Marathon Palladium Project Environmental Impact Statement Addendum

VOLUME 1 OF 2

4.0 Environmental Setting

Prepared for:

GENERATIONPGM

Prepared by:

Stantec

Ecometrix | Environmental INTELLIGENCE

NORTHERN BIOSCIENCE ECOLOGICAL CONSULTING

Knight Piésold CONSULTING

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Abbreviations

ºC	degrees Celsius
AIRs	additional information requests
AOC	Area of Concern
APS	Anishinabek Police Service
AUT	Marathon, Marathon Airport, and Pukaskwa
BH	Borehole
CACs	criteria air contaminants
Chl a	chlorophyll a
CIAR	Canadian Impact Assessment Registry
cm	centimetres
CSDs	census subdivisions
CSI	crime severity index
Cu	copper
CWB	Community Well-Being
CWQG	Canadian Water Quality Guidelines
DEM	digital elevation model
ECCC	Environment Canada and Climate Change
EIS	environmental impact statement
ELC	ecological land classification
EMS	emergency medical services
FMZ	Fisheries Management Zone

FRI	forest resource inventory
GCDWQ	Guidelines for Canadian Drinking Water Quality
GenPGM	Generation PGM
ha	hectares
i.e.	that is
IAAC	Impact Assessment Agency of Canada
IRs	Information requests
km	kilometre
L/s	litres per second
LGS	Layered Gabbro Series
LHIN	Local Health Integration Network
LIDAR	light detection and ranging
LSA	Local Study Area
m	metre
MECP	Ministry of the Environment, Conservation and Parks
mg/L	milligrams per litre
MHSTCI	Ministry of Heritage, Sport, Tourism and Culture Industries
mm	millimetre
MDMER	Metal and Diamond Mining Effluent Regulations
MNRF	Ministry of Natural Resources and Forestry
MOE	Ministry of the Environment (now MECP)
MTO	Ministry of Transportation
NH_3	Ammonia

NA	not applicable
NAD	North American Datum
NAPS	National Air Pollution Surveillance
NFMC	Nawiinginokiima Forest Management Corporation
NHIC	Natural Heritage Information Centre
Ni	Nickel
NRCan	Natural Resources Canada
ODWQS	Ontario Drinking Water Quality Standards
OPP	Ontario Provincial Police
Pd	Palladium
PGM	Platinum Group Metals
pH	potential of hydrogen
ppm	parts per million
PSMF	Process Solids Management Facility
ROW	right-of-way
RSA	Regional Study Area
SIRs	Supplementary Information Requests
SSA	Site Study Area
TDS	total dissolved solids
UTM	Universal Transverse Mercator
VEC	Valued Ecosystem Component
WSC	Water Survey of Canada

4.0 ENVIRONMENTAL SETTING

This chapter provides an overview of the environmental setting for the Project and the broader surrounding environment to provide context for the EIS Addendum and a description of the general character of the area where the Project will be developed. The environmental setting described in this chapter provides a contextual description of the geographic area as a whole, focusing on components of the environment that reasonably may be affected by the Project. The information contained in this chapter is taken from the updated baseline conditions described in the various updated baseline reports submitted to IAAC and the Panel on November 13, 2020 (CIAR #722).

The updated baseline reports summarize and document changes to the existing environmental conditions relative to those conditions considered in the original EIS (2012) in order to support the updated assessment of potential environmental effects provided in this EIS Addendum. The purpose of this chapter is to summarize changes to the characterization of existing baseline conditions in consideration of the updated baseline reports, previous information provided through baseline studies, responses to the information requests (IRs), additional information requests (AIRs), and supplemental information requests (SIRs) submitted to the Panel. For a comprehensive description of existing conditions, this chapter should be reviewed in conjunction with the original EIS (2012) and supporting documentation.

Further analysis and modelling of the potential effects of the construction, operation, and closure phases of the Project will be presented in the EIS Addendum (Volume 2).

4.1 GENERAL SETTING

The Project is located approximately 10 km north of the Town of Marathon, Ontario. Marathon is a community of approximately 3,300 people (Statistics Canada, 2017) located adjacent to the Trans-Canada Highway (Highway 17) on the northeast shore of Lake Superior, approximately 300 km east of Thunder Bay and 400 km northwest of Sault Ste. Marie. The centre of the Project footprint sits at approximately 48° 47’ N latitude, 86° 19’ W longitude (UTM NAD83 N16 Easting 550197 and Northing 5403595). The footprint of the proposed mine location is roughly bounded by Highway 17 and the Marathon Airport to the south, the Pic River and Camp 19 Road to the east, Hare Lake to the west, and Bamoos Lake to the north. Access is currently gained through Camp 19 Road.

The Project is proposed within an area characterized by relatively dense vegetation, composed largely of a birch and spruce-dominated mixed wood forest. The terrain is moderate to steep, with frequent bedrock outcrops and prominent east-west oriented valleys. Several watercourses and lakes traverse the area, with drainage flowing either eastward to the Pic River or westward to Lake Superior. The climate of this area is typical of northern areas within the Canadian Shield, with long winters and short, warm summers.

The Project is proposed on Crown Land, with GenPGM holding surface and mineral rights for the area. Regional land-use activities in the area include hunting, fishing, trapping and snowmobiling, as well as mineral exploration (and mining) and forestry. Other localized land uses in the area include several licensed aggregate pits, the Marathon Municipal Airport, the Marathon Landfill, a municipal works yard, and several commercial and residential properties.

The primary industries in the area have historically been forestry, pulp and paper, mining, and tourism. Exploration for copper and nickel deposits in the area extend as far back as the 1920s. A large copper-PGM deposit was discovered in 1963. Advanced exploration programs have continued across the area since then. These programs have been supported by various feasibility studies to confirm the economic viability of extracting the deposits.

Several First Nation and Métis groups were originally identified as having a potential interest in the Project based on asserted traditional territory, Treaty Rights and proximity to the Project. Traditional uses which they have identified as occurring in the area include hunting, trapping, fishing, and plant harvesting, with activities generally focused on the larger waterways, such as the Pic River, Bamoos Lake, and Hare Lake.

4.2 GEOLOGY

The *Geological Conditions Baseline Report Update* (Ecometrix, 2020d) was prepared to provide a general understanding of the regional and local geological settings and to characterize the nature and mechanisms of mineralization of the Marathon PGM-Cu deposit. Recent data collected through exploration programs confirm the previous description of geological conditions on the project site. Data collected since the environmental assessment process was suspended do not affect how the geological conditions associated with the site will be used to support the assessment of effects on select valued ecosystem components (VECs). The following is a summary of the findings.

4.2.1 Regional Geology

The Marathon PGM-Cu deposit is hosted within the Eastern Gabbro Series of the Proterozoic Coldwell Complex, which intrudes and bisects the much older Archean Schreiber-Hemlo Greenstone Belt. The sub-circular complex was formed approximately 1.1 billion years ago. It has a diameter of 25 km and a surface area of 580 km² and is the largest alkaline intrusive complex in North America. The Coldwell Complex was emplaced as three nested intrusive centres that were active during cauldron subsidence near where the northern end of the Thiel Fault intersected Archean rocks, on the north shore of Lake Superior.

4.2.2 Deposit Geology

At least three mechanisms for sulphide and PGM precipitation have been proposed for the deposit, including hydrothermal (Watkinson and Ohnenstetter, 1992), magmatic (Good and Crocket, 1994) and zone refining (Barrie et al., 2001). The magma conduit model is the preferred mineralization process and, in the model, the gabbroic units and associated Cu-PGM mineralization represent material that crystallized or settled out of the magma as it moved through the conduit.

Mineralization in the area of the Project is part of a very large magmatic system that consists of at least two major intrusive events of predominantly olivine gabbroic units that form the Eastern Gabbro of the Coldwell Complex. The earlier of the two events is termed the Layered Gabbro Series (LGS) and is made up of alternating layers of gabbro, olivine gabbro and troctolite. The grain size for units within the LGS varies considerably, with some units, on the order of 100 m in thickness, being composed of numerous 1-5 m thick layers of fine-grained gabbro. The LGS was intruded by the Two Duck Intrusion (TDI) in multiple horizons within the stratigraphic package that makes up the LGS. The TDI is composed of coarse-grained to pegmatitic relatively homogeneous gabbro and olivine gabbro or troctolite. Late quartz syenite and augite syenite dykes cut the gabbros but form a minor component of the intrusive assemblage. The TDI is the host rock for Cu-PGM mineralization and has been the focus of past exploration activities.

A very prominent feature of the deposit is the local and extreme enrichment of PGMs with respect to Cu and Ni. For example, high grade samples from the W Horizon that contain between 25 and 50 g/t Pd (1 g/t = 1 ppm) might also contain very low concentrations of Cu and Ni (<0.02%). The separation of PGMs from Cu is observed throughout the deposit but is most common near the top of the mineralized zone. In the southern half of the deposit, PGM enrichment is most prominent in the W Horizon.

4.2.3 Seismicity

Natural Resources Canada (NRCan) has published updated national seismic hazard maps as of 2015[1] (NRCan 2015). The characterization of the Project area as being within a region of relatively low seismicity is unchanged (Figure 4.2-1). The peak ground acceleration corresponding to the 1 in 2,475 year earthquake event was used for design. This value corresponds with the guidance in the Canadian Dam Association Guidelines (CDA, 2013) for a dam classified as high consequence.

[1] The original EIS submission included 2010 seismic hazard information.

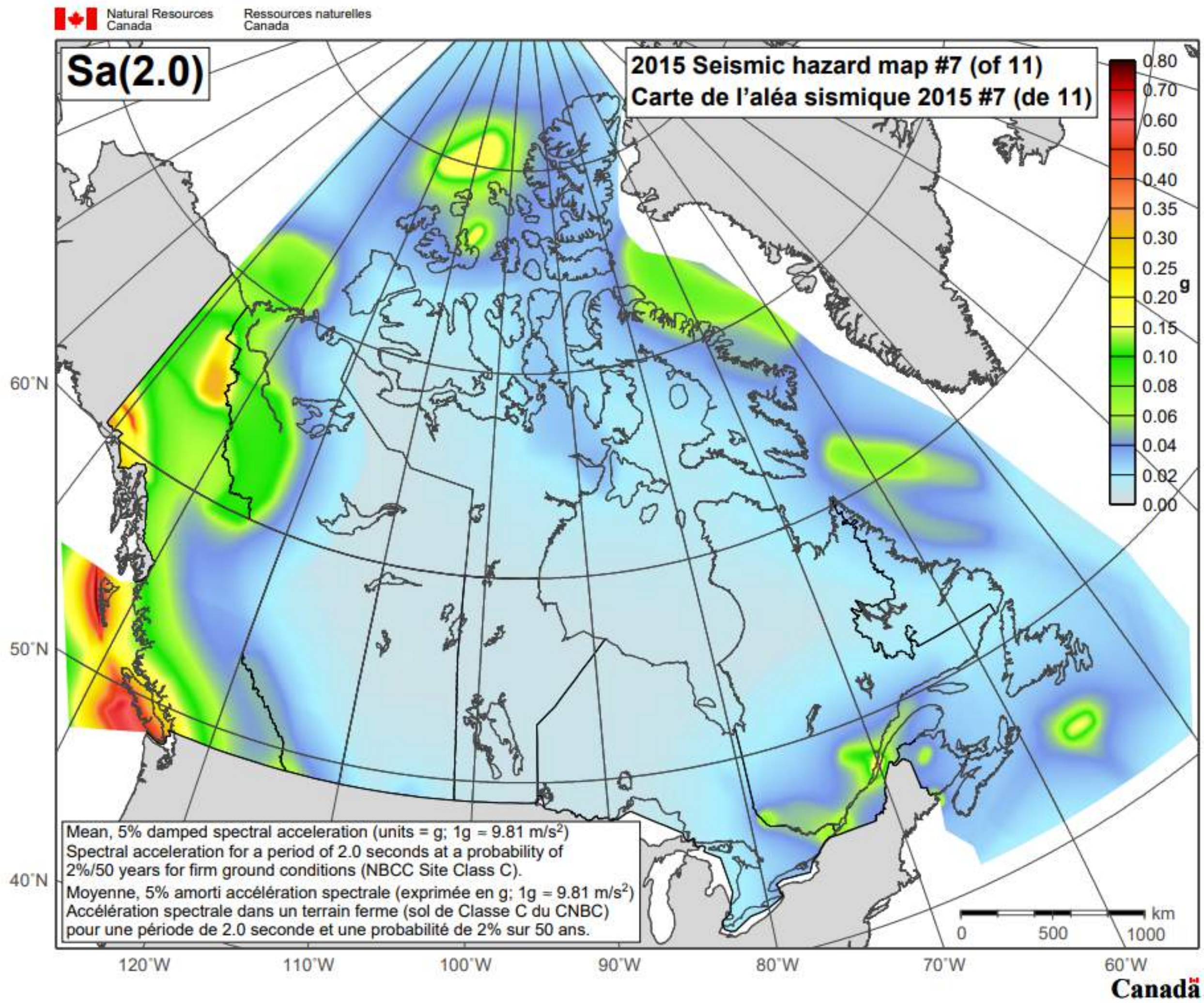


Figure 4.2-1: Seismic Hazard Map of Canada (Source NRCan, 2015)

4.3 ATMOSPHERIC ENVIRONMENT

The *Air Quality Baseline Report Update* (Stantec, 2020b) was prepared to summarize and document changes to the existing environmental conditions relating to air quality monitoring data and air quality regulations, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. Updated meteorological and background ambient air quality concentration data have been collected for the list of Contaminants of Potential Concern, reflecting the expanded availability of air quality criteria for a variety of substances since 2012. Concentrations of criteria air contaminants (CACs) at the property were either confirmed to be low through measurement or were projected to be low, based on a review of National Air Pollution Surveillance (NAPS) measurements at nearby representative stations. The following is a summary of the findings.

4.3.1 Climate and Meteorology

Data sources for climate and meteorological information include stations located at the Thunder Bay Airport (i.e., for climate), the Marathon Airport (i.e., for meteorology), and Pukaskwa National Park (for precipitation). These stations are expected to be representative of the Marathon area.

The Project lies in the sub-arctic region. The climate of the general area of the Project is typical of northern areas within the Canadian Shield, with long winters and short warm summers. However, Marathon experiences cooler summers and warmer winters compared to other more remote northerly communities in northwestern Ontario due to its proximity to Lake Superior. Extreme minimum temperatures at the Marathon Airport ranged from -41.7°C to +2.1°C and maximum temperatures ranged from +2.6°C to +28.5°C.

The average annual precipitation for the Pukaskwa Station (located 15 km south of the Marathon Airport) is 759 mm, which compares well to the Thunder Bay climate normal value of 712 mm and the Marathon Airport data for 1988-1999 (840 mm). More detail incorporating results from multiple stations are provided in Section 4.5.1.1 of this report.

4.3.2 Weather Phenomena and Extreme Weather

Occurrences of weather phenomena, including extreme and rare meteorological phenomena, were reviewed from real-time data collected at the Marathon Airport and from published Environment Canada and Climate Change (ECCC) rare weather mapping.

There are no reported occurrences of tornadoes in the Marathon area, based on ECCC mapping from the Canadian National Tornado Database for the period of 1980 to 2009.

According to ECCC records for the period 1999 to 2018, approximately 25 incidents of cloud to ground lightning are reported per year within 25 km of Geraldton - the closest city with data to the Project area. The incidence of lightning near the Project is typical of northern Ontario and lower than the number of incidences observed in southern Ontario.

Visibility was not measured at the Marathon Airport Station for the 2015-2019 period. The average number of days per year that visibility is reduced to less than 1 km due to fog from the Thunder Bay climate normal data is approximately 127 days.

Only one report of a potentially damaging hail occurrence was reported for the Marathon area between 1979 and 2009. Compared to southern Ontario where the range of incidences was from 1 to 50 events over this period, the potential for damaging hail occurrences at the Project site is considered to be low.

The area is potentially susceptible to heavy snowfall events, with an average of approximately five daily events per year of more than 10 cm of snowfall (based on the climate normal data for the Thunder Bay station between 1971 and 2000).

There were no reported damaging wind occurrences for the Marathon area between 1979 and 2009.

4.3.3 Air Quality

Baseline air quality levels at the Project are low as the property is located in a relatively undeveloped area north of Highway 17. Sources of airborne contaminants currently near the Project include several permitted gravel pits, the Town of Marathon landfill site, and the Town of Marathon wastewater lagoons. Regional influences on air quality include residential/commercial/institutional heating, fugitive emissions from Highway 17 traffic, fugitive emissions from airport traffic, and other nearby industrial sources, such as the Hemlo gold mine, located approximately 30 km east of the Project.

Concentrations of CACs at the property were either confirmed to be low through measurement or were projected to be low, based on a review of NAPS measurements at nearby representative stations.

Background ambient concentrations established in the *Air Quality Baseline Update* (Stantec, 2020b) are expected to be conservative and an over-estimation of actual ambient concentrations in the LSA. Background air concentrations are primarily based on NAPS stations which are located in large urban residential, commercial, and industrial areas that are expected to have higher background concentrations relative to the Project.

4.4 ACOUSTIC ENVIRONMENT

The *Environmental Noise Updated Baseline Report* (Stantec, 2020c) was prepared to summarize and document changes to the existing environmental conditions relating to noise, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. Upon review of noise baseline data as presented in the *Baseline Noise Report* (True Grit Consulting Ltd., 2012a) (CIAR #227) and supplemental work prepared through the IR process, no substantive revisions were required to the original work presented.

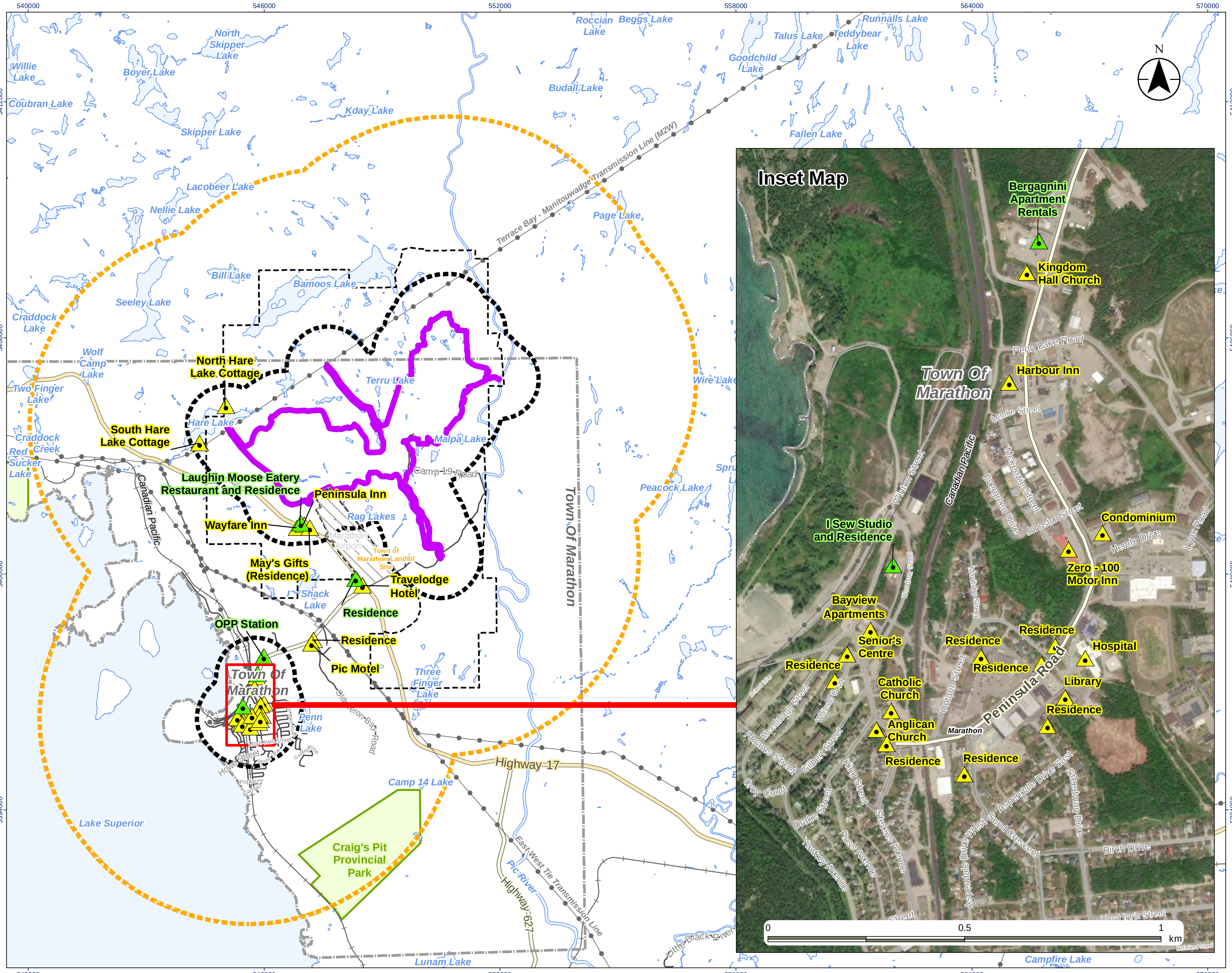
Changes to traffic conditions and noise-sensitive receptors were considered in the *Environmental Noise Updated Baseline Report* (Stantec, 2020c). The baseline noise modelling results for Highway 17 presented in the *Baseline Technical Report - Noise* (True Grit Consulting Limited, 2012a) are expected to be representative of the baseline noise level at the nearest sensitive receptors.

The original receptor locations have been reviewed and no updates are required. Noise receptors are shown on Figure 4.4-1. Some revisions were made to the location of Noise-Sensitive Receptors to recognize the following:

- Ontario Provincial Police (OPP) station, which has an overnight jail (101 Peninsula Road)
- Sew Studio and Residence (3 Woodson Street)
- Bergagnini Apartment Rental (85 Peninsula Road)

- Residence along Highway 17 adjacent to Travelodge (Highway 17)
- Laughing Moose Restaurant and Residence (RR10 Highway 17).

For each of these new receptors, an existing receptor had already been assessed that is expected to have equal or greater influence from the Project (i.e. original receptor is closer to the noise source than the new receptor). Thus, the original points of reception identified in the *Baseline Technical Report – Noise* (True Grit Consulting Limited, 2012a) are representative of these new locations. Of note, the North Hare Lake Cottage is owned by GenPGM and is identified as a receptor.



Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
4. The North Hare Lake Cottage is owned by Generation PGM.

Project Location: Marathon
129673006 REVA
Prepared by SW on 2020-12-18
Technical Review by DH on 2020-09-16
Independent Review by ABC on yyyy-mm-dd

Client/Project: GENERATION PGM INC. MARATHON PALLADIUM PROJECT

Figure No. 4.4-1

Title: Noise Receptors

4.5 WATER QUALITY AND QUANTITY

Water quality and quantity have been characterized through several updated baseline reports, including:

- *Environmental Hydrology Updated Baseline Report* (Stantec, 2020d)
- *Environmental Hydrogeology Updated Baseline Report* (Stantec, 2020e)
- *Water Quality Baseline Report Update* (Ecometrix, 2020c)

These reports were prepared to summarize and document changes to the existing environmental conditions relating to surface water and groundwater quality and quantity, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. The following is a summary of the findings.

4.5.1 Hydrology

4.5.1.1 Climate

Climatic data, such as precipitation and air temperature, strongly influence hydrology as they affect the quantity and timing of runoff near the Project. Climatic conditions for the Project are continental, with substantial variation between annual highs and lows. Continental climates typically have short, warm summers and long, cold winters.

Historical climate stations from ECCC (2020) were used to supplement barometric pressure data, where required, and to calculate the average annual precipitation and mean temperature range for the Project. The historical climate stations in Table 4.5-1 are all within a 40 km range of the Project and were compared with each other to determine the climate data best representing the Project area and to form an ensemble of stations to represent conditions to present.

Table 4.5-1: Regional Climatic Stations (Environment Canada, 2020)

Station ID	Station Name	Coordinates	Records Period (Total)	Data Interval	Elevation (m)	Distance from LSA (km)	Average Annual Precipitation (mm)	Mean Temperature Range (˚C)
6044962	Marathon A	48.7553˚N 86.3444˚W	2007-2014 (8)	Hourly	314.60	33.10	N/A	-13.3 to 17.3
6044963	Marathon A	48.7572˚N 86.3458˚W	2014-2020 (7)	Hourly	314.60	33.10	N/A	N/A
6044967	Marathon A	48.7572˚N 86.3458˚W	2014-2020 (7) 2018-2020 (3)	Hourly Daily	314.60	33.10	N/A	-14.3 to 15.6
6044961	Marathon Airport	48.7556˚N 86.3444˚W	2007 (1) 1988-1999 (12) 1988-1999 (12)	Hourly Daily Monthly	315.50	33.10	858.3	-15.1 to 14.9

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Table 4.5-1: Regional Climatic Stations (Environment Canada, 2020)

Station ID	Station Name	Coordinates	Records Period (Total)	Data Interval	Elevation (m)	Distance from LSA (km)	Average Annual Precipitation (mm)	Mean Temperature Range (˚C)
6044959	Marathon	48.7167˚N 86.4000˚W	1945-1984 (40) 1945-1984 (40)	Daily Monthly	189.00	35.29	845.3	-13.6 to 14.8
6046767	Pukaskwa (AUT)	48.5883˚N 86.2947˚W	1994-2012 (19) 1996-2012 (17) 2005-2006 (2)	Hourly Daily Monthly	207.60	44.50	686.7	-12.2 to 16.0
6046768	Pukaskwa (AUT)	48.6078˚N 86.2872˚W	2012-2020 (9) 2011-2020 (10)	Hourly Daily	191.50	43.50	701.1	-12.2 to 15.3
6046770	Pukaskwa Natl Park	48.6000˚N 86.3000˚W	1983-2005 (23) 1983-2005 (23)	Daily Monthly	192.00	43.56	797.0	-13.5 to 15.6
6043452	Hemlo Battle Mountain	48.7000˚N 85.8833˚W	1985-2001 (17) 1985-2001 (17)	Daily Monthly	335.00	66.50	760.8	-14.7 to 16.8

Note: N/A indicates that the applicable data set did not provide enough information for statistics to be calculated

The average annual precipitation was found to be 818.2 mm, relatively consistent with what was presented in Calder (2012) of 826.5 mm for Marathon. The mean temperature ranged from -13.4˚C in January to 15.1˚C in August, which was also found to be consistent with what was presented in Calder (2012) of -13.9˚C in January to 14.6˚C in August.

