Mitigation measures have been proposed to minimize potential adverse effects resulting from Project interactions with VCs. Residual effects, remaining after implementation of mitigation measures, were estimated for each selected VC. The significance of residual effects was determined through an evaluation of magnitude, geographical extent, duration, frequency, and reversibility, as well as through comparison to applicable regulatory criteria. Monitoring and follow up programs will be implemented to verify the accuracy of predicted effects and determine the degree to which mitigation measures were successful in eliminating, reducing, or controlling those effects. The following VCs were selected for assessment in this EARD:

- Air
- Light
- Noise
- Geology, Soil, and Sediment
- Groundwater Resources
- Surface Water Resources
- Wetlands
- Fish and Fish Habitat
- Terrestrial Environment
- Socioeconomic Conditions
- Indigenous Peoples
- Cultural and Heritage Resources

A summary of the impact assessment completed for each VC is provided below.

Air

Dust generation and air contaminant emissions have the potential to adversely affect human and ecological health. Air emissions estimates and dispersion modelling were completed to predict air contaminant concentrations resulting from the Project. Based on the maximum emissions scenario evaluated in the modelling, the maximum ground level air concentrations of all modelled contaminants are predicted to meet the assessment criteria for all averaging periods at nearby residential receptors and at the PPB for the Project. Project related GHG emissions were estimated for all

planned stationary and mobile fuel combustion sources. Peak annual GHG emissions are estimated to be approximately 0.26% of the reported 2020 GHG total for NS. Predicted residual effects of the Project on air quality and GHGs are considered not significant. Air quality monitoring will occur over the life of the Project to validate model predictions and confirm regulatory compliance. The overall residual effect of the Project on air is assessed as not likely to have significant adverse effects after appropriate mitigation measures have been implemented, including the development and implementation of a Fugitive Dust Best Management Practice Plan.

Light

Changes to ambient light levels have the potential to adversely affect nearby residential receptors as well as fauna and birds. The impact of Project lighting was calculated using the quantities, power output, and efficiency of proposed equipment and lighting installations. Project-related light levels calculated at nearby residential receptors were less than the assessment criteria. Predicted residual effects of the Project on light are considered not significant. If complaints are received concerning light trespass, a monitoring program will be developed in consultation with regulators.

Noise

Increases in noise levels have the potential to adversely affect nearby residential receptors and wildlife. Acoustical modelling was completed to estimate the potential impacts of noise sources during Project construction and operations. The model concluded that predicted noise levels produced by the Project will be within the assessment limits specified at nearby residential receptors and at the PPB. Predicted residual effects of the Project on noise are considered not significant. Noise monitoring will occur over the life of the Project to validate model predictions and confirm regulatory compliance.

Geology, Soil and Sediment

Exposed soil and rock have the potential to produce sediment laden runoff, ML/ARD that can adversely affect the aquatic environment. Geochemical source terms were developed for several material types present in the PA through a series of static and kinetic test programs and were applied in predictive water quality and groundwater contaminant transport modelling completed for the Project. Mine tailings produced from historic mining operations were deposited in Gold Brook and in low-lying areas south of Gold Brook Lake. Historic tailings within the footprint of Project infrastructure will be removed and transported to the TMF for long-term storage and monitoring. Predicted residual of the Project on geology, soil, and sediment are both positive and adverse but are not considered significant. Mine rock and tailings will be tested regularly to monitor the ML/ARD potential and inform material handling and storage strategies.

Groundwater Resources

Open pit mining operations have the potential to result in adverse effects to groundwater quantity and quality. Groundwater elevations and quality monitoring has been on-going in the PA since 2017 to establish baseline conditions. A 3D numerical groundwater flow model was developed to estimate potential impacts to the groundwater table elevation and contaminant transport, as well as potential reductions in baseflow contributions to nearby watercourses. Model results indicate the predicted groundwater radius of influence does not reach the nearest residential well. Similarly, predicted contaminant concentrations above potable water criteria do not extend to within 1 km of the nearest residential well. Predicted residual of the Project on groundwater resources are considered not significant. Groundwater quantity and quality monitoring will occur over the life of the Project to validate model predictions and confirm regulatory compliance.

