

Report of the Joint Review Panel

MARATHON PALLADIUM PROJECT



JOINT REVIEW PANEL ESTABLISHED BY THE FEDERAL MINISTER OF ENVIRONMENT
AND CLIMATE CHANGE AND THE ONTARIO MINISTER OF THE ENVIRONMENT,
CONSERVATION AND PARKS

AUGUST 2, 2022

Joint Review Panel Report for the Marathon Palladium Project

Prepared by:

**The Joint Review Panel Established by the Federal Minister of
Environment and Climate Change and the Ontario Minister of the
Environment, Conservation and Parks**

August 2, 2022

Report of the Joint Review Panel: Marathon Palladium Project

Prepared by: the Joint Review Panel Established by the Federal Minister of Environment and Climate Change and the Ontario Minister of the Environment, Conservation and Parks

August 2, 2022

Catalogue No.: En106-245/2022E-PDF

ISBN: 978-0-660-43306-6

Canadian Impact Assessment Registry Reference No. 54755

Published by:

Ontario Ministry of the Environment, Conservation and Parks

College Park 5th Floor

777 Bay St

Toronto, ON M7A 2J3

and

Impact Assessment Agency of Canada

160 Elgin Street, 22nd Floor

Place Bell Canada, Ottawa, Ontario K1A 0H3

Telephone: 613-957-0700

Fax: 613-957-0941

Website: <https://www.canada.ca/en/impact-assessment-agency.html>

August 2, 2022

The Honourable Steven Guilbeault, P.C, M.P.
Minister of Environment and Climate Change Canada
House of Commons
Ottawa, Ontario K1A 0A6

The Honorable David Piccini, M.P.P.
Minister of Environment, Conservation and Parks
College Park 5th Flr
777 Bay St
Toronto, ON M7A 2J3

Dear Ministers Guilbeault and Piccini,

The Joint Review Panel has completed our environmental assessment for the Marathon Palladium Project in accordance with our mandate issued on August 9, 2011 (amended February 3, 2021). Herein, the Joint Review Panel submits our report for consideration by the Government of Canada and the Government of Ontario. The Joint Review Panel's report is based on evidence and information provided to it up to May 19, 2022, when the Project record was closed.

Sincerely,

<Original signed by>

Debra Sikora
Panel Chair

<Original signed by>

Laurie Bruce
Panel Member

<Original signed by>

Gay Drescher
Panel Member

TABLE OF CONTENTS

List of Tables	vii
List of Figures	vii
List of Acronyms and Abbreviations.....	viii
List of Units	ix
Executive Summary	xi
Part 1: Environmental Assessment Process and Approach	1
Section 1: Introduction	1
1.1 Panel’s Mandate	1
Section 2: Review Process.....	3
2.1 Panel Referral and Process under the Former Panel.....	3
2.2 Project Re-start and Process Under the Current Review Panel.....	4
2.3 Public Participation.....	5
2.4 Confidentiality Requests.....	6
2.5 Site Visit	8
2.6 Public hearing	8
Section 3: Mandate of the Panel and Scope of Review.....	10
3.1 Legal Context	10
3.2 Future Permitting and Authorizations.....	11
3.3 Definition of Environment	11
3.4 Determining Significance.....	12
3.5 Precautionary Principle	13
3.6 Aboriginal and Treaty Rights.....	15
3.7 Species at Risk	16
3.8 Cumulative Effects Assessment	16
Section 4: Project Overview	24
4.1 Project Setting	24
4.2 Spatial and Temporal Boundaries.....	25
4.3 Project Components	27
4.4 Site Preparation and Construction Phase.....	30
4.5 Operations Phase.....	32
4.6 Active Closure Phase	34
4.7 Post-Closure Phase	36

Section 5: Need, Purpose, and Assessment of Alternatives	37
5.1 Requirements for the Consideration of Need, Purpose, and Assessment of Alternatives	37
5.2 Need and Purpose of the Project	37
5.3 Panel Conclusions	39
5.4 Alternatives to the Project	40
5.5 Alternative Means	41
5.6 Panel Conclusions	44
Part 2: Aquatic Environment.....	46
Section 6: Geology.....	46
6.1 Requirements for the Consideration of Geology.....	46
6.2 Assessment of Geochemistry	46
6.3 Metal Leaching and Acid Rock Drainage	49
6.4 Water Quality Model.....	52
6.5 Panel Conclusions and Recommendations.....	53
Section 7: Groundwater Quantity and Quality	56
7.1 Requirements for the Consideration of Groundwater Quality and Quantity.....	56
7.2 Baseline Groundwater Conditions.....	56
7.3 Effect on Groundwater Quantity.....	59
7.4 Effect on Groundwater Quality	60
7.5 Mitigation and Monitoring	65
7.6 Panel Conclusions and Recommendations.....	65
7.7 Cumulative Effects.....	70
Section 8: Surface Water Quantity.....	71
8.1 Requirements for Consideration of Surface Water Quantity	71
8.2 Baseline	71
8.3 Effect on Hydrology	73
8.4 Mitigation and Monitoring	84
8.5 Panel Conclusions and Recommendations.....	86
8.6 Cumulative Effects.....	91
Section 9: Surface Water Quality	94
9.1 Requirements for the Consideration of Surface Water Quality	94
9.2 Surface Water Quality Baseline	94
9.3 Site Water Management	96
9.4 Mercury and Methylmercury	103
9.5 Surface Water Quality Mitigation and Monitoring.....	105
9.6 Panel Conclusions and Recommendations.....	106
9.7 Cumulative Effects.....	113

Section 10: Fish and Fish Habitat	116
10.1 Baseline	116
10.2 Mitigation and Monitoring	127
10.3 Cumulative Effects	136
10.4 Northern Brook Lamprey	138
10.5 Lake Sturgeon	143
Part 3: Terrestrial Environment.....	150
Section 11: Terrain, Soils and Vegetation	150
11.1 Requirements for the Consideration of Terrain, Soils and Vegetation.....	150
11.2 Baseline	150
11.3 Environmental Effects	152
11.4 Panel Conclusions and Recommendations.....	165
11.5 Cumulative Effects.....	168
Section 12: Wildlife Species	172
12.1 Requirements for the Consideration of Wildlife	172
12.2 Mammals.....	172
12.3 Amphibians.....	184
12.4 Migratory Birds.....	187
12.5 Cumulative Effects.....	195
Section 13: Caribou.....	198
13.1 Requirements for the Consideration of Caribou	198
13.2 Regulatory and Policy Setting.....	198
13.3 Baseline	199
13.4 Project Effects.....	204
13.5 Mitigation and Offsetting	214
13.6 Residual Effects and Conclusions	222
13.7 Panel Conclusions and Recommendations.....	222
13.8 Cumulative Effects.....	227
Section 14: Terrestrial Species at Risk	231
14.1 Requirements for the Consideration of Species at Risk	231
14.2 Baseline	231
14.3 Environmental Effects	232
Part 4: Atmospheric and Acoustic Environment	269
Section 15: Atmospheric Environment.....	269
15.1 Air Quality.....	269
15.2 Greenhouse Gas Emissions.....	284
15.3 Ambient Light	289

Section 16: Acoustic Environment.....	293
16.1 Requirements for the Consideration of Noise and Vibration	293
16.2 Methodology and Baseline.....	293
16.3 Project Site Noise	296
16.4 Traffic Noise.....	300
16.5 Rail Load-Out Facility Operation Noise.....	302
16.6 General Mitigation Measures and Monitoring.....	303
16.7 Panel Conclusions and Recommendations.....	304
16.8 Cumulative Effects.....	307
Part 5: Human Environment	309
Section 17: Human Health	309
17.1 Requirements for the Consideration of Human Health.....	309
17.2 Current Human Health Conditions	309
17.3 Human Health Risk Assessment Methodology.....	312
17.4 Results of Human Health Risk Assessment.....	316
17.5 Mitigation of Human Health Effects	323
17.6 Monitoring and Follow-up Programs	324
17.7 Panel Conclusions and Recommendations.....	326
17.8 Cumulative Effects.....	331
Section 18: Socio-economic Environment	333
18.1 Economy and Employment.....	333
18.2 Accommodations, Infrastructure and Services.....	340
18.3 Land and Resources Use	350
18.4 Navigable Waters	354
18.5 Physical and Cultural Heritage Resources	356
Part 6: Natural and Operational Hazards	360
Section 19: Effects of the Environment on the Project	360
19.1 Requirements for the Consideration of the Effect of the Environment on the Project	360
19.2 Effect of Climate Change on the Project	360
19.3 Effect of Extreme Weather Events on the Project.....	364
19.4 Effect of Forest Fires on the Project	366
19.5 Effect of Seismic Activity on the Project.....	368

Section 20: Accidents and Malfunctions.....	370
20.1 Requirements for Consideration of Accidents and Malfunctions and Panel’s Approach	370
20.2 Methodology	370
20.3 Process Solids Management Facility Dam Breach	372
20.4 Mine Rock Storage Area Slope Failure	378
20.5 Unanticipated Seepage from the Process Solids Management Facility	378
20.6 Transportation Incidents	380
20.7 Other Scenarios Described by the Proponent	382
20.8 Emergency Response Plans and Procedures	387
20.9 Panel Conclusions and Recommendations.....	388
Part 7: Indigenous Matters	392
Section 21: Effects on Indigenous Peoples	392
21.1 Introduction.....	392
21.2 Views of the Proponent.....	398
21.3 Biigtigong Nishnaabeg	406
21.4 Pays Plat First Nation.....	442
21.5 Métis Nation of Ontario	456
21.6 Red Sky Métis Independent Nation.....	468
21.7 Michipicoten First Nation	473
21.8 Ginoogaming First Nation.....	474
21.9 Netmizaaggamig Nishnaabeg	477
21.10 Jackfish Metis Association	480
Section 22: Indigenous Rights	485
22.1 Consideration of Indigenous Rights.....	485
22.2 Panel Recommendations.....	493
Part 8: Other Matters	494
Section 23: Environmental Management	494
23.1 Requirements for the Consideration of Environmental Management.....	494
23.2 Panel Conclusions and Recommendations.....	500
Section 24: Capacity of Renewable Resources.....	502
24.1 Consideration of Capacity of Renewable Resources	502
Section 25: Biological Diversity	505
25.1 Requirements for the Consideration of Biological Diversity	505
25.2 Panel Conclusions and Recommendations.....	506

Part 9: Summary of Panel’s Conclusions and Recommendations.....507**Section 26: Panel Findings and Recommendations.....507**

26.1 Additional Considerations under CEAA 2012	507
26.2 Considerations for the Justification of Significant Adverse Environmental Effects... ..	511
26.3 Recommendation on Approval for Province of Ontario	515
26.4 Concluding Remarks	516

Appendices

Appendix 1: Biographies of Panel Members	518
Appendix 2: Updated Table of Commitments	520
Appendix 3: Joint Review Panel Process Timeline	599
Appendix 4: Amended and Restated Agreement to Re-establish a Joint Review Panel for the Marathon Palladium Project	602
Appendix 5: Hearing Participants and Review Panel Secretariat	621
Appendix 6: Local and Regional Study Areas for Each of the Valued Ecosystem Components.....	626

List of Tables

Table 5-1: Summary of Proponent’s Assessment of Technically and Economically Feasible Alternative	42
Table 8-1: Summary of the Subwatersheds Along with Their Names and Catchment Areas	75
Table 8-2: Change in Mean Annual Flow from Baseline for Subwatersheds 101, 102, and 103	77
Table 8-3: Change in Mean Annual Flow from Baseline for Subwatershed 106	83
Table 16-1: Noise-Sensitive Receptors in Proximity to Project’s Sources of Noise	295
Table 18-1: Estimated Direct, Indirect, and Induced Full-time Equivalents and Labour Income	336
Table 18-2: Estimated Total Gross Domestic Product Contributions (Millions CDN\$)	337

List of Figures

Figure 3-1: Past, Current, and Reasonably Foreseeable Projects and Activities for Cumulative Effects Assessment	20
Figure 4-1: Site Study Area	26
Figure 4-2: General Site Layout	27
Figure 8-1: Surface Water Conditions during Operations Indicating Flow of Creeks	72
Figure 9-1: Construction and Operation Water Management	97
Figure 10-1: Areas with Anticipated Effects on Fish and Fish Habitat	121
Figure 11-1: Proponent’s Conceptual Plan for the Post-Closure Landscape	158
Figure 13-1: Baseline Scenario	209
Figure 13-2: Construction and Operation Scenario	210
Figure 13-3: Five Years Post-Closure Scenario	210
Figure 13-4: 50 Years Post-Closure Scenario	211
Figure 20-1: Process Solids Management Facility – Potential Inundations Routes – Hypothetical Dam Breach	373

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym/Abbreviation	Meaning
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
Agency	The Panel uses the term 'the Agency' to refer to both the former Canadian Environmental Assessment Agency as well as the current Impact Assessment Agency of Canada.
CEAA 2012	<i>Canadian Environmental Assessment Act, 2012</i>
CIAR	Canadian Impact Assessment Registry
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide-equivalent
Cu	Copper
EAA	<i>Ontario Environmental Assessment Act</i>
EIS	Environmental Impact Statement
EIS Addendum	Environmental Impact Statement Addendum
EIS Guidelines	Guidelines for the Preparation of an Environmental Impact Statement for the Marathon Platinum Group Metals and Copper Mine Project
GenPGM	Generation PGM Inc.
GHG	Greenhouse gas
HHRA	Human health risk assessment
IR	Information Request
MNDMNRF	The Panel uses the term MNDMNRF throughout the report to refer to the Ministry of Northern Development, Mines, Natural Resources and Forestry, including the Natural Resources and Forestry division and the Northern Development and Mines division.
NO ₂	Nitrogen dioxide
NO _x	nitrogen oxides

Acronym/Abbreviation	Meaning
non-PAG	non-Potentially acid-generating
PAG	Potentially acid-generating
the Panel	Joint Review Panel
PGM	platinum group metal
pH	Potential of hydrogen
PM ₁	Ultrafine particulate matter
PM _{2.5}	Fine particulate matter
PM ₁₀	Particulate matter
the Project	the Marathon Palladium Project
the Proponent	Generation PGM Inc.
Stillwater	Stillwater Canada Inc.
US	United States of America
WMU	Wildlife Management Unit
2SLGBTQQIA	two-spirit, lesbian, gay, bisexual, transgender, queer, questioning, intersex, and asexual

LIST OF UNITS

Unit	Meaning
°C	Degree Celsius
CDN\$	Canadian dollars
CO ₂ /t	Carbon dioxide per tonne
cm	Centimetre
dB	Decibel
dBA	A-weighted decibel
dBLin	Peak linear decibel

Unit	Meaning
ha	Hectare
g/m ³	Grams per cubic metre
m	Metre
m ²	Square metre
m ³	Cubic metre
mm	Millimetre
mg/L	Milligram per litre
ng/L	Nanogram per litre
kg	Kilogram
kt	Kilotonne
mg/kg	Milligram per kilogram
km	Kilometre
km ²	Square kilometre
kV	Kilovolt
ppm	Parts per million
µg/m ³	Micrograms per cubic metre
µg/g	Microgram per gram
µm	Micrometer
%	Percent
% HA	Percent highly annoyed

EXECUTIVE SUMMARY

The Project

Generation PGM Inc. (GenPGM or the Proponent) is proposing to build and operate an open pit platinum group metal and copper mine and milling operation located approximately 10 km north of the Town of Marathon, Ontario. The Proponent could also produce magnetite concentrate containing vanadium if it becomes economically feasible.