Comparing the driest and wettest years of average annual precipitation for the combined Marathon, Marathon Airport, and Pukaskwa (AUT) stations over the applicable years showed a wettest annual precipitation of 1,155.6 mm, which occurred in 1979, and a driest annual precipitation of 558.3 mm, which occurred in 1981. The range of average annual precipitation during the wettest to driest years indicates there is considerable variability in precipitation in the area of the Project.

Table 4.5-2 presents the monthly breakdown of climate data for combined Marathon, Marathon Airport, and Pukaskwa (AUT) stations. Rationale for the selection of appropriate climate stations and determination of appropriate data sets for use in characterizing existing climate conditions for this Project are presented in Section 6.1.1 of the *Updated Baseline Hydrology Conditions* (Stantec, 2020d). The mean monthly precipitation is reasonably consistent with the data provided by Calder (2012) for Marathon.

Table 4.5-2: Climate Data Summary at Combined Marathon, Marathon Airport, and Pukaskwa (AUT) Stations

Month	Mean Monthly Precipitation (mm)	Temperature ˚C
January	64.7	-13.4
February	47.6	-11.7
March	56.6	-6.0

Table 4.5-2: Climate Data Summary at Combined Marathon, Marathon Airport, and Pukaskwa (AUT) Stations

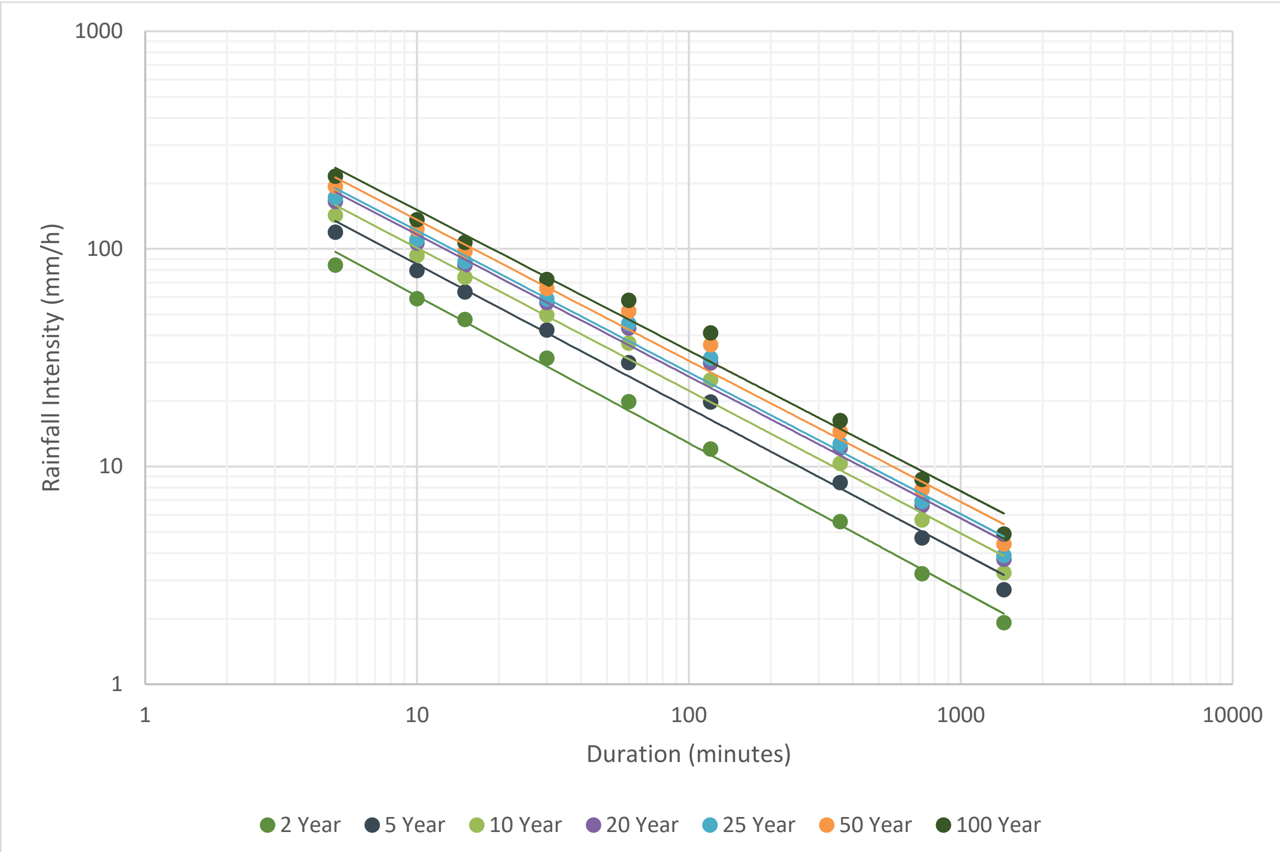
Month	Mean Monthly Precipitation (mm)	Temperature °C
April	49.8	1.4
May	67.7	7.4
June	71.4	11.7
July	74.6	14.1
August	73.0	15.1
September	94.4	11.0
October	90.0	5.5
November	63.4	-2.3
December	65.0	-10.0
Total:	**818.2**	**2.0**

An intensity-duration-frequency (IDF) curve was obtained from the IDF_CC Tool 4.0 (Schardong et al., 2020) using the Gumbel distribution. The Pukaskwa National Park IDF station is the closest station within 20 km to the Project and has 21 years of available data from 1983 to 2007 which is presented in Table 4.5-3 and Figure 4.5-1.

Table 4.5-3: Intensity-Duration-Frequency Curves for Pukaskwa National Park Station (Schardong et al., 2020)

Duration	Total Rainfall (mm)						
	2 Year	5 Year	10 Year	20 Year	25 Year	50 Year	100 Year
5 minute	7.03	9.96	11.9	13.75	14.34	16.16	17.97
10 minute	9.83	13.27	15.55	17.73	18.43	20.56	22.68
15 minute	11.86	15.86	18.51	21.05	21.85	24.33	26.8
30 minute	15.74	21.23	24.87	28.35	29.46	32.87	36.25
1 hour	19.86	30.08	36.86	43.35	45.41	51.76	58.06
2 hour	24.11	39.69	50	59.89	63.03	72.69	82.29
6 hour	33.55	50.69	62.03	72.92	76.37	87.01	97.57
12 hour	38.64	56.4	68.16	79.44	83.01	94.04	104.98
24 hour	46.17	65.28	77.93	90.07	93.92	105.78	117.56

Figure 4.5-1: Intensity-Duration-Frequency Curves for Pukaskwa National Park Station (Schardong et al., 2020)

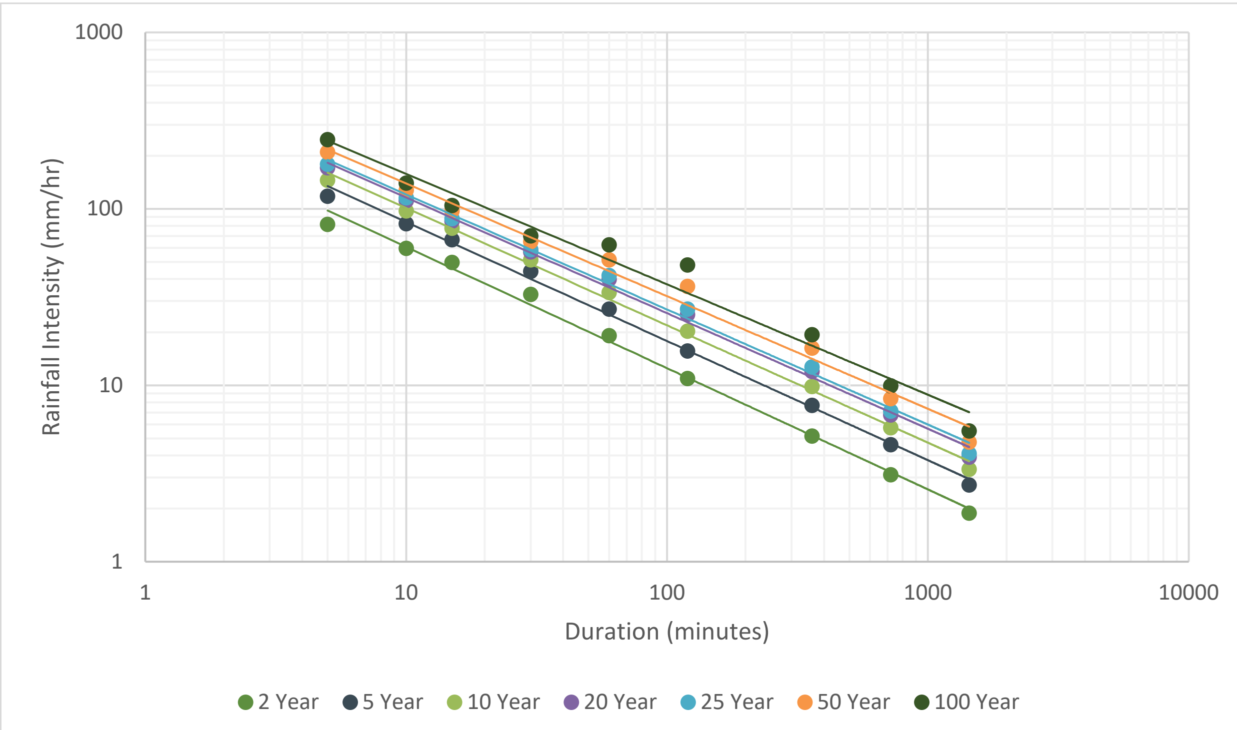


4.5.1.2 Climate Change

Climate change is a scientifically recognized issue that has already seen Ontario's climate warm by up to 1.6˚C over the past 63 years and is projected to continue increasing the temperature and change precipitation patterns in the years to come (Colombo et al., 2007). In addition, precipitation in northwestern Ontario has been observed to have increased by up to 50% during spring over a 60-year period (McDermid et al., 2015). Increased precipitation events require careful consideration when constructing structures that require the consideration of stormwater.

Climate projections for the next 20 years were researched to review the projected changing conditions over the active period of the Project (i.e., prior to post-closure). Three representative concentration pathways were focused on to provide the best-case scenario (RCP2.6), intermediate-case scenario (RCP4.5), and worst-case scenario (RCP8.5) for the Project. These scenarios assume varying degrees of mitigation to curb global emissions, and were considered when determining the effect of climate change on the IDF curve for the Project (see Section 6.1.2 of the *Updated Baseline Hydrology Conditions* (Stantec, 2020d)). It is recommended that the RCP4.5 IDF curves be used to estimate Project conditions as they reflect realistic precipitation changes due to climate change for an intermediate stabilization scenario, as presented on Figure 4.5-2.

Figure 4.5-2: Intensity-Duration-Frequency Curves for Pukaskwa National Park Station – RCP4.5, Projection Period 2010-2040 (Schardong et al., 2020)



4.5.1.3 Local Watersheds

Watershed delineations were updated from the original baseline report (Calder 2012) using a satellite light detection and ranging (LIDAR) derived digital elevation mode (DEM) as the topographic data source in order to enhance the accuracy of the watershed boundaries using the best available data source. Local watersheds identified within the SSA are presented on Figure 4.5-3.

The naming convention for the watersheds were kept consistent with the Calder (2012) report for consistency. In addition to the original 8 watersheds (101 to 108) identified by Calder (2012), an additional 8 watersheds (109 to 117) were delineated. One watershed (117) was previously included in Calder (2012) as part of watershed 103; however, upon further review of the LIDAR DEM, two separate watercourses were observed to discharge to the Pic River.

Further field-based assessments were conducted as a quality assurance/quality control measure, which resulted in the following:

- Watershed 109 - Clarification that the lake network south of Rag Lakes (watershed 109) originally considered to flow towards watersheds 101 or 116 actually drains via south towards a wetland with no discharge pathway, indicating a possible connection into the groundwater system at the south end of the lake network, and therefore was kept within watershed 109

- Watershed 105 – Clarification that L5 (Canoe Lake), which receives water from headwaters to the north and discharges to both the east and west due to beaver activity within the lake, was observed to be flowing predominantly to the west into watershed 105, and therefore has been left within watershed 105

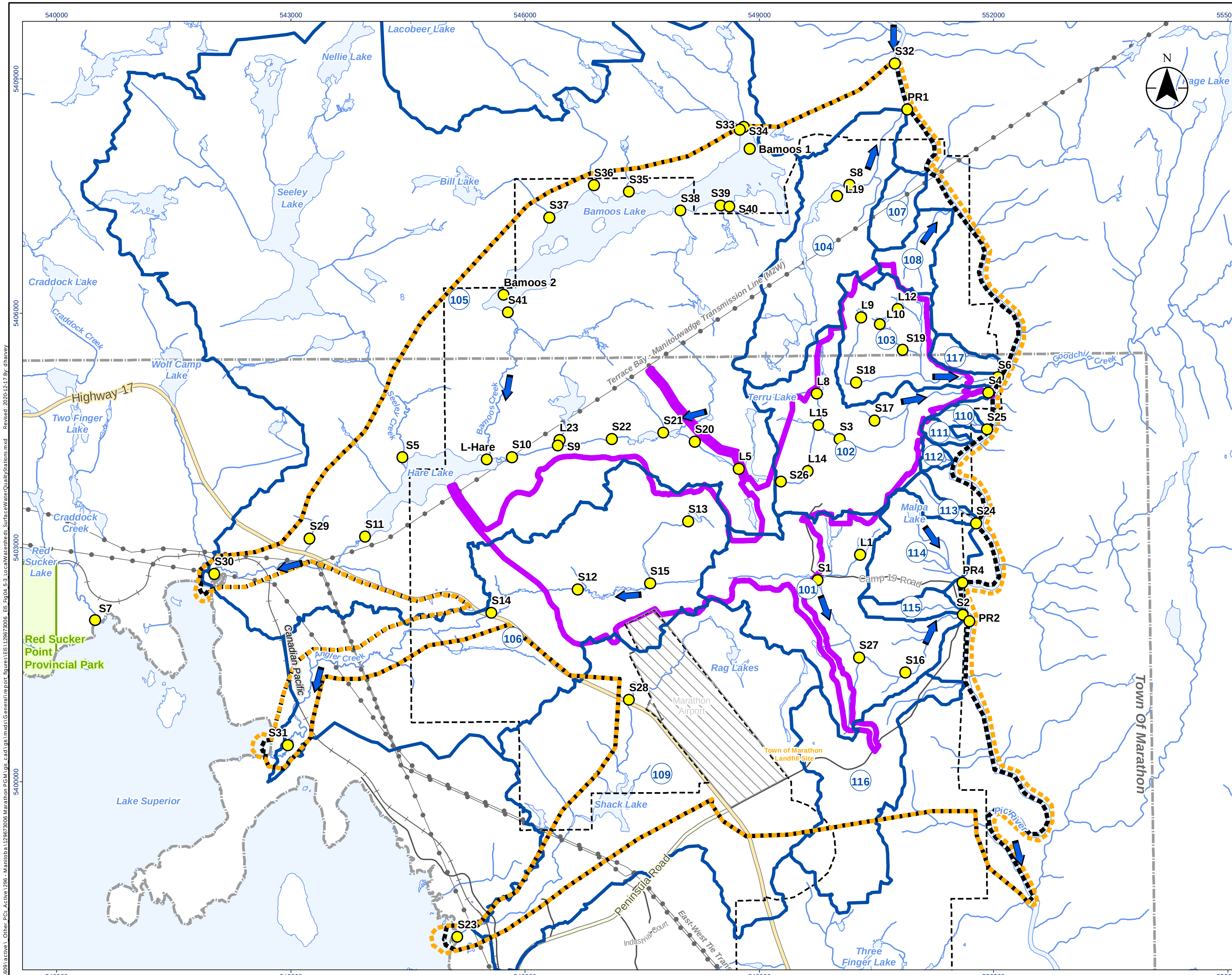
Revisions to the SSA to reflect refinements in project design (some initiated to avoid encroachment on specific watersheds) resulted in watersheds 107, 110, 113, 114, 115, and 117 no longer having portions of their watersheds within the SSA; however, the local hydrology assessment completed for the identified watersheds outside of the SSA have been left in the *Updated Baseline Hydrology Conditions* (Stantec, 2020d).

The summary of the local watersheds is presented in Table 4.5-4 with area from LIDAR data and watershed characterizations from the Ontario Flow Assessment Tool and is shown on Figure 4.5-3.

Table 4.5-4: Local Watersheds Within SSA

Watershed ID	Area (km2)	Mean Slope (%)	Area of Waterbodies (%)	Land Cover
101	4.538	17.307	3%	Deciduous Trees (38.1%)
102	3.495	20.918	4%	Mixed Trees (35.4%)
103	1.867	13.27	4%	Deciduous Trees (45.0%)
104	3.457	18.733	4%	Deciduous Trees (52.1%)
105	47.826	17.846	11%	Mixed Trees (45.1%)
106	10.523	11.025	3%	Mixed Trees (39.8%)
107	0.501	18.811	0%	Deciduous Trees (45.3%)
108	0.567	22.153	0%	Deciduous Trees (34.8%)
109	12.037	6.795	9%	Coniferous Trees (30.8%)
110	0.133	12.242	0%	Deciduous Trees (60.7%)
111	0.121	19.041	0%	Deciduous Trees (76.5%)
112	0.109	23.742	0%	Deciduous Trees (83.5%)
113	0.240	17.75	0%	Deciduous Trees (82.3%)
114	1.344	20.16	2%	Deciduous Trees (43.1%)
115	0.311	15.515	0%	Deciduous Trees (54.8%)
116	2.935	12.431	0%	Deciduous Trees (50.3%)
117	0.261	13.575	0%	Deciduous Trees (72.5%)

In comparison to the *Final Report Baseline Hydrology* (Calder, 2012), watershed 103 has an area 13% smaller than originally presented and watershed 108 has an area 7% greater. The remaining identified six watersheds (101, 102, 104 through 107) within the SSA, are reasonably consistent in area.



Stantec

Legend

Type

- Surface Water Local Study Area
- Surface Water Regional Study Area
- Approximate Limit of Surface Rights (current and/ or planned)
- Site Study Area Boundary
- Surfacewater Quantity Sampling Station
- Surface Water Flow Direction
- Highway
- Major Road
- Minor Road
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Provincial Park
- Waterbody
- Watershed Boundary

0 1 2 km

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Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2020-12-17
Technical Review by ABC on yyyy-mm-dd
Independent Review by ABC on yyyy-mm-dd

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
4.5-3

Title
Local Watersheds and Surface Water Quality Stations

4.5.1.4 Regional Hydrology

Regional relationships were developed for hydrologic data extracted from the Water Survey of Canada (WSC) regional flow gauging stations to apply to local hydrological conditions. Rationale for the selection of appropriate WSC stations, and the relationship between flow and catchment area to be used to estimate local hydrological conditions in the LSA (mean annual flow, mean monthly flow, peak flows, low flows, environmental flows) are presented in Section 6.1.4 of the *Updated Baseline Hydrology Conditions* (Stantec, 2020d).

4.5.1.5 Local Hydrology

The relationships derived from the regional hydrology assessment were used to characterize the local hydrology. Mean annual flows, mean monthly flows, peak flows, and low flows were calculated for the local watersheds, and used to determine the environmental flows and environmental water balance for the Project.

In general, with the continuation of field hydrometric monitoring, rating curve confidence was increased which, combined with the longer record of precipitation data, resulted in an improved understanding of the local hydrology. The improved hydrological data resulted in changes in the peak flows and low flows presented by Calder (2012), as follows:

- Peak flows were compared to the Calder (2012) peak flows for watershed 104, 107, and 108, which were calculated for the entirety of the watershed rather than at a stream gauge node as with watersheds 101, 102, 103, 105, and 106. It was found that there was a difference with the updated hydrology peak flows showing a range of 20% to 68% smaller peak flows than original calculated by Calder (2012), with the difference in watershed area only ranging from a 2% to 7% increase when comparing the updated hydrology peak flows to Calder's (2012). Therefore, the difference in watershed area did not account for the difference observed in the peak flows.

- When comparing low flows to the Calder (2012) low flows for watershed 104, it was found that there was a difference with the updated hydrology peak flows. Watersheds 107 and 108 were not included in the comparison as Calder (2012) reported them to be <0.001. The difference between the Calder (2012) low flows and updated hydrology low flows showed a range of 88% for both $7Q_{10}$ and $7Q_{20}$, with a 2% difference in watershed area.

Based on the use of multiple assessment methods including regional hydrological assessment, local field hydrology, baseflow index assessment, environmental water balance and estimates of groundwater recharge conducted in the *Revised Hydrogeology Baseline Report* (True Grit Consulting Ltd., 2012b) (SID14) (CIAR #233), there is reasonable alignment regarding the nature of local hydrological flows indicating that overland flow is the dominant component of total streamflow, while recharge and groundwater discharge play a less proportional role.

4.5.2 Hydrogeology

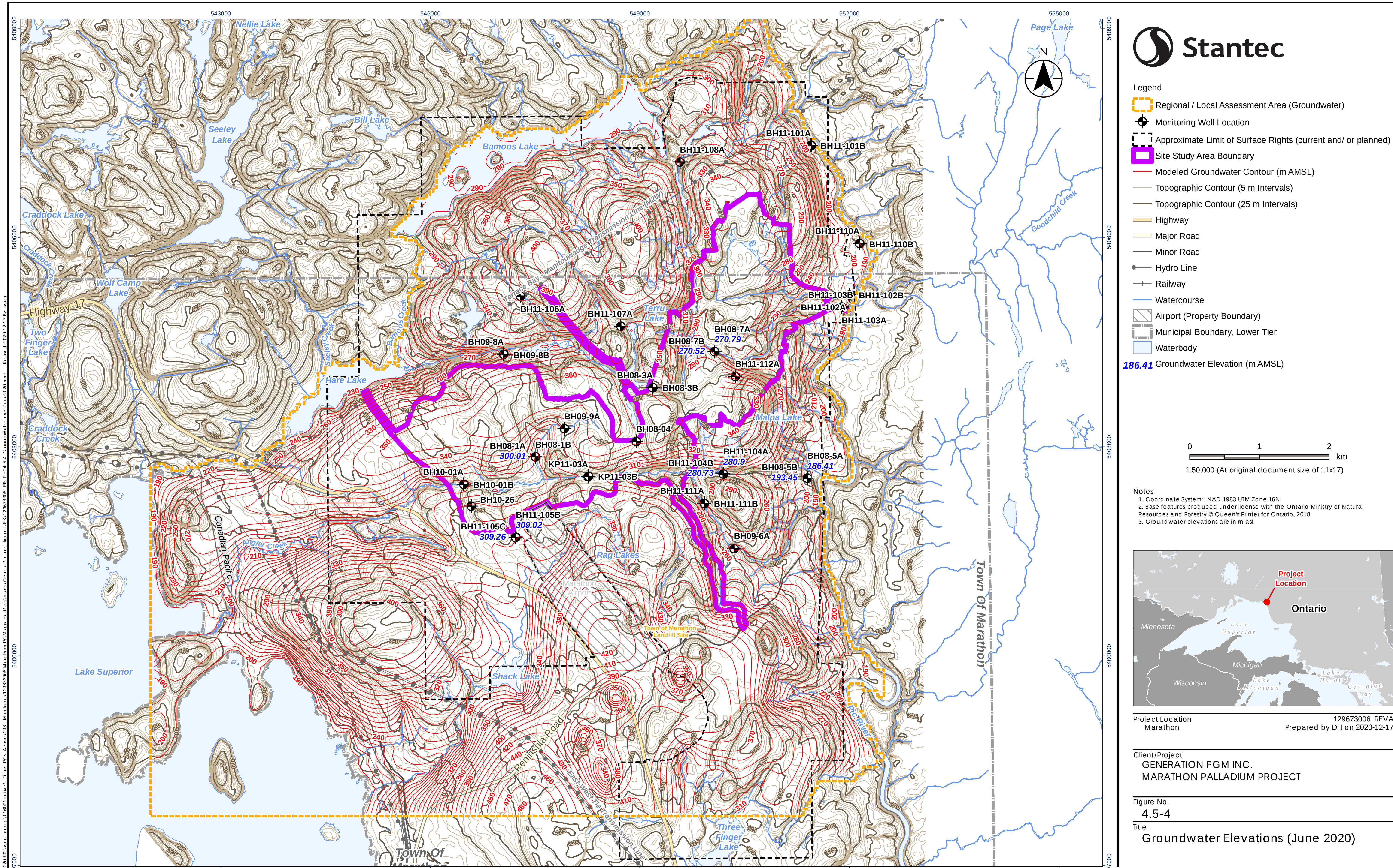
4.5.2.1 Groundwater Elevations

The interpretation of groundwater elevations and flow direction was consistent with that presented in the *Revised Hydrogeology Baseline Report* (True Grit Consulting Ltd., 2012b). Groundwater levels measured in the SSA in 2012, 2013, and 2020 were within the range of historical results from 2008 to 2011 (+/- 0.25 m) for each monitored location.

Within overburden, groundwater levels at a given monitoring well fluctuated from 0.26 m to 2.19 m with an average of 1.03 m over the monitored period (2008 to 2013 and 2020). Within bedrock, groundwater levels at a given monitoring well fluctuated from 0.28 m to 2.79 m with an average of 1.36 m over the monitored period (2008 to 2013 and 2020). Artesian wells were observed in low lying areas (BH08-1A/B, BH08-3A/B, BH10-01B, BH11-104A/B) where the groundwater level was measured above ground surface. There were no flowing artesian wells observed within the SSA during the monitoring events except at bedrock monitoring well BH08-1A where the water level was generally above the top of the well casing in spring and summer 2009.

The modelled groundwater flow map presented in the 2012 baseline report is included as Figure 4.5-4, with the supplemental June 2020 groundwater level data presented on the figure for comparison purposes. As shown on Figure 4.5-4, the 2020 groundwater level data is consistent with the results of the modelled baseline groundwater levels and flow directions. In general, groundwater elevations are a subdued expression of the topography with a shallower depth to the water table in valleys and at lower elevations and a greater depth to the water table at higher elevations. Groundwater flow is controlled by topography, with recharge associated with topographic highs and discharge associated with topographic lows.