Surface Water Resources

Alterations to baseline catchment areas and discharge of mine contact water have the potential to result in adverse effects to surface water quantity and quality. Surface water quantity and quality monitoring has been on-going in the PA since 2017 to establish baseline conditions A water balance analysis and predictive water quality assessment were completed to evaluate potential impacts to surface water quantity and quality, respectively. Outputs from the groundwater models were used in the surface water models to ensure changes to groundwater were included in the

evaluation of effects on surface water resources. Following implementation of proposed water management infrastructure, including water treatment, residual effects to surface water resources are not expected to be significant. Surface water quantity and quality monitoring will occur over the life of the Project to validate model predictions and confirm regulatory compliance.

Wetlands

Infrastructure development, reductions in groundwater and surface water contributions, and discharge of sediment laden runoff have the potential to result in adverse effects to wetlands. Groundwater and surface water model results were used in the evaluation of Project related effects on wetlands. Project specific GIS spatial models were developed to quantify direct impacts to wildlife habitat and vegetative communities. An evaluation of the general vegetation communities and habitat within the defined Project assessment areas was completed through the development of a desktop driven P-ELC. Approximately 96 ha of wetland area is expected to be altered by the Project either through direct impacts resulting from Project infrastructure placement or indirect impacts resulting from changes in hydrology. All altered wetlands require compensation under the Nova Scotia Wetland Conservation Policy. Project infrastructure has been micro-sited where possible to avoid wetlands. Following implementation of mitigation measures including wetland compensation, residual effects of the Project on wetlands are considered not significant. Wetland monitoring will be completed to verify the accuracy of the predicted environmental effects.

Fish and Fish Habitat

Infrastructure development and changes to watercourse flow regimes and water quality parameters have the potential to adversely affect fish and fish habitat. Effects to fish and fish habitat through flow reductions have been assessed using guidance outlined in the Framework for Assessing the Ecological Flow Requirements to support Fisheries in Canada. Groundwater and surface water models were used to support the evaluation of effects on fish and fish habitat by predicting changes to baseflow, stream flow, water levels, and quality parameters. Detailed habitat evaluation included ground-truthing areas proposed for direct impact, and multiple years of fish collection. This has provided a solid basis for Signal Gold to understand fish usage of habitats within the PA and has allowed for micro-siting of infrastructure away from fish habitat wherever practical. The total area directly and indirectly (flow reductions) impacted by the Project is 26,353 m^2. A Conceptual Fish Habitat Offsetting Plan has been developed using DFO guidance. Following implementation of mitigation measures including fish habitat offsetting, residual effects to fish and fish habitat are not expected to be significant. An AEMP will be implemented.

Terrestrial Environment

Project activities were assessed to determine their effects on the terrestrial environment within the PA, including terrestrial habitat and vegetation, terrestrial fauna, avifauna, SAR, and SOCI. To quantify impacts to the terrestrial environment, namely, loss of suitable wildlife habitat and vegetation communities, several GIS models and field data were used. These models identified and quantified the abundance and distribution of terrestrial fauna, avifauna habitat, and vegetation communities. The modelling tools used in the terrestrial environment effects assessment include the P-ELC, Terrestrial Fauna Assessment, Avifauna Land Use Assessment, Interior Forest, and Mainland Moose modelling. Following implementation of mitigation measures, residual effects to the terrestrial habitat is not expected to be significant. Several monitoring and management plans have been developed to assess the accuracy of the predicted environmental effects and effectiveness of mitigation measures.

Socioeconomic Conditions

Several socioeconomic conditions, including economy, land use, transportation, and human health, have the potential to be affected either positively or adversely by Project activities. Impacts to socioeconomic conditions were estimated using modelling and other analyses, including a viewshed analysis and HHERA. The Project will have beneficial effects for the local and provincial economy. It will produce 325 full-time jobs during the construction phase and 215 direct full-time jobs during the operations phase. The Project is estimated to generate $528 million in income and mining taxes at the federal, provincial, and municipal levels from direct and spin-off economic activity. Signal Gold, which will also spend approximately $1.7 billion on goods and services over the life of the Project and contribute to an increase in provincial GDP of $2.1B, is implementing measures to maximize benefits to the local economy and

communities. Signal Gold's approach to employment, procurement, and benefits is based on hiring and buying locally and regionally wherever feasible.