Components for the Marathon Palladium Project (the Project) include three open pits, an onsite ore processing facility, a 115 kV transmission line, an access road, a mine rock storage area, a process solids management facility, a water management system, and an explosives production plant and associated storage area. Offsite infrastructure includes an employee accommodation complex and a potential rail load-out facility.

The north pit would be mined throughout the 12.7-year operating life of the Project, whereas the central and south pits would be mined at various times to supplement ore production. Approximately 25,200 tonnes of ore would be processed into concentrate per day. Concentrate would be delivered to a third-party facility for further processing either by truck or by train via the rail load-out facility.

The Proponent would undertake decommissioning and reclamation activities for a period of two to five years after operations, and would continue to implement a Closure Plan and to monitor restoration success for another 40 to 45 years.

This Summary

The Panel completed their environmental assessment of the proposed Project in accordance with the requirements of their Terms of Reference, the *Canadian Environmental Assessment Act 2012*, and Ontario's *Environmental Assessment Act*. This summary contains key findings from the report.

Need, Purpose and Alternatives

The Panel heard that platinum group metals (including palladium, platinum, and rhodium) are essential metals in the manufacture of automotive catalytic converters. GenPGM indicated that there is a limited supply of these metals and that the expectation is shortages will continue as more countries introduce more stringent vehicle exhaust controls. GenPGM stated that copper, which would also be mined, is a critical mineral for electric vehicles and associated charging infrastructure, and for the growth of renewable energy infrastructure.

The Proponent's economic analyses indicated that with the predicted grade, tonnage, mining and milling methods planned and with anticipated closure costs, the mine would be profitable and would provide both jobs and economic stimuli to an area which has seen some setbacks due to closures or scaling back of major industries. The Proponent estimated that the Project would generate approximately 430 full time jobs for an operational Project lifespan of 12.7 years, with expected spin-off increases in local employment along with net economic benefits to the Town of Marathon, Ontario and Canada from the Project.

The Panel concludes that the Proponent adequately demonstrated the purpose of and need for the Project as well as the assessment of alternatives associated with Project components. This information was supported with a feasibility study that demonstrated the economic viability of the Project.

Aquatic Environment

The Panel considered the environmental effects of the Project on the geology of the site, groundwater quantity and quality, surface water quantity and quality, and fish and fish habitat, including fish species at risk.

GenPGM performed a geochemical characterization of mine materials to understand the potential for acid generation and metal leaching, and how these could alter water quality near the Project site, either in effluent discharge or natural site drainage. The Proponent stated that 10 to 15% of mine rock has the potential for acid generation and metal leaching. These materials would be segregated and permanently stored in a saturated state to prevent exposure, oxidation, and acid generation either in the process solids management facility or the open pits in the closure stage. The Panel concludes the Proponent's approach to the geochemical characterization was satisfactory.

GenPGM modelled potential Project effects to groundwater quantity and quality, noting that no groundwater users are located near the Project. They indicated that groundwater seepage from mine facilities is not predicted to discharge to surface water for over one hundred years. The Proponent committed to monitoring changes in groundwater quantity and quality at a series of wells, including known drinking water wells along Highway 17. The Panel concluded the Project is not likely to cause a significant adverse environmental effect on groundwater quality or quantity.

The Proponent modelled the potential Project effects to surface water quantity. Hare Lake would see water level increases within the range of natural variation while flow changes to the Biigtig Zibi would be less than 1%. Angler Creek would experience flow decreases during construction and operations, as it would be largely overprinted by the process solids management facility. The Panel notes this effect would persist for at least 20 years. The Panel recommends that the Proponent engage with government agencies and Indigenous groups to identify feasible options to supplement flow to Angler Creek during construction and

operations. The Panel concludes the Project is likely to cause a significant adverse environmental effect on the hydrology of Stream 6 (Angler Creek).

GenPGM indicated the site water management would see all contact water collected and treated as required during the construction and operations phases, before release to Hare Lake. Water quality modelling revealed that contaminant concentrations in mine effluent would meet the water quality discharge limits considered protective of aquatic biota and/or human health. The Proponent stated the Project would not be a direct source of mercury, and added that indirect sources such as land clearing could be adequately mitigated or treated, and government agencies agreed. The Proponent also stated water would continue to be managed during active closure and post-closure until water quality is acceptable and flow is returned to a natural state.

Biigtigong Nishnaabeg stated that any increase of methylmercury in waterbodies would be unacceptable. The Panel understands that phosphorous and sulphate discharges from the Project could lead to anoxic conditions and increase the presence of methylmercury in local waterbodies. GenPGM proposed a suite of mitigation measures and a follow-up program to manage phosphorous and sulphate in effluent. The Panel is satisfied that the Proponent would have the capacity to treat water quality in all Project phases to acceptable levels prior to release in the environment. The Panel concludes that, if the recommended mitigation measures and monitoring and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on water quality.

GenPGM described the main fish communities in waterbodies including Hare Lake, Hare Creek, the Biigtig Zibi, and Angler Creek. The Proponent identified five potential effects to fish and fish habitat as a result of the Project: fish mortality, change of fish habitat, change in water quantity (flow), change in water quality, and change to the benthic invertebrate communities. These effects would be caused by detonation of explosives near water, overprinting of water bodies, flow reduction to creeks and changes in water quality. The Proponent estimated that the Project would result in a direct and indirect loss of 12.33 ha of fish habitat and proposed offsets and compensation for the predicted Project effects. The Panel concludes that, if the recommended mitigation measures and follow-up programs, were implemented, and offsetting occurs, the Project is not likely to cause a significant adverse environmental effect on fish or fish habitat, including two species at risk: Northern Brook Lamprey and Lake Sturgeon. The Panel concludes, however, that as a result of a change in flow in the Biigtig Zibi the Project is likely to cause a significant adverse cumulative effect on Lake Sturgeon habitat.

Terrestrial Environment

The Panel considered environmental effects relating to terrain and soils, vegetation, wildlife and their habitat, including species at risk.

GenPGM described the Site Study Area as comprised primarily of mixedwood old growth forest with limited amounts of other vegetative ecosites. During site preparation and construction, all 1,116 ha of vegetation would be removed. The terrain would be altered, particularly during operations, and the soils would be stockpiled for subsequent site rehabilitation. GenPGM committed to preparing a regulatory Closure Plan that would restore the site to a self-sustaining ecosystem including areas of even-aged conifer dominated forest. The Proponent acknowledged that reclamation would take over 40 years and the site would host different species and landscape features than what is currently present. The Panel concludes that, although the existing vegetation would be completely removed, the Project is not likely to cause a significant adverse environmental effect on terrain, soils, and vegetation due to the abundance of similar vegetation communities in the region.

The Panel finds that while the loss of vegetation would negatively affect wildlife through habitat loss, mammals and birds were not habitat-limited in the region and would relocate during construction and operations. Amphibian habitat is abundant in the region and amphibians would be relocated from the Site Study Area by the Proponent. The closure landscape over time would restore some of the habitat lost due to the Project. Additionally, the Panel finds that the measures to reduce mortality risk to birds and mammals to be sufficient and recommended the Proponent conduct follow-up monitoring and adaptive management to verify the success of these measures. The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on wildlife, amphibians, and migratory birds that are not listed species at risk.

The Proponent reported potentially suitable habitat occurs for about 15 federal or provincial species at risk in the Regional Study Area, and 10 species were confirmed in the Site Study Area and/or Local Study Area. The Project could affect these species at risk due to changes on the landscape associated with activities during the preparation, construction, operations, and active closure, and post-closure of the Project. These effects include habitat loss, sensory disturbance and effects from dustfall, and increased risk of direct mortality.

The Panel concludes that the Project is likely to cause a significant adverse effect on Little Brown Myotis and Northern Myotis, which are identified as endangered species federally and provincially, and on their respective habitats. The Panel concludes that, if the recommended mitigation is implemented, the Project is not likely to cause a significant adverse environmental effect on Canada Warbler, Rusty Blackbird, Eastern Wood Pewee, Olive-sided Flycatcher, Evening Grosbeak, Eastern Whip-poor-will and Common Nighthawk, Monarch Butterfly and Yellow-banded Bumble Bee. The Panel concludes that the Project is not likely to have a residual adverse environmental effect on Bald Eagle and Peregrine Falcon. The Panel also concludes that

the Project, in combination with other projects and activities is likely to cause a significant adverse cumulative effect on Little Brown Myotis, Northern Myotis and Eastern Whip-poor-will.

The Project is within the Lake Superior Coastal Range for Boreal Woodland Caribou, which is a 10 kilometre wide linear range along the north shore, including offshore islands where most animals are located. Caribou are less resilient than other ungulates. GenPGM reported the overall population in the Lake Superior Coastal Range dramatically declined within the last decade. GenPGM added there is no evidence of caribou use within the Site Study Area, the potential for caribou to interact with the Project is very low, and the mainland population could become locally extirpated before the Project is operational. Government agencies confirmed that all areas of the Lake Superior Coastal Range, including the Site Study Area, are considered critical habitat that could support the species.

GenPGM reported the primary Project effect on caribou would be the reduced connectivity with the Lake Superior Coastal Range and adjacent ranges. Other potential effects include the loss of potential habitat from clearing of the Site Study Area and sensory disturbances. GenPGM considered that no significant environmental effects would occur to caribou, particularly on habitat connectivity or critical habitat, however government agencies stated that the Proponent may have underestimated the effects to caribou. The Proponent presented mitigation and offsetting measures intended to reduce the effects of the Project on caribou, although government agencies generally believed that these actions would not be sufficient to offset the effects of the Project on caribou, especially with regard to habitat connectivity. Biigtigong Nishnaabeg and Michipicoten First Nation shared their own recovery strategies for caribou, and expressed an interest in a leadership role in recovery efforts.

The Panel is of the view that, considering the status of the species, and its vulnerability to extirpation, any additional effects have the potential to be severely detrimental. Despite the recommended mitigation measures outlined above, much uncertainty remains about the effects of the Project on caribou. Therefore, in applying the precautionary principle, the Panel concludes the Project is likely to cause a significant adverse effect on critical habitat for caribou, as well as on connectivity of habitat within the Lake Superior Coastal Range.

Atmospheric and Acoustic Environment

The Panel considered environmental effects of the Project relating to air quality, greenhouse gas emissions, and acoustics.

Project activities would produce a change in air quality from contaminants and dustfall. Sources include fuel combustion from vehicles and heavy equipment, travel on unpaved haul routes, and material movement and processing. Air quality dispersion modelling predicted there could be exceedances of air quality criteria or standards at special receptors in the Local Study Area, during the construction and operations phases. GenPGM stated the air quality dispersion modelling was conservative and that the model effectively overestimated the environmental

effects, and expert government departments generally agreed. The Proponent committed to implementing mitigation measures as well as a monitoring and follow-up program for air emissions, including a best management plan for dust. The Panel concludes the Project is not likely to cause a significant adverse environmental effect on air quality.

The Project would be a source of greenhouse gas emissions, the primary contributor to global climate change, from the combustion of fuels in vehicle engines, diesel generators, and other mining equipment. GenPGM stated the Project would emit 1,677.5 kt of CO₂e over its lifecycle, which represents a small fraction of provincial and national emissions. GenPGM reported the Project would perform well in terms of emissions intensity, when compared to similar mines in Canada and internationally. The Panel concludes the Project is not likely to cause a significant adverse environmental effect on greenhouse gases or climate change.

The Project's construction and operations activities (including blasting), traffic, and rail load-out activities would generate noise and vibration. GenPGM predicted that the Project would not result in exceedances above provincial guidelines for noise and vibration levels or federal guidelines for health effects. The Proponent committed to implementing mitigation measures to limit Project-related noise and to reduce or restrict noise at nighttime. They would also implement follow-up and monitoring measures to notify residents before noise-generating activities and to address any noise complaints or noise exceedances. The Panel concludes the Project is not likely to cause a significant adverse environmental effect on the acoustic environment.

Human Environment

The Panel considered the environmental effects of the Project relating to human health, socio-economics, land and resource uses, navigation, and archaeology and heritage resources.