As shown on Figure 4.5-5, which presents continuous and manual groundwater elevation data obtained between June 3 and July 22, 2020, there is generally a water level response to precipitation events in wells completed in bedrock and overburden. The similar water level responses at nested well pairs supports the previous assessment that overburden and shallow bedrock are hydraulically connected. The supplemental groundwater elevation data collected in 2012, 2013, and 2020, as presented in the *Environmental Hydrogeology Updated Baseline Report* (Stantec, 2020e), supports the interpretation presented in the *Revised Hydrogeology Baseline Report* (True Grit Consulting Ltd., 2012b).



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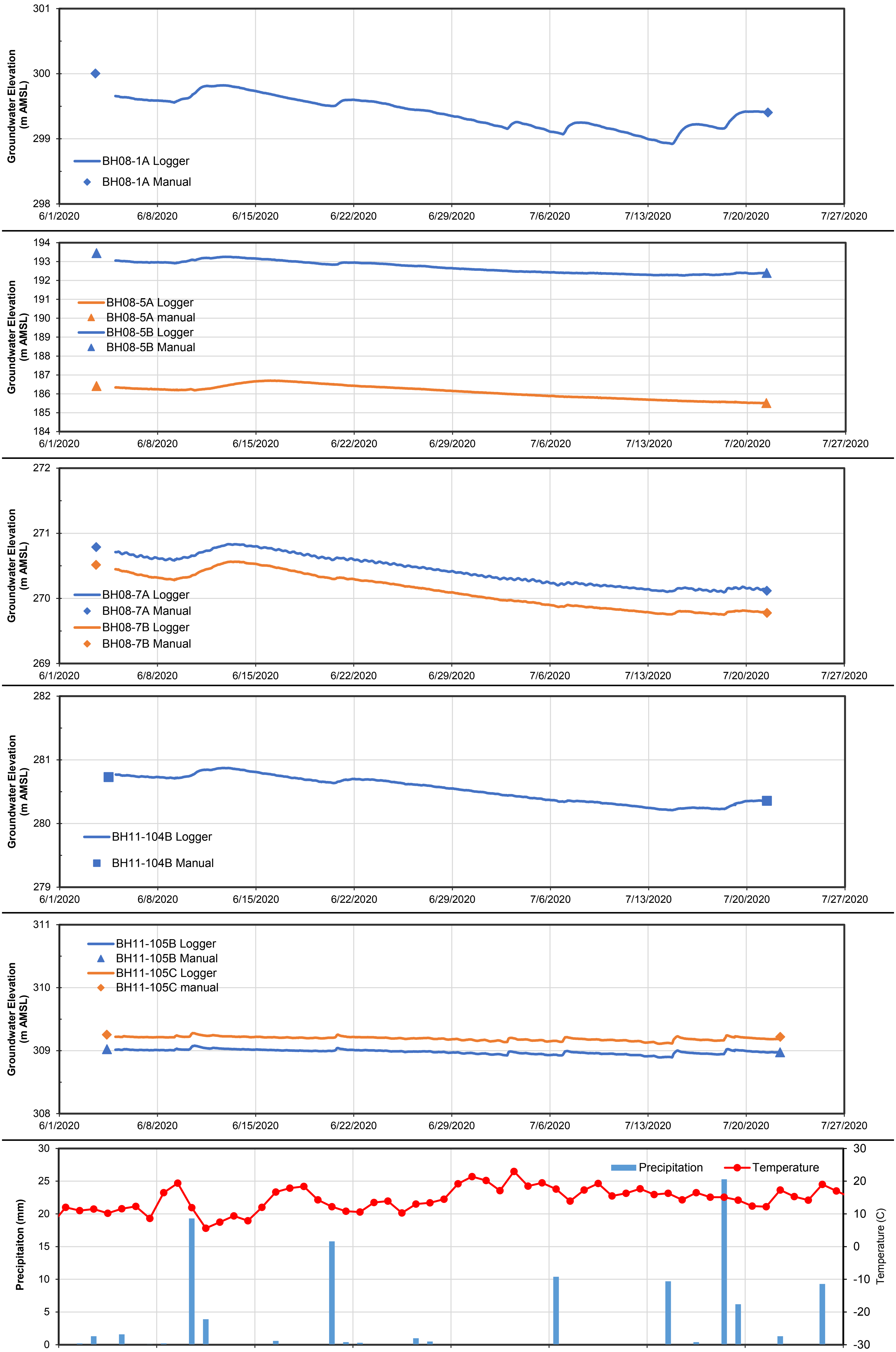

Notes:

Precipitation and temperature data were obtained from Environment Canada for the Pukaskwa (AUT) Climate Station (ID 6046768), accessed August 2020.

Client/Project

Marathon PGM Project
Hydrogeology Baseline Update Report
Generation PGM Inc.

Figure No.

4.5-5

Title

Groundwater Hydrographs

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4.5.2.2 Groundwater Quality

Groundwater from monitoring wells BH08-1B, BH08-3B, BH08-5A/B, BH08-7B, BH09-8B, BH10-01A, BH11-101A/B, BH11-102A/B, BH11-103A/B, BH11-104B, BH11-105B/C, BH11-110A/B, and BH11-111B are considered to represent overburden groundwater quality in the SSA (refer to Figure 4.5-4 for monitoring well locations).

The groundwater quality results from samples collected in 2012, 2013, and 2020 are consistent with the historical groundwater quality data presented in the *Revised Hydrogeology Baseline Report* (True Grit Consulting Ltd., 2012b). There is some variability evident in groundwater quality data at some overburden wells compared to historical; and this is interpreted to be related to temporal/seasonal variability.

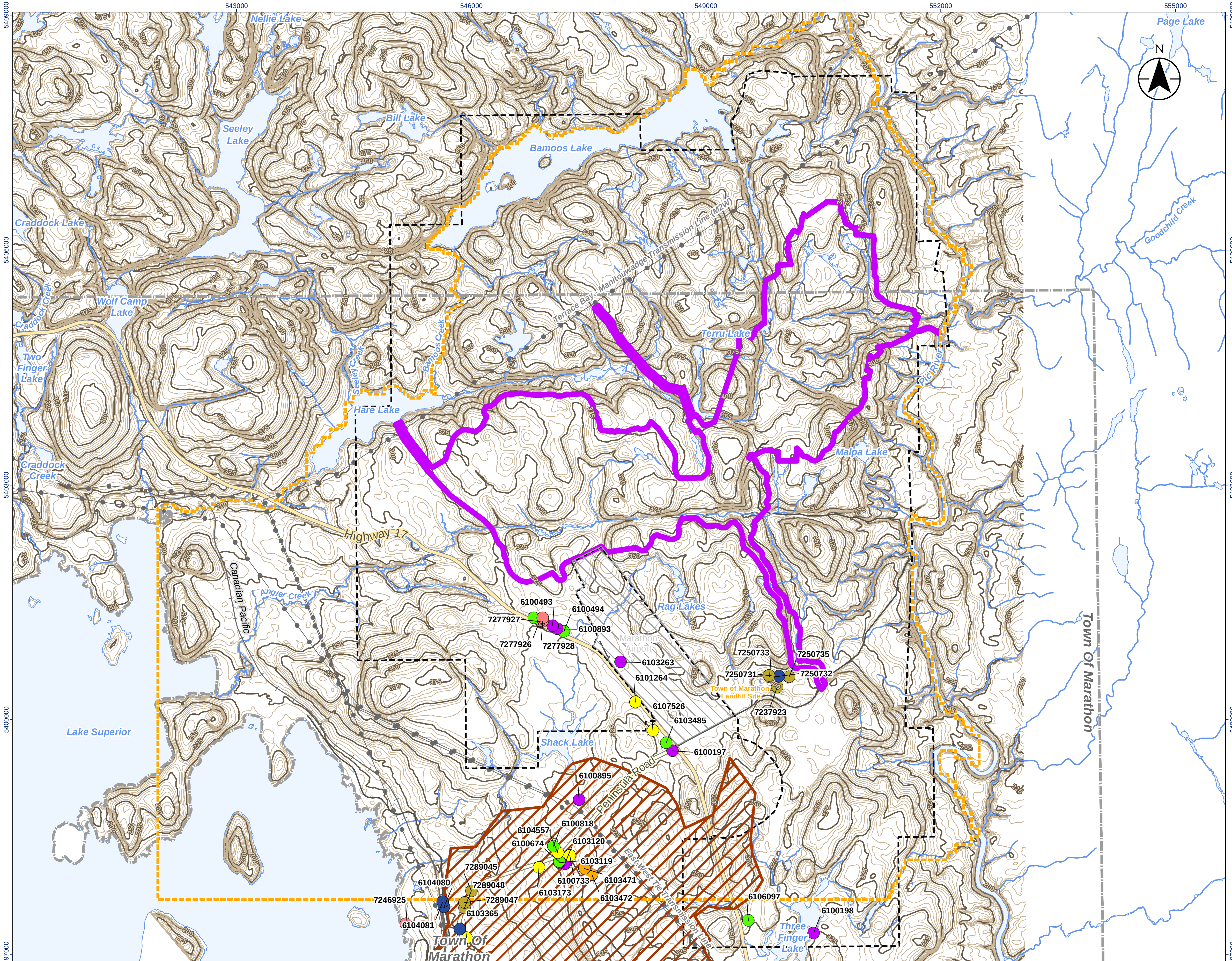
The background groundwater quality generally met the GCDWQ and/or ODWQS for the parameters analyzed except for hardness, dissolved organic carbon, colour, iron, and manganese, which is typical of groundwater in Ontario and are reflective of the natural mineralization and geochemical processes in the area. None of the exceedances are human health related. Irregular exceedances (one or two samples at a given location or consistently at a limited number of locations relative to the size of the monitoring network) of the GCDWQ and/or ODWQS for TDS, pH, turbidity, alkalinity, fluoride, sulphate, aluminum, antimony, and uranium were observed.

The ODWQS for arsenic and uranium were updated since the 2012 Hydrogeology Baseline Report (True Grit Consulting Ltd., 2012b) to more stringent criteria. None of the samples collected had concentrations that exceeded the more stringent ODWQS except for one or more samples collected from overburden monitoring wells BH08-5B, BH11-101A, BH11-101B, BH11-103A, and BH11-110A for arsenic and BH11-101A for uranium.

4.5.2.3 Water Wells

Figure 4.5-6 presents MECP water well records for the SSA, LSA, and RSA based on a search of the MECP water well records database on October 7, 2020. There were no new water well records identified since the previous search was completed on September 21, 2011 as part of the *Revised Hydrogeology Baseline Report* (True Grit Consulting Ltd., 2012b). There are 39 well records within 10 km of the approximate centre of the SSA. The nearest documented supply wells to the SSA are along Highway 17 and are associated with businesses (i.e., motels, gas stations, and restaurants) and the airport.

The water supply for the Town of Marathon is obtained from five groundwater supply wells located throughout the community of Marathon. The groundwater supply wells are completed in the overburden and have maximum supply capacities ranging from 19.25 L/s to 32 L/s (Marathon, 2020). The groundwater protection zones for the water supply wells are presented on Figure 4.5-6 and was obtained from the Town of Marathon's Official Plan Land Use Schedule E. The groundwater protection zone is located south and southwest of the LSA, extending from the water supply wells located in the Town of Marathon toward the intersection of Highway 17 and Peninsula Road.



Stantec

Legend

- Regional / Local Assessment Area (Groundwater)
- Approximate Limit of Surface Rights (current and/ or planned)
- Site Study Area Boundary
- Topographic Contour (5 m Intervals)
- Topographic Contour (25 m Intervals)
- Highway
- Major Road
- Minor Road
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Town of Marathon Groundwater Protection Zone
- Waterbody

Water Well Records (MECP)

- Commerical
- Domestic
- Monitoring
- Monitoring and Test Hole
- Municipal
- Not Used
- Public

0 1 2 km

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Notes
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Figure No.
4.5-6

Title
Water Well Records

4.5.3 Surface Water Quality

4.5.3.1 Existing Conditions

The original characterization of surface water quality that included a network of 58 sampling locations (refer to Figure 4.5-3 for the location of surface water quality stations) was supplemented through the collection of additional water quality data at representative stations for each subwatershed in the SSA between 2013 and 2019.

The screening of surface water quality results from 2013 to 2019 provides context with respect to future impact assessment. Table 4.5-5 provides a summary of the percentage of instances that water quality samples showed an exceedance for a parameter during the period from 2013 to 2019. Further details with respect to the season this exceedance occurred is provided in Appendix B of the *Water Quality Baseline Report Update* (Ecometrix, 2020c).

Ammonia (N) and un-ionized ammonia exceeded the CWQG on a number of occasions and many of these occurred during the summer (July) sampling period over the long-term. The highest concentrations observed for ammonia occurred in 2017, yet concentrations were much reduced in the same season in 2018 and 2019. Copper, iron and fluoride were consistently above the CWQG and PWQO for the protection of aquatic life at representative subwatershed stations throughout the sampling period (2013 to 2019). Dissolved oxygen was below the CWQG for cold water biota (early life stages = 9.5 mg/L and other life stages = 6.5 mg/L) on several occasions, but most typically during summer (July-August) at representative subwatershed sampling stations. Such low oxygen events were more prevalent in 2016, 2018 and 2019. Similar results were observed in the earlier portion of the time series (i.e. 2008 to 2009). Other parameters had infrequent exceedances of quality criteria which are likely indicative of natural variability within the subwatershed systems over time.

Table 4.5-5: Summary of Surface Water Quality Exceedances (2013 to 2019)

Benchmark	Parameter	Location	Total Count	Count of Exceedance	Percentage of Exceedance (%)
CWQG (CCME)	Aluminum (Al)	S14	5	5	100.0
		S2	7	7	100.0
		S3	3	2	66.67
		S30	6	6	100.0
		S6	5	5	100.0
		S8	3	2	66.67
	Ammonia (N)	S11	15	1	6.67
		S14	15	2	13.33
		S2	15	1	6.67

Table 4.5-5: Summary of Surface Water Quality Exceedances (2013 to 2019)

Benchmark	Parameter	Location	Total Count	Count of Exceedance	Percentage of Exceedance (%)
		S3	15	2	13.33
		S30	15	2	13.33
		S52	15	2	13.33
		S8	15	2	13.33
	Chromium (Cr)	S6	5	1	20.0
	Copper (Cu)	S2	22	19	86.36
		S3	18	18	100.0
		S52	15	15	100.0
		S6	5	5	100.0
		S8	18	18	100.0
	Dissolved Oxygen	S11	21	11	52.38
		S14	19	12	63.16
		S2	20	5	25.0
		S3	17	9	52.94
		S30	21	11	52.38
		S52	14	4	28.57
		S6	5	1	20.0
		S8	17	11	64.71
	Fluoride (F)	S11	20	20	100.0
		S14	19	19	100.0
		S2	21	21	100.0
		S3	18	18	100.0
		S30	20	20	100.0
		S52	15	15	100.0
		S6	4	4	100.0
		S8	18	18	100.0
	Iron (Fe)	S11	21	5	23.81
		S14	20	20	100.0
		S2	22	12	54.55
		S3	18	15	83.33
		S30	21	1	4.76
		S52	15	4	26.67
		S6	5	4	80.0

Table 4.5-5: Summary of Surface Water Quality Exceedances (2013 to 2019)

Benchmark	Parameter	Location	Total Count	Count of Exceedance	Percentage of Exceedance (%)
		S8	18	18	100.0
	Lead (Pb)	S2	22	1	4.55
		S6	5	1	20.0
	Manganese (Mn)	S14	20	4	20.0
		S2	22	1	4.55
		S3	18	2	11.11
	Nitrite-N (NO2-N)	S30	6	6	100.0
	pH	S11	21	1	4.76
		S14	20	5	25.0
		S2	21	2	9.52
		S3	18	1	5.56
		S30	21	3	14.29
		S6	5	2	40.0
		S8	18	1	5.56
	pH (field)	S11	15	5	33.33
		S14	15	3	20.0
		S2	15	1	6.67
		S3	15	1	6.67
		S30	15	3	20.0
		S52	15	4	26.67
		S8	15	4	26.67
	Un-ionized Ammonia (N)	S11	15	8	53.33
		S14	15	9	60.0
		S2	15	7	46.67
		S3	15	6	40.0
		S30	15	7	46.67
		S52	15	7	46.67
		S8	15	6	40.0
	Zinc (Zn)	S14	20	5	25.0
		S2	22	2	9.09
		S3	18	1	5.56
		S30	21	1	4.76
		S52	15	1	6.67

Table 4.5-5: Summary of Surface Water Quality Exceedances (2013 to 2019)

Benchmark	Parameter	Location	Total Count	Count of Exceedance	Percentage of Exceedance (%)
		S6	5	1	20.0
Interim PWQO	Aluminum (Al)-Dissolved	S11	21	17	80.95
		S14	15	15	100.0
		S2	15	5	33.33
		S3	15	3	20.0
		S30	15	12	80.0
		S52	15	7	46.67
		S8	15	1	6.67
	Cobalt (Co)	S14	20	3	15.0
		S2	22	1	4.55
		S3	18	3	16.67
		S6	5	1	20.0
		S8	18	1	5.56
	Copper (Cu)	S2	22	1	4.55
		S3	18	13	72.22
		S52	15	15	100.0
		S6	5	5	100.0
		S8	18	18	100.0
	Phosphorus (P)-Total	S14	20	1	5.0
		S2	22	6	27.27
		S3	18	6	33.33
		S6	5	3	60.0
		S8	18	6	33.33
	Vanadium (V)	S2	22	1	4.55
		S6	5	1	20.0
	Zinc (Zn)	S2	22	1	4.55
		S3	18	1	5.56
PWQO	Chromium (Cr)	S6	5	1	20.0
	Copper (Cu)	S2	22	1	4.55
		S3	18	13	72.22
		S52	15	15	100.0
		S6	5	5	100.0
		S8	18	18	100.0

Table 4.5-5: Summary of Surface Water Quality Exceedances (2013 to 2019)

Benchmark	Parameter	Location	Total Count	Count of Exceedance	Percentage of Exceedance (%)
	Iron (Fe)	S11	21	5	23.81
		S14	20	20	100.0
		S2	22	12	54.55
		S3	18	15	83.33
		S30	21	1	4.76
		S52	15	4	26.67
		S6	5	4	80.0
		S8	18	18	100.0
	pH	S11	21	2	9.52
		S14	20	5	25.0
		S2	21	3	14.29
		S3	18	1	5.56
		S30	21	3	14.29
		S6	5	3	60.0
		S8	18	1	5.56
	pH (field)	S11	15	5	33.33
		S14	15	3	20.0
		S2	15	1	6.67
		S3	15	1	6.67
		S30	15	3	20.0
		S52	15	4	26.67
		S8	15	4	26.67

Notes:

Un-ionized ammonia concentrations were screened against the criteria bounded by a pH of 7.5 and water temperature of 15 degrees Celsius.

Where criteria are derived from hardness, an average hardness of 40 mg/L was used for calculation of metal specific quality criteria.

The information collected throughout the long-term data set indicates that surface water quality has not changed appreciably. This is likely indicative of a lack of development or appreciable change to the subwatersheds over this period. Generally, previous information presented in support of the Project continues to be relevant and sufficient to support the updated effects assessment.

4.6 AQUATIC HABITAT

The *Aquatic Environment Baseline Report Update* (Ecometrix, 2020b) was prepared to summarize and document changes to the existing environmental conditions relating to the aquatic environment, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. The aquatic environment baseline characterization program included multi-year, multi-season surveys of aquatic habitats and communities. The existing characterization of the aquatic environment was re-considered within the context of several factors to assess its suitability to support the updated assessment of potential Project-related effects. Only minor additional information was identified as a need and this information was collected in July 2020 for the small headwater waterbody (L20) and two small unnamed beaver ponds that drain into Lake 8 and Lake 15 via stream networks S76-77 and S78. The following is a summary of the findings.

4.6.1 Fish and Fish Habitat

Overall, minnow-trapping in 2020 corroborated previous assessments of fish communities. Low numbers of brook stickleback were caught in L8 and its downstream tributary linking it to L15. Although no fish were caught in L15, brook stickleback is expected to be present since there are no barriers to fish passage in the 50 m of connecting stream reach. Absence of fish in traps in L15 may be due to the recently flooded (due to beaver activity) margins where the traps were set, and possibly the presence of a large number of predacious diving beetle larvae (*Coleoptera: Dytiscidae*) in traps.

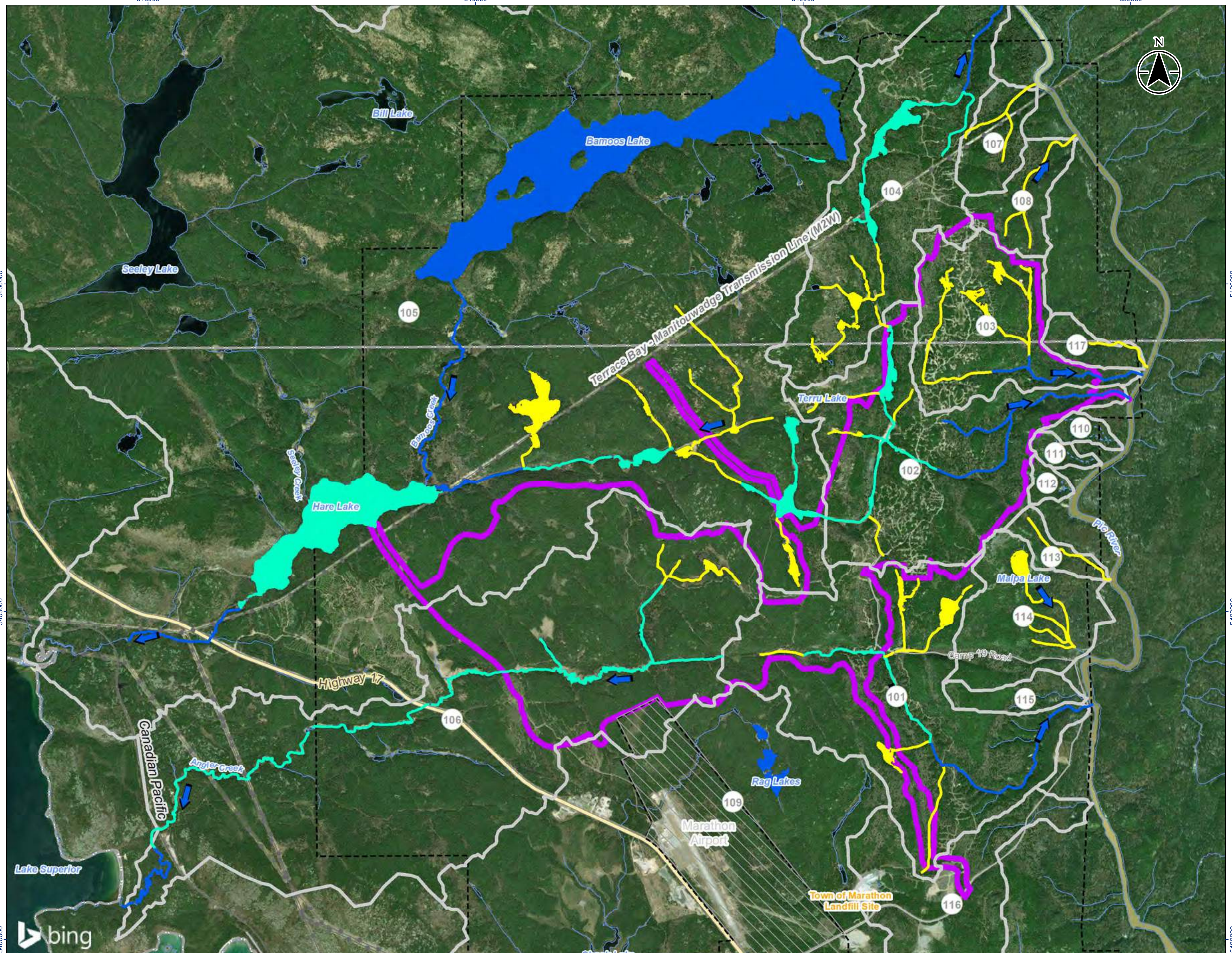
One brook stickleback was observed in the lower reach of Stream S77 and several others were observed in the shallow water at its mouth. No fish were found farther upstream or in Terru Lake due to multiple 0.5-1m+ vertical or near vertical drops along the stream channel.

Upstream passage to Terru Lake is not considered possible from L8. Fish presence in Terru Lake would therefore require anthropogenic introduction or post-glacial dispersal during significantly higher water levels. In addition, in the absence of upstream dispersal, is not clear if Terru Lake would be deep enough to prevent winterkill from anoxia without the presence of a beaver dam at its outlet (i.e., continued presence of Terru Lake fish communities might have required continuous post-glacial presence of a beaver dam).

No fish were found in Stream S78 or in the upstream beaver pond to the west. The maximum depth of the beaver pond is approximately 1 m, and it may experience anoxia during winter months thus precluding continued fish presence. Upstream passage from L15 via S78 is not possible due to the high gradient and multiple 1+ m vertical drops.

As described in the original baseline aquatic environment documentation, much of the interior of the project is fishless with limited upstream dispersal potential. Coldwater fish habitat is provided in the LSA in tributaries to the Pic River and Lake Superior that is utilized by a variety of resident and migratory species. Currently, Hare Lake supports a predominantly coolwater fish community with Yellow Perch and Northern Pike the most abundant large-bodied fish species. Limited coldwater species remain.
Figure 4.6-1 identifies the fish-bearing and non-fish-bearing waters within the SSA and LSA.

Several species of fish identified as having importance to Indigenous peoples are known to occur within the SSA and/or LSA for the Project, as identified in Table 4.6-1.