Mining projects have the potential to result in adverse effects on communities including land and resource use conflicts, public safety, and human health. Land use zoning is appropriate to accommodate this development. Signal Gold requires access to Crown and private lands and is in the process of applying for access and negotiating the purchase of certain private lands that fall in the PA. This Project is anticipated to have the following adverse effects: temporary loss of access to an area used for recreation and commercial activities. Signal Gold is working with other commercial operators with interests in the PA. From a recreational land use perspective, Signal Gold will construct a bypass road around the secured area of the Project to maintain access to Crown lands north of the PA where residents participate in land use and recreational activities. Signal Gold will take measures to minimize effects that could arise from Project traffic and the employee accommodations facility.

Based on the viewshed analysis, there is a low potential for impact to views from most areas surrounding the PA However, prominent Project infrastructure may be visible from lakes and other open areas where vistas have low horizons.

Based on the HHERA, the Project is not predicted to result in any increased risk to human health or ecological receptors compared to baseline conditions.

This Project is expected to make a strong contribution to the economy of Guysborough and NS. Given Signal Gold's commitment to complying with all regulations and following industry best practices for management of socioeconomic issues, residual adverse effects of the Project on socioeconomic conditions are not expected to be significant.

Indigenous Peoples

The Project has the potential to positively affect Indigenous Peoples through employment, training, and procurement. Signal Gold is working with KMKNO on a Mutual Benefits Agreement, which will facilitate access to employment, training, and procurement opportunities, and other community benefits, for the Mi'kmaq of Nova Scotia. Potential adverse Project effects include loss of access to lands used for traditional purposes, and effects on natural resources within the PA (effects on natural resources such as terrestrial and aquatic habitats are discussed in other VC sections). An MEKS was completed for the Project in 2017 (for a regional area that includes the PA), and an update is currently in progress to reflect the results of a second site visit and any new information from consultation. The MEKS indicates the Mi'kmaq have a long-standing relationship with lands in and around Goldboro and some Indigenous people engage in activities such as hunting and fishing within the broader MEKS Study Area. The PA contains no unique habitats and is presently not a primary harvesting area for the Mi'kmaq though it is of possible interest in the future. There is some potential for mining operations to limit Mi'kmaq traditional land and resource use, but the area will become available in the future upon closure. On-going engagement and discussions with the Mi'kmaq of Nova Scotia will aid in minimizing, and where possible, eliminating any effects to traditional land and resource use.

The Project is expected to be beneficial for Indigenous Peoples. Following implementation of applicable mitigation measures and continued engagement and discussions with the Mi'kmaq of Nova Scotia as right holders, the predicted residual adverse environmental effects of the Project on Indigenous Peoples are assessed to be not significant.

Cultural and Heritage Resources

Infrastructure development has the potential to affect cultural and heritage resources through damage or removal of such resources. Four Archaeological Resource Impact Assessments were completed for the Project between 2017 and 2021. Fourteen historic mining artefacts are located within (10) or near (4) the planned footprint of the West Pit. While those within the Pit are likely to be damaged or removed, those outside the excavation can be saved from damage through micro-siting. One object believed to be of historic mining origin will be removed for evaluation. An area of moderate elevated potential for Mi'kmaq and ancestral archaeological resources is within the footprint of the East Pit and four are between the East and West Pits. These areas could be potentially impacted by Project activities. Signal Gold has proactively made changes to the Project footprint to prevent damage or removal of cultural and

heritage resources and committed to conducting shovel testing to evaluate areas of moderate potential that may be impacted. Micro-siting will be used to avoid known cultural heritage features. In the unlikely event that archaeological resources not previously identified are encountered, all work in the associated area(s) will be halted. Signal Gold representatives will contact the Coordinator of the Special Places Program of the NS Department of Communities, Culture, Tourism and Heritage to determine a suitable method of mitigation. Residual effects of the Project on cultural and heritage resources are not expected to be significant.

7.4 Conclusions

This EARD was prepared to identify and address potential environmental effects resulting from the Project. Signal Gold has applied a comprehensive approach to effects assessment by investigating and documenting baseline conditions since 2017 and completing modelling and other analyses to provide conservative, science-based effects predictions. Mitigation measures have been proposed to minimize potential adverse effects resulting from Project interactions with VCs.

The predicted residual effects of the Project on all VCs were assessed to be not significant. Monitoring and follow up programs will be implemented to verify the accuracy of predicted effects and determine if proposed mitigation measures are effective in eliminating, reducing, or controlling those effects, or whether additional mitigation is required.

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