Human Health

GenPGM assessed whether the Project could cause changes in human health from environmental effects on air quality, water quality, country foods, noise, and electromagnetic fields. The Proponent did not expect human health effects from surface water, as concentrations of contaminants were not predicted to exceed water quality benchmarks that are protective of human health. They concluded there would be no health effects from the Project related to noise, consumption of drinking water, or consumption of country foods.

GenPGM conducted a human health risk assessment for health effects from changes to air quality, based on exceedances of relevant regulatory criteria or notable deviations from background conditions. They assessed cancer risks quantitatively, and non-cancer risks qualitatively and reported that the exposure to each of these contaminants from Project activities would be below levels associated with health risks.

Indigenous groups were concerned with the potential for methylmercury to accumulate in fish tissue, as there are current fish consumption advisories in waterbodies near the Project site. GenPGM committed to implementing mitigation measures, as well as a monitoring and follow-up program, to monitor mercury levels and manage Project effects on country foods.

The Panel concludes the Project is not likely to cause a significant adverse environmental effect on human health. However, the Panel is of the view that any incremental increase in mercury levels in local waterbodies could contribute to existing adverse cumulative effects on human health. Although it is unlikely, if, despite mitigation, mercury levels in fish were to increase due to the Project, the Panel concludes that the Project, in combination with other projects and activities, would cause a significant adverse cumulative effect on human health.

Socio-economics

GenPGM stated the Project would result in employment opportunities and income, government revenue, and promote economic and business development, particularly in the construction and operations phases of the Project. They estimated there would be an average of 430 to 550 workers during the construction phase and 430 employees during the operations phase. The Panel concludes that there are no significant adverse effects on employment and the economy and that, if the recommended mitigation measures and follow-up programs are implemented, the Project is likely to have a positive effect on the economy and employment.

There is currently a very limited supply of housing in the Marathon area for transient workers moving into Marathon. The Proponent stated that they would build an accommodation complex to house workers. Additional housing developments are planned and under construction in Marathon. The Town expressed confidence that there is sufficient capacity in infrastructure and services to accommodate workers and their families. This would be augmented by the Proponent who would provide employees with physical, mental, and social health services.

Biigtigong Nishnaabeg has constraints on almost all social services within their community and a long wait list for housing. The Panel was advised that there would be community members that would want to return to the reserve but would not be able to in light of the absence of sufficient services and housing. Biigtigong Nishnaabeg stated there is clear evidence in the literature of how resource extraction projects that attract large groups of out-of-town men for employment have contributed to increases in violence, assaults, discrimination, unplanned pregnancies, drug use, and safety concerns for women and children in Indigenous communities. GenPGM has committed to cultural sensitivity training and the establishment of a code of conduct. The Panel believes this is best developed in collaboration with Indigenous groups. The Panel concludes the Project is not likely to cause significant adverse effects on the socio-economic environment with regards to off reserve accommodation, infrastructure and non-Indigenous services.

The proposed Project would result in the loss of 1,116 hectares for land and resource use. The Project would not affect lands currently set aside for forestry operations and would not conflict with established federal, provincial, or municipal land use designations, policies, or by-laws. The Panel concludes the Project is not likely to cause a significant adverse effect on the land and resource use by non-Indigenous users.

GenPGM conducted an archaeological study which identified Hare Lake as having high potential for archaeological resources. They indicated they would complete further archaeological assessments and, if necessary, adjust the location of the discharge structure in Hare Lake if additional archaeological resources are found. The Proponent committed to implementing a chance-find protocol and to inform Indigenous groups, including Biigtigong Nishnaabeg, of any further archaeological studies and their results. The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause a residual effect on physical or cultural heritage resources.

Natural and Operational Hazards

GenPGM assessed the effects of the environment on the Project including climate change, extreme weather forest fires, and seismic activity. They highlighted Project design features and/or low probabilities of occurrence in assessing the risks of each of these effects of the environment on the Project. The Panel concluded that with the implementation of the recommended mitigation, the Project could be designed to adequately account for possible adverse effects of the environment on the Project.

GenPGM assessed numerous accident and malfunction scenarios, which included a dam breach, unanticipated seepage, and fuel and chemical releases during transport. The Proponent concluded there would be a low overall risk to the environment associated with the remote scenarios with high consequence. With respect to a potential dam breach, the Panel finds that such an event, or other event resulting in accidental discharge of process-affected water to the Biigtig Zibi and/or Angler Creek, would result in severe deterioration of the environment comprising a significant adverse environmental effect. The Panel is of the view however that the likelihood of such an occurrence is remote. The Panel is satisfied that proposed design features, regulatory requirements, the Proponent's commitment to establish an independent tailings review board, and the Panel's own recommendations would minimize the risk to the extent possible. With respect to all other accident and malfunction scenarios, the Panel concluded that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect.

Indigenous Matters

The Panel considered Project effects on Indigenous communities on their current use of lands and resources for traditional purposes, physical and cultural heritage, and health and socio-economic conditions. The perspectives provided by Indigenous groups in the region were crucial to understanding the biophysical environmental effects of the Project.

The traditional territories of several First Nations and Métis communities overlap with the area where the Project is proposed along the north shore of Lake Superior. The Project is wholly on land claimed by Biigtigong Nishnaabeg as their Exclusive Title Area. Other Indigenous communities in proximity to the Project are:

- Netmizaaggamig Nishnaabeg
- Pays Plat First Nation
- Michipicoten First Nation
- Ginoogaming First Nation
- Jackfish Metis Association
- Red Sky Métis Independent Nation
- Métis Nation of Ontario

The Project's footprint and mining activities would result in a loss of access to preferred areas, and changes to lands and resources used for traditional purposes for all Indigenous groups who reported harvesting in the area. The perception of contamination, as well as sensory disturbances, would further alter the behaviour of traditional harvesters, notably fish harvesters in Hare Lake, Angler Creek, and the Biigtig Zibi.

The Panel finds that Biigtigong Nishnaabeg would be most affected by the Project. The Project would remove the use of Biigtigong Nishnaabeg's sole community trapline, which also holds cultural importance for Biigtigong Nishnaabeg. The Panel is of the view that access in Biigtigong Nishnaabeg's Exclusive Title Area is already limited, such that harvesters and community members could not readily go elsewhere to practice current use activities.

The Panel heard from Biigtigong Nishnaabeg of the sacredness of the Biigtig Zibi, as well as the cultural importance of Angler Creek and the community trapline. Biigtigong Nishnaabeg expressed particular concern over planned discharges to the Biigtig Zibi during mine closure. The Proponent committed to continue to pursue feasible alternatives to address this concern.

The Panel heard Biigtigong Nishnaabeg associate many aspects of their health with the health of the Biigtig Zibi, the safe practice of current use on the land, and the protection of their cultural heritage. Further, the community shared that perception of contamination could lead to changes in harvesting practices and compromise a very important part of Biigtigong Nishnaabeg's diet.

The Panel heard information on the economic value extracted from Biigtigong Nishnaabeg's community trapline that would be lost. The Panel also heard that harvesters would be unlikely to continue using Camp 19 Road while the mine was in operation, regardless of which mitigation measures are employed – this displacement would result in additional costs for Biigtigong Nishnaabeg members.

The Panel concludes that the Project is likely to cause a significant adverse environmental effect, and cumulative effects on Biigtigong Nishnaabeg's current use of lands and resources for traditional purposes, physical and cultural heritage, and health and socio-economic conditions.

The Panel recognizes that there are existing constraints on Biigtigong Nishnaabeg's housing, and social and health services, which would be exacerbated by the Project, the Panel concludes the Project is likely to cause considerable impacts on Biigtigong Nishnaabeg's socio-economic conditions, related to housing, social services, education, infrastructure, health, and safety.

Pays Plat First Nation shared that they were profoundly connected through cultural history with the Angler area, and considered Lake Superior as sacred. The Panel concludes that the Project is likely to cause a significant adverse environmental effect on Pays Plat First Nation's physical and cultural heritage in relation to their cultural ties to Angler.

The Panel expects the Project could cause residual adverse environmental effects, and cumulative effects, on other communities, although they would be neither significant nor likely to occur.

The Panel invited, and received, information from Indigenous communities related to the nature and scope of potential or established Aboriginal and Treaty rights in the area of the Project, as well as information on the potential adverse environmental effects the Project may have on these rights. The Panel heard that Indigenous communities exercise rights through a deeply rooted connection to the land that is used for their way of life, including traditional activities such as trapping, harvesting, hunting, fishing, and ceremony. The Panel makes recommendations to the Proponent and the Crown regarding measures that could address impacts of the Project on Indigenous rights.

Concluding Remarks

The Panel has completed their assessment which will now be referred to the federal and provincial Ministers of Environment. The Panel is of the view that should the Government of Ontario and/or Government of Canada decide to approve the Project, it would be with the understanding that the Project is likely to cause significant adverse effects, which by definition are adverse effects that cannot be fully mitigated.

To minimize the adverse effects from the Project, recommendations have been set out in this Panel report for the Proponent, and both the federal and provincial governments. The Panel recommends, if the Ministers decide to approve the Project, that the full set of recommendations that fall within the respective government's jurisdiction, be implemented.

The Panel is mindful that this proposed Project would also provide economic and employment benefits. The Panel was advised that the Project would contribute to the critical mineral strategy. However, Indigenous communities who have occupied the lands since time immemorial, would experience adverse effects. The Panel notes that while the Project could provide employment benefits, measures need to be taken by the Proponent, and potentially the Government of Ontario and/or Government of Canada, to ensure Project benefits are equitably experienced, and for Indigenous communities to realize a long-term, net benefit from the Project, beyond limited-term employment opportunities.

PART 1: ENVIRONMENTAL ASSESSMENT PROCESS AND APPROACH

SECTION 1: INTRODUCTION

Generation PGM Inc. (GenPGM or the Proponent) has proposed to build an open-pit platinum group metal and copper mine and milling operation approximately 10 km north of the Town of Marathon, Ontario. The Marathon Palladium Project (the Project) would include three open pits, an on-site ore processing facility, a 115 kV transmission-line corridor, an access road, a mine rock storage area, a process solids management facility, a water management system, and an explosives production plant and storage area. Off-site infrastructure includes an employee accommodation complex, and a rail load-out facility.

The Panel acknowledges that the Project footprint is within the Exclusive Title Area of Biigtigong Nishnaabeg and the traditional territory of several other First Nations and Métis communities who have practised their rights and way of life since time immemorial on the north shore of Lake Superior.

The federal Minister of the Environment and the Ontario Minister of the Environment established a Joint Review Panel (the Panel) to conduct an environmental assessment of the Project under both the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and Ontario's *Environmental Assessment Act* (EAA).

1.1 PANEL'S MANDATE

On November 16, 2020, the federal Minister of the Environment and Climate Change, and the Ontario Minister of the Environment, Conservation and Parks (the Ministers) announced the appointment of the Joint Review Panel (the Panel) to conduct an environmental assessment of the Project under both CEAA 2012 and the EAA.

Debra Sikora was appointed Chair of the Joint Review Panel, and Laurie Bruce and Gay Drescher were appointed members of the Joint Review Panel. Panel member biographies can be found in Appendix 1. The members were selected based on their knowledge and expertise related to the potential environmental effects of the Project, and are unbiased and free from any conflict of interest relative to the Project as required under CEAA 2012. Together, these panel members authored this report, which reflects the views of each member.

An Amended Terms of Reference issued by the Ministers on February 3, 2021, established the mandate and authorities of this Panel, as well as the procedures and timelines for the review.

This is the Panel's report for the purpose of the environmental assessment. The report presents the results of the assessment of the potential environmental effects of the Project. The report contains the Panel's rationale, conclusions, and recommendations for mitigation measures and requirements for follow-up programs. The report also includes a summary of the information provided by participants, including governments, Indigenous groups, and the public.

At the beginning of each section the Panel has explained how the subject of the section relates to CEAA 2012, the EAA, the *Guidelines for the Preparation of an Environmental Impact Statement* (EIS Guidelines) and the Panel's Terms of Reference.

The Panel is also mandated to identify, for the purposes of the federal Minister of the Environment and Climate Change, those conclusions and recommended mitigation measures that relate to the environmental effects to be taken into account under section 5 of CEAA 2012. In the Panel's view, all of the conclusions and recommended mitigation measures in this report relate to, or should be taken into account, under section 5 of CEAA 2012, with the exception of those in Section 18 (Socio-economic Environment), and those that are explicitly identified as being for provincial decision makers within Section 11 (Terrain, Soils, and Vegetation), Section 12 (Wildlife Species), and Section 21 (Effects on Indigenous Peoples). The Panel observes that the intersection of provincial jurisdiction under the EAA, and federal jurisdiction under CEAA 2012, the *Species at Risk Act*, the *Fisheries Act*, and section 35 of the *Constitution Act* in this case is complex, given the Project's particular geographic context. The Panel encourages decision makers to think broadly about how their proposed recommendations might be implemented, and not place too much focus on the Panel's identification of matters that do, or do not relate, to CEAA 2012.

The reader will note that different subjects are treated in different ways. These differences are tied to the nature of the joint federal provincial review process. From this perspective, to meet their mandate, the Panel makes a finding about significant adverse environmental effects where such a finding is required by legislation. These findings are reflected in boxed text. Where the Panel makes findings on factors considered, those that are specifically referenced in section 19 of CEAA 2012, a determination of significance is not provided nor required.

The Panel has identified the conclusions that relate to the environmental effects under section 5 of CEAA 2012 and the recommended mitigation measures and follow-up programs that were taken into account in making the conclusions. The Panel also provides their recommendation to the Ontario Minister of the Environment, Conservation and Parks as to whether the Project should be given approval to proceed, including, where applicable, any recommended conditions to provide for the protection, conservation, and management of the environment (Section 26). As required by the provincial Minister of the Environment, Conservation and Parks, the Panel has included all the commitments identified by the Proponent in Appendix 2.