Stantec

Legend

- Approximate Limit of Surface Rights (current and/ or planned)
- Site Study Area Boundary
- Surface Water Flow Direction
- Cool/ Warm Water Fish
- Cold/ Cool Water Fish
- No Fish
- Highway
- Hydro Line
- Railway
- Watercourse- Permanent
- Watercourse- Intermittent
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Waterbody
- Watershed Boundary

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Notes

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Project Location
Marathon

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Prepared by DH on 2020-12-17
Technical Review by ABC on yyyy-mm-dd
Independent Review by ABC on yyyy-mm-dd

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MARATHON PALLADIUM PROJECT

Figure No.
4.6-1

Title
Location of Fish Bearing Waters in Proximity to the Project

Table 4.6-1: Fish Species of Importance to Indigenous Peoples with SSA and LSA

Species of Interest to Indigenous Peoples		Recorded in the SSA and/or LSA	
Species Names	**Scientific Name**	**SSA**	**LSA**
Brook Trout (Speckled Trout)	*Salvelinus fontinalis*	present (Stream 2 only)	wider distribution in the LSA
Burbot	*Lota*	not found	present in LSA (Hare lake, Bamoos Lake and Lake Superior)
Lake Chub	*Leuciscidae (family)*	present	present in LSA (one of the most widely distributed forage fish species)
Cisco	*Coregonus artedi*	not found	Dwarf and Normal forms present in LSA (Hare Lake, Bamoos Lake and Lake Superior)
Coho Salmon	*Oncorhynchus kisutch*	Not found	present in LSA
Lake Sturgeon	*Acipenser fulvescens*	not found	present in the LSA (Pic River)
Lake Trout	*Salvelinus namaycush*	not found	present in LSA (Hare Lake, Bamoos Lake and Lake Superior)
Longnose Dace	*Rhinichthys cataractae*	not found	present in the LSA
Muskellunge	*Esox masquinongy*	not found	present in the LSA (Pic River)
Northern Pike	*Esox lucius*	not found	present in LSA (Hare Lake, Bamoos Lake and Lake Superior embayments)
Yellow Perch	*Perca flavenscens*	not found	present in LSA (Hare Lake, Shack Lake and Lake Superior)
Rainbow Smelt	*Osmerus mordax*	not found	present in LSA (Hare Lake, Pic River and Lake Superior embayments)
Rainbow Trout	*Osmerus mordax*	present (Stream 2 only)	present in LSA (Hare Lake, Lower Reaches of Lake Superior and Pic River tributaries, Pic River, Bamoos Lake and its outlet)
Slimy Sculpin	*Cottus cognatus*	present (Stream 2 only)	wider distribution in the LSA (Hare Lake, Lower Reaches of Lake Superior and Pic River tributaries, Bamoos Lake and its outlet)
Splake	*Salvelinus fontinalis x S. namaycush*	not found	not found in LSA (historically stocked in Hare Lake)
Sucker	*Catostomus sp.*	not found	White Sucker and Longnose Sucker present in LSA
Threespine Stickleback	*Gasterosteus aculeatu*	not found	present in LSA (lower reach of Stream 6 (Angler's Creek) and Lake Superior embayments)
Walleye (Pickerel)	*Sander vitreus*	not found	present in LSA (Pic River and Lake Superior embayments)

Table 4.6-1: Fish Species of Importance to Indigenous Peoples with SSA and LSA

Species of Interest to Indigenous Peoples		Recorded in the SSA and/or LSA	
Species Names	**Scientific Name**	**SSA**	**LSA**
White fish	*F. Salmonidae*	not found	present in LSA (Lake Whitefish in Hare Lake, Bamoos Lake, and Lake Superior embayments; Round Whitefish in Lake Superior embayments)

Source: Adapted from Table 6.1 of the *Aquatic Environment Baseline Report Update* (Ecometrix, 2020b)

4.6.2 Sediment Quality and Benthos

Following the submission of the original EIS (2012), focused sampling was undertaken to supplement existing baseline data. This information was presented in response to IR #12.2.1 (CIAR #396), IR #12.13 (CIAR #375) and AIR #10 (CIAR #655) specifically pertaining to benthic invertebrate sampling completed at stations S30 (Hare Creek) and S31 (Stream 6).

The sampling conducted was consistent with the requirements of the federal Environmental Effects Monitoring Program under the Metal Mining Effluent Regulations[2] (*Fisheries Act*) in terms of sampling methodology and rigour, taxonomic analyses and data analysis.

Zooplankton and phytoplankton samples were also collected in Hare Lake in September 2013, and then again in June, July, August and September of 2014.

The sediment quality information presented in the original EIS (2012) did not require updating.

4.6.2.1 Benthos

4.6.2.1.1 Hare Creek

Benthic samples were collected at five replicate stations at S30, Hare Creek downstream of the Highway 17 crossing, with a standard Surber sampler fitted with a 500-micron mesh net in 2013. Total taxa numbers at S30 were on the order of 50 with the EPT taxa comprising about 80% of total density.

4.6.2.1.2 Stream 6

Five replicates samples were collected via Ekman grab at S31, the lower reach near Lake Superior, in 2013. At S31, invertebrate density was, on average, low (< 100 animals/m^2).

[2] Now Metal and Diamond Mining Effluent Regulations (MDMER)

4.6.2.2 Primary Productivity (Zooplankton and phytoplankton)

4.6.2.2.1 Hare Lake

Depth-integrated samples were collected for characterization of chlorophyll a (Chl a), phytoplankton and zooplankton from three locations in Hare Lake between September 2013 and September 2014. The 2014 data provide an indication of seasonal variation as monthly samples were collected between June and September.

Chl a concentrations, and the biovolume of plankton, increased between June and July, was similar in August, and then decreased in September. Chl a concentrations ranged from 0.95 to 1.15 ug/L, from 1.53 to 1.97 ug/L, from 1.4 to 1.5 ug/L, and from 1.07 to 1.34 ug/L in June, July, August and September, respectively.

A total of 19 phytoplankton taxa were identified in June, with the majority of phytoplankton biovolume composed of taxa from the green and blue-green algae. A total of 19 zooplankton taxa were identified in June, with the majority of zooplankton biovolume comprised of copepod taxa.

A total of 29 phytoplankton taxa were identified in July, with the majority of phytoplankton biovolume composed of taxa from the green and blue-green algae. A total of 19 zooplankton taxa were identified in July, with the majority of phytoplankton biovolume composed of copepod taxa and the cladoceran *Diaphanosoma*.

A total of 27 phytoplankton taxa were identified in August, with the majority of phytoplankton biovolume composed of taxa from the green and blue-green algae. A total of 17 zooplankton taxa were identified in August, with the majority of phytoplankton biovolume comprised of copepod taxa and the cladoceran *Diaphanosoma*.

A total of 22 phytoplankton taxa were identified in September, with the majority of phytoplankton biovolume composed of taxa from the green and blue-green algae. A total of 13 zooplankton taxa were identified in September, with the majority of phytoplankton biovolume composed of copepod taxa and the cladoceran *Bosmina*.

4.7 TERRAIN AND SOILS

The *Soils Baseline Report Update* (Ecometrix, 2020a) was prepared to:

- provide a general understanding of terrain, surficial soils and overburden characteristics within the Project footprint,
- to characterize baseline surficial soil chemistry at air quality sampling locations that may be used in the future to monitor fugitive air emissions from the site,
- to characterize overburden volume in areas where overburden will be removed, and

- to describe the acid generation and metal leaching potential of overburden materials that will be excavated and subsequently stored to accommodate the construction of Project-related infrastructure on site.

Generally, this information continues to be relevant and sufficient to support the updated effects assessment. Some updated baseline soils information has been provided for a new proposed plant site location and access road alignment. The following is a summary of the findings.

4.7.1 General Site Geography

On a regional scale, the overburden is derived from till veneer and, to a lesser extent, fine- and coarse-grained glaciolucustrine material. Podzols are the dominant soil type. Within the SSA, the topsoils and overburden are typically relatively thin layers and there are extensive areas of bedrock outcrops. The Pic River flood plain is composed of thick deposits of sand and sandy silts and clays.

4.7.2 Physical Characterization of Overburden and Soils at the Project Site

The physical description of soil and overburden materials is summarized by site aspect in Table 4.7-1

Table 4.7-1: Summary of the Physical Description of Soil and Overburden Materials

Project Area	Description
Mine Rock Storage Area	The overburden thickness was variable and ranged from approximately 0.5 to 4.2 m. The overburden topsoils were dark brown to black and rich in organic matter with an average thickness of 7.6 cm. The horizons below the topsoil were typically a mix of fine to coarse sand and silt with gravel and boulder fractions. The subsequent layers were rich in silt and clay with some traces of sand. At some sites clay laminations about 1 cm thick were found in the overburden soils.
North Pit	The overburden cover was generally thin in the primary open pit area with cover as shallow as 6.0 cm. There were many areas of exposed bedrock outcrop in this area. The average overburden thickness indicated by drill hole investigations was 2.59 m and, in a few cases, overburden cover was over 6.0 m in depth. Overburden topsoils in the main pit were dark brown to black and rich in organic matter including root material with an average thickness of 7.98 cm. The overburden material was typically composed of sand and silt and in some instances gravel. Below the surface horizon, overburden soils were classified as clayey silts and sandy silts and the occurrence of coarse-grained sand, gravel and cobbles increased with depth. Ground water seepage was not evident as test pit sites remained dry after completion.
Central and South Pits	Overburden thickness was variable at the satellite pit sites and ranges from approximately 0.25 m to 4.0 m. Outcrops of exposed bedrock are found in these areas. The satellite pit sample site topsoils provided the thinnest cover compared to the other sample sites with an average thickness of 6.86 cm. Topsoils were dark brown to black and rich in organic matter and contained rootlets. Underlying soil horizons were light grey to brown in colour and were composed of a mixture of sand, silt and clay and gravel sized fractions. The majority of the test pits sampled in the satellite pit sites remained dry after completion. Seepage was noted at site TP07-14 and was associated with a peat rich layer.

Table 4.7-1: Summary of the Physical Description of Soil and Overburden Materials

Project Area	Description
Process Plant/Mill Site	The overburden thickness at the mill site typically ranged from 0.03 m to 0.61 m. On average, topsoil layers were thickest at the mill site, with an average thickness of 9.91 cm, and were rich in organic material, such as roots and leaf litter. Underlying soil horizons were composed of variable mixtures of silt, sand and clay (clayey-silt and silty-sand horizons were typical). Seepage was evident in the organic rich topsoil layers at sites BH08-3, BH08-9, BH08-11 and TP08-13.
Process Solids Management Facility	The overburden thickness at the PSMF site was generally shallow, with a typical overburden cover of 0.3 m. The overburden cover was thicker at the southernmost end of the PSMF site, where overburden thickness was greater than 11 m. The shallow overburden soils sampled at the PSMF location were reddish-brown to light brown to grey in colour and were predominately sandy with some traces of silt, clay and gravels. Groundwater seepage was encountered at KP11-09 and KP11-38 at a depth of 1.5 and 1.6 m.
Pic River Area	The Pic River area was composed of thick (as much as > 20 m in some places) deposits of sand, silt, and clay with a moist, black topsoil cover ranging from 20 to 30 cm thick. Test pits in the Pic River area both indicated overburden thickness greater than 4.55 m (depth terminated at 4.55 m), consistent with visual inspection of the area's overburden cover. Historically this material is derived from river bedload that has been deposited in the floodplain during times of high water. The overburden stratigraphy generally consisted of clayey silt with trace sand to sand with trace silt for about 1.25 to 2 m below the topsoil cover. Below this depth, the material gradually transitioned into a more clay-rich silt with trace interlayered sands. Test pits in the Pic River flood plain had variable instances of ground water seepage. Grain size distribution was dominantly medium to fine sands with smaller proportions of silt, clay, coarse sands, and gravel.
Proposed Access Road	The overburden thickness at test pit sites along the corridor for the proposed access road were as shallow as 0.1 m and reached a depth greater than 4 m. Bedrock was not encountered at most test pits sites sampled. Overburden cover was over 13 m at one borehole site. Topsoil was 0.21 m thick on average and contained moist, black organic silt or peat material containing rootlets. The overburden soils were generally made up of horizons that had a variable composition and distribution of sand, silt, and clay. The soil horizons beneath the topsoil layer tended to follow a trend of increased silt to sand ratios from south to north along the proposed access road, with increasing clay content with depth along the same trajectory. The occurrence of gravels tended to be in the more sandy horizons, and the gravels became less abundant travelling north along the proposed access road. The soils along the proposed access road, just south of the intersection with the existing access road, tended to have higher silt and clay contents than the soil horizons to the south. With the exception of a single test pit (TP08-2), groundwater seepage was indicated at depths ranging from 1.5 m to 2.6 m; however, groundwater was only indicated in a small percentage of the sites, whereas the rest remained dry after the completed excavation.

Source: Table 2-1 from the *Baseline Soils Report Update* (EcoMetrix, 2020a); For soil sampling locations, refer to Figure 2-1 in the *Baseline Soils Report Update* (EcoMetrix, 2020a) and Figure 1 in the *Baseline Hydrogeology Report Update* (Stantec, 2020e)

4.7.3 Chemical Characterization of Overburden and Soils at the Project Site

The chemical characterization of soil and overburden materials is summarized by site aspect in Table 4.7-2.

Table 4.7-2: Summary of the Chemical Characterization of Soil and Overburden Materials

Project Area	Description
Mine Rock Storage Area	The pH of MRSA topsoils and overburden materials was variable and ranged from 4.22 to 5.22 in the topsoils and from 3.83 to 4.67 in the overburden material, typical of podzolic soils in northern Ontario. The total organic carbon content in the topsoil was relatively high as concentrations ranged from 10.3% to 37.0%. Topsoils sampled at the MRSA were visibly rich in organic matter, as the soils were a rich dark brown to black and contained root material. Carbonate levels were comparatively low, and total organic carbon was found to account for the majority of the total carbon content in the soils. Overburden material was comparatively rich in organic carbon and low in carbonate. Total organic carbon contents in the overburden ranged from 13.4% to 34.1%, with the highest levels occurring at sites "RP-2" and "RP-3" (30.1% and 34.1%). Total sulphur content in the topsoils ranged from 0.01% to 0.069% and from 0.056% to 0.169% in the overburden material. Sulphide contents were either at detection limits or marginally above detection limits in materials. Sulphate accounts for the majority of the sulphur content in the soils, attributed to the presence of sulphate rich minerals, most likely barite. Overburden samples collected from the MRSA were elevated with respect to average crustal abundance concentrations for antimony, arsenic, cadmium, lead, molybdenum and selenium. With the exception of antimony, most samples did not exceed or only slightly exceeded the Ontario Ministry of the Environment[3] (MOE) background standards.
North Pit	Topsoil pH values were variable and ranged from 3.95 to 5.08; overburden pH values ranged from 5.60 to 6.09. Total organic carbon was greater in the topsoil compared to the overburden material. Topsoil total organic carbon contents ranged from 14.2% to 33.4% and the total organic carbon content in the overburden material ranged from 0.995% to 7.50%. Carbonate content was considered to be low (< 0.02%) in the topsoils and overburden materials. The total sulphur content in the topsoils ranged from the detection limit (0.01%) to 0.101% and from 0.116% to 0.173% in the overburden material. Sulphate was found to account for the majority of the total sulphur content in the soils and overburden material, due to the presence of the sulphate rich mineral barite. Most samples exceeded average crustal abundance concentrations for the selected constituents, but only cobalt, mercury, molybdenum and selenium were found to exceed the MOE background standards.
Central and South Pits	Topsoil pH values ranged from 5.31 to 6.08, and overburden material pH values ranged from 3.83 to 5.98. Total organic carbon was variable in the topsoil samples and ranged from 8.0% to 19.3%. The total organic carbon content of the overburden material was higher than levels found in the topsoil with concentrations ranging from 2.83% to 33.2%. Carbonate content in the topsoil and overburden was low, as total organic carbon content accounted for the majority of the total carbon content. Average total sulphur contents in the topsoil and overburden material samples were 0.042% and 0.151%, respectively. Sulphate levels were found to account for the majority of the total sulphur.

[3] The standards were published by the MOE at that time, now the Ministry of the Environment, Conservation and Parks (MECP).

Table 4.7-2: Summary of the Chemical Characterization of Soil and Overburden Materials

Project Area	Description
	Topsoil and overburden material generally exceeded average crustal abundance concentrations for the selected constituents, but only a few samples exceeded the background standards for cadmium, cobalt, copper, molybdenum and zinc. In most cases the constituents were only marginally elevated with respect to the MOE background levels.
Process Plant/Mill Site	Mill site topsoils were slightly acidic as pH values ranged from 3.80 to 5.56. Overburden material pH values were variable and ranged from 5.39 to 8.06. The more alkaline pH values observed in the overburden at some of the sites can be attributed to the carbonate content in the overburden materials. Carbonate contents at sites “FS-2”, “FS-3” and “FS-4” were 16.1%, 6.48% and 2.19%, respectively. Total organic carbon in the mill site topsoils was high and ranged from 13.7% to 25.3%. The carbonate content of the topsoils was low (<0.2%). Total organic carbon contents were comparatively low in the overburden material as concentrations ranged from 0.581% to 1.99%. As indicated above, carbonate concentrations were relatively high in overburden at three of the five mill area sites. These high carbonate contents may be explained by erratic mineral deposits from glacial outwash, as the soils were developed on glacial tills. Total sulphur contents in the topsoils were low and generally below detection limits (<0.01%). Average sulphur content in the overburden material was 0.11%, with sulphate accounting for much of the total sulphur content. Soils and overburden at the mill site have little potential for acid generation due to these low total sulphur and sulphide contents. Overburden soils were found to be elevated in antimony, arsenic, cadmium, lead, molybdenum, and selenium with respect to average crustal abundance concentrations. Molybdenum and selenium concentrations were found to slightly exceed the MOE background standards. Overburden soils were found to be elevated in antimony, arsenic, cadmium, lead, molybdenum, and selenium with respect to average crustal abundance concentrations. Molybdenum and selenium concentrations were found to slightly exceed the MOE background standards.
Process Solids Management Facility	The pH of the overburden material sampled at the PSMF site was variable with values ranging from 4.61 to 6.42. Material sampled at a depth of 8.8 - 9.4 m (“KP11-05”) were more alkaline with a pH of 8.28, which corresponded to higher carbonate levels in the sample. Total organic carbon contents in the overburden soils sampled were variable and ranged from 0.01% to 7.64%. Carbonate concentrations were generally low. Total sulphur and sulphide contents were found to be below detection limits (<0.01%). All constituent concentrations were either below or only marginally above crustal abundance concentrations. Only molybdenum and selenium concentrations were found to exceed MOE background site standards and were only marginally elevated at a few sites. Overburden material from the PSMF site would be suitable for use as reclamation material.
Pic River	Arsenic, cadmium, lead, selenium, silver and thallium exceeded average crustal abundance levels at both sampling locations in the Pic River flood plain. No constituent exceeded the full depth background site condition standards provided by the MOE.

Table 4.7-2: Summary of the Chemical Characterization of Soil and Overburden Materials

Project Area	Description
Air Quality Monitoring Stations	The soils sampled at the air quality monitoring stations were slightly acidic in nature with an average pH of 5.63. Total organic carbon ranged from 1.98% to 3.38% and carbonate content ranged from 0.05% to 0.09%. Sulphur content was low in the air quality station soils. Average total sulphur, sulphate and sulphide contents were 0.14%, 0.13% and <0.01%, respectively. Soil samples collected from the off-site air quality monitoring stations were elevated in arsenic, cadmium, lead, molybdenum and zinc content with respect to average crustal abundance concentrations. Only molybdenum was found to exceed the MOE standards at the “AP” and “HL” sites. Characterizing the metal content in soils at the air quality monitoring sites was appropriate for establishing baseline soil conditions of off-site locations for use in possible future fugitive air emission studies. This data can be used during later phases of mine life to monitor fugitive dust emissions.
Additional Areas	Sampling sites “Soil 3” and “Soil 5” are not associated with any specific mine-related facility and represent general overburden conditions within the Project area. “Soil 3” is located near the north eastern end of the PSMF and “Soil 5” is located east of the southeast corner of the PSMF and east of the proposed access road. At both sites, constituent concentrations were generally below average crustal abundance concentrations and no constituents were found to exceed MOE standards.

Source: Table 2-2 from the *Baseline Soils Report Update* (EcoMetrix, 2020a); For soil sampling locations, refer to Figure 2-1 in the *Baseline Soils Report Update* (EcoMetrix, 2020a) and Figure 1 in the *Baseline Hydrogeology Report Update* (Stantec, 2020e)

4.7.4 Leach Testing Results

Short-term leach tests (shake flasks) were performed in order to assess the metal leaching potential of overburden materials. For reference purposes only, the soluble concentrations of select constituents were compared to the Provincial Water Quality Objectives (PWQO) (Ministry of the Environment (MOE), 1994). The leach test results are summarized in Table 4.7-3, below.

Table 4.7-3: Summary of the Short-term Leach Tests for Overburden Materials

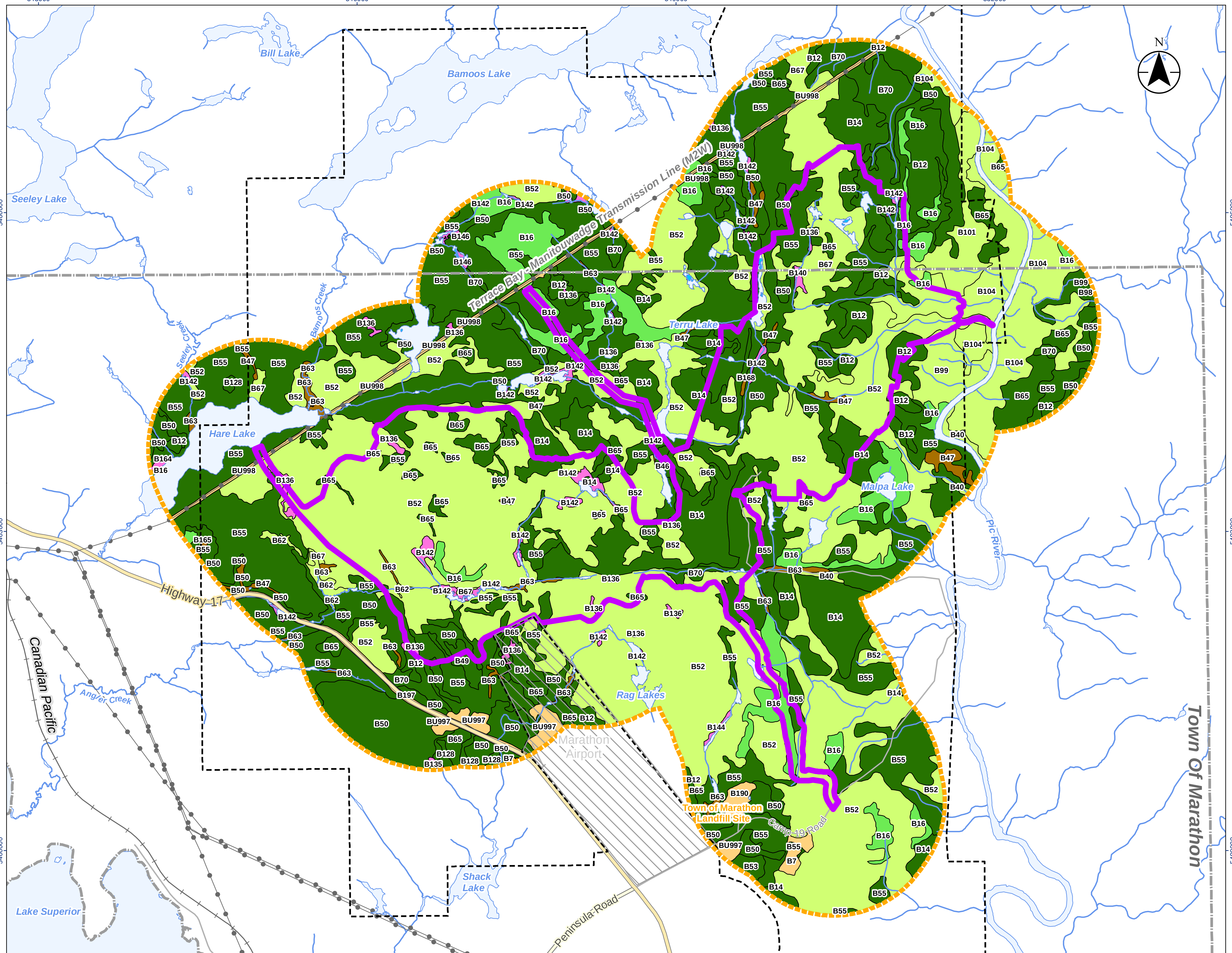
Project Area	Description
Mine Rock Storage Area	The overburden samples were marginally elevated above MOE guidelines for cadmium and cobalt.
North Pit	Soluble copper concentrations exceeded the screening criteria at two locations. Dissolved zinc and cobalt concentrations only marginally exceeded the guidelines.
Central and South Pits	Soluble cobalt concentrations were marginally elevated above MOE guidelines at one location.
Process Plant/Mill Site	Soluble cobalt concentrations were marginally elevated above MOE guidelines at one location.
Process Solids Management Facility	Overburden samples were marginally elevated above MOE guidelines for dissolved copper, cobalt and zinc concentrations.

Source: Table 2-3 from the *Baseline Soils Report Update* (EcoMetrix, 2020a)

4.8 VEGETATION

The *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020) was prepared to summarize and document changes to the existing environmental conditions relating to vegetation and wildlife, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects.

Vegetation communities have not changed substantially since field surveys in 2007-2010 due to the absence of major disturbance such as fire or insect outbreak and the relatively slow rate of forest and succession. Quantification of the extent of ecosite-based vegetation communities has been updated to reflect a refined SSA. Where possible, fieldwork in 2020 confirmed the accuracy of these new ecosite designations and polygon boundaries within the SSA (see Figure 4.8-1 and Table 4.8-1). These ecosite-based vegetation communities will support revised habitat modelling in the updated impact assessment. The following is a summary of the findings.



Stantec

Legend

- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Vegetation Local Study Area
- Highway
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Waterbody

Vegetation Class (Refer to Table 4.8-1 For Ecosite Designations)

- Anthropogenic
- Conifer Forest
- Hardwood Forest
- Mixedwood Forest
- Non-forested Upland
- Non-forested Wetland
- Water and Island

B007 Ecosite Designation

0 1 2 km

1:37,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2020-12-17

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
4.8-1

Title
Vegetation Communities in the LSA

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Table 4.8-1: Summary of Vegetation Communities in the LSA Based on Boreal Ecosites

ES	Description	Vegetation Class	Area (ha)		% of Area	
			LSA	SSA	LSA	SSA
B007	Active Mineral Barren (gravel pit)	Anthropogenic	6.3	0.0	0.2	0.0
B012	Black Spruce-Jack Pine: Very Shallow Soil	Conifer Forest	121.6	41.8	2.9	3.7
B014	Very Shallow, Dry to Fresh: Conifer	Conifer Forest	264.6	110.8	6.4	9.9
B016	Very Shallow, Dry to Fresh: Aspen - Birch Hardwood	Hardwood Forest	180.6	18.1	4.4	1.6
B040	Hardwood-Fir-Spruce Mixedwood: Sandy Soil	Mixedwood Forest	7.4	0.0	0.2	0.0
B046	Fresh, Sandy or Dry to Fresh, Coarse Loamy. Non-treed	Non-forested Upland	0.4	0.0	0.0	0.0
B047	Fresh, Sandy or Dry to Fresh, Coarse Loamy. Non-treed	Non-forested Upland	17.3	3.0	0.4	0.3
B049	Spruce-Pine / Feathermoss: Fresh, Sandy-Coarse Loamy Soil	Conifer Forest	8.0	3.1	0.2	0.3
B050	Dry to Fresh, Coarse: Pine-Black Spruce Conifer	Conifer Forest	304.8	39.7	7.4	3.6
B052	Fir-Spruce Mixedwood: Fresh, Coarse Loamy Soil	Mixedwood Forest	1334.5	537.1	32.3	48.1
B053	Dry to Fresh, Coarse: Conifer. Tall treed	Conifer Forest	5.1	0.0	0.1	0.0
B055	Dry to Fresh, Coarse: Conifer. Low treed	Conifer Forest	1061.6	194.4	25.7	17.4
B062	Hardwood-Fir-Spruce Mixedwood: Fresh, Sandy-Coarse Loamy Soil	Mixedwood Forest	8.4	0.8	0.2	0.1
B063	Moist, Sandy to Coarse Loamy non-treed	Non-forested Upland	17.6	2.4	0.4	0.2
B065	Spruce-Pine / *Ledum* / Feathermoss: Moist, Sandy-Coarse Loamy Soil	Conifer Forest	91.2	26.3	2.2	2.4
B067	Hardwood-Fir-Spruce Mixedwood: Moist, Sandy-Coarse Loamy Soil	Mixedwood Forest	118.0	77.3	2.9	6.9
B070	Spruce-Pine / Feathermoss: Fresh, Fine Loamy-Clayey Soil	Conifer Forest	70.9	4.7	1.7	0.4
B098	Pine-Spruce / Feathermoss: Fresh, Silty Soil	Conifer Forest	8.0	0.0	0.2	0.0
B099	Fir-Spruce Mixedwood: Fresh, Fine Loamy Soil	Mixedwood Forest	31.3	0.8	0.8	0.1
B101	Hardwood-Fir-Spruce Mixedwood: Fresh, Silty Soil	Mixedwood Forest	42.1	2.5	1.0	0.2
B104	Hardwood-Fir-Spruce Mixedwood: Fresh, Silty Soil	Mixedwood Forest	170.8	18.4	4.1	1.6

Table 4.8-1: Summary of Vegetation Communities in the LSA Based on Boreal Ecosites

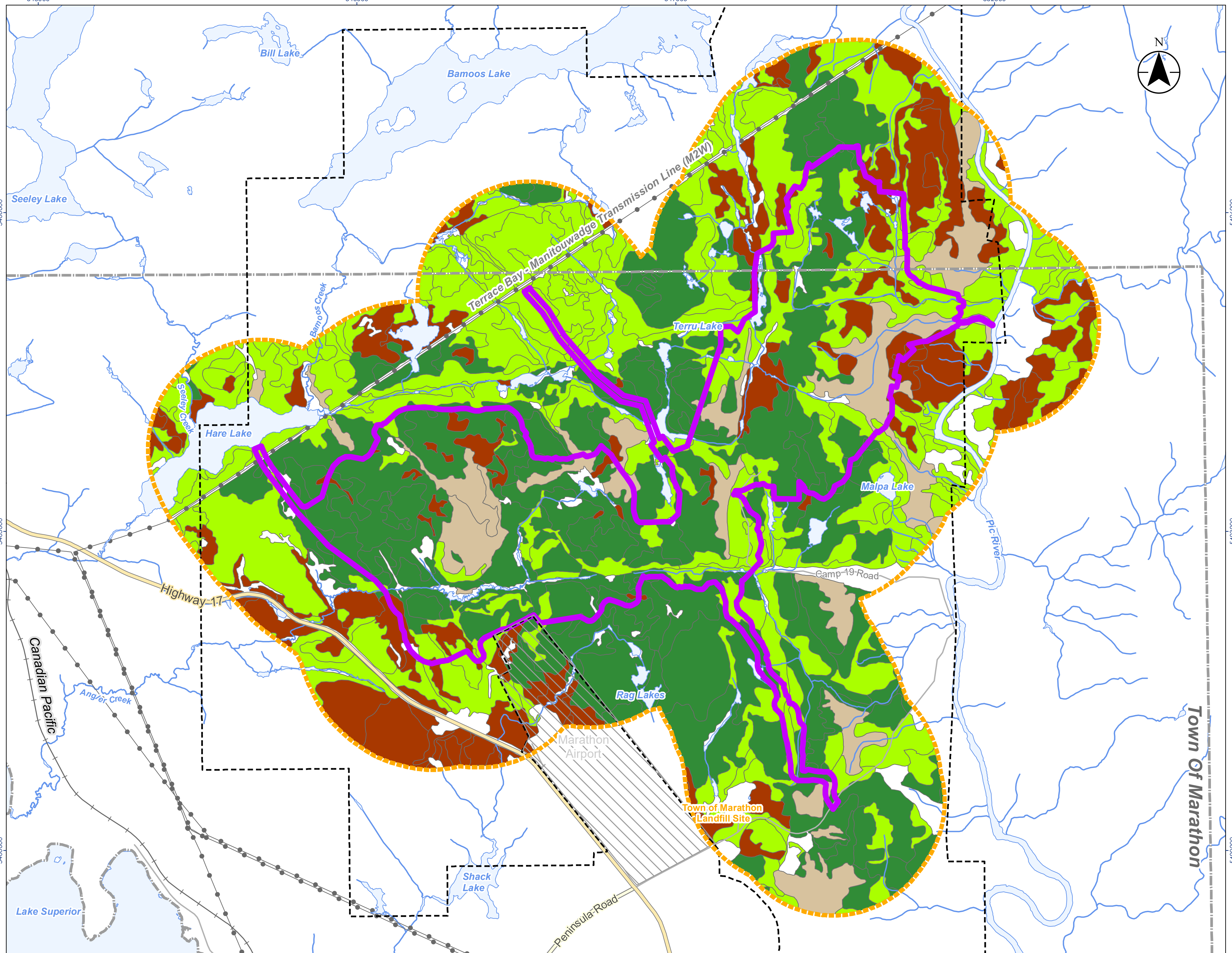
ES	Description	Vegetation Class	Area (ha)		% of Area	
			LSA	SSA	LSA	SSA
B128	Intermediate Swamp: Black Spruce (Tamarack): Organic Soil	Conifer Forest	7.3	0.0	0.2	0.0
B135	Organic Thicket Swamp	Non-Forested Wetland	0.9	0.0	0.0	0.0
B136	Sparse Treed Fen: Tamarack-Black Spruce/ *Sphagnum*: Organic Soil	Non-Forested Wetland	14.4	4.3	0.3	0.4
B140	Open Moderately Rich Fen	Non-Forested Wetland	1.6	1.6	0.0	0.1
B142	Mineral Meadow Marsh	Non-Forested Wetland	24.6	14.7	0.6	1.3
B144	Organic Meadow Marsh	Non-Forested Wetland	1.0	0.0	0.0	0.0
B146	Shore Fen: Organic Soil	Non-Forested Wetland	1.7	0.0	0.0	0.0
B164	Organic Meadow Marsh	Non-Forested Wetland	0.9	0.0	0.0	0.0
B165	Open Rock Barren	Non-forested Upland	0.4	0.0	0.0	0.0
B168	Open Talus	Non-forested Upland	0.6	0.6	0.0	0.1
B190	Anthropogenic	Anthropogenic	7.0	0.0	0.2	0.0
B197	Anthropogenic	Anthropogenic	16.7	0.0	0.4	0.0
U997	Developed Area (airport)	Anthropogenic	18.7	0.0	0.5	0.0
U998	Existing Transmission Line	Anthropogenic	22.9	0.2	0.6	0.0
	Water & Island	Water & Island	142.0	13.8	3.4	1.2
	TOTAL		4131.4	1116.4	100.0	100.0

Source: Table 5 from the *Terrestrial Environment Updated Baseline Report* (Northern BioScience, 2020)

4.8.1 Forest Communities

Forested communities in the SSA remain largely unchanged from previous descriptions (Harris and Foster 2009, 2012, IR #15.1, IR #23.4.1), although there have been relatively minor changes in areas of different boreal ecosites reflecting the refined SSA (see Figure 4.8-2). Mixedwood forest accounts for approximately 57% of the SSA and a slightly lower proportion (42%) of the LSA with conifer representing the bulk of the remaining vegetation classes by area. Other vegetation classes represent approximately 5.3% of the SSA and 11.5 % of the LSA. Most of the mixedwood and conifer forests are dominated by varying proportions of balsam fir, white spruce, black spruce, and white birch in the overstory. Hardwood forests are relatively uncommon, with trembling aspen more abundant in deeper alluvial soils near the Pic

River. The forests of the SSA exhibit an uneven age distribution, with 272 ha or 25% of the forest cover being overmature (150+ years), about 22% of the forest in the 121-130 year age group, and 29% aged 71-90 years of age. There is almost no area (< 4 ha) in young pre-closure forests (i.e., <40 years of age) due to a lack of recent natural (e.g., fire) or anthropogenic (i.e., harvesting) disturbance.



Stantec

Legend

- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Vegetation Local Study Area
- Highway
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Waterbody

Dominant Tree Species

- Balsam Fir
- White Birch
- Black Spruce
- White Spruce

0 1 2 km

1:37,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2020-12-17

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
4.8-2

Title
Forest Communities in the LSA by Dominant Tree Species

4.8.2 Wetlands

Ecosite boundaries for open wetlands within the SSA were revised based on 2020 field observations and previous information (e.g., Ecometrix 2012; Harris and Foster 2012) (see Figure 4.8-3. In general, wetlands are rather small and limited in development in the SSA, in part due to the small waterbodies, rugged topography, and thin soils. None of the wetlands in the SSA have been formally evaluated for provincial significance (OMNR 2014) but would not meet the criteria due to their very small size, low diversity, limited hydrological function, and paucity of special features.

A variety of types of wetlands were identified within the SSA, the number and size of which are summarized in Table 4.8-2 and shown on Figure 4.8-3.

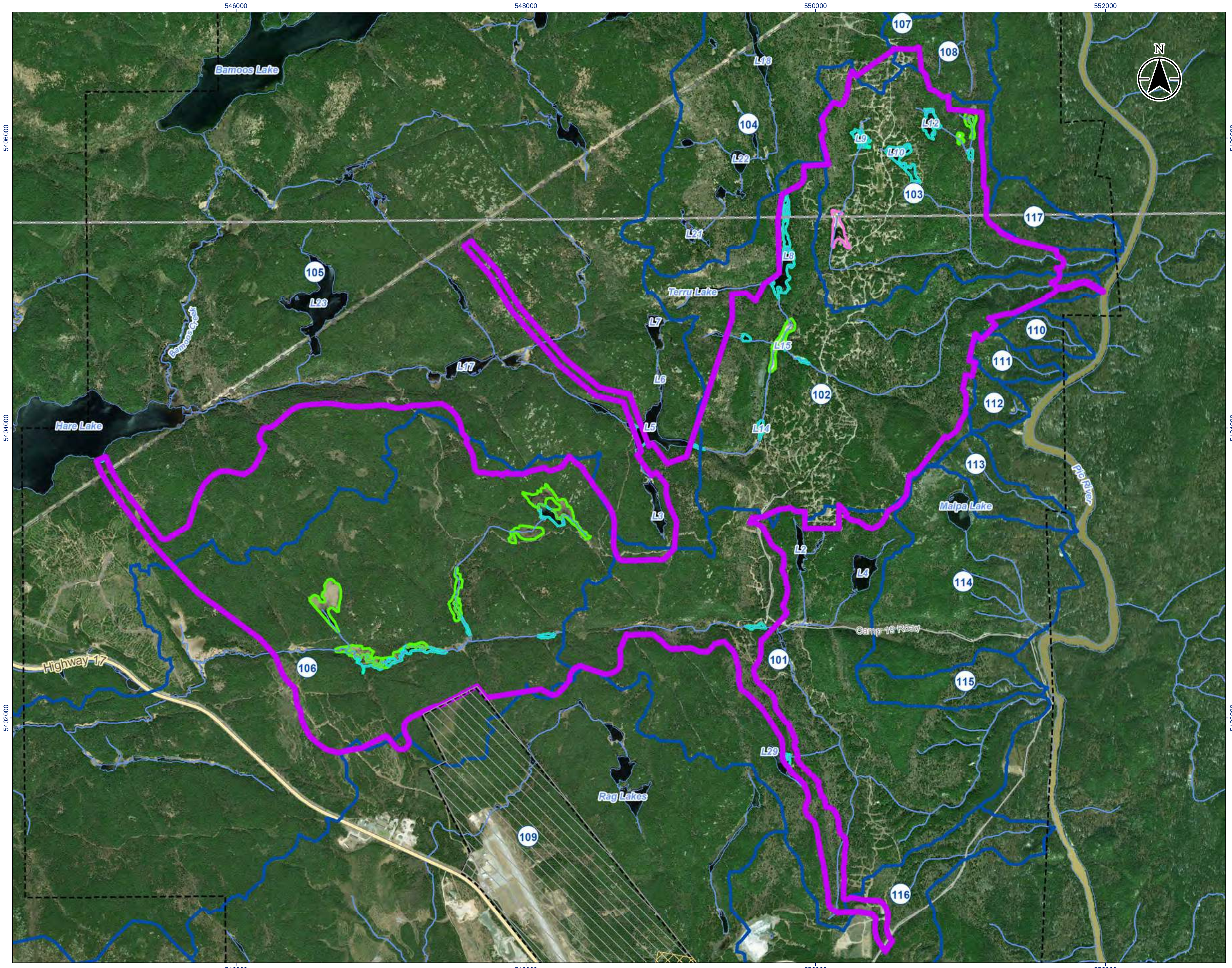
Table 4.8-2: Summary of Open Wetlands within the SSA

Wetland Name	Boreal Ecosite Area (ha)											
	B134 Mineral Thicket Swamp	B135 Organic Thicket Swamp	B139 Poor Fen	B140 Open Moderately Rich Fen	B142 Mineral Meadow Marsh	B144 Organic Meadow Marsh	B146 Open Shore Fen	B147 Shrub Shore Fen	B151 Open Water Marsh: Mineral	B152 Open Water Marsh: Organic	Open Water (<25% submergents)	Total Area (ha)
L10/L11								0.14			1.74	1.88
L12				0.09			0.09	0.13			1.16	1.47
L13						0.16		0.54			0.17	0.87
L13a										0.18		0.18
L13b						0.25				0.02		0.27
L14											0.31	0.31
L15		1.32				0.26				0.16		1.75
L16						1.21				0.40		1.61
L24					3.36							3.36
L26							3.26			0.47	0.66	4.39
L26a			1.67									1.67
L29											0.27	0.27
L5							0.01				0.93	0.94
L8								0.35			3.29	3.64
L9											0.74	0.74
S15	2.59				0.89				1.80			5.28

Table 4.8-2: Summary of Open Wetlands within the SSA

Wetland Name	Boreal Ecosite Area (ha)											
	B134 Mineral Thicket Swamp	B135 Organic Thicket Swamp	B139 Poor Fen	B140 Open Moderately Rich Fen	B142 Mineral Meadow Marsh	B144 Organic Meadow Marsh	B146 Open Shore Fen	B147 Shrub Shore Fen	B151 Open Water Marsh: Mineral	B152 Open Water Marsh: Organic	Open Water (<25% submergents)	Total Area (ha)
S3										0.10		0.10
S58											0.22	0.22
S63	0.12				0.95				0.62			1.68
S78										0.22		0.22
S79											0.24	0.24
Total	2.71	1.32	1.67	0.09	1.84	5.24	3.36	1.17	2.42	1.55	9.74	31.09

Source: Table 6 from the *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020)



Legend

- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Hydro Line
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Watershed Boundary
- Waterbody
- Waste Management Site

Mapped FRI Ecosite

- Waterbody Island
- Moderately Rich Fen
- Meadow Marsh

0 0.5 1 km

1:27,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthographic Imagery Source: Service Layer Credits: © 2020 Microsoft Corporation © 2020 Maxar ©CNES (2020) Distribution Airbus DS

Project Location
Marathon

129673006 REVA
Prepared by DH on 2020-12-17

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
4.8-3

Title
Mapped Waterbodies and Open Wetlands within the SSA

V:\01609\active\1_Other_PC_Active\1296_Manitoba\129673006 Marathon PGM\gis_cad\gis\mxds\General\report_figures\ES\129673006_ES_Fig04.8-3_Waterbodies_and_OpenWetlands_20201214.mxd Revised: 2020-12-17 By: dharvey

4.8.3 Non-Forested Communities

Not including the open wetlands discussed above, the remaining non-forested communities include rock barrens, talus, cliff/rock face, and anthropogenic habitats such as hydro transmission lines and gravel pits. As per the provincial ecological land classification (ELC) system, these open communities typically have than 25% cover of trees[4]. Terrestrial non-forested communities account for approximately 6.1 ha or about 0.5 % of the Project SSA, and 0.9% of the LSA.

Individual patches of rock barren are generally small (i.e., <100 m^2) and scattered throughout the study area, typically associated with shallow soils over bedrock and steep relief. Most are too small to be delineated individually in the FRI. Typical vascular plant species include common juniper (*Juniperus communis*), bearberry (*Arctostaphylos uva-ursi*), and three-toothed cinquefoil (*Sibbaldia tridentata*), with scattered pin cherry (*Prunus pensylvanica*), white spruce (*Picea glauca*), and balsam fir (*Abies balsamea*). No rare plant species or community types were observed in this ecosite, but it could potentially be suitable for winter habitat for woodland caribou due to the abundance of *Cladonia* (*Cladina*) ground lichens ("reindeer moss"). The active mineral barren in the southwest portion of the LSA is an existing gravel pit.

Talus slopes are generally too small to be typed individually in the Forest Resource Inventory (FRI) data for the Big Pic Forest, which typically have a minimum polygon size of at least 5 ha. Talus slopes are found at the base of cliffs or very steep slopes such as along the west shore of L8. Talus communities are typically dominated by lichens such as *Peltigera* and *Cladonia* in xeric, open conditions, but with more moss cover (e.g., *Pleurozium, Ptilium)* in moister shaded conditions. Vascular plants are less abundant and not diverse; rock polypody (*Polypodium virginianum*) and rusty woodsia (*Woodsia ilvensis*) are common species. No rare species or vegetation species were associated with this ecosite.

Cliffs and rock faces are fairly common in the SSA and LSA, although there are few large cliffs despite the topography due to the rounded nature of the bedrock domes. Most rock faces are fairly small (i.e., 3-5 m in height) and are often forested to the upper rim and along the base. North-facing cliffs tend to have cooler and moister than average microclimates, and often support a dense carpet of mosses and often a rich herbaceous and shrub (e.g., mountain maple *Acer spicatum*) community at the base. Ferns such as fragrant cliff fern (*Dryopteris fragrans*), fragile fern (*Cystopteris fragilis*), *Woodsia* spp., and club mosses (Lycopodiaceae) are common in cracks and ledges on the bedrock faces, along with scattered sedges (e.g., *Carex canescens*), mosses, and lichens.

Approximately 70 ha of human-modified habitat is found in the LSA and includes the transmission line right-of-way (ROW) passes through the northern part of the SSA. The ROW is dominated by grasses and other graminoids, and early successional weedy species, as well as remnant survivors of the original forest floor such as bunchberry. The vegetation is kept in an early successional, open state by active vegetation management (e.g., herbicide spraying and brush-saw) at regular intervals. There is less than 1 ha of mapped anthropogenic ecosites within the SSA, but there are extensive unmapped disturbed

[4] larger than 10 cm diameter at breast height and/or greater than 2 m tall

areas from mineral exploration such as trenches, trails and roads along the main north-south axis of the SSA.

4.8.4 Flora

A total of 359 species of vascular plants have been documented in the LSA. An additional 29 species were observed in 2020 in addition to the 340 species previously documented for the study area in 2007-2010[5]. No new occurrences of previously observed provincially or regionally rare plant species were found during the 2020 field surveys. The presence of the S3-listed alga pondweed (*Potamogeton oaksianus*) in waterbody L26 was reconfirmed; other past occurrences of provincially or regionally rare plant species were not revisited and are assumed to be extant.

Since 2013, there have been a number of changes in the taxonomy or ranking of rare plant species documented from the GenPGM Project study area. Marsh speedwell (*Veronica scutellata*) is no longer considered regionally rare in the Thunder Bay District as additional occurrences of this species have been observed. Occurrences of narrow-leaved cattail (*Typha angustifolia*) in the Thunder Bay District are now all considered non-native and, therefore, this species is no longer considered regionally rare (TBFN 2015), as it was previously (TBFN 2003).

Several species of arctic-alpine disjunct plant species, including fragrant cliff fern (*Dryopteris fragrans*), glaucous blue grass (*Poa glauca*), alpine bistort (*Bistorta vivipara*), mountain cranberry (*Vaccinium vitis-idea*), northern woodsia (*Woodsia alpina*), and smooth woodsia (*W. glabella*) were discovered in 2009-2010 on cool, north-facing cliffs or bedrock faces. Although most of these species are not rare in Ontario, these species are significant because they are geographically separated from their main ranges in arctic and alpine regions in northern and western Canada. An additional western disjunct, thimbleberry (*Rubus parviflorus*) was documented during 2020 fieldwork.

A total of 40 non-native species have been observed in the LSA. This represents approximately 11% of the species documented thus far in the LSA in comparison, approximately 38% of the known species in Ontario are considered non-native (Natural Heritage Information Centre (NHIC) unpublished data). Non-native species were most abundant along trails and road such as clovers (*Trifolium* spp.), oxeye daisy (*Leucanthemum vulgare*), common plantain (*Plantago major*), and little yellow rattle (*Rhinanthus minor*), many of which typically do not invade natural communities. However, several species that are potentially invasive were newly observed in the LSA in 2020. Tansy (*Tanacetum vulgare*) was observed at several locations along trails, and bull thistle (*Cirsium vulgare*) was observed roadside and along the shoreline of a small pond (where it must have spread via air-borne seeds). Purple loosestrife (*Lythrium salicaria*) was observed at one location and presumably arrived on site as seeds stuck to mud in tires. There are very few records of this invasive species along the north shore of Lake Superior, with the nearest documented location approximately 35 km to the west along Highway 17 at Black Fox Lake (iNaturalist 2020). Non-

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[5] 292 vascular plant species were listed in SID 24 (Harris and Foster 2009); subsequent fieldwork brought the total to 340 presented in the original EIS report (SCI 2012)

native common St. John's-wort (*Hypericum perforatum*) was very dense along some trails, crowding out other herbaceous species. Milkweed (*Asclepias* spp.) has not been observed in the LSA.

Table 12 from the *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020) lists plant species of interest to Indigenous communities.

4.9 WILDLIFE

The *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020) was prepared to summarize and document changes to the existing environmental conditions relating to vegetation and wildlife, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. The following is a summary of the findings.

Of note, Table 13 from *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020) lists wildlife of interest to Indigenous communities.

4.9.1 Insects

Field surveys in 2020 focused on insect groups of higher conservation concern (e.g., S1-S3 ranked), particularly odonates and butterflies. A total of 26 species of odonates are known to occur in the LSA, with 2020 field surveys confirming the presence of six new species of dragonflies and one species of damselfly. Additional species are likely present given broad ranges and habitat types present in the LSA.

A single male ski-tipped emerald (formerly called ski-tailed emerald) observed flying along the margins of a small pond along the main access road. This dragonfly species is ranked as S3? by the NHIC (Oldham pers. Comm.). Ski-tipped emeralds are typically associated with slow-moving streams in bogs and swamps, forest streams, and small waterbodies at their outlets (Jones et al. 2020; Paulson 2011). Uncommon and local, the species is known from relatively few records in northern Ontario (iNat 2020; TBFN 2010) but is one of the more commonly encountered *Somatochlora* species in Algonquin Park and surrounding area (Jones et al. 2008). No other provincially rare odonates are known from the Project study area.

Eleven new species of butterflies were observed during 2020 field surveys. A total of 23 species have been documented in the LSA during 2007-2010 and 2020 field surveys or from other sources (e.g., eButterfly 2020; iNat 2020). Additional butterfly species are likely present given broad ranges (Hall et al. 2014; TBFN 2019) and habitat types present in the LSA. Apart from the monarch, no butterfly species known to occur in the LSA are considered provincially rare (S1-S3) by MNRF's NHIC. Two rare butterflies identified by Golder Associates Ltd. (2009) as potentially occurring in the LSA (i.e., large marble (*Euchloe ausonides*) and taiga alpine (*Erebia mancinus*)), were not confirmed to be present in the LSA. The preferred habitat for large marble is sandy, open pine forests (Hall et al. 2014), which are lacking the LSA. Taiga alpines prefer wet, open forests around spruce and tamarack bogs (Hall et al. 2014), which are limited in the LSA.

Two insect SAR insects i.e., yellow-banded bumblebee (*Bombus terricola*) and monarch (*Danaus plexippus*) were observed during 2020 fieldwork (refer to Section 4.10)

4.9.2 Amphibians and Reptiles

Ten species of amphibians have been confirmed as occurring in the LSA, with several others potentially occurring based on their broad ranges and habitat within the study area. No new amphibian species were observed during 2020 fieldwork. No abundance estimates were calculated, but anurans were generally widespread and relatively abundant, as in 2007-2010.