SECTION 2: REVIEW PROCESS

The following section provides a brief chronology of the Project review, including a summary of the environmental assessment review process to determine if the information the Proponent provided was sufficient, the steps taken to obtain additional information, and public participation opportunities. Further details on the review process milestones are provided in Appendix 3.

2.1 PANEL REFERRAL AND PROCESS UNDER THE FORMER PANEL

Marathon PGM Corporation, the original proponent of the Project, submitted a Project description to the Impact Assessment Agency of Canada (formerly known as the Canadian Environmental Assessment Agency, hereafter the Agency) on February 26, 2010. The environmental assessment of the Project initially commenced as a comprehensive study, pursuant to the *Canadian Environmental Assessment Act, 1992*, with Fisheries and Oceans Canada, Natural Resources Canada, and Transport Canada acting as the responsible authorities. On July 12, 2010, amendments to the *Canadian Environmental Assessment Act, 1992* came into force. The environmental assessment was continued under the new act and the Agency was named as the responsible authority.

On July 30, 2010, the Marathon PGM Corporation, in response to feedback received from Indigenous groups and local stakeholders as well as federal and provincial government departments, submitted a revised project description that altered the Project design, notably removing Bamooos Lake as a process solids storage area.

Based on this revised project description, the federal Minister of the Environment referred the Project to a review panel on October 7, 2010, taking into consideration advice from Fisheries and Oceans Canada and Transport Canada that the Project could have significant adverse environmental effects on fish and fish habitat and navigation.

On November 30, 2010, the Stillwater Mining Company purchased Marathon PGM Corporation's assets, including the properties and claims to the site of the Project. In January of 2011, Stillwater Mining Company's assets were consolidated under Stillwater Canada Inc., an indirect subsidiary of Stillwater Mining Company, making Stillwater the new proponent for the Project.

On March 23, 2011, Stillwater Canada Inc. entered into a voluntary agreement with the Ontario Minister of the Environment to make the Project in its entirety subject to the requirements of the EAA. This agreement facilitated harmonization with the *Canadian Environmental Assessment Act, 1992*.

The Project was assessed in accordance with the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and the Ontario *Environmental Assessment Act* (EAA) through a joint review panel

and pursuant to the Canada-Ontario Agreement on Environmental Assessment Cooperation (2004). On March 25, 2011, the Ontario Ministry of the Environment released a draft *Harmonization Order* for public comment. This *Harmonization Order* was put into place to modify certain sections of the EAA for the joint review panel process to evaluate the Project in a way that would meet both Provincial and Federal requirements. The *Harmonization Order* and the Joint Review Panel Agreement (Appendix 4) provided for a joint review process to be established to avoid unnecessary duplication that could have resulted from separate environmental assessments carried out by each government. It also permitted the mandate of the Panel to satisfy the requirements of both the EAA (as varied through the *Harmonization Order*) and CEAA 2012.

On March 25, 2011, the Agency and the Ontario Ministry of the Environment also released draft EIS Guidelines for public comment. Their purpose was to identify and provide direction to the Proponent on what issues are required to be addressed and how to describe and assess these issues. Following consideration of comments received from participants, the federal Minister of Environment issued the final EIS Guidelines to Stillwater on August 9, 2011.

The former panel received the Environmental Impact Statement (EIS) from Stillwater in July 2012. In accordance with their Terms of Reference, the former panel was required to determine if the information in the EIS, and any additional information provided, was sufficient to proceed to a public hearing.

Following multiple requests for additional information and public comment periods, the former panel announced on December 17, 2013, that it had sufficient information to proceed to a public hearing. However, in 2014, prior to the hearing, Stillwater indicated it did not plan to proceed with the project at that time. The federal Minister of Environment disbanded the Panel, noting that a review panel would be appointed and the environmental assessment would resume should the proponent determine they wanted to proceed with the project.

2.2 PROJECT RE-START AND PROCESS UNDER THE CURRENT REVIEW PANEL

In 2019, Generation PGM Inc. (GenPGM or the Proponent) and Stillwater Canada Inc. entered into a joint venture arrangement, pursuant to which GenPGM acquired an interest in the Project. GenPGM is currently the designated operator of the Project.

The environmental assessment process was re-started by the Proponent in July 2020. In October 2020, the Proponent renewed a voluntary agreement with the Ontario Minister of the Environment to make the Project, in its entirety, subject to the requirements of the EAA.

The current Panel was appointed on November 13, 2020, and in April 2021 received the complete Environmental Impact Statement Addendum (EIS Addendum) from the Proponent.

GenPGM indicated that the information in the EIS Addendum was prepared to verify and/or update the EIS and assessment of environmental effects for the Project.

The changes identified by GenPGM included:

- changes to the characterization of existing baseline conditions since the completion of previous baseline studies;
- changes to applicable criteria, standards, and/or thresholds for determining the significance of potential residual environmental effects; and
- changes to the Project, including refinements to project components and activities.

On April 19, 2021, the Panel announced receipt of the EIS Addendum from GenPGM and started a 70-day public comment period to give participants an opportunity to submit their views on the sufficiency and technical merit of the EIS Addendum.

In accordance with their Terms of Reference, the Panel was required to determine if the information in the Proponent's EIS and EIS Addendum, and any additional information provided, was sufficient to proceed to a public hearing.

Following receipt of comments from participants, and responses to requests for additional information from the Proponent, the Panel announced on December 7, 2021, that the information provided was sufficient to proceed to a public hearing.

2.3 PUBLIC PARTICIPATION

Public participation plays a crucial role in the review process. The Canadian Impact Assessment Registry internet site for the Project allowed public access to all of the documents associated with the environmental assessment of the Project.

Prior to each Panel's appointment, the Agency and the Government of Ontario invited comments from the public and Indigenous groups on the draft Amended Joint Review Panel Agreement and Terms of Reference.

Once in place, the Panel also provided opportunities for the public to express their views throughout the environmental assessment. Any person was welcome to submit comments to the Joint Review Panel during the review. Opportunities for participation included:

- providing comments during the public comment periods on the EIS and EIS Addendum;
- reviewing material on the record for the Project;
- presenting information to the Panel during the public hearing; and

- submitting written comments or documents to the Panel at any time until the record closed.

Funding was made available to a number of groups and individuals through the Agency's Participant Funding Program to support participation during the environmental assessment of the Project. This funding helped eligible individuals and groups review and provide comments on the draft Joint Review Panel's Terms of Reference, EIS, and EIS Addendum, and to prepare for and participate in the public hearing.

A secretariat, comprised of staff from the Agency and Ontario ministries, supported the Panel and took steps to facilitate public participation throughout the review process on behalf of the Panel. On February 5, 2021, the Panel secretariat published an information sheet to the public registry to support public participation in the joint review process for the Project. On April 6, 2021, the Panel secretariat published a video to provide information on the Joint Review Panel process and support public participation. The video contained information on the Project, the history of the environmental assessment for the Project, the Joint Review Panel, the stages of the environmental assessment, and how the public could participate in and contribute to the process. On June 2, 2021, the Panel secretariat prepared a compilation of key documents and a resource document to help participants review information and submit comments. On January 11, 2022, the Panel secretariat hosted a virtual information session to help participants prepare for the public hearing. On the same date the Panel secretariat published a questions-and-answers document to further support participation during the public hearing.

2.4 CONFIDENTIALITY REQUESTS

In accordance with section 44 of the *Canadian Environmental Assessment Act, 2012* and section 2.9 of the Panel's Terms of Reference, which allow the Panel to keep information confidential where the disclosure of such information would cause specific, direct and substantial harm to a witness or specific harm to the environment, the former panel issued Procedures for Requesting Confidentiality on March 26, 2012. Between 2012 and 2013, the former panel granted confidentiality requests made by the following Indigenous groups:

- Biigtigong Nishnaabeg (formerly Ojibways of the Pic River First Nation) regarding information and documents regarding their Traditional Ecological Knowledge, Traditional Land Use and Occupancy studies, and evidence covered by legal privilege in the context of past and ongoing land claims and/or negotiation processes or litigation with Ontario and Canada;
- Pays Plat First Nation regarding their Traditional Ecological Knowledge and Traditional Land Use studies and oral evidence presented during community hearing sessions; and

- Netmizaaggamig Nishnaabeg (formerly Pic Mobert First Nation) regarding Traditional Ecological Knowledge and Traditional Land Use studies, and historical documents presented or conveyed through research reports, correspondence, transcripts, maps, and community hearings.

On January 28, 2021, the Panel wrote to the three Indigenous groups that had previously requested confidentiality. The Panel requested that each group clarify whether they still intended to claim confidentiality over Traditional Ecological Knowledge and Traditional Land Use studies, or if there were elements of the 2013 requests for confidentiality that had changed.

The Panel received the following requests for confidentiality, each of which was granted with the understanding that the confidential information would also be shared with the Proponent, and that a Confidentiality Agreement would be signed by specified individuals who had access to the information.

Biigtigong Nishnaabeg submitted a confidentiality request to the Panel on July 23, 2021, for their technical review submission of the EIS Addendum (2021). Biigtigong Nishnaabeg indicated that because their technical review submission was based on information obtained from, among other sources, confidential interviews with band members and site-specific Traditional Ecological Knowledge, release of the submission could harm their members and/or the environment. On August 16, 2021, the Panel granted Biigtigong Nishnaabeg's request.

On August 23, 2021, the Panel informed Biigtigong Nishnaabeg that they had determined, upon preliminary review of Biigtigong Nishnaabeg First Nation's confidential technical review submission, that they required additional information and clarification. The Panel invited Biigtigong Nishnaabeg to participate in a confidential pre-hearing session, held on September 16, 2021, to give members of Biigtigong Nishnaabeg an opportunity to present further information with respect to their culture and the effects of the Project on their members, as described in their technical review submission. The Panel noted that they remained satisfied that the disclosure of information contained in the Biigtigong Nishnaabeg's technical review submission, which contained information on Traditional Ecological Knowledge and Traditional Land Use, could cause specific, direct, and substantial harm to members of Biigtigong Nishnaabeg and indicated the information gathered during this session would also be treated as confidential. The Panel also indicated that, to ensure procedural fairness, they intended to allow GenPGM to participate in the session, and extended an invitation to participate to the Agency's Crown Consultation Coordinator.

On February 25, 2022, Pays Plat First Nation requested confidentiality for a report on their historical presence on Angler Creek. On March 4, 2022, the Panel advised that they would accept the Angler Creek Report on a confidential basis. On April 5, 2022, during the public hearing for the Project, Pays Plat First Nation submitted a confidentiality request to the Panel for an in-camera session, to allow two members to present information confidentially, during

their community session. Pays Plat First Nation stated confidentiality was necessary to protect their familial traditional knowledge, oral family histories, and genealogical records tied to the Angler Creek and Hare Lake areas. On April 7, 2022, the Panel granted Pays Plat First Nation's request. A portion of the Pays Plat First Nation community session was held in-camera on April 8, 2022.

The information received in confidence by the Panel provided depth and perspective to the Panel's understanding of effects to Indigenous groups. Where in this Report the Panel refers to confidential information, they do so at a high level to respect the confidentiality requests made by Biigtigong Nishnaabeg and Pays Plat First Nation and granted by the Panel.

2.5 SITE VISIT

On September 13 and 15, 2021, the Panel and members of their secretariat conducted a site visit of the Project site and surrounding areas. The objective of the site visit was to provide the Panel and the secretariat with an opportunity to view the Project site, its features and relative locations, and the surrounding area and topography.

The Panel announced their intent to conduct a site visit and received public comments on August 20, 2021. These comments, considered with the results of the site visit conducted by the previous Panel, informed the itinerary. The site visit was a ground tour and included stops at Hare Lake and Hare Creek, the Biigtig Zibi, and the proposed locations of various components of the Project. The Panel developed a COVID-19 safety protocol and adhered to it throughout the site visit. A summary of the Panel's site visit was issued on October 22, 2021.

2.6 PUBLIC HEARING

The Panel's Terms of Reference specified that, in the event hearings could not be held in a public space due to COVID-19 or other public health restrictions, the Joint Review Panel would hold a virtual public hearing following the same procedures as an in-person hearing.

On September 23, 2021, the Joint Review Panel invited comments on the draft Public Hearing Procedures. The Panel considered the comments received before posting the final Public Hearing Procedures on December 7, 2021.

The Panel heard from Biigtigong Nishnaabeg, who stated that, despite the adoption of videoconferencing technology in response to the COVID-19 pandemic, due to the complexity and volume of information to be provided, an exclusively virtual hearing format would be inferior. Biigtigong Nishnaabeg suggested that an in-person hearing would be more expeditious, noting that, when there are significant factual disputes or complex issues at play, the use of technology may not be as appropriate or as efficient as in-person hearings. They stated that this

is particularly true for Indigenous communities, many of which have difficulty accessing technology and have internet connectivity issues.

The Panel heard from Pays Plat First Nation that the community did not have sufficiently reliable internet to enable their community members to effectively participate in a virtual hearing to share their views on the Project's environmental effects. They noted that limited bandwidth and poor internet connections would mean that effective communication may not be possible, preventing the Panel from being able to consider and respond to community issues or concerns. Pays Plat First Nation described these issues as systemic, with very few readily available solutions, but indicated they were pursuing stopgap measures to address their concerns.

The Panel also received a submission from students at the Osgoode Hall Law School that provided commentary on the "digital reality" in Northern Ontario. They noted that the north shore of Lake Superior, where the Project is located, is in an underserved, unreliable internet area with slow access speeds, and no access to 4G data coverage. They indicated that, in a virtual setting, internet issues and individuals' differing abilities to access and use Zoom videoconferencing software would mean a large proportion of the most directly affected public would not have a meaningful opportunity to be heard.