4.9.3 Mammals

At least 24 species of mammals have been confirmed using the LSA, including 13 new species in 2020 that had not previously documented in the LSA. Seven species of mammals were observed on the trail cameras deployed in the LSA; the remaining mammal species were recorded on acoustic recorders or observed opportunistically during June-August fieldwork in 2020. Approximately 60 species of mammals are known to have occurred in the Thunder Bay District (TBFN 2018), and additional mammal species typical of the southern boreal forest (e.g., Eder 2012; Kurta 2017; Naughton 2012) likely use the LSA but were not detected during the 2020 fieldwork, in particular insectivores and rodents.

Mammals observed with trail cameras in 2020 included American marten, beaver, black bear, grey wolf, moose, sandhill crane, snowshoe hare, and white-tailed deer.

No evidence of woodland caribou was observed in 2020. Refer to Section 4.10.5.2 for further discussion of this species. No additional mammal SAR are expected to be present based on available habitat, known ranges, and similar surveys conducted in the RSA (Foster 2019).

4.9.3.1 Bats

A total of six bat species were recorded using acoustic recorders at 12 locations during 2020. Passes by hoary bat were by far the most numerous, followed by two other migratory species, silver-haired bat and red bat. Other bat species recorded include big brown bat, little brown myotis and northern myotis. Refer to Section 4.10.5.1 for further discussion of Little Brown Myotis and Northern Myotis, both of which are listed as Endangered federally and provincially.

4.9.4 Birds

A total of 97 bird species has been documented at the LSA, with an additional 35 species detected nearby in the RSA on past Breeding Bird Survey (BBS) or Ontario Bird Atlas. Additional species are expected to occur in the RSA (eBird 2020; iNaturalist 2020) but may not be breeding. Six new species were detected in the LSA in 2020 including American goldfinch, turkey vulture, Cape May warbler, American woodcock, northern saw-whet owl, and sandhill crane.

4.9.4.1 Waterfowl

Very few waterfowl species or individuals were observed in the LSA. Based on field observations, the small waterbodies provide suitable breeding habitat for hooded merganser and common goldeneye (fledged young observed) and may also be suitable for ring-necked duck, mallard, common merganser, and red-breasted merganser.

4.9.4.2 Marsh Birds

Marsh birds are relatively rare in the LSA. Evidence suggests the LSA supports a low density of marsh birds that depend upon wetland habitats. A great blue heron was reported previously in the LSA, but none were observed in 2020.

4.9.4.3 Raptors

Very few raptors and no raptor nests were observed in 2020. The LSA does potentially provide suitable nesting habitat at least for broad-winged hawk and red-tailed hawk, which were observed in 2020, as well as northern goshawk and sharp-shinned hawk, which have been reported nearby in the RSA.

4.9.4.4 Colonial Nesting Birds

There is no evidence within the LSA of colonial-nesting birds, such as great blue heron, Bonaparte's gull, or terns. There is potentially suitable treed habitat, particularly along or near the margins of small lakes, but no evidence of use by great blue herons or Bonaparte's gulls. Low-lying islets suitable for nesting common terns are limited and there are no large hemi-marshes that would potentially support breeding black terns. There are no banks suitable for colonial-nesting bank swallows or bridges for cliff swallows or barn swallows.

4.9.4.5 Shorebirds

Shorebirds were uncommon in the LSA in 2020 and previously, with just a few common species observed. Suitable breeding habitat exists for a few shorebird species such as solitary sandpiper, spotted sandpiper, and killdeer. There is no significant wildlife habitat for shorebird migratory stopover areas in the LSA. No seasonally flooded fields, open sandy shoreline habitat, or extensive mudflats or marshes are present.

4.9.4.6 Game Birds

The LSA does provide suitable breeding habitat for upland game birds including ruffed grouse and spruce grouse, which may be of significance to Indigenous communities. Fledged young of both species were observed in 2020. Sharp-tailed grouse are not present in the LSA due to the lack of suitable habitat such as large open peatlands, cutovers, or fields.

4.10 SPECIES AT RISK

The *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020) was prepared to summarize and document changes to the existing environmental conditions relating to vegetation and wildlife, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. The following is a summary of the findings.

At least 32 federal or provincial species at risk have ranges that broadly overlap the RSA. Of these, potentially suitable habitat occurs for about 15 species, and 10 species have been confirmed in the SSA or LSA. SAR species confirmed within the SSA and/or LSA include:

- Little Brown Myotis (*Myotis lucifungus*)
- Northern Myotis (*Myotis septentrionalis*)
- Canada Warbler (*Wilsonia canadensis*)
- Rusty Blackbrid (*Euphagus carolinus*)
- Olive-sided Flycatcher (*Contopus borealis*)
- Evening Grosbeak (*Coccothraustes vespertinus*)
- Bald Eagle (*Haliaeetus leucocephalus*)
- Eastern Wood-Pewee (*Contopus virens*)
- Monarch (*Danaus plexippus*)
- Yellow banded Bumble Bee (*Bombus terricola*)

Potentially suitable habitat for the following additional species occur within the SSA or LSA, although evidence of such species was not confirmed during field investigations:

- Woodland Caribou (Boreal population)
- Common Nighthawk (*Chordeiles minor*)
- Eastern Whip-poor-will (*Antrostomus vociferus*)
- Golden Eagle (*Aquila chrysaetos*)
- Peregrine Falcon (*Falco peregrinus*)

Several other species have been found in the RSA but whose presence has not been confirmed (see Table 11 of the *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020)). Their absence may be the results of a) the habitat appearing suitable but is actually not suitable, b) the habitat is suitable but is unoccupied for other unknown reasons, c) or the species were present but not detected, or d) other undetermined reasons. SAR that have been confirmed from the SSA or LSA or are present in the LSA and have apparently suitable habitat in the LSA/SSA are discussed in detail below.

4.10.1 Plants

Black ash is the only federally or provincially assessed plant SAR[6] that has potential to occur in the SSA or LSA. Despite targeting suitable habitats, no black ash were observed in the Project study area in 2007-2010, and none were observed in 2020. There are only a few black ash records along the north shore of Lake Superior between Nipigon and Sault Ste. Marie, and again, none in the LSA. Throughout its range, including the RSA, the primary threat to black ash is the invasive emerald ash borer (*Agrilus planipennis*) (COSEWIC 2018a).

4.10.2 Insects

4.10.2.1 Monarch (*Danaus plexippus*)

No monarchs were observed during the 2007-2010 fieldwork. However, at least 15 monarchs were observed on July 7-8, 2020 along the main access road through the Project. These individuals likely represent the 2nd or 3rd generation of migrating adults (COSEWIC 2016b), including females that are in search of suitable milkweed plants upon which oviposit. Milkweeds (*Asclepias* spp.) are the obligate host plants of larval monarchs (COSEWIC 2016b), and no milkweeds have been observed in the LSA during surveys in 2020 and previously in 2007-2010 (monarch were listed as Special Concern at the time).

Only two species of milkweed are found in the Thunder Bay District (TBFN 2015) that could potentially serve as food plants for monarch larvae. Common milkweed (*A. incarnata*) is the most common species in the Thunder Bay District, but existing occurrences appears to be largely of anthropogenic origin along roadsides, railways, gravel pits, and deliberate plantings such as gardens (Foster pers. Obs.; iNaturalist 2020). Swamp milkweed (*A. incarnata*) is rare in the District and localized to a few locations southwest of Thunder Bay. Due to the lack of milkweed, the Project LSA is unsuitable habitat for this species to complete its life cycle, although adults may nectar on wildflowers, particularly along roadsides.

4.10.2.2 Yellow-banded Bumblebee (*Bombus terricola*)

A least five yellow-banded bumblebees were observed in June-August 2020 foraging for nectar and/or pollen on wildflowers such as goldenroads (*Solidago* spp.) along the main access road through the SSA and LSA.. Although listed as Special Concern due to apparent declines in abundance in parts of its range

[6] Black ash has been assessed as Threatened by COSEWIC but has not been added to Schedule 1 of the SARA; its status has not been assessed provincially

(COSEWIC 2015), recent targeted bumblebee surveys in northwestern Ontario (Harris et al. 2019) have indicated that the species is not uncommon along roadsides in much of northwestern Ontario.

4.10.3 Reptiles and Amphibians

There is no evidence of reptile or amphibian SAR within the SSA or LSA. Further rationale for this determination is provided in Section 7.3.1 of the *Terrestrial Environment Updated Baseline Report* (Northern Bioscience, 2020).

4.10.4 Birds

4.10.4.1 Eastern Whip-poor-will (*Caprimulgus vociferous*)

No eastern whip-poor-will were observed during the 2020 surveys and no whip-poor-will were detected on acoustic recorders in 2020. In addition, no eastern whip-poor-wills were identified in previous surveys undertaken for the Project. The nearest documented records for eastern whip-poor-will are approximately 80 km east of the Project from a regenerating cutover west of Dayohessarah Lake near White River (Foster 2018a,b).

4.10.4.2 Canada Warbler (*Wilsonia canadensis*)

Canada warbler is a common nesting species in birch-dominated mixedwood forest and was observed at 16 locations (including 13 point counts) in the LSA in 2020. This species was often detected in previous fieldwork at the SSA as well, with 17 individuals observed during SAR encounter surveys and an additional five birds heard on four point counts (Harris and Foster 2012). During 2017 SAR surveys in the RSA to the north and west of the Project (Foster 2019), Canada warblers were observed at 33 locations and were the 11th most abundant bird species during point counts (Foster 2019). Canada warblers were also recorded every year of 23 years of Breeding Bird Survey south of the study area (1976 to 2004) with a maximum count of 15 in 1985 (Harris and Foster 2012).

4.10.4.3 Rusty Blackbrid (*Euphagus carolinus*)

No rusty blackbirds were detected in the Project LSA in 2020. However, a family group (adults with fledged young) was observed in 2009 along the shoreline of waterbody L16 in SSA (Harris and Foster 2009). Rusty blackbirds were observed in 2017 at five locations along lakeshores and streams in the RSA to the north and west of the LSA (Foster 2019). This species typically breeds in conifer swamps and other forested wetlands, often along streams and beaver ponds (Francis 2007). There is suitable breeding habitat in the LSA, although it may not be occupied, at least not in all years the surveys were completed.

4.10.4.4 Olive-sided Flycatcher (*Contopus borealis*)

No olive-sided flycatchers were detected in the LSA in 2020. A single olive-sided flycatcher was seen in 2009 on the shore of a small lake southeast of Bamoos Lake outside the current SSA (Harris and Foster 2009). Olive-sided flycatchers were observed at several locations near open areas (wetlands, trails) in the RSA to the west and north of the Project in 2017 (Foster 2019). This species was reported on two years (1979 and 1980) of 23 years of BBS south of the SSA (Harris and Foster 2012). Conifer forests with snags or other suitable perches adjacent to open areas for hawking insects is the preferred habitat for this species in Ontario (Cadman et al. 2007; Environment Canada 2016). There is likely suitable breeding habitat in the LSA, although it may not be occupied, at least not in all years the surveys were completed.

4.10.4.5 Common Nighthawk (*Chordeiles minor*)

No common nighthawk were heard or seen during the 2020 surveys and none were detected on acoustic recorders in 2020. In addition, no common nighthawk were identified in previous surveys undertaken for the Project.

Common nighthawk have been observed in the Marathon area, however, including a 2011 observation within the RSA (just south of the LSA) near the gravel pit along the main access road 1.8 km north of Highway 17 (eBird 2020). Although no common nighthawks were observed in 2008 or 2009, this species was tallied once (1998) in the BBS south of the study area. It may be an uncommon nesting species in the LSA, since it prefers open bedrock ridges, burns, and cutovers as nesting habitat (COSEWIC 2018b).

4.10.4.6 Evening Grosbeak (*Coccothraustes vespertinus*)

The evening grosbeak was not considered a SAR during the initial baseline study and were only recently assessed as Special Concern by COSEWIC (2016), and thereafter by Ontario. No evening grosbeaks were observed during 2020 fieldwork, but single individuals were observed in the LSA during point counts in both 2008 and 2009 (Harris and Foster 2012). Neither individual was a singling male, so it is not known whether they were successful breeders. Evening grosbeaks are socially monogamous and not territorial during the breeding season (Cornell Lab of Ornithology 2019; COSEWIC 2016).

4.10.4.7 Peregrine Falcon (*Falco peregrinus*)

No peregrine falcons were observed in the LSA in 2020 or previously. MNRF data shows the nearest nest location about 8 km west of the SSA. An aerial survey in March 2009 found four potential nesting cliffs just outside the LSA (Harris and Foster 2009), but a follow-up aerial survey in June found no evidence of nesting on the cliffs. Cliff habitat within the study area were classified as “marginal” habitat value (cliff faces less than 15 m high and less than 100 m long (B. Ratcliff pers. Comm.).

4.10.4.8 Bald Eagle (*Haliaeetus leucocephalus*)

No bald eagles were observed during 2020 fieldwork. Bald eagles are not known to nest in the LSA. No nests or birds were observed during the 2009-2010 fieldwork (Harris and Foster 2009; IR # 23.4.4), although a single adult was observed near the Marathon Airport in 2008 (Golder Associates Ltd 2009). None were reported in 23 years of Breeding Bird Surveys along Highway 17 at the south edge of the study area (Harris and Foster 2012). MNRF data show the nearest bald eagle nest at about 11 km north of the study area. This species is apparently an uncommon nesting species in the Marathon area, although it is observed fairly frequently in the Marathon area (eBird 2020). A single flying eagle was observed over Bamoos Lake during the 2017 fieldwork, as well as a smaller unnamed lake to the west (Foster 2019). Based on the limited data available, modest but increasing numbers of Bald Eagles are present at Marathon and on the lower Pic River in the fall and early winter, which reflect Ontario's growing Bald Eagle population (IR# 23.4.4).

4.10.4.9 Eastern Wood-Pewee (*Contopus virens*)

No eastern wood-pewees were detected in the LSA in 2020. A single eastern wood-pewee was heard on a point count in the LSA in 2010 (Harris and Foster 2012), but the species had not yet been federally or provincially listed as a SAR. In 2017, two male eastern wood-pewee were heard singing along the edge of mixedwood forest in the RSA to the west of the SSA.

This species prefers gaps and edges of deciduous and mixedwood forests (COSEWIC 2012; MacLaren 2007; Watt et al. 2018), which are abundant in LSA. Although this species is relatively uncommon along the north shore of Lake Superior (MacLaren 2017; eBird 2018), there is potentially suitable breeding habitat in the LSA. It may not always be occupied, however, due to factors other than habitat suitability.

4.10.5 Mammals

4.10.5.1 Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*)

No roosting bats, maternity colonies, or suitable large diameter trees with cavities were observed during 2020 fieldwork. Depending on the species, roost sites can include areas hidden amongst foliage in trees, under boulders, in tree cavities, caves, rock crevices, and buildings; some roosting habitat may be therefore present but undetected in the LSA.

Based on the results of the acoustic monitoring, the LSA provides foraging habitat for little brown myotis, particularly near waterbodies and forest openings (e.g., trails). The continued presence of little brown myotis detected at recorders throughout much of the late spring and summer monitoring period at multiple locations suggest that the LSA also provides roosting habitat for males or non-breeding females. However, it is not known whether any of these passes detected represent breeding female little brown myotis (sex cannot be determined from the acoustic recordings). No anthropogenic structures are present in the LSA that represent what is now typical maternity colony for this species, but the presence of natural maternity roost(s) cannot be ruled out. Northern myotis are more likely to use natural maternity roosts in suitable trees, but only one of the 4000+ recorded passes was tentatively identified as northern myotis. This lack of activity suggests that there is little if any use of the LSA by northern myotis.

Little brown myotis and northern myotis typically hibernate in abandoned mine shafts or caves (Naughton 2012). No mine adits or natural caves were observed during 2020 fieldwork, nor have any been observed during previous fieldwork or indicated for the LSA in the Ministry of Northern Development and Mines' Abandoned Mine Information System (MNDM 2020). Little brown myotis migrate up to 1000 km between summer ranges and winter hibernacula (Naughton 2012), so their presence during the summer does not necessarily indicate the presence of hibernacula at or near the Project site. Movement of approximately 50 km from summer range and hibernacula have also been documented for northern myotis (Naughton 2012). White-nose syndrome is the main reason for the decline in these two species, with the fungus responsible having been reported from locations near the study such as Terrace Bay, Wawa, and Thunder Bay (MNRF 2015a).

4.10.5.2 Woodland Caribou (*Rangifer tarandus caribou*)

Woodland caribou and their habitat were initially discussed in the 2009 baseline report (Harris and Foster 2009; SID #24) followed by a more in-depth analysis (Foster and Harris, SID #26). Caribou habitat models were subsequently updated in 2013 based on newly available forest resource inventory (FRI) in IR #23.1 Fragmentation and Woodland Caribou. There have been no changes to available caribou habitat models, as these are the same models currently used by MNRF for forest management planning in the Coastal Range. However, the Project layout has been modified in the interim and, therefore, the shape of the SSA has changed, with concomitant changes in the amount of potential caribou habitat directly affected by the Project. In addition, MECP has recently updated caribou habitat categorization in the Lake Superior Coastal Range (including the SSA) based on the MNRF (2013) general habitat description for woodland caribou.

No caribou or evidence of their presence (e.g., tracks, pellets, lichen cratering, bones) were observed during the 2020 fieldwork. A review of available information provided by MECP/NHIC/MNRF indicates no observations of caribou in or near the SSA.

Available evidence suggests that the current population in the LSA (i.e., the mainland Coastal Range west of Pukaskwa National Park) is lower than the estimate suggested in SID #24. Since 2013, there have been four aerial surveys in the mainly Lake Superior Coastal range and nearshore islands for woodland caribou as well as potential predators and alternate prey (i.e., wolves, moose, and white-tailed deer). These surveys, two by Northern Bioscience (Foster 2013, 2020), one by MNRF (Shuter et al. 2018), and another by Michipicoten First Nation (no report available), all used generally similar methodologies with transects spaced 1 km apart and running perpendicular to the Lake Superior shoreline at least the width of the Coastal Range i.e., 10 km. Only one caribou total (on Detention Island in Neys Provincial Park), was observed during these four surveys in 2003, 2004, 2019, and 2020. On each survey, tracks of small groups (3-4 animals) of caribou were observed at several different locations. Based on modelling of detection distances of caribou and moose tracks during their 2016 survey, Shuter et al. (2018) estimated there were 55 caribou (95% confidence intervals of 13-227) in the mainland

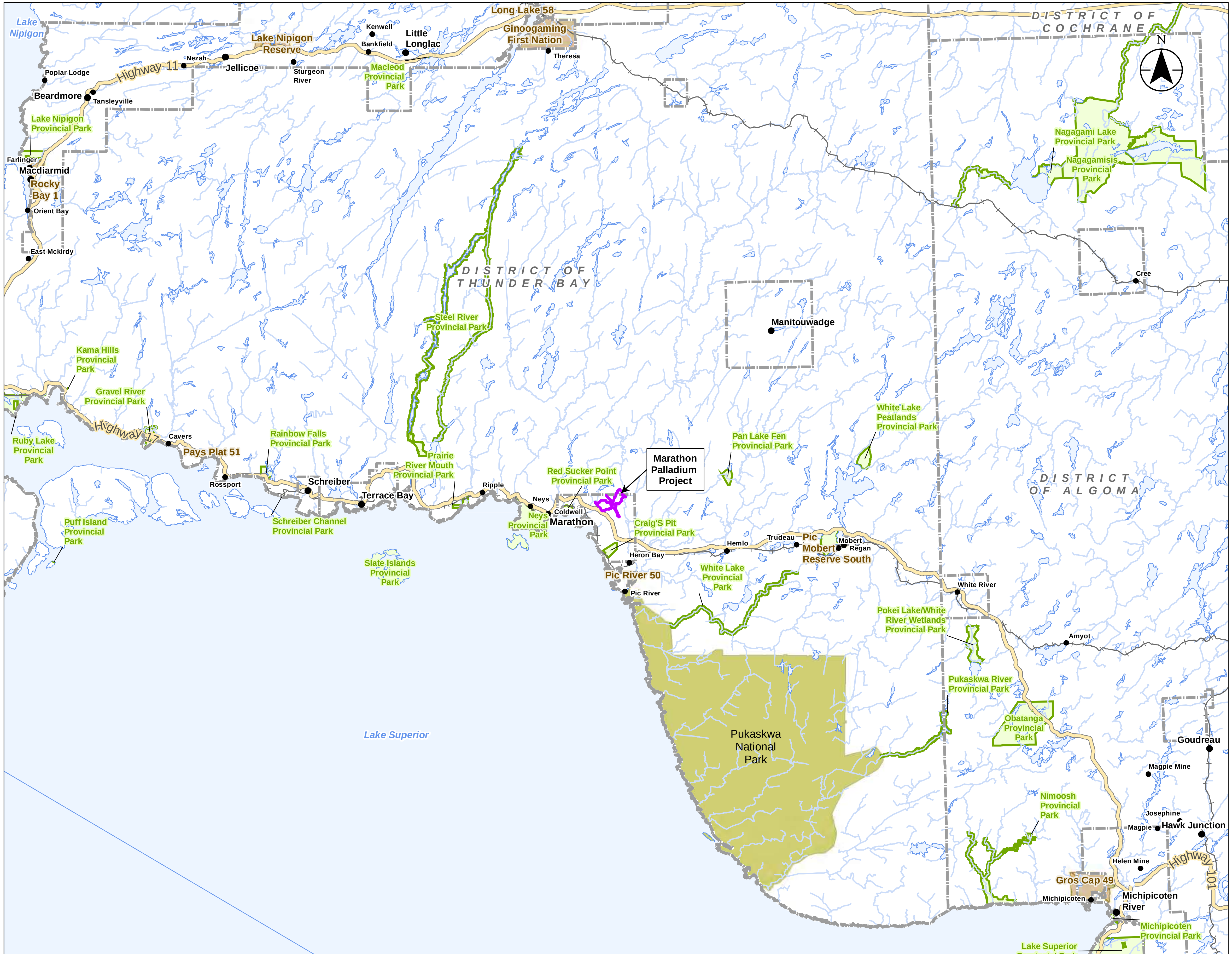
Coastal Range and a minimum animal estimate of 10 caribou. No other population estimate is available from MNRF/MECP for the Lake Superior Coastal Range nor has a formal range assessment been conducted, despite the provincial commitment in the 2008 Caribou Conservation Plan (MNR 2008) to conduct range assessments (including population estimates) for each range every five years.

Within the Project's caribou RSA, i.e., the Lake Superior Coastal Range, the overall caribou population has dramatically declined since 2013 due to wolves crossing over to both the Slate Islands and Michipicoten Island via ice bridges in 2014 (MNRF 2018). As a result, the caribou populations on the Slate Island declined from approximately 100 in 2009 (Carr et al. 2012) to just several animals at most in 2017 (MNRF 2018). An estimated 450 caribou in the fall of 2014 on Michipicoten Island in the fall declined to less than 116 animals by the fall of 2016, leading MNRF to translocate six caribou (2 bulls, 4 cows) individuals to Caribou Island and nine caribou (1 bull; 8 cows) to the Slate Islands[7] during the early winter of 2018 (MNRF 2018). No caribou are believed to now persist on Michipicoten Island. Apparently, some of the translocated caribou have given birth (G. Eason pers. Comm.) but there are still less than 25-40 animals on offshore islands (Slate Is., Michipicoten I., Caribou I.) within the Lake Superior Coastal Range currently compared to approximately 500-600 caribou a decade ago.

4.11 SOCIO-ECONOMIC CONDITIONS

The *Socio-economic and Current Resource Use Updated Baseline Report* (Stantec, 2020g) was prepared to summarize and document changes to the existing socio-economic environment, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. Updated information was collected on current population, labour force, infrastructure and services, community well-being, and land and resource use. Figure 4.11-1 illustrates the communities within proximity of the Project. The following is a summary of the findings.

[7] where they joined two surviving bulls



Stantec

Legend
- Site Study Area Boundary
- Highway
- Railway
- Watercourse
- Municipal Boundary
- First Nations Reserve
- National Park
- Provincial Park
- Waterbody

0 10 20 km
1:889,085 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2020-12-18

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
4.11-1

Title
Communities in Proximity to the Project

V:\01609\active_Other_PCs_Active\296 - Manitoba\129673006 Marathon PGM\gis_cad\gis\mxds\General\report_figures\EIS\129673006_EIS_Fig04_11-1_Communities.mxd Revised: 2020-12-18 By: dharvey

4.11.1 Population

The RSA encompasses the Town of Marathon, plus communities located within approximately one-hour commuting time (i.e. approximately 100 km). As summarized in Table 4.11-1, there are nine communities (data presented for Statistics Canada's census subdivisions (CSDs)) within an hour's commuting time to Marathon, and in 2016 the RSA had a total population of 9,380 persons (48.8% female). Persons of Indigenous identity[8] accounted for 19.8% (1,855 persons) of the RSA population. Of the Indigenous population, 52.8% were female.

In addition to the nine communities in the RSA, some of the residents living within the Thunder Bay Unorganized CSD are within commuting distance of Marathon. However, this is a large subdivision, and it is anticipated that most of its residents live beyond commuting range to Marathon.

Table 4.11-1: Regional Communities and Population Characteristics

Community	Total Population			Indigenous[1] Population			Distance to Marathon, Ont. (km)
	Total	Male	Female	Total	Male	Female	
Town of Marathon	3,275	1,675	1,600	410	190	220	-
Pic River 50 Reserve lands	445	215	230	425	210	215	10
Pic Mobert North Reserve lands	200	100	100	185	95	90	73
Pic Mobert South Reserve lands	120	65	55	120	65	55	73
Terrace Bay Township	1,610	810	800	150	55	95	82
Schreiber Township	1,060	555	505	90	40	50	96
White River	645	340	305	175	65	110	96
Manitouwadge Township	1,935	990	945	215	105	110	99
Pays Plat IR 51	90	50	40	85	50	35	126
Total	**9,380**	**4,800**	**4,580**	**1,855**	**875**	**980**	**-**

[8] *Indigenous* includes statistics for Aboriginal identity. Statistics Canada defines Aboriginal identity as persons who self-identify as being an Aboriginal person. This includes those who are First Nations (North American Indian), Métis or Inuk (Inuit) and/or those who are Registered or Treaty Indians (that is, registered under the *Indian Act* of Canada) and/or those who have membership in a First Nation or Indian band. Aboriginal peoples of Canada are defined in the Constitution Act, 1982, section 35 (2) as including the Indian, Inuit and Métis peoples of Canada.

Table 4.11-1: Regional Communities and Population Characteristics

Community	Total Population			Indigenous[1] Population			Distance to Marathon, Ont. (km)
	Total	Male	Female	Total	Male	Female	

Notes:

[1] Indigenous and non-Indigenous totals may not sum to equal total population counts as they are based on a 25% population sample size

Total may not sum due to rounding.

NA = not applicable

2011 'Total Population' data from 2011 Census of the Population – Census Profile. 2011 "Aboriginal Population' data taken from 2011 NHS – Aboriginal Profile.

Values shown in "Total" columns are the sum of male and female CSD subsets taken from Statistics Canada's 2011 and 2016 Census Profile (Census of the Population). Due to Statistics Canada rounding (Statistics Canada 2019a) totals may not exactly align with those shown on CSD Census Profiles and may not sum across tables

Source: Table 6.1 from the *Socio-economic and Current Resource Use Updated Baseline Report* (Stantec, 2020g); Statistics Canada 2012, 2013, 2014, 2017, 2018

4.11.2 Labour Force

4.11.2.1 General Labour Force

The total population of the RSA in 2016 aged 15 years or over was 7,900. The labour force totalled 4,705 (49.2% female) persons representing a participation rate of 59.6%. The average unemployment rate for the RSA was 9.5%.

Mining remains an important industry in northwestern Ontario. Compared to provincial averages, a notably greater percentage of the RSA labour force is employed in the mining, quarrying, and oil and gas extraction sector. Overall, employment was greatest in the mining, quarrying and oil and gas extraction sector accounting for 14.8% of the labour force in 2016. Among the Indigenous RSA labour force, employment was greatest in retail trade and public administration, with each accounting for 12.7% of the labour force (employing 110 persons each).

As of 2016, 50.6% of the total RSA population and 42.6% of the Indigenous RSA population had completed post-secondary (i.e., greater than secondary [high school]) education. Across the RSA, males accounted for the greatest percentage of the population (79.0%) with an apprenticeship, trades certificate, or diploma. This is more pronounced among the Indigenous population where 92.6% of the population with an apprenticeship, trades certificate or diploma were male. Females generally accounted for a greater proportion of all other forms of post-secondary education (the exception being Indigenous persons holding a university certificate or diploma below bachelor level where educational attainment was equal among males and females). Levels of educational attainment are similar in the RSA to those seen across the province.

In 2015, total and employment incomes earned by RSA males (total and Indigenous populations) were greater than provincial averages while incomes earned by RSA females were generally less than provincial averages (the exception being median total incomes earned by Indigenous females). See Table 6.6 of the *Socio-economic and Current Resource Use Updated Baseline Report* (Stantec, 2020g) for details.

4.11.2.2 Mining Labour Force

The mining sector tends to have a lower unemployment rate than other industries in Canada, though it experiences greater volatility in labour demand (Statistics Canada 2020). In 2019, the labour force unemployment rate in mining was 4.7%, compared to 5.8% for all industries. In the same year, the unemployment rate for 15 to 24 year olds employed in mining was approximately 8.4%, compared to 11.1% for all industries while the unemployment rate for 25 to 54 year olds employed in mining was 3.6% compared to 4.9% for all industries. Similar trends are observed in Ontario.

Riverlight Consulting Inc. (2019) identified seven active mines in northwestern Ontario and nine advanced exploration projects. Of active mines and development projects, the Hemlo Mine, sited approximately 40 km east of Marathon, and the Sugar Zone mine, located 20 km east of White River, are within commuting distance of communities within the RSA.

In addition to operating mines, development projects in northwestern Ontario are anticipated to require substantial construction and operational workforces. Riverlight Consulting Inc. (2019) estimates that mine construction will employ an average of 582 persons per year, from 2019 to 2030, while mine operations will employ an average of 2,162 persons per year over the same period. According to Riverlight Consulting Inc., 2019, some of the trends affecting the supply and demand for mining labour in northwestern Ontario include:

- Tight labour market – mining companies having difficulty attracting and retaining qualified staff
- Mobile workforce – mining workers seeking employment outside of northwestern Ontario
- Aging workforce – by 2027 an estimated 25% of the industry's current workforce are set to retire
- Demographic participation – women are under-represented in the mining industry, accounting for 17% of the total workforce, mainly in clerical and corporate services roles

Operated by Barrick Gold Corp., the Hemlo Mine is one of the largest gold mines in Canada. Operating since 1985, two of the mine's three sites (David Bell and Golden Giant) have been decommissioned, with the Williams open pit and underground sites remaining in production. Until recently, the mine employed approximately 700 employees, drawn from neighbouring communities, including Marathon, Manitouwadge, White River, Biigtigong Nishnaabeg First Nation and Pic Mobert First Nation (RPA 2017).

Hemlo is run on a "locally-operated" basis, with its workforce drawn from local communities rather than commuting from outside the region. In 2017, the average age of the workforce was 46 years with annual turnover of 8.5%, primarily due to voluntary retirement (RPA 2017). The average age of the Hemlo workforce in November 2019 was reported to be 57 (McGee 2019).

Barrick is repositioning Hemlo as a non-critical asset producing less than 500 koz of gold per year, closing its open pit operation, while extending the life of its underground operations (Barrick 2019). Barrick was expected to lay off 61 persons in the fall of 2020 (many were expected to take voluntary retirement) with a further 150 persons to be laid off before the end of 2020 (McGee 2020). In March 2020, Barrick contracted Barminco to provide underground mining services at the Hemlo site. Barminco has indicated that it will employ more than 300 people at the Hemlo site (Gleeson 2020) with a number of these positions being expatriate development miners and supervision from non-Canadian origin.

While layoffs from the Hemlo operation may free up mining labour for other projects, considering the reported average age of the Hemlo workforce, it is possible that many of those who were laid off will choose to retire. Assuming that 300 to 350 persons remain employed at Hemlo's underground operation, and 150 to 200 persons retire, is estimated that approximately 200 persons in mining occupations within the RSA may be available to work on other projects in the near future.

Harte Gold Corp's Sugar Zone Mine commenced operations in 2019. It is an underground gold mine, employing an estimated 230 persons on an owner-operator operation. The Sugar Zone Mine provides worker accommodations in a camp facility based in White River with a 30-minute commute to and from the mine site on a daily basis. Operations at the Sugar Zone mine were temporarily suspended in March 2020 as a safety response to the COVID-19 pandemic; Harte Gold resumed mining operations in July 2020 and plant operations in August 2020.

4.11.2.3 Biigtigong Nishnaabeg – Economic Development

Biigtigong Nishnaabeg provided GenPGM with updated information on select corporations and businesses as well as economic partnerships and development projects currently underway. These include business ventures/corporations (i.e., Pic River Development Corporation and Biigtigong Dbenjgan), various partnerships related to the East-West Tie Transmission Project, hydro developments and catering, and several development projects targeting employment, business and training opportunities. See Table 6.10 of the *Socio-economic and Current Resource Use Updated Baseline Report* (Stantec, 2020g) for further details on the information available for each of these Indigenous lead initiatives.

4.11.3 Infrastructure and Services

The communities in the RSA are well serviced by community and emergency services and have adequate infrastructure capacity (e.g., sewage, water) to serve existing populations and accommodate modest growth. This generally remains the case.

However, some Towns are now experiencing very low vacancy rates for owned and temporary accommodations due to increased demand from mining activity in the region and the crime severity index (CSI) has more than doubled in the Marathon and Superior East (Wawa) OPP detachments.

As the population of the RSA has been declining, it stands to reason that there is spare capacity with respect to other infrastructure and services. Capacity has been added in some areas with increases in the number of family medicine physicians and specialists in the health region and improvements to some utilities, including construction of a new landfill in Marathon.

4.11.3.1 Housing and Accommodations

In 2016, there were a total of 4,916 private dwellings in the RSA. The number of private dwellings decreased in all communities in the RSA, except Schreiber, which saw an increase of 5.7% (Statistics Canada 2017). Between 2006 and 2016, the average value of a home in the RSA increased between 1.4% (White River) and 69.4% (Schreiber) while it decreased by 19.0% in Manitouwadge. In 2016, housing prices ranged from $72,593 (Manitouwadge) to $98,686 (Marathon) (Statistics Canada 2017).

Results of the most recent rural rental market survey (2015) show that vacancy rates for rental properties in Marathon were between 1.7% and 3.8% for apartments and row houses (CMHC 2018; Zakher, pers. Comm., 2020). The average monthly rent in the RSA in 2016 ranged from $603 (Schreiber) to $746 (Marathon) (Statistics Canada 2017). Vacancy rates for owned homes and rented accommodations in the RSA are currently very low as a result of other resource projects in the area. Marathon, for instance has a vacancy rate near 0% and municipal authorities foresee the need for an additional subdivision to be built in the near future should other projects occur in the area (Skworchinski, pers. Comm., 2020).

Of the 152 dwellings on the Biigtigong Nishnaabeg Reserve lands, 120 are on track to eventually have occupants own their homes. Over the last 10 years, the community has built 46 new homes and repaired an additional 40. In 2020, Biigtigong is finalizing the completion of three duplexes which will help with the ever-growing demand for housing. Currently, there are plans to develop an addition four units with construction expected to start in the spring of 2021 (BN 2020).

In 2011, there were 18 hotels, motels, and bed-and-breakfasts in the RSA with a total of 400 rooms (gck Consulting 2011). As of September 2020, there are 24 temporary accommodations in the RSA communities with 470 rooms (TripAdvisor 2020). GMS Camps and Accommodations is a company that has been providing temporary worker accommodations to contractors and workers deployed in Marathon, Manitouwadge, White River, Biigtigong Nishnaabeg, and Pic Mobert since 2018. It has 50 rooms in two facilities and can provide catering services (GMS Camps no date). There are no hotels or motels in Biigtigong Nishnaabeg; however, there is a one-bedroom guest suite available for rent, which is referred to as the Pic River Guest Suite (BN 2020).

4.11.3.2 Education

Five school boards administer education in the RSA with more than 1,500 elementary and secondary students in 2018/2019, including Superior-Greenstone District School Board, Superior North Catholic District School Board, Huron Superior Catholic School Board, Conseil scolaire Public du Grand Nord de l'Ontario and Conseil scolaire de district catholique des Aurores boreales (Stantec, 2020g).

There are several post-secondary education institutions in the RSA, including Confederation College (Thunder Bay, as well as its Northshore campus in Marathon), Lakehead University (Thunder Bay and Orillia), Algoma University (Sault Ste. Marie, Brampton, and Timmins), and Sault College (Sault Ste. Marie).

Residents of White River also have access to an Adult Learning Centre and Contact North offers access to university and college courses through distance learning and online education.

4.11.3.3 Health Services and Programs

The RSA communities are part of the District of Thunder Bay, which is one of five sub-regions within the North West Local Health Integration Network (LHIN) that represents a local planning area for health services. The District of Thunder Bay sub-region is composed of five Local Health Hubs – Greenstone, Manitouwadge, Marathon, Nipigon, and Terrace Bay (North West LHIN 2014).

In 2019, the North West LHIN had 372 family medicine physicians, up 13.4% from 328 in 2015. This represents 156 physicians per 100,000 population. Between 2015 and 2019, the number of specialists in the North West LHIN increased 12.3% from 187 to 210, representing 88 physicians per 100,000 population. In 2019, Ontario had 115 family physicians and 117 specialists per 100,000 population (CIHI 2019).

There are three hospitals in the RSA with a total of 97 acute care beds, including Wilson Memorial General Hospital in Marathon, The McCausland Hospital in Terrace Bay and Sante Manitouwadge Health in Manitouwadge). There are also five medical clinics that offer a range of medical and health services, including Marathon Family Health in Marathon, Aguasabon Medical Clinic and J.E. Stokes Medical Centre in Terrace Bay, White River Medical Centre in White River, Biigtigong Nishnaabeg Mno-zhi-yaawgamig/Pic River Health Centre in Pic River and Pic Mobert Health Centre in Pic Mobert.

Health services in First Nations communities are provided through federally-funded, community-based programs that are operated through local health centres. These centres promote physical and mental health for community members and offer a similar suite of services in each community.

Biigtigong Nishnaabeg Health operates out of the Biigtigong Nishnaabeg Health Centre. The community signed a Health Transfer Agreement with ISC-First Nations and Inuit Health Branch in May 1997, which was renewed for another five years in 2017. This agreement allows for increased autonomy in determining what types of health care services are provided in the community to meet the needs of members. In 2018, Biigtigong Nishnaabeg became the host community for The North East Mental

Wellness & Crisis Response Team for the communities of Pays Plat First Nation, Michipicoten First Nation, Pic Mobert First Nation and Biigtigong Nishnaabeg. This team responds to crisis situations and provides ongoing mental health services to individuals, groups, and families affiliated with these four communities. The community also receives visiting specialists such as medical doctors, dieticians, diabetes educators and traditional healers.

In 2019, Biigtigong Nishnaabeg signed a Memorandum of Understanding with Dilico for regularly scheduled visits to the community by their Primary Care Travelling Team. This team provides a collaborative health care team approach and provides the community members of Biigtigong Nishnaabeg with access to a nurse practitioner, pharmacist, social worker, chiropodist, traditional healing liaison, registered dietician, psychologist, mental health nurse, and a registered Practical Nurse.

The Biigtigong Nishnaabeg Social Service Program provides the following services to the community members:

- One-on-one counselling using various treatment modalities and addressing a variety of mental health concerns
- Advocacy
- Workshops & presentations
- Family Support
- Band representation for child protection
- 50+ Programming
- School Programming
- Crisis Counselling, Intervention, and follow-up
- Case Management

Biigtigong Nishnaabeg also administer the Biidaaban Healing Lodge, a 12-unit facility which offers treatment for drug and alcohol addictions through a combination of modern medicine and traditional native healing.

The Pic Mobert Health Centre offers minor treatment through community nursing and health team staff, and facilitates and coordinates visits from specialists including medical doctors from Marathon Family Health Team, dietitians, diabetes educators, traditional healers and dental hygienists (Northwesthealthline.ca 2020a).

Staff at the Pays Plat Health Centre work closely with the Community Health Nurse and administer several health programs, including Aboriginal Diabetes Initiative, Brighter Futures, and Canada Prenatal Nutrition Program (Northwesthealthline.ca 2020b).

4.11.3.4 Emergency Services

Police services in the RSA are provided by Ontario Provincial Police (OPP) and by the Anishinabek Police Service (APS), including:

- OPP Marathon Detachment provides services to Marathon, Manitouwadge, Biigtigong Nishnaabeg, and Pic Mobert First Nation
- OPP Nipigon Detachment (Schreiber Satellite Detachment) provides services to Terrace Bay, Schreiber, and Pays Plat First Nation
- OPP Superior East (Wawa) Detachment provides services to White River
- APS Biigtigong Nishnaabeg detachment provides service to BN and Pic Mobert First Nation

In total, there are 140 officers in the RSA. Between 2014 and 2018, the CSI has increased in every police service in the RSA, with the exception of OPP Manitouwadge. In both the Marathon and Superior East (Wawa) OPP detachments, the CSI has more than doubled. In 2018, Ontario's CSI was 59.96, while the CSI and rate of criminal code violations were highest for the APS (194.53) and lowest for the OPP Schreiber (Terrace Bay) detachment (27.43) (Statistics Canada 2019a). The rate of criminal code violations per 100,000 population in Ontario in 2018 was 4,311.46 (Statistics Canada 2019b).

There are seven fire departments in the RSA with 108 members, including:

- Marathon Fire Department (22 members)
- Terrace Bay Fire Department (26 members)
- Manitouwadge Fire Department (23 members)
- Schreiber Fire Department (20 members)
- White River Fire Department (17 members)
- Biigtigong Nishnaabeg Fire Department (12 members)
- Pays Plat First Nation Fire Department (-)

There are five ambulance stations in the RSA operated by Superior North Emergency Medical Services (District of Thunder Bay) and Algoma District Paramedic Services Emergency Medical Services (EMS), including:

- Marathon EMS station (6 paramedics)
- Terrace Bay EMS Station (5 paramedics)
- Manitouwadge EMS Station (6 paramedics)
- Schreiber EMS Station (6 paramedics)
- White River Station (-)

In the District of Thunder Bay, the average response time, or average travel time to patients for highest priority calls, for EMS in 2019 was 7 minutes, 22 seconds. The response time standard for EMS response to calls ranges from 6 to 21 minutes depending on the severity and urgency of the threat to life (Ontario Ministry of Health and Long-Term Care 2019). In the Algoma District, the response time standard for calls for service from Algoma District Paramedic Services ranges from 6 to 25 minutes and the average response time is 8 minutes, 57 seconds (Ontario Ministry of Health and Long-Term Care 2019).

Biigtigong Nishnaabeg community members who require transport to medical appointments in the local area have access to transportation via a Medical Transportation program 24 hours per day, 7 days per week. Travel to specialist appointments for medical care are coordinated through the Community Health Clerk (BN 2020).

4.11.3.5 Utilities

Water distribution and treatment services, including sewage treatment, are provided by the municipalities of Marathon, Terrace Bay, Schreiber, Manitouwadge, and White River.

Biigtigong Nishnaabeg has an aging water treatment plant that requires upgrades, which has put the community in a very vulnerable position when trying to supply potable water and to maintain its fire protection abilities. Biigtigong Nishnaabeg is awaiting approval of a $15 million water treatment facility that will better meet the community’s consumption needs. All households and community buildings utilize septic fields (BN 2020).

In 2016, Pic Mobert First Nation opened a new water treatment plant with capacity to supply the community (Garrick 2016).

Marathon operates a landfill site within its municipal boundaries, which is located on Camp 19 Road. It opened in July 2015 when the former landfill east of the Town reached capacity. As of December 2018, the remaining capacity of the site was estimated at 346,177 tonnes. The site is not expected to reach capacity until 2140 (Skworchinski, pers. Comm., 2020).

In order to manage waste after its landfill site was closed in 2018, BN purchased a truck and garbage compactor for weekly roadside pickup of domestic waste, which is transferred to the Marathon landfill. To enhance waste management, the community also has a bi-weekly recycling pick up.

4.11.3.6 Transportation and Traffic Conditions

The main highway in the RSA is Highway 17, which is the primary land corridor linking Canada from east to west. Within the Project Area, Highway 17 is identified as a Rural Arterial Undivided King's Highway with a design speed of 110 km/h and a posted speed limit of 90 km/h. This section is a two-lane, Class III Controlled Access Highway and is a part of the Trans-Canada Highway. Access to the Project is currently provided by the Camp 19 Road, opposite Peninsula Road at Highway 17.

The *Transportation Updated Baseline Report* (Stantec, 2020f) was prepared to summarize and document changes to the existing environmental conditions relating to traffic operations and impacts to Highway 17 relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. Most of the assumptions and analysis outlined within the transportation baseline report remain applicable.

The assumed traffic type, volume, and distribution were still considered valid and applicable to the updated baseline condition. The background information regarding the area developments was also reviewed and the assumptions made in the TIS were found to still be applicable relative to the anticipated traffic volumes in the area. Updates to baseline traffic volumes will be required for permitting through the Ministry of Transportation (MTO); however, by using a conservative approach to the estimation of the traffic growth, no additional improvements (i.e. turning lanes, signalization) would be warranted beyond the recommendations outlined in the original EIS (2012).

The geometric configuration of the Camp 19 Road intersection itself has not changed since the time of the original EIS (2012); therefore, the recommendations outlined in the original EIS (2012) would be considered valid. The sightline measurements undertaken previously are still being met with the proposed improvements. The only change in condition relative to previous conditions described in the EIS (2012) is that Camp 19 Road is now paved farther north than the previous 100 m limit.

4.11.4 Community Well-Being

The Community Well-Being (CWB) Index is a method of assessing socio-economic well-being in Canadian communities. Various indicators of socio-economic well-being, including education, labour force activity, income and housing, are derived from Statistics Canada's Census of Population and combined to give each community a well-being "score". These scores are used to compare well-being across First Nations and Inuit communities with well-being in other Canadian communities.

CWB Index scores for 2016 for the municipalities and First Nations in the RSA are summarized in Table 4.11-2. Individual component scores are not available for Pic Mobert First Nation and Pays Plat First Nation. In 2016, Terrace Bay had the highest overall CWB Index score in the RSA and Pic Mobert First Nation had the lowest score (CIRNAC 2016). In general, the component with the highest scores throughout the RSA was housing, while education scores were the lowest.

Table 4.11-2: Community Well-Being Scores for RSA Communities, 2016

Community	Income Score	Education Score	Housing Score	Labour Force Score	Community Well-Being
Biigtigong Nishnaabeg	67	53	85	75	70
Pic Mobert First Nation	-	-	-	-	53
Pays Plat First Nation	-	-	-	-	65
Marathon	81	58	97	84	80
Schreiber	78	58	94	85	79
Terrace Bay	82	64	96	85	82
Manitouwadge	81	52	94	76	76
White River	80	52	89	87	77

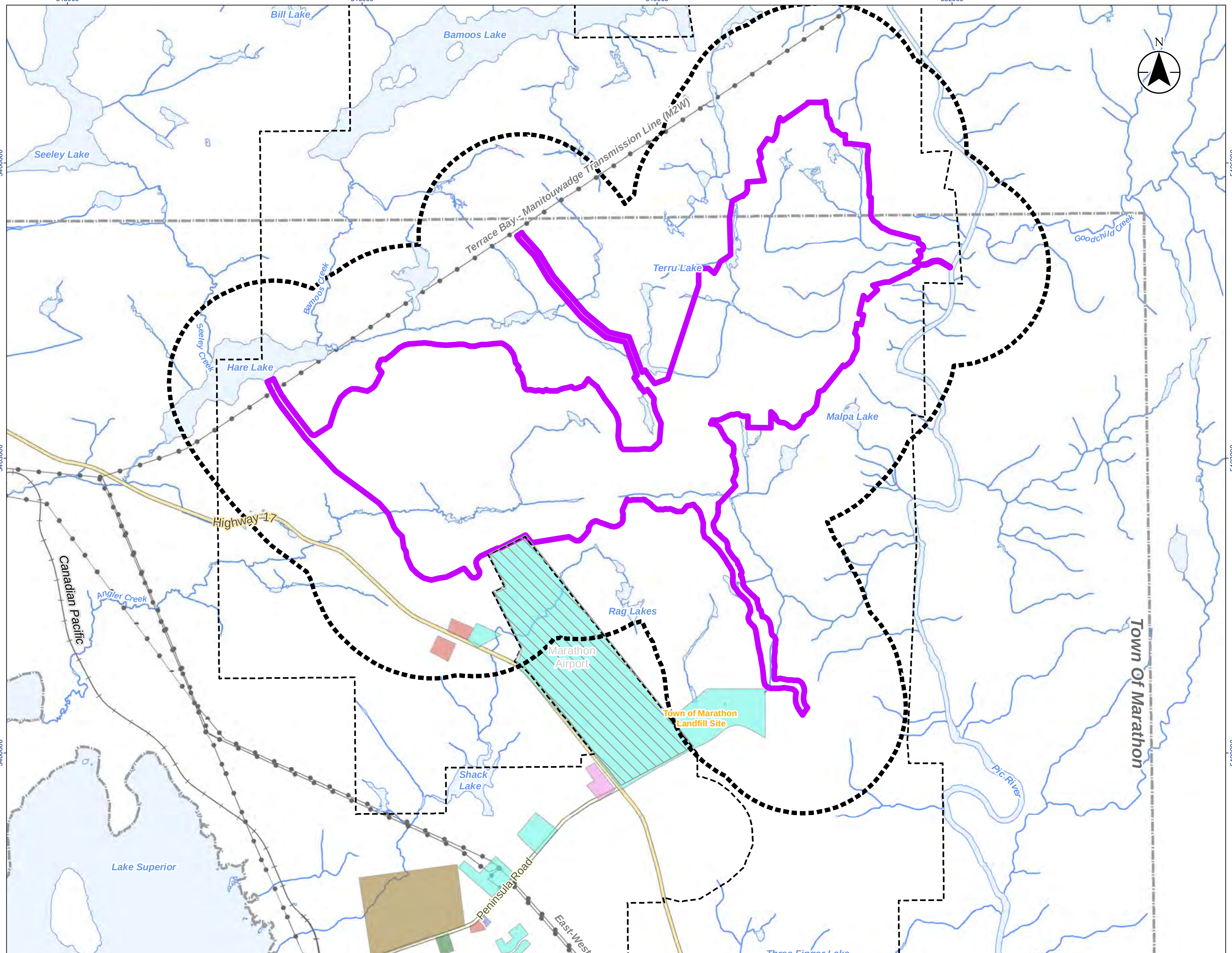
Source: CIRNAC 2016; *Socio-Economic and Current Resource Use Updated Baseline Report* (Stantec, 2020g)

4.11.5 Land and Resource Use

4.11.5.1 Land Use

The SSA is located entirely on Crown land, which represents 96.5% of the LSA (3,985 ha) and 96.2% of the RSA (439,797 ha). Land use within the SSA is directed by the Town of Marathon's Official Plan (see Figure 4.11-1) and the Crown Land Use Policies (see Figure 4.11-2). Mine exploration and development is a permitted use by both of these policies. According to the Ministry of Natural Resources and Forestry (MNRF) Crown Land Use Policies, the SSA is primarily located within a General Use Area designation, which permits mine exploration and development (see Figure 4.11-1).

The Official Plan includes policies that require technical studies and designs to limit impact to natural features and to ensure development is not at risk to natural hazards. Crown Land Use policies promote resource extraction in a manner that limits conflicting use and enhances access to recreation uses, including the Pic River.



Stantec

Legend

- Land and Resource Use Local Study Area Local Study Area
- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Highway
- Major Road
- Minor Road
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Waterbody

Town of Marathon Land Use Designations*

- General Commercial (C2)
- Heavy Industrial (M2)
- Institutional (I)
- Open Space (OS)
- Residential 1 (R1)
- Residential Multiple (RM-1)

0 1 2 km

1:40,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
* Land Use Designations have been adapted from the Town of Marathon Official Plan- Schedule A and should be considered approximate.