On December 7, 2021, the Panel released their notice of a public hearing, indicating that the Panel would prioritize the safety of all hearing participants and hold the public hearing sessions virtually. Participants were invited to register for general sessions, topic-specific sessions, or community hearing sessions.

The public hearing was set to begin on February 15, 2022; however, due to rising cases of COVID-19 in Ontario, on January 5, 2022, the Panel released a notice changing the start date of the virtual hearing to March 14, 2022.

The public hearing began on March 14, 2022, with an opening ceremony conducted by Biigtigong Nishnaabeg. The hearing was held on Zoom and livestreamed to YouTube for members of the public to observe. The hearing lasted 19 sitting days between March 14 and April 8, 2022. Closing remarks were held on May 18 and 19, 2022, following which a closing ceremony was conducted by Biigtigong Nishnaabeg. During the public hearing, the Panel heard from a variety of participants, including Indigenous groups, members of the public, the Proponent, government authorities and non-governmental organizations. For a complete list of hearing participants, refer to Appendix 5.

The Panel wishes to thank Biigtigong Nishnaabeg, Pays Plat First Nation, and the Crown Consultation Team for their creativity in ensuring the successful resolution of potential issues regarding connectivity prior to the start of the hearing. The Panel wishes to acknowledge the efforts of both the Crown Consultation Team and Biigtigong Nishnaabeg that resulted in the "hybrid" community session days.

SECTION 3: MANDATE OF THE PANEL AND SCOPE OF REVIEW

3.1 LEGAL CONTEXT

As noted above, on July 6, 2012, the *Canadian Environmental Assessment Act, 1992* was repealed and CEAA 2012 came into force. In accordance with subsection 126(1) of CEAA 2012, environmental assessment of the Project continued under the direction of the new Act. On August 28, 2019, CEAA 2012 was repealed and the *Impact Assessment Act* (IAA) came into force. In accordance with subsection 181(1) of the IAA, the assessment by the Panel commenced under CEAA 2012, continued under that Act.

On February 25, 2022, Pays Plat First Nation filed a hearing submission and communicated their “objections to the process being governed by the old legislation [CEAA 2012] rather than the 2019 *Impact Assessment Act*.” Pays Plat brought a motion requesting that the Panel amend their Public Hearing Procedures to incorporate several “excerpts” from the IAA. In a decision issued March 4, 2022, the Panel denied the motion.

Subsequently, in their closing remarks, Pays Plat First Nation argued that by “choosing to proceed under the 2012 *Canadian Environmental Assessment Act* rather than the 2019 *Impact Assessment Act*” the Panel limited Pays Plat First Nation's ability to participate in the hearing and therefore raised procedural fairness concerns.

In their decision on Pays Plat First Nation’s motion, the Panel explained that it did not “choose” to conduct the environmental assessment under CEAA 2012; it was required to do so by statute. The Panel had no authority or discretion to conduct the assessment under the IAA. Pays Plat First Nation also requested that the Panel include excerpts of the IAA in their Public Hearing Procedures. Among other things, Pays Plat First Nation was, in effect, trying to replace the understanding in CEAA 2012 that all information provided to the Panel should be made public with the new IAA provisions that specify Indigenous knowledge is confidential. The Panel indicated that this would not be appropriate, because Pays Plat First Nation was trying to substitute a provision of the IAA for a provision of CEAA 2012 by amending the Public Hearing Procedures.

The Panel was required to conduct their review in a manner that discharges the requirements set out in the Terms of Reference, CEAA 2012, and the requirements of the harmonization agreement made under subsection 3.1(2) of the EAA by the provincial Minister of the Environment, Conservation and Parks. The Panel is satisfied that they have fulfilled their mandate as outlined in their Terms of Reference and have collected enough information to evaluate the potential adverse environmental effects of the Project and the significance of those effects. The Panel is also satisfied that they have, where appropriate, made recommendations for the management of potential adverse environmental effects associated with the Project, should it proceed.

3.2 FUTURE PERMITTING AND AUTHORIZATIONS

Construction of the mine itself is subject to Ontario's *Mining Act*, under the jurisdiction of the Ministry of Northern Development, Mines, Natural Resources, and Forestry.

In addition, the Project may require authorizations from the following authorities in order to proceed:

- Fisheries and Oceans Canada;
- Environment and Climate Change Canada;
- Natural Resources Canada;
- Transport Canada;
- Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry;
- Ontario Ministry of Environment, Conservation and Parks;
- Ontario Ministry of Transportation;
- Ontario Ministry of Labour;
- Ontario Technical Standards and Safety Authority;
- Town of Marathon; and
- Thunder Bay District Health Unit

3.3 DEFINITION OF ENVIRONMENT

The Amended and Restated Agreement to Establish a Joint Review Panel for the Marathon Palladium Project defines "environment" as follows:

"Environment" means

- a) air, land or water,
- b) plant and animal life, including human life,
- c) the social, economic and cultural conditions that influence the life of humans or a community,
- d) any building, structure, machine or other device or thing made by humans,
- e) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or
- f) any part or combination of the foregoing and the interrelationships between any two or more of them.

Biigtigong Nishnaabeg commented that the definition of “environment” in CEAA 2012 and in the Panel’s Terms of Reference was too narrow. Biigtigong Nishnaabeg encouraged the Panel to “adopt a holistic interpretation of the term “environment” that considers the entire context, scheme and object” of CEAA 2012. Biigtigong Nishnaabeg envisioned that “environment” should be inclusive of not only natural environmental elements but also of past, present, and future humans and human activities, in order to allow for a more comprehensive consideration of the socio-economic and cultural impacts that would result not only from the development of the Project by the Proponent, but also from the exercise of powers, duties, or functions by the Crown in approving the Project.

The Panel’s Terms of Reference, included as an appendix to the agreement noted above, specify that the Panel is to “conduct an assessment of the environmental effects of the Project.” The Panel has adopted the definition of environment contained within their Terms of Reference for the assessment of environmental effects for the purposes of their duties to the provincial Minister of Environment. However, the Panel is of the view that the broader definition of environment contained within their Terms of Reference does not expand their jurisdiction under CEAA 2012 for the purposes of identifying effects of the project to areas of federal jurisdiction.

The Panel understands that, when considering effects on Indigenous Peoples under CEAA 2012 the federal mandate is limited to those effects set out under paragraph 5(1)(c). For this assessment, the Panel has applied the narrower definition of environment as set out under CEAA 2012.

However, given the importance of direct socio-economic effects on Indigenous communities, the Panel documented what they heard from participants and included their observations and recommendations on social conditions for the consideration of the federal and provincial Crowns.

3.4 DETERMINING SIGNIFICANCE

The Panel followed the Agency’s guidance document, *Technical Guidance – Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act, 2012*, to determine the significance of adverse environmental effects. The Panel adopted the following approach to determining whether a project is likely to cause significant adverse environmental effects:

- The Panel examined the interactions between the Project and the environment, considered possible mitigation measures and determined whether there would be a residual effect after the application of those measures.

- The Panel then considered whether any residual effect was adverse, and if it was, whether that adverse effect would be significant.
- For any effects the Panel identified as significant, the Panel then determined whether those effects were likely to occur.

In each section the Panel provides a list of factors they found to be particularly relevant. These were the factors they relied upon in coming to their conclusions on the environmental effects of the Project. The Panel only assessed the significance of effects that they considered adverse and residual.

3.4.1 Consideration of Mitigation

In making their significance determinations, the Panel considered the technically and economically feasible measures proposed by GenPGM to mitigate potentially significant adverse environmental effects. Throughout this report, the Panel has recommended the mitigation measures they consider to be required to mitigate potential significant adverse environmental effects. These measures, and others recommended by the Panel, appear before the “boxed” conclusions on the significance of the environmental effects. Decision-makers and authorities should consider the enforceability of these measures as conditions, and, where the mitigation cannot be implemented or enforced, the Minister(s) would need to determine whether the resulting effect without mitigation is significant or not, and/or whether the project should be given approval. The recommendations identified by the Panel should be considered collectively. For example, the Panel’s recommendations relating to surface water quality, also serve to mitigate effects to fish and fish habitat, human health, and Indigenous Peoples. The exclusion of any of these recommendations may result in a change to the Panel’s conclusions on the significance of adverse effects.

In response to an undertaking requested by the Panel, at the conclusion of the evidentiary portion of the hearing, GenPGM prepared an updated table of commitments, an updated summary of mitigation, monitoring and follow-up, and a joint submission with Biigtigong Nishnaabeg, including a list of mutually agreed-upon commitments (Appendix 2).

3.5 PRECAUTIONARY PRINCIPLE

One of the purposes of CEEA 2012 is to ensure that designated projects, such as the Marathon Palladium Project, are considered in a careful and precautionary manner to avoid significant adverse environmental effects.

The EIS Guidelines for the Project state that the precautionary principle requires the decision-maker to take a cautionary approach, or to err on the side of caution, particularly where there is a large degree of uncertainty or high risk. They also state that the proponent must indicate

how the precautionary principle was applied or considered in the design of the Project and demonstrate that all aspects of the Project have been examined and planned in a careful and precautionary manner to ensure that they do not cause serious or irreversible damage to the environment or the human health of current or future generations. The EIS Guidelines refer the Proponent to the guiding principles set out in *A Framework for the Application of Precaution in Science-based Decision Making About Risk (2003)*.

GenPGM stated that their assessment applies a precautionary approach, especially when there is a high degree of uncertainty or risk to the protection of health and safety, the protection of the environment or the conservation of natural resources.

The Panel's Terms of Reference state that the precautionary principle recognizes that, where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In accordance with the precautionary principle, the Panel considered the Project in a careful and precautionary manner and applied the guiding principles in the Government of Canada's *A Framework for the Application of Precaution in Science-based Decision Making About Risk (2003)*. If, after reviewing the record of information for the review, the Panel decided that there were uncertainties about a potential adverse environmental effect and the ability to manage that effect and the risk of serious or irreversible environmental harm was high, then the Panel adopted a precautionary approach.

In some cases, such as the matter of mercury, the Panel believes the information provided was sufficient for their environmental assessment. The Panel found that the residual uncertainties and the related risk could be adequately managed through additional monitoring, the collection of baseline data during pre-construction, and cooperatively developed monitoring and follow-up programs. In those cases, the Panel made recommendations to fill the information gaps during subsequent regulatory phases to further reduce uncertainty.

In other cases, such as caribou, where there was greater uncertainty, or a greater chance that an information gap could result in serious or irreversible adverse environmental effects, the Panel identified the risk and made recommendations to assist any subsequent regulatory review.

There were no instances in which the Panel applied the precautionary principle and concluded there would be significant adverse environmental effects based *solely* on uncertainty related to an information gap. When considering any issue, the Panel reviewed and considered their record carefully to determine the best approach forward to assess the Project.

3.6 ABORIGINAL AND TREATY RIGHTS

The EIS Guidelines required GenPGM to provide a discussion of the asserted or established Aboriginal and Treaty rights supported with maps, legal cases, and treaties as appropriate, in the EIS. The EIS Guidelines required that GenPGM document the potential effect of the Project on asserted or established Aboriginal and Treaty rights, and the measures to prevent or mitigate those potential effects. The EIS Guidelines required that GenPGM identify the residual impacts of effects on asserted or established Aboriginal and Treaty rights.

Section 2.4 of the Panel's Terms of Reference mandated the Panel to invite Indigenous groups to provide information about rights, as well as about potential adverse effects on rights. The Panel invited Indigenous groups to submit this information during the comment period on the EIS addendum, and invited Indigenous groups to provide this information in letters of invitation to the public hearing. Section 2.6 of the Terms of Reference mandates the Panel to make recommendations that relate to the manner in which the environmental effects of the Project may adversely impact potential or established Aboriginal or Treaty rights based on the information collected.

Where appropriate, the Panel utilized the information brought forward from Indigenous groups related to the potential impacts of the project on Aboriginal or Treaty rights in formulating recommendations with respect to measures that may serve to address impacts on rights.

The Panel's Terms of Reference state that the Joint Review Panel is not mandated to make any determinations as to:

- the validity of potential or established Aboriginal and Treaty rights asserted by Indigenous groups or the strength of their claimed rights;
- the scope of the Crown's duty to consult Indigenous groups;
- whether the Crown has met their duty to consult Indigenous groups and, where appropriate, accommodate their interests in respect of the potential adverse environmental effects of the Project on their rights, as recognized and affirmed in section 35 of the *Constitution Act, 1982*;
- whether the Project would be an infringement of potential or established Aboriginal or Treaty rights; and
- any matter of Treaty interpretation.

The *Constitution Act 1982*, CEEA 2012 and the Panel's Terms of Reference all refer to Aboriginal rights instead of Indigenous rights. However, considering the widespread use of the term Indigenous rights, the Panel will hereafter use the term "Indigenous rights" to refer to "Aboriginal and Treaty rights".

Additional information on the Panel's assessment of the potential impacts of the Project on Indigenous rights is presented in Section 22 (Indigenous Rights).

3.7 SPECIES AT RISK

The Terms of Reference require the Panel to consider the extent to which biological diversity (ecosystems and/or species diversity) is affected by the Project, including any listed wildlife species, its critical habitat or the residences of individuals of that species as those terms are defined in subsection 2(1) of the federal *Species at Risk Act*, as well as any effect it may have on a provincially threatened or endangered species and/or protected habitat.

Critical habitat is defined in the *Species at Risk Act* as habitat necessary for the survival or recovery of a listed wildlife species and identified as the species' critical habitat in the recovery strategy or in an action plan for the species.

As required by subsection 79(1) of the *Species at Risk Act*, on October 2, 2013, the former panel notified the federal Minister of the Environment that the project had the potential to affect listed migratory bird species, in particular the Canada Warbler, Olive-sided Flycatcher, and Rusty Blackbird.