Project Location
Marathon

129673006 REVA
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Client/Project
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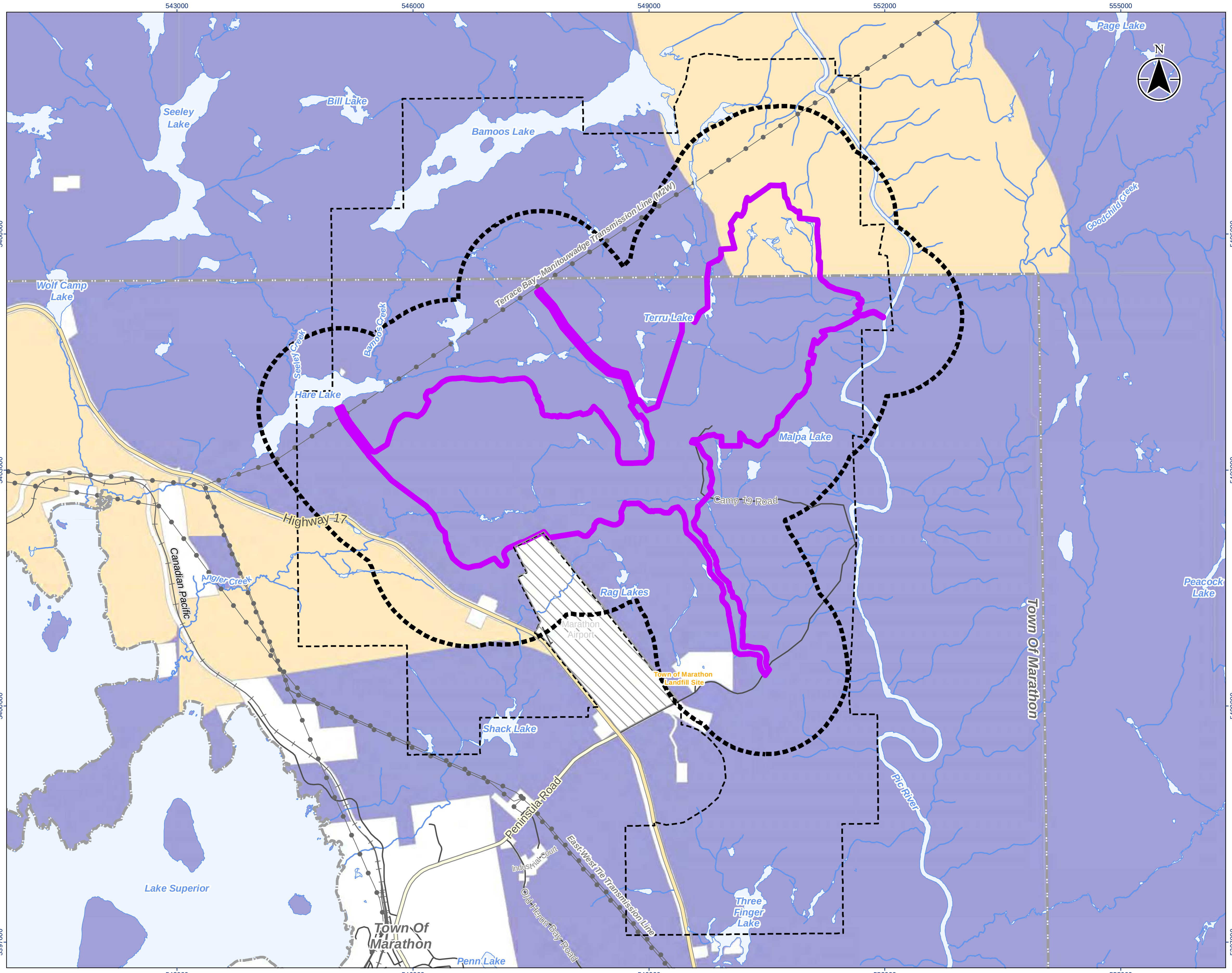
MARATHON PALLADIUM PROJECT

Figure No.
4.11-2

Title
Official Plan Land Use Designations in the LSA



Stantec

Legend

- Land and Resource Use Local Study Area
- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Highway
- Major Road
- Minor Road
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- Waterbody

Crownland Use Designation*

- Enhanced Management Area
- General Use Area

0 1 2 km

1:50,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
* Based on the Ontario Crownland Use Policy Atlas from Land Inventory Ontario (LIO) does not include information on private land.

Project Location: Marathon

129673006 REVA

Prepared by DH on 2020-12-18

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

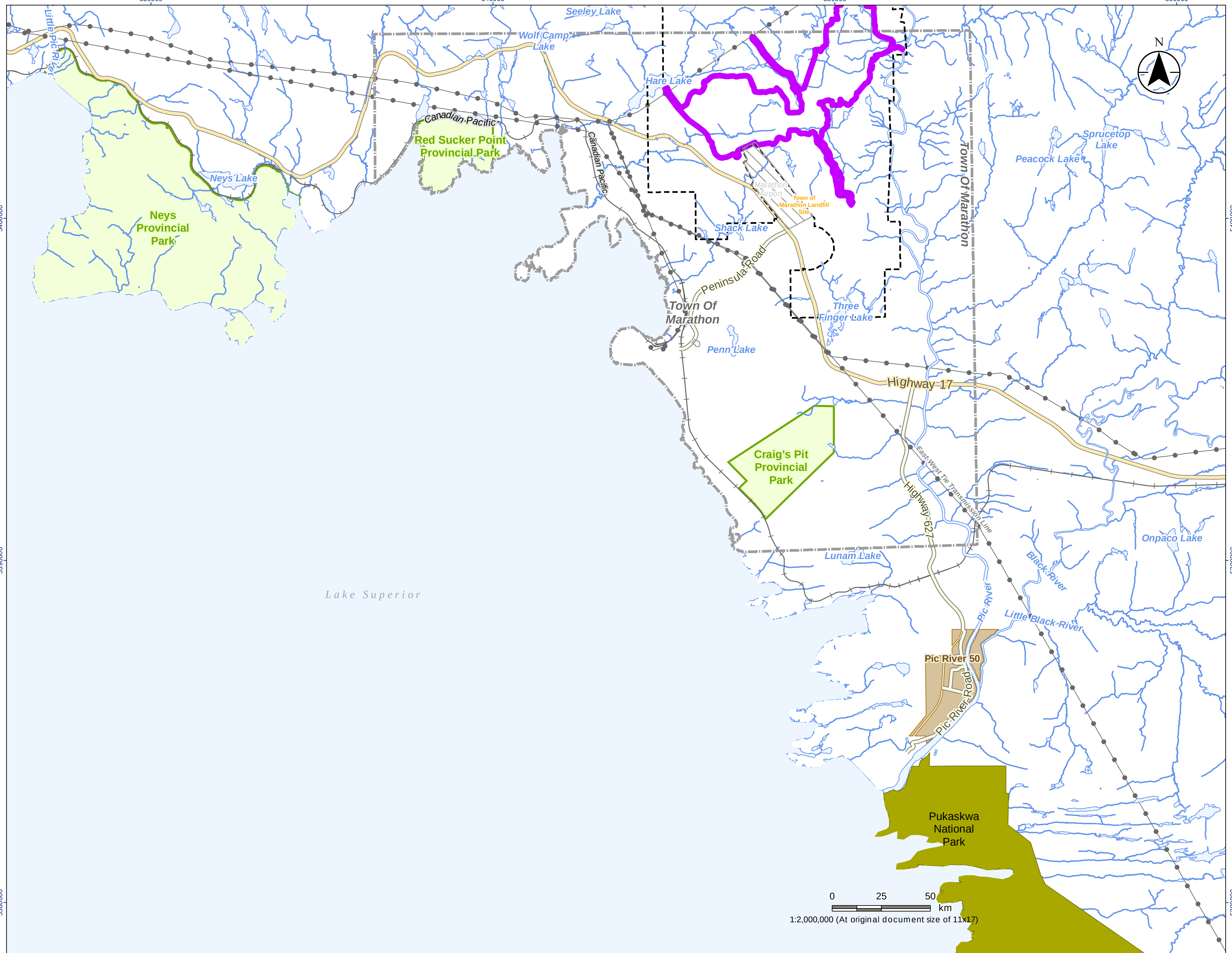
Figure No.
4.11-3

Title
Crown Land Use Designations in the LSA

4.11.5.2 Protected Areas

Within the RSA, there are several prominent nature conservation and protection/enhancement areas, including the Lake Superior Shoreline, Pukaskwa National Park, Craigs Pit Provincial Park, Red Sucker Point Provincial Park and Neys Provincial Park (See Figure 4.11-3).

The Great Lakes Water Quality Agreement established 43 Areas of Concern (AOC) given their severely degraded water quality and environmental health. The Peninsula Harbour AOC, located on the north side of the Town of Marathon, was designated as an AOC due to severely degraded water quality and environmental health (Government of Canada, 2017). The Peninsula Harbour AOC is located outside of the LSA, but does receive drainage from subwatershed 109, which includes the airport lands and a small portion of the SSA. In 2012, all actions required to restore ecosystem health and water quality were completed and ongoing monitoring will determine whether Peninsula Harbour will be delisted as an AOC in the future.



Stantec

Legend

- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Highway
- Major Road
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- Municipal Boundary, Lower Tier
- National Park
- Provincial Park
- Waterbody

0 2.5 5 km

1:115,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2020-12-18

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
4.11-4

Title
Protected Areas in Proximity to the Project

V:\01609\active_Other_PCs_Active\1296 - Manitoba\129673006 Marathon PGM\gis_cad\gis\mxds\General\report_figures\EIS\129673006_EIS_Fig04_11-4_ProtectedAreas_inProximity_to_the_Project.mxd Revised: 2020-12-18 By: dharvey

4.11.5.3 Mineral Exploration and Development

Historically, the Thunder Bay South District has seen mining operations for gold, silver, base metal, and platinum group elements. Gold exploration in the area began in the late 1800s and continues to the present day. Silver production in the area, likewise, began in the mid to late 1800s and continued until the early 1900s. Further detail on site exploration in the area from 1940-2010 is provided in Section 1.4.2.5 of the original EIS (2012).

As of 2019, the Thunder Bay South District had two operating mines - the Hemlo Gold Mine, which has since altered production, and the Lac Des Iles Palladium mine north of Thunder Bay. The Hemlo Gold Mine previously consisted of the David Bell Mine, which ceased production in 2010, and the Golden Giant Mine, which ceased production in 2014 (MDO, 2020). Currently, the Hemlo Gold Mine consists of the Williams Mine, which is projected to maintain open pit and underground operations until 2029-2031 (CBC, 2017).

The Mining claims, which grant its owner the exclusive rights to explore for minerals on a designated piece of land, within the SSA have been or will be converted to mining leases that are held by GenPGM for this Project.

There are eight aggregate operations within the LSA, the largest of which are owned and operated by Lafarge Canada and its subsidiaries. All of these operations are open pit type aggregate operations with annual extraction that ranges from 0 to 400,000 tonnes.

4.11.5.4 Forestry

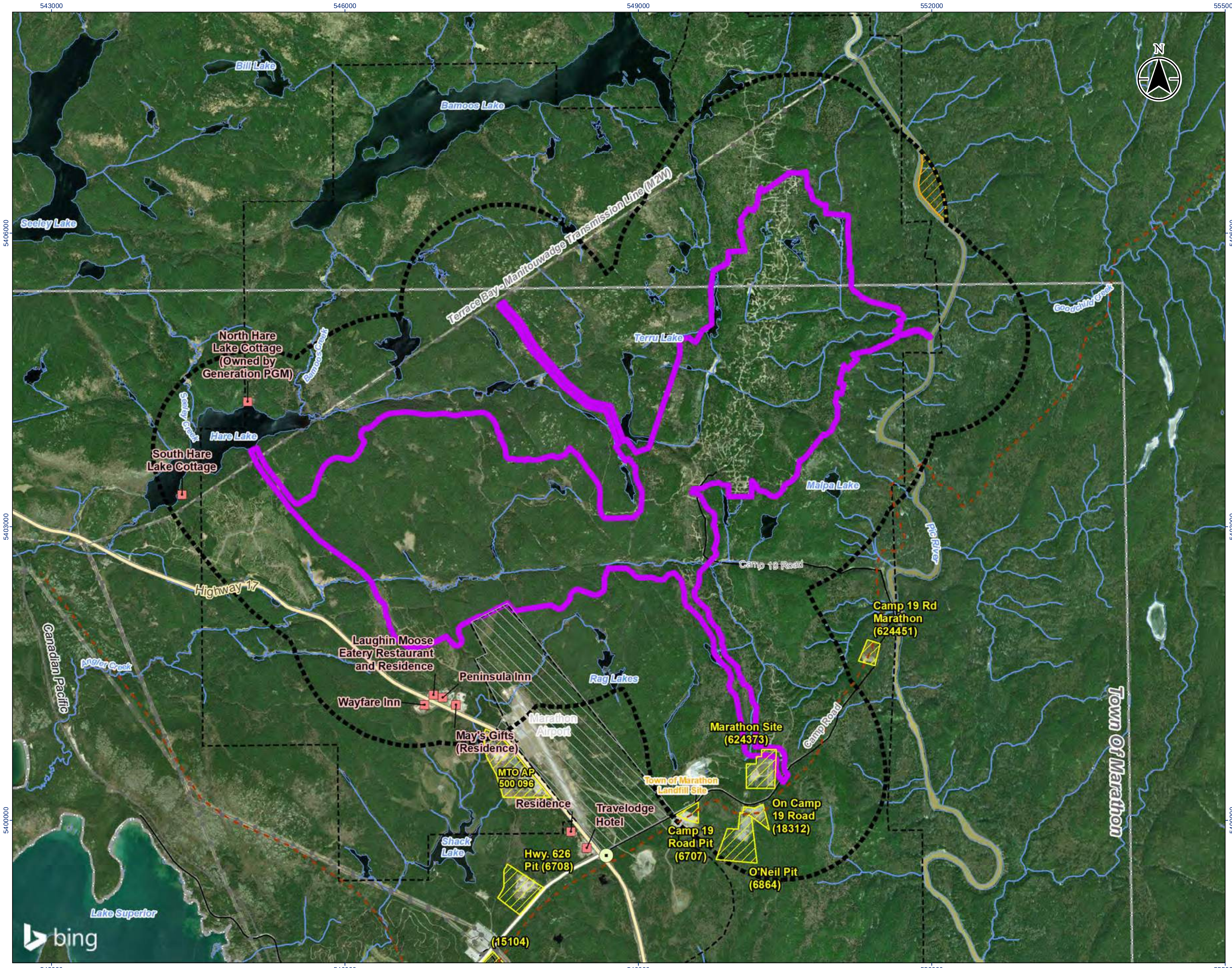
Forestry operations within the RSA declined in the mid-2000s, culminating in the permanent closure of the Marathon Pulp Inc. pulp mill and the temporary closure of the Terrace Bay pulp mill in 2009 (Nawiinginokiima Forest Management Corporation (NFMC), 2019). Since this time, harvest levels have gradually increased, and it is expected that this trend towards a more productive forestry industry will continue for the next ten years.

The Project is located in the Pic Forest Management Unit, which is managed by the NFMC, a Local Forest Management Corporation, under the *Ontario Forest Tenure Modernization Act* (NFMC, 2012). The Big Pic Forest Management Unit and the Pic River Forest Management Unit were amalgamated in 2013 to form the Pic Forest Management Unit. The Pic Forest Management Unit is 1,153,237 ha in size, of which 98% (1,131,800 ha) is Crown land (NFMC, 2019). The SSA previously overlapped the Big Pic Forest Management Unit.

Current direction for forest management is provided through the Contingency Plan 2019-2021 for the Pic Forest (NFMC, 2019) and the Summary of the Proposed Long-Term Management Direction for the Pic Forest Management Plan (NFMC, 2018). The Pic Forest Management Plan is anticipated to be finalized by 2021. The Contingency Plan (2019) established a planned harvest area of 21,270 ha between 2019-2021, with an additional 2,500 ha being carried over from the previous Contingency Plan (2017-2019). No harvest areas were identified within the SSA or LSA.

The Summary of the Proposed Long-Term Management Direction for the Pic Forest Management Plan (2018) outlines potential harvest areas until 2029; however, no potential harvest areas were identified within the SSA. A small portion of the LSA (approximately 10 ha) east of the Pic River is identified as a preferred harvest area (see Figure 4.11-4).

Camp 19 Road is identified as a municipal/other road that terminates near the existing aggregate operations to the west of the SSA (NFMC, 2018). Additional details on Camp 19 Road can be found in Section 6.1.9. No forest access roads are proposed within the SSA or LSA. Access to the preferred harvest area on the east side of the Pic River is to be provided by a yet to be constructed forest access road that will be located outside of the LSA.



Stantec

Legend

- Land and Resource Use Local Study Area Local Study Area
- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Landuse Points
- Park
- Highway
- Major Road
- Hydro Line
- Railway
- Snowmobile Trail
- Watercourse
- Airport (Property Boundary)
- Active Aggregate Site
- Preferred Harvest Area (Approximate Location within LSA)[4]
- Municipal Boundary, Lower Tier
- Waterbody

0 1 2 km

1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthography Imagery Source: © 2020 Microsoft Corporation © 2020 Maxar ©CNES (2020) Distribution Airbus DS
4. Intended to show the approximate location of the preferred harvest area within the LSA. For more details on the exact location of the preferred harvest area refer to 2019-2021 Contingency Plan Pic Forest- MU966.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2021-01-06

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
4.11-5

Title
Surrounding Land Uses

V:\01609\active_Other_PCs_Active\1296...Manitoba\129673006 Marathon PGM\gis_cad\gis\mxds\General\report_figures\EIS\129673006_EIS_Fig04_11-5_SurroundingLanduse.mxd Revised: 2021-01-06 By: dharvey

4.11.5.5 Agriculture

The original EIS (2012) identified that negligible agriculture existed in the area, which is unchanged for the addendum. No agriculture activities occur within the SSA or LSA but do occur in the Thunder Bay district. The 2006 Census recognized 67 farms in the entire Thunder Bay district, with many farms growing hay, fodder crops and alfalfa with a minority growing potatoes, oats, and barley. The 2016 Agricultural Census identified 46 farms, representing a 31% decline (OMAFRA, 2016).

4.11.5.6 Hunting and Trapping

Hunting and trapping are regulated by the MNRF under the *Fish and Wildlife Conservation Act* and Regulations (1997), which divide the province up into wildlife management units (WMUs) and govern hunting, trapping, fishing, and wildlife management activities in the province (Government of Ontario 1997). The LSA is located within, and portions of the RSA compromise, WMU 21A and 21B.

Hunting for small and big game species is licensed for Ontario residents and non-residents, with the exception of Indigenous communities hunting within traditional or treaty areas or hunting for food, social, or ceremonial purposes.

Within WMU 21A and 21B, hunting is permitted for moose (adult and calf), white tail deer, black bear, wolf & coyote, small game (Ruffed Grouse, Sharp tailed Grouse, Ring Necked Grouse, Snowshoe Hare, Grey/Black and Fox Squirrel, Racoons, Possum, Red Fox, Skunk, Weasel), and furbearing animals. Hunting in this area is traditionally undertaken with rifles, shotguns, muzzle loading guns, and bows; however, the use of falcons and dogs is also permitted in certain seasons. Moose is the most common species pursued by active hunters with an estimated 5,484 active hunters in 2018. The number of moose harvest in 2018 is estimated to be 243.

Migratory waterfowl hunted in WMU 21A and 21B include ducks, rails, gallinules, coots, snipes, geese, woodcock, and mourning dove. The hunting season generally extends from September to December.

In Ontario, trapping is also subject to regulations under the *Fish and Wildlife Conservation Act* and policies, which are administered by MNRF. As with hunting, trapping inside provincial parks and Crown game reserves is prohibited (Government of Ontario, 1997). In accordance with the *Fish and Wildlife Conservation Act*, trappers must:

- hold a licence and complete a Fur Harvest, Fur Management, and Conservation Course
- respect annual harvest quotas
- use humane certified traps
- limit trapping to traplines on Crown land or obtain written permission from the landowner if trapping on private property
- adhere to open trapping season

Within the WMU 21A and 21B, a variety of furbearing species are available for trapping, including beaver, otter, bobcat and lynx, mink, muskrat, fisher and marten, raccoon, fox, skunk, red squirrel, weasel, black bear, wolf, and coyote. There are multiple traplines located within the RSA, including two within the SSA and LSA (see Table 6.27 of the *Socio-Economic and Current Resource Use Updated Baseline Report* (Stantec, 2020g). The trapping season varies but generally runs from the fall to spring months apart from skunk which can be trapped year-round.

4.11.5.7 Fishing

Bait harvesting is carried out in the RSA and is a licensed commercial activity. The province divides the territory into bait harvesting areas. The SSA is located within a single bait fish harvest area (NI3502). The LSA is located within two bait harvest areas (NI3101, NI3502), whereas the RSA is located within 23 bait harvest areas.

The SSA and LSA are located within Ontario Fisheries Management Zone (FMZ) 7, whereas the RSA is located in FMZ 7 and FMZ 9:

- Fisheries Management Zone 7: FMZ 7 includes important fisheries for recreation and tourism, with Walleye, Northern Pike, Lake Trout, and Brook Trout being the main fisheries (Government of Ontario, 2015). FMZ 7 consists of land that drains into Lake Superior. It is comprised primarily of recreational and tourism-based fisheries and is a prominent region for Walleye, Northern Pike, Lake Trout, and Brook Trout. Brook Trout are stocked in many lakes in FMZ 7. This area also includes Pukaskwa National Park and the Chapleau Crown Game Reserve.

- Fisheries Management Zone 9 (Lake Superior): FMZ 9 includes the Canadian waters of Lake Superior, the largest surface area of any freshwater lake in the world and some of the lakes most unique aquatic and terrestrial environments. Active recreational fisheries in the area include fishing for Lake Trout, Walleye, Yellow Perch, Brook Trout, as well as introduced species including Chinook salmon, Coho salmon, and Rainbow Trout in open water and tributaries.

Commercial fisheries in this area target Whitefish, Walleye, Cisco, Lake Trout, and Yellow Perch.

4.11.5.8 Recreation and Tourism

The RSA is located within Ontario Tourism Region 13C in northwestern Ontario. Regional tourism profiles (MTC, 2020) indicated that in 2017, there were 1,669,487 visits to the “13C North West Ontario” region, of which 64% (1,069,471) were from Ontario. The remaining visitors came from the rest of Canada (562,155 or 33%) and overseas (37,861 or 2.2%). Of those visits in 2017, 891,613 or 54% were for pleasure followed by 511,265 or 30.6% for recreation and entertainment.

Tourism in the Thunder Bay area (Zone 13C) consists of accommodation, arts, entertainment, and recreation, as well as food and beverage, transportation, travel, and retail. In 2018, tourism-related establishments made up 20% of all industry establishments in the region, compared to the provincial average of 13%.

Informal recreational tourism in the SSA, LSA and RSA includes fishing, swimming, boating, canoeing, biking, picnicking, and birding in the summer months. While winter recreation consists of snowmobiling, cross-country skiing, and snowshoeing. Recreational hunting, trapping, and fishing is discussed in Sections 4.11.5.6 and 4.11.5.7.

There are several snowmobile trails within the SSA, LSA, and RSA. The Marathon Sno-Kickers Snowmobile Club operates a trail along Camp 19 Road that extends from Highway 17 to the east of the Pic River (Ontario Federation of Snowmobile Clubs, no date).

Recreation is an important appeal for tourism in the RSA and has undoubtedly been hampered by the ongoing Covid-19 pandemic.

4.11.5.9 Other Land and Resource Uses

Two transmission line runs through the LSA, including the Terrace Bay-Manitouwadge transmission line (M2W Line) along the northern edge of the SSA and the East-West Tie Transmission Line along the west side of Highway 17.

Notable land uses within the LSA include (see Figure 4.11-5):

- Marathon Airport
- Commercial and residential properties along Highway 17
- Aggregate operations along Camp 19 Road
- Cottages on Hare Lake
- Town of Marathon Landfill

4.12 HUMAN HEALTH

The assessment of human health effects for the Project is based on exposure to various contaminants that may affect air quality, noise, water quality, and country foods. Changes to baseline conditions to which people may be exposed, and the activities that they may be undertaken at the time, have been summarized in the various sections above.

4.13 PHYSICAL AND CULTURAL HERITAGE RESOURCES

4.13.1 Archaeology

No additional archaeological work was undertaken in support of the Project. As reported previously in the Stage 1 and 2 archaeological assessments (CIAR #227), as well as responses to IR16.6 (CIAR #377), sites with high archaeological potential occur on Hare Lake and Bamoos Lake outside of the SSA.

4.13.2 Built Heritage and Cultural Heritage Landscapes

The *Environmental Cultural Heritage Updated Baseline Report* (Stantec, 2020a) was prepared to summarize and document changes to existing environmental conditions relating to built heritage resources and cultural heritage landscapes, relative to those conditions considered in the previous assessment, in order to support the updated assessment of potential environmental effects. This work provided an update to the *Assessment of Non-Aboriginal Cultural Heritage/Built Environment/Cultural Landscape Values for the Marathon PGM-CU Project Environmental Impact Statement* (Ross Archaeological Research and Hamilton Archaeological Consulting, 2013) (provided as Appendix B of Stantec, 2020a).

An evaluation of potential built heritage resources and cultural heritage landscapes using the MHSTCI Checklist was completed. This checklist is a screening tool used to identify known and potential resources of cultural heritage value, along with considerations for local and Indigenous knowledge. This assessment was completed to identify potential properties and structures of cultural heritage value that could potentially interact with the Project.

The assessment included a review of current aerial photography of the site, desktop screening of historic records, data requests from local and provincial sources, and a review of online databases to determine the presence of previously identified built heritage resources and cultural heritage landscapes. Requests for information were also distributed to identify Indigenous interest on the site regarding cultural, spiritual, and land use considerations.

Based on the findings of the MHTSCI Checklist, no indicators for potential built heritage resources or cultural heritage resources were identified. This finding is consistent with the previously completed 2013 assessment and no change to the previous conclusions presented are required as a result of this update. Therefore, there is low potential for built heritage resources or cultural heritage resources to be identified within the SSA. As such, no further assessment is required.

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