This report serves as the Panel's revised notification to both the Ministers of Environment and Climate Change Canada and Fisheries and Oceans Canada under subsection 79(1) of the *Species at Risk Act*. In addition to the three species identified by the former panel in 2013, the Panel has concluded that the Project has the potential to adversely affect the following species at risk: Woodland Caribou (Boreal population), Little Brown Myotis, Northern Myotis, Monarch butterfly, and Yellow-banded Bumble Bee, Eastern Whip-poor-will, Common Nighthawk, Evening Grosbeak, Bald Eagle, Peregrine Falcon, and Eastern Wood-Pee-wee, Lake Sturgeon and Northern Brook Lamprey.

The potential effects of the project on species listed under the *Species at Risk Act* are discussed in Section 10 (Fish and Fish Habitat), Section 13 (Caribou) and Section 14 (Terrestrial Species at Risk).

3.8 CUMULATIVE EFFECTS ASSESSMENT

This section addresses the requirements for cumulative effects, GenPGM's approach to the assessment of cumulative effects, and participants' concerns regarding that approach. The Panel provides their views on the Proponent's cumulative effects assessment and describes their own approach. The cumulative effects assessment of specific valued ecosystem components can be found in their respective sections.

The Terms of Reference specify that the Panel should include a consideration of any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out.

Subsection 2.7.1.4 of the EIS Guidelines required the Proponent to identify and assess the cumulative environmental effects of the Project, including on-site and off-site components, in combination with other past, present, or reasonably foreseeable projects and/or activities within the study areas. It required the Proponent to present spatial and temporal boundaries of the cumulative effects assessment for each valued ecosystem component selected, identify the potential cumulative effects, describe mitigation measures, determine the significance of the cumulative effects, and develop a follow-up program to verify the accuracy of the assessment or evaluate the effectiveness of mitigation measures. The Proponent had to include different forms of effects, such as synergistic, additive, induced, spatial or temporal, and identify impact pathways and trends.

Views of the Proponent

As part of their cumulative effects assessment, the Proponent provided a regional historical overview describing how the region has been affected by mineral exploration, mining, and logging since the mid-19th century. They stated that timber harvesting has been the most consistent and significant resource-based industry of the local and regional economies since the First World War. The pulp and paper industry also played an important role in the development of the area beginning in the 1940s. Natural large-scale disturbances such as forest fires and windthrows have historically affected the area.

The Proponent's cumulative effects assessment was informed by Agency guidelines¹ and by the EIS Guidelines. The Proponent first assessed Project-related residual adverse environmental effects that would likely interact cumulatively with residual adverse environmental effects from other physical activities. The Proponent carried forward the valued ecosystem components with potential residual environmental effects: atmospheric environment, acoustic environment, water quality and quantity, fish and fish habitat, terrain and soil, vegetation, wildlife, species at risk, socio-economic environment, human health, and Indigenous considerations. To assess potential cumulative effects, the Proponent defined the spatial boundaries as each valued ecosystem components' Regional Study Area, and the temporal boundaries as all Project phases, from site preparation and construction to decommissioning and closure.

¹ *Cumulative Effects Assessment Practitioner's Guide* (1999), *Operational Policy Statement for Assessing Cumulative Effects* (2015), and *Interim Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012* (2018).

The Proponent then established a project inclusion list, which identified past, present, and reasonably foreseeable projects and physical activities that may interact cumulatively with the Project. The Proponent stated that the past and current projects and activities were in fact included in the baseline conditions upon which the Project effects were assessed.

Consequently, they described cumulative effects as resulting from residual adverse effects from the Project combined with the effects of certain and reasonably foreseeable future projects and activities. The Panel expressed concerns with this approach, stating that if each project incorporated past effects, baseline conditions would continually shift. In response, the Proponent stated that their cumulative effects assessment did not ignore the “shifting baseline syndrome” but recognized valued ecosystem components that currently exist in a compromised state relative to some state in the far past. They noted that the current state of a valued ecosystem component is typically a consequence of past conditions. The Proponent stated that “the inevitable trajectory of any environment subject to common post-Colonization influences [...] will be some degree of diminishment of environmental values when compared to post-glacial ‘pristine’ conditions, along with thousands of years of broad landscape-scale natural environmental change (such as climate, fire and floods).” As part of past and existing projects and activities, GenPGM included:

- major settlements and communities;
- protected areas and parks;
- major transportation networks and hubs;
- major commercial or industrial enterprises;
- general recreational and land use activities;
- Indigenous land and resource use activities;
- Hemlo Gold Mine;
- Harte Gold Sugar Zone Mine;
- Wesdome Gold Mines Ltd.;
- Peninsula Harbour Sediment Remediation Project at Jellicoe Cove and the Peninsula Harbour Area of Concern;
- Jackfish Bay Area of Concern;
- Biigtigong Nishnaabeg Hydroelectric Facilities;
- Highway 17 improvements;
- Pic Moberg Hydroelectric Facility;

- timber harvesting;
- Bell Communication Towers;
- AV Terrace Bay Inc.;
- East-West Ties Transmission Line Expansion;
- Town of Marathon Landfill; and
- Town of Marathon Waste Transfer Station.

As for reasonably foreseeable projects and activities, the Proponent defined them as having either a) obtained the necessary authorizations to proceed or in the process of obtaining them, or b) been publicly announced with the intention to seek the necessary authorizations to proceed. For future projects and activities, the Proponent included:

- Biigtigong Nishnaabeg community water system upgrade;
- Magino Gold Project;
- mineral exploration;
- Biigtigong Nishnaabeg hydroelectric facilities;
- Biigtigong Nishnaabeg wind energy projects; and
- Pic River Road Rehabilitation.

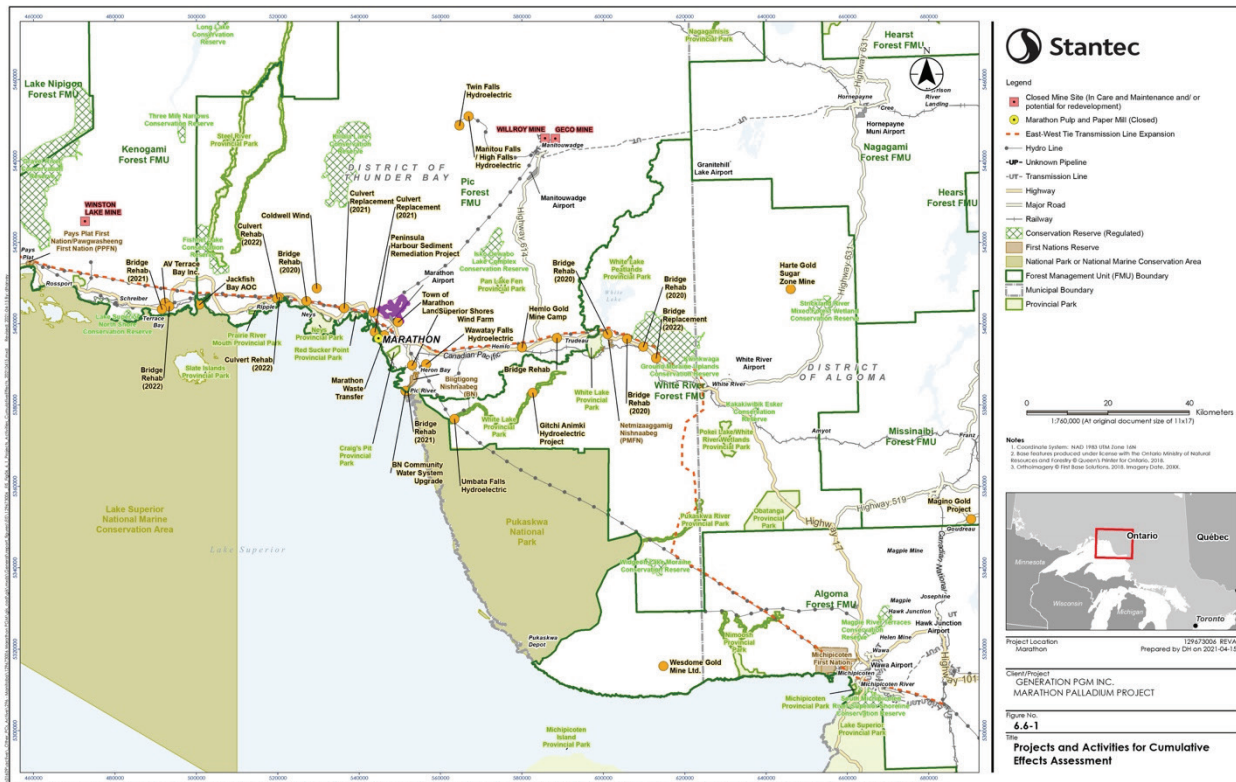


Figure 3-1: Past, Current, and Reasonably Foreseeable Projects and Activities for Cumulative Effects Assessment (Source: CIAR #727)

Of the valued ecosystem components identified as potentially contributing to cumulative effects, the Proponent predicted no cumulative effects on air quality and light, acoustic environment, water quality and quantity, soils and terrain, human health, and Indigenous health. The Proponent identified cumulative residual effects for fish and fish habitat, vegetation, wildlife, species at risk, infrastructure and community services, land and resource use, and Indigenous traditional land and resource use and Indigenous heritage, but stated that cumulative effects were likely to occur with or without the Project. For each of these, the Proponent stated the overall adverse cumulative residual effect is predicted to be not significant. For greenhouse gases, GenPGM was of the view that any project or activity that emits greenhouse gases could affect Canada’s ability to meet its commitments with respect to climate change, and therefore deemed the Project’s effects to be not significant. Last, GenPGM identified positive effects related to the economy and employment in the area that would not occur without the Project.

Views of the Participants

The Citizens for Responsible Industry in Northwestern Ontario indicated that the spatial scope of the Proponent’s cumulative effects assessment was too narrow. They stated that the assessment should have been completed at the level of the Lake Superior watershed, within Canadian boundaries at a minimum, to protect air quality, water quality, and wildlife habitat

within the region. The group referenced a World Wildlife Fund watershed report stating that, in the northeastern portion of Lake Superior's watershed, the water quality was "poor," pollution posed a "very high" risk, habitat fragmentation was at "high" risk, and the risk of overuse of water was "very high."

Pays Plat First Nation stated that the Proponent's cumulative effects assessment methodology minimized the magnitude of the effects of the Project, and characterized them as insignificant, by comparing them to effects from other projects and activities. They indicated that this approach ignored the possibility that ecological thresholds may be surpassed even when the contribution of a new activity is relatively minor. They added that cumulative effects are a combination of effects, irrespective of the magnitude of individual projects or activities. They also stated that the Proponent implicitly assumed that the nature of the interactions between the effects of all the activities was additive. Pays Plat First Nation noted that, while this may be true in some instances, other effects may interact in a synergistic nature or respond to thresholds, and that, therefore, cumulative effects could have been underestimated.

With respect to the cumulative effects to Indigenous considerations, particularly traditional land and resource use, Biigtigong Nishnaabeg indicated that, in their view, significant cumulative effects have already occurred as a result of the past and present projects and activities within their traditional territory.

The Panel heard also from several participants who stated that the Proponent failed to include, or failed to appropriately include, specific projects or activities in their assessment of cumulative effects.

The Citizens for Responsible Industry in Northwestern Ontario noted that small-scale environmental effects from the Project could still result in cumulative effects. The group also compiled compliance violations by past and existing projects, stating that the Proponent may have underestimated potential cumulative effects with these projects.

Pays Plat First Nation expressed concern that the other deposits noted in the Proponent's Feasibility Study, specifically the Geordie and Sally deposits, could make "this a much larger project with a much larger environmental impact." They indicated this would also make their concerns regarding the cumulative impact of the Project more pressing. Pays Plat First Nation suggested that, even if development of the deposits is uncertain, as they are in the early stages of the study, they had a reasonable prospect of being developed and should have been considered in this environmental impact assessment.

Northwatch noted that both the Town of Marathon and the Proponent alluded to construction of a future port along the shores of Lake Superior near Marathon; however, no information was provided in the EIS or EIS Addendum. The Proponent confirmed that the proposed port was not part of the Project, and that a port authority was still in development.

3.8.1 Panel's Conclusions

GenPGM stated that the Project Inclusion List is conservative and inclusive of potential projects and activities that could have the potential to act cumulatively with the proposed Project. The Panel agrees that the list of projects itself is conservative; however, it is not always evident why there were no interactions between the Project and projects on the inclusion list. The Panel finds that the cumulative effects assessment would have benefited in many instances from a more thorough analysis.

The Panel finds that inclusion of “mineral exploration” on the list of reasonably foreseeable activities was appropriate. The Panel is satisfied that GenPGM has included the Geordie and Sally deposits as reasonably foreseeable exploration properties, and not part of the Project at this time.

No information on the potential port in Marathon was provided to the Panel. As a result, the Panel has not considered it a foreseeable future project for the purposes of their cumulative effects assessment.

The Panel maintains the “shifting baseline syndrome” has not been adequately addressed by the Proponent. Although the Proponent acknowledged in their brief historical overview that some valued ecosystem components have been previously affected by past developments, considering present conditions as the baseline in a previously disturbed area may not provide a reasonable understanding of the cumulative effects from successive past and present projects. If each successive project in an area incorporates past effects into the baseline, the baseline would continually shift and significant effects on valued ecosystem components could be overlooked.

The Panel is of the view that effects from past and existing projects on a valued ecosystem component, including how those project activities contribute(d) to the current state of the component, should have been described and considered on their own and not simply incorporated as a reflection of the current baseline condition of the component. The Proponent often concluded that the Project's contributions would be relatively minor in comparison to the magnitude of effects from other projects or activities. At times the Proponent also stated that cumulative effects would occur with or without the Project.

The Panel agrees with Pays Plat First Nation that cumulative effects are a combination of effects, irrespective of the magnitude of individual projects or activities. The Panel is of the view that, if past projects and activities are not properly considered in the cumulative effects assessment, then cumulative effects on certain valued components that are already significant could be missed; the project would then add to an “already significant” effect. This is particularly true for effects on valued ecosystem components for which thresholds may be surpassed even when the contribution of a new activity is relatively minor. For example, in the case of species at risk, it is often past projects, activities, and stressors on the landscape that

have cumulatively affected the survival and recovery of the species in question. Without a clear depiction of the incremental changes over time, the Panel finds it challenging to discern the potential for this Project to contribute to both existing and future cumulative effects.

Panel Approach to Assessing Cumulative Effects

The Panel considered the following Agency guidance in their assessment of cumulative effects.

- *An Operational Policy Statement for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 – March 2015*; and
- *Interim technical guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 – March 2018*

In the absence of explicit consideration of past effects by GenPGM for specific valued ecosystem components for which the Panel determined there were residual effects, the Panel applied judgment and considered the qualitative information provided by the Proponent and participants to determine the significance of cumulative effects.

With respect to species at risk, where a species at risk was listed federally on Schedule 1 of the *Species at Risk Act* as extirpated, endangered, or threatened, or provincially under the *Endangered Species Act* as threatened or endangered, the Panel has considered that the existing cumulative effects to the species are already significant. Therefore, any residual adverse effect on the species at risk has resulted in a finding of significant cumulative adverse effects. However, if the Panel concluded that the Project would not result in any residual adverse effect on the species at risk, no cumulative effect assessment was undertaken.

SECTION 4: PROJECT OVERVIEW

As noted in the introduction, GenPGM, a subsidiary of Generation Mining Limited, is proposing to build and operate an open-pit platinum group metal (PGM) and copper mine and milling operation approximately 10 km north of Marathon, Ontario. Ore would be extracted from three open pits. The rate of production would be approximately 25,200 tonnes of ore per day during the 12.7-year operating life of the Project. GenPGM would produce a PGM-copper concentrate, and recover copper, PGMs (palladium, platinum, and rhodium), gold, and silver. GenPGM could also produce magnetite concentrate containing vanadium if applying magnetic-separation to PGM-copper becomes economically feasible.

The Proponent indicated that the Project would be implemented in three phases: (I) site preparation and construction, (II) operations, and (III) decommissioning and closure.

4.1 PROJECT SETTING

The location of the proposed Project is approximately 10 km north of Marathon, Ontario, a community of 3,300 inhabitants adjacent to the Trans-Canada Highway (Highway 17) on the northeast shore of Lake Superior.

The climate is characterized by long winters and short, warm summers. The area for the proposed mine is relatively densely vegetated, with a moderate to steep terrain, bedrock outcrops, and prominent east-west valleys.

Waterbodies and watercourses near the Project site include small streams, ponds, and lakes. Six subwatersheds drain the Project site. Four of those subwatersheds drain directly into the Biigtig Zibi before ultimately draining into Lake Superior. Another subwatershed drains into Hare Lake prior to reporting to Lake Superior, and the final subwatershed drains directly into Lake Superior.

The Project is approximately 20 km from Biigtigong Nishnaabeg. The edge of Biigtigong Nishnaabeg's community is 9 km from the edge of the Proponent's property. The Proponent acknowledged that the Project would be located in Biigtigong Nishnaabeg's asserted Exclusive Title Area. GenPGM identified several other First Nations and Métis groups who practise rights and have interests in the Project area, which overlaps their traditional territories and the area of the 1850 Robinson-Superior Treaty. The Biigtig Zibi, Bamooos Lake, Hare Lake, Angler Creek, and Lake Superior were identified most often as important locations for harvesting and cultural and spiritual purposes by First Nations and Métis groups.

The area's primary industries were historically forestry, pulp and paper, mining, and tourism. Today, mineral exploration, mining, and forestry characterize the area, as well as other activities, including hunting, fishing, trapping, and snowmobiling. Other land uses in proximity to the proposed site include several licensed aggregate pits, the Marathon Municipal Airport,

the Marathon Landfill, a municipal works yard, and several commercial and residential properties.

The centre of the Project footprint is located on Crown Land at approximately 48° 47' N latitude, 86° 19' W longitude. The proposed mine's footprint is bounded by Highway 17 and the Marathon Airport to the south, the Biigtig Zibi and Camp 19 Road to the east, Hare Lake to the West, and Bamooos Lake to the north. The Proponent holds surface and mineral rights for the area, which lies within the eastern portion of the Coldwell Complex.

4.2 SPATIAL AND TEMPORAL BOUNDARIES

GenPGM identified spatial and temporal boundaries to frame the assessment of environmental effects. Spatial boundaries reflect the geographic range within which Project-related environmental effects may occur. Spatial boundaries vary among valued ecosystem components depending on the nature of the potential effects. The spatial boundaries for the Project are defined as follows:

- **Site Study Area:** the 1,116.4 ha footprint of the Project within which direct physical disturbance would occur. This includes the mining operation components, as well as a transmission line and an access road. The Site Study Area is consistent for all valued ecosystem components. It is outlined in Figure 4-1.
- **Local Study Area:** the maximum area within which Project-related effects can be predicted or measured with a reasonable degree of accuracy and confidence. It includes the Site Study Area and adjacent areas where effects can reasonably be expected. A Local Study Area has been determined for each valued ecosystem component based on the reasonably expected extent of Project-related effects associated with the component. Local Study Areas for each of the valued ecosystem components are provided in Appendix 6.
- **Regional Study Area:** the area within which residual environmental effects from Project activities and components may interact cumulatively with the residual environmental effects of other past, present, and future physical activities. A Regional Study Area has been determined for each valued ecosystem component based on regional conditions. Regional Study Areas for each valued ecosystem components are provided in Appendix 6.

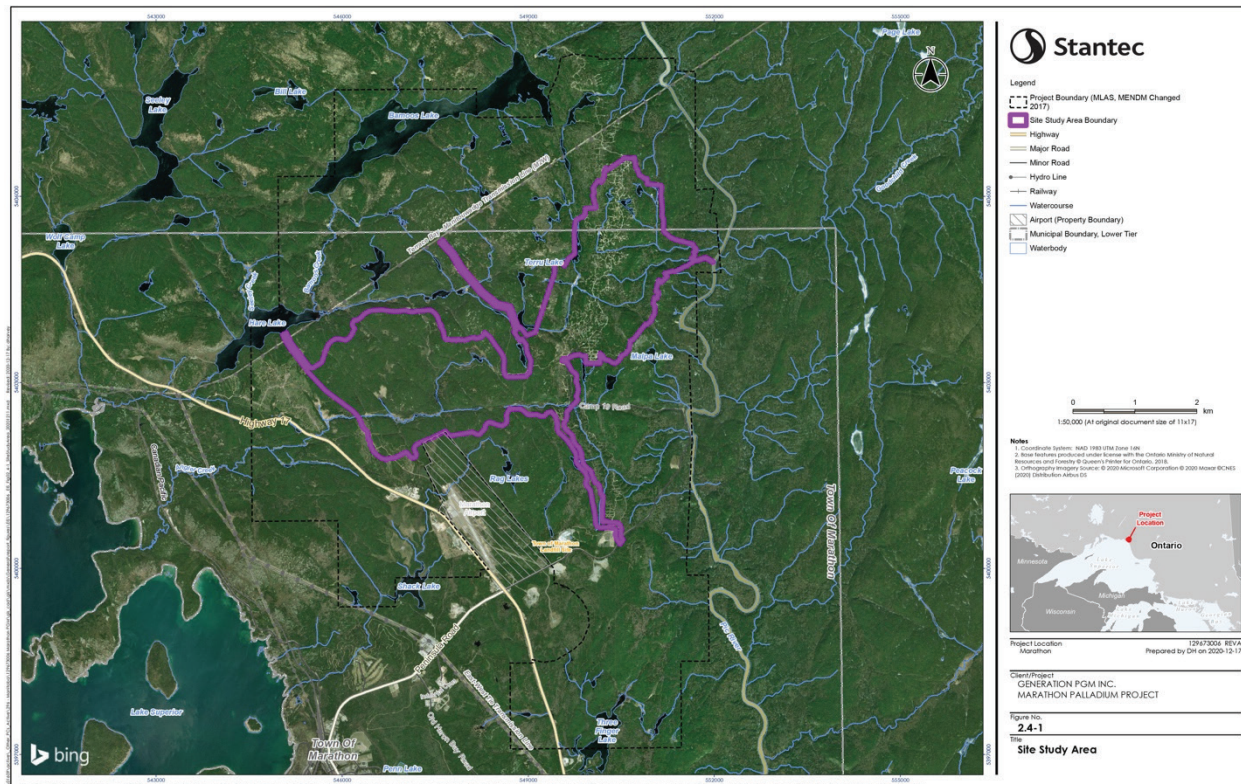


Figure 4-1: Site Study Area (Source: CIAR #727)

Temporal boundaries reflect when Project-related effects may occur based on the timing and duration of Project activities and on the nature of the interactions with valued ecosystem components. The temporal boundaries for the Project are defined by the following phases:

- **Phase I – Site Preparation and Construction:** Pre-operations activities to be completed over a period of 18 to 24 months.
- **Phase II – Operations:** Extraction and processing of minerals for a period of approximately 12.7 years.
- **Phase III – Decommissioning and Closure**
 - **Phase IIIA – Decommissioning and Closure:** Intensive reclamation and decommissioning activities for a period of two to five years. This phase, referred to as active closure, includes the removal of site infrastructure, regrading and stabilization of the site, placement of Type 2 material in permanent storage, and reclamation of the process solids management facility, the mine rock storage area, the process plant area, and other site locations.
 - **Phase IIIB – Post-Closure:** Follow-up and monitoring activities and stabilization of environmental conditions for a period of up to 40 to 45 years. This phase primarily

consists of follow-up and monitoring activities and the subsequent stabilization of environmental conditions specific to each VEC.

For clarity, throughout this document, the Panel will refer to Phase IIIA - Decommissioning and Closure phase as the “active closure” phase. The Panel also considers the active closure phase to be separate from the post-closure phase.

4.3 PROJECT COMPONENTS

The general layout of the components of the Project, including the mining operations, the transmission line corridor and access road, is provided in the General Site Layout (Figure 4-2).

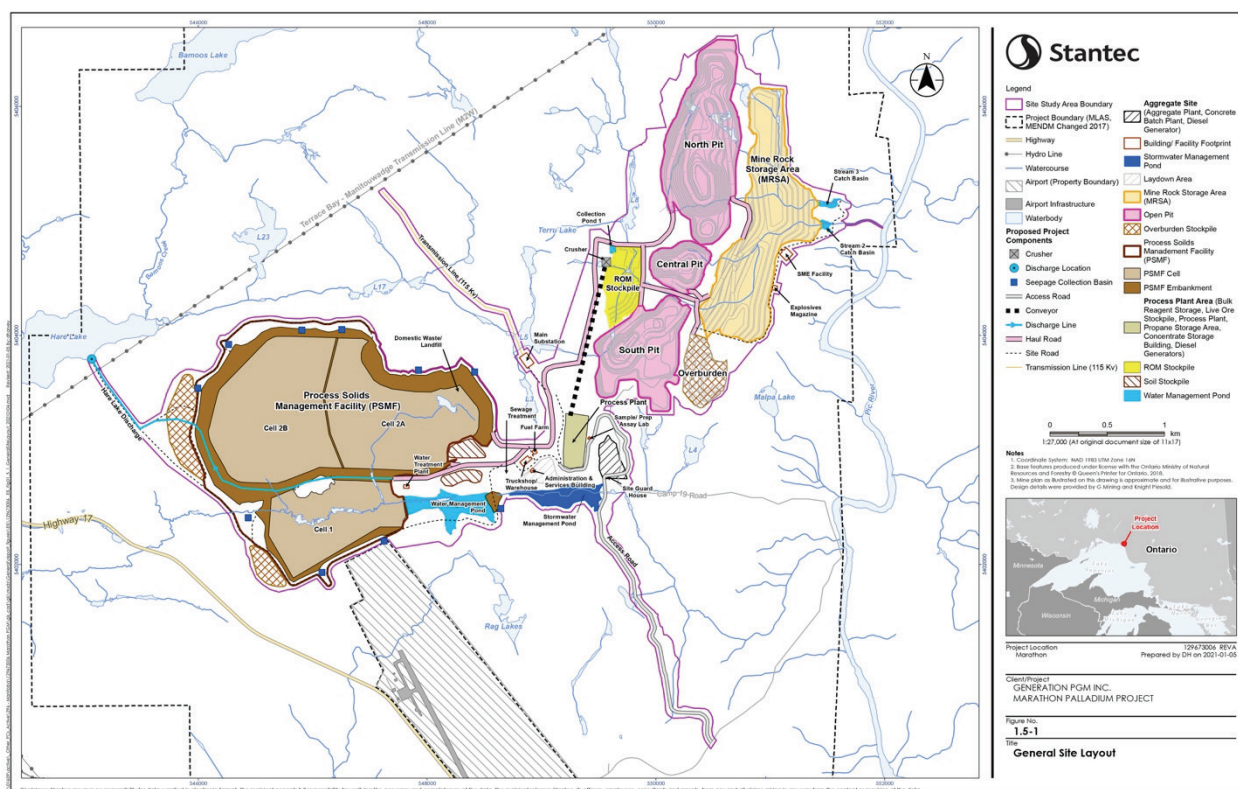


Figure 4-2: General Site Layout (Source: CIAR# 727)

4.3.1 On-site Project Components

Ore Mining and Processing

The Project would include the following components:

- **Open pits:** three open pits where PGM-copper ore would be excavated: north pit, central pit, and south pit, with approximate volumes of 106 million m³, 12 million m³, and 31 million m³, respectively.

- **Mine rock storage area:** where Type 1 mine rock (non–potentially acid-generating rock that has been excavated from active mining areas but does not have sufficient ore grades to permit economically viable extraction) can be stored safely in perpetuity following extraction from the open pits. This area would be located east of the open pits.
- **Run-of-mill stockpile:** a storage area for run-of-the-mine ore excavated at the pits.
- **Crusher:** an enclosed facility where large pieces of rock excavated from the open pits would be reduced to a size that can be sent to the process plant via a conveyor.
- **Process plant:** ore processing facility at which minerals from the mined ore would be recovered and processed into concentrate. The average daily feed rate would be approximately 25,200 tonnes. The process plant area would also include a crushed-ore stockpile, a bulk-reagent storage building, a propane storage area, a concentrate storage building, back-up diesel generators, and an assay lab (if located on-site). The process plant area would be located between the south pit and the process solids management facility.
- **Process solids management facility and dams:** the facility would store the non-marketable solids generated following the extraction of the minerals from the ore. The perimeter dams would include geomembrane liners on the upstream face. Type 1 (non–potentially acid-generating), and Type 2 (potentially acid-generating) process solids would be deposited in Cell 1, Cell 2A, and/or Cell 2B, depending on the stage of the mine life.
- **Aggregate plant:** a facility in which excavated mine rock would be reduced into aggregate material for construction of site facilities and to support operating activities.

Water Management

- **Water management system:** a system to collect and manage contact water at the mine site, including water from the open pits, the mine rock storage area, the process solids management facility, and the stormwater management pond.
- **Water treatment plant:** a facility to remove contaminants of concern, including phosphorus, to meet applicable water quality criteria.
- **Seepage collection basin:** basins along the toe of the embankment to intercept seepage and pump it back to the process solids management facility via a water pipeline.
- **Water management pond:** a pond which would receive site contact water, including water from the open pits, mine rock storage area catch basins, process plant, process solids management facility, and stormwater management facility. The water management pond would provide reclaimed water to the process plant via a pipeline during operations. Excess water in the water management pond would be treated at the water treatment plant, as required, and then discharged to Hare Lake via a multi-port diffuser located in the lake.

- **Stormwater management pond:** a pond to manage stormwater runoff from the process plant area and from the aggregate plant area. The water would be pumped to the water management pond or treated as necessary and discharged to Hare Lake.

Other Facilities

- **Assay lab:** a laboratory that would provide testing support for five primary functions: (1) segregation of mine rock from ore in the pits, (2) segregation of Type 1 from Type 2 mine rock, (3) ore-grade control for the mining operation, (4) process analysis to optimize the process plant's performance, and (5) environmental analysis to support site environmental management operations. Type 1 mine rock has less than 0.18% sulphur and is defined as non-potentially acid-generating. Type 2 mine rock has more than 0.18% sulphur and is assessed to be potentially acid-generating.
- **Explosives production plant and storage area:** facilities to manufacture nitrogen-based explosives and store boosters, detonators, and site-mixed emulsions that would be used for the purpose of blasting the ore and mine rock at the open pits.
- **Transmission line:** a 115 kV overhead transmission line to provide electrical power to the Project site from the existing Terrace Bay-Manitouwadge transmission line. The corridor would be approximately 30 m wide and 2.2 km long, running from the existing transmission corridor to a transformer substation north of the process plant.
- **Site access road:** a road to provide safe and direct access between the public road network and the Project site. At a distance of 2.2 km north of the Highway 17 Junction along Camp 19 Road, this new road corridor would be 30 m wide and 2.8 km long, extending to just south of the process plant. The road continues from the mine site to Hare Lake to support the effluent discharge. The site access road alignment has three potential crossings, including one at Angler Creek along the segment between the mine site and Hare Lake.
- **Fuel farm:** a primary fuel storage area to store up to 500,000 L of fuel in aboveground bulk tanks. Storage tanks would be outfitted with secondary containment and protection to guard against mobile equipment collisions. Storage and distribution areas would be designed to catch spills. Portable double-walled temporary storage tanks would be located on site to support construction and mining activities.

4.3.2 Off-Site Project Components

- **Employee accommodation complex:** complex that would accommodate approximately 60 workers, and up to 180, during the operations phase. It would be operated by a third party during the operations phase. The complex would be located within the general area of the town of Marathon.

- **Rail load-out facility:** enclosed facility along the Canadian Pacific or Canadian National Railway rail lines to be constructed if a combination of truck and rail is favoured for transporting concentrate to a third-party mineral processor. Although the exact location of a potential rail load-out facility has not been determined, for the purposes of the EIS Addendum, the Proponent assumed it to be situated in the town of Marathon. Any concentrate not loaded onto rail cars would be stored into two 2,000-tonne capacity bunkers at the facility.

4.4 SITE PREPARATION AND CONSTRUCTION PHASE

Site preparation is expected to be completed over a period of 18 to 24 months. This phase would focus on preparing the site and constructing all facilities and buildings necessary for the operation of the mine.

4.4.1 Site Clearing and Mine Development

Clearing of vegetation and grubbing would occur within the Project footprint for the development of Project infrastructure. Topsoil and other organic materials (stripping) would be removed within the Project footprint, but left along the roads and the transmission line corridors. Soil removed would be placed into stockpiles in the same area as the overburden, to the extent possible, and subsequently used for progressive reclamation and closure of the mine. The removed overburden would be used for either filling areas for road and process plant construction or for reclamation purposes at later stages.

Blasting would occur to prepare the three open pits, the process plant area, and roads and dams. Drilling would occur for the development of the pits and for the process plant area. A temporary explosives transfer facility would be used during this phase, but would then be replaced by a permanent facility that utilizes site-mixed emulsion technology. This technology would allow GenPGM to manufacture the emulsion at the pits, eliminating the need to store the finished product at the facility.

Mine rock would be excavated from the open pits and hauled to a crusher that would reduce mine rock to aggregates of various sizes for use in construction. Type 1 mine rock could be used for dam and road construction, or other infrastructure development. Type 2 material would be segregated in a temporary area adjacent to the pits such that drainage would be contained and managed.

The basic infrastructure of the water management system would be developed during the early stages of this phase to ensure that runoff from disturbed areas can be appropriately managed.

4.4.2 Access Roads

During the construction phase, the existing exploration road, which starts north of the access gate located on Camp 19 Road, would be used to access the site and would need to be widened and smoothed. Sections of Camp 19 Road between Highway 17 and the existing access gate would need to be widened at culverts between these two points. A new road would also be developed to provide safe and direct access to the Project site during operations. This new road would begin 2.2 km north of the Highway 17 junction on Camp 19 Road. This new corridor would be 30 m wide and 2.8 km long, ending just south of the process plant, where a guard house is proposed. GenPGM stated that improvements have already been made by other parties at the intersection of the Highway 17 and Camp 19 Road but that additional improvements may be necessary, including an 85 m taper to widen the right turning lane to accommodate mine-related traffic.

4.4.3 Transmission Line

GenPGM would also develop the electrical power transmission corridor to supply the Project site. This transmission corridor would be approximately 30 m wide and 2.2 km long. The overhead 115-kV transmission line would run from the existing Terrace Bay-Manitouwadge transmission line, owned and operated by Hydro One Networks Inc., to a transformer substation located north of the process plant between the south pit and the process solids management facility. While the transmission line is being completed, five 1 MW diesel generators would be used to supply power at the site. The generators would remain in place during operations in case of a power failure.

4.4.4 Temporary Facilities

Temporary construction facilities, such as a construction office, laydown areas, and a temporary maintenance shop, would be built on-site. A concrete batch plant would produce concrete to build infrastructure and would be decommissioned after this phase.

4.4.5 Mine Rock Storage Area

The basic infrastructure of the mine rock storage area would be developed during the early stages of this phase to ensure that it is ready to accept materials when operations begin.

4.4.6 Process Solids Management Facility and Water Management Pond

The basic infrastructure of the process solids management facility would be developed during the early stages of this phase to ensure that it is ready to accept materials when operations begin. The process solids management facility, which is located west of the process plant, would be created through the downstream construction of rockfill dams using Type 1 mine

rock. The dams would be raised in stages to provide sufficient storage capacity for process solids and site water management. The final elevation of the dams would range from 343 m above sea level to 380 m above sea level.

During this phase, the water management pond would initially be used as a storage pond for construction dewatering. During construction, GenPGM indicated no discharge is expected.

4.4.7 Accommodations and Other Supporting Infrastructure

Buildings and other infrastructure would be constructed as areas are cleared including: the crusher, conveyor system, processing facilities, maintenance and administration buildings, and other on-site supporting infrastructure.

GenPGM expects a work force of 430 to 550 workers on average during this phase, with a peak of between 800 and 1,000 workers. The already existing Valard Construction Camp in Marathon would be used to accommodate transient workers. This facility can be expanded to accommodate up to 700 workers. Other accommodations such as hotels and rental accommodations could add another 150 rooms to house workers as well.

4.5 OPERATIONS PHASE

4.5.1 Mine Ore Processing and Concentrate Production

The operations phase is expected to last for 12.7 years. During this phase, the mine would be in operation and ore would be excavated from three pits: north pit, central pit and south pit. The north pit would be mined throughout the operating life of the Project whereas the Central and south pits would be mined at various times to supplement ore production. Run-of-the-mine ore would be transported to either the crusher or the run-of-mill stockpile pad. Crushed ore would then be transported onto a covered conveyor 1.4 km long to a covered coarse-ore stockpile in the process plant area. This coarse-ore stockpile would have a live capacity of 25,000 tonnes, the approximate equivalent to one day of process plant feed, which is equivalent to a total ore stockpile of approximately three times, or 75,000 tonnes.

Crushed ore would be processed into concentrate following a conventional two-step grinding and flotation process. If GenPGM pursued the option of producing vanadium-magnetite concentrate, low intensity magnetic separation would be applied to the flotation tailings and to the PGM-copper concentrate.

Trucks would drive through the process plant, loaded with concentrate and covered for transport. The Proponent estimated that approximately 10 truckloads of PGM-copper concentrate would be transported off-site daily, and, if produced, 30 truckloads of vanadium-magnetite would be transported off-site daily. A concentrate storage building would be

constructed at the process plant area and would be used in the event of an interruption in transportation. Concentrate would be delivered to a third-party facility for further processing, either by truck or by train via the rail load-out facility.

4.5.2 Mine Rock Management

Samples from blast holes would be taken to the assay lab to determine ore and mine rock boundaries, and to identify Type 1 and Type 2 mine rock. The two types of mine rock would be segregated and managed differently. Type 1 mine rock that is not crushed and used for dam construction or as aggregate for site infrastructure would be directed to the mine rock storage area for permanent storage. Type 2 mine rock would be placed in the process solids management facility, and then covered with Type 1 process solids to prevent acid drainage in the long term. The south pit would be mined out by the end of year 6 and would be available for storage of mine rock and Type 2 material. The central pit would become available for storage closer to the end of the mining operations.

4.5.3 Process Solids Management

The process plant would produce 85% Type 1 and 15% Type 2 process solids. Type 1 process solids would be discharged into the process solids management facility. Type 2 process solids would be discharged into a designated area of the facility, and the central pit during the last three years of operation.

4.5.4 Water Management

All contact water from the site, including water from the open pits, mine rock storage area catch basins, process plant, process solids management facility and stormwater management pond, would be transferred to the water management pond via a water transfer pipeline system. Water in the management pond would be reclaimed for use at the process plant. Excess water above the need of the process plant would be either directly discharged to Hare Lake or treated prior to discharge depending on the quality. GenPGM plans to discharge up to 2 million m³ annually during operations. Water from collection pond 1 could also be used for dust suppression on the mine haul roads. GenPGM expects that the discharge rate at Hare Lake would be relatively low and would largely occur during the spring freshet.

Approximately 1.4 million m³ of water would be stored in the water management pond initially to support the commissioning of the process plant and to ensure that ore processing can be sustained during the initial period of operations. It is estimated that up to 25,000 m³ of reclaimed water may be required daily to process the average daily process plant throughput of 25,200 tonnes.

4.5.5 Workforce and Accommodation

The operations phase would be a seven-day-per-week operation, which would include two shifts per day. GenPGM estimated that 90 passenger vehicles would enter the mine site for the day shift, and 60 would enter for the night shift. The shift changes would occur outside of regular traffic hours, early in the morning or later in the evening. Other traffic includes up to 40 tractor-trailer loads per day of concentrate product and 6 tractor-trailer loads of supplies. The contractors or employer would also provide a crew bus to the mine site for workers, where appropriate.

The Proponent expects an average workforce of 430 employees working on a one-week on/off rotation during the operations phase. This means that there would be 215 workers at the site in a given week. An accommodations complex would house workers who are not from the local or regional catchment (those who have more than a 100 km one-way commute), which the Proponent predicted to be about 10% to 20% of the workforce. The accommodations complex is designed to house 60 workers but it could be expanded to house up to 180. Other forms of temporary accommodations such as hotels could supply an additional 150 rooms, if needed.

4.6 ACTIVE CLOSURE PHASE

The active closure phase includes intensive reclamation and decommissioning activities for a period of two to five years. A conceptual Closure Plan exists at the moment and a regulatory plan would be developed with input from Indigenous communities, government agencies, and the public. This more-detailed plan would be submitted for approval to the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, as required by the provincial *Mining Act*. The general objectives of the detailed plan would be to:

- reclaim lands within the Site Study Area so they are physically and chemically stable;
- provide suitable habitat for plants and animals;
- reduce impacts to the natural environment; and
- re-instate access for traditional and other land and resource uses.

GenPGM stated that the site would be reclaimed on an on-going basis to the extent practical during all previous phases, but that the most intense period of decommissioning of site infrastructure would occur immediately following the cessation of operations. At that point, as much of the site infrastructure as possible would be removed. Specific activities that would occur during this phase of the Project include:

- decommissioning/removal of maintenance, administration and on-site support facilities;

- decommissioning/removal of off-site support infrastructure;
- decommissioning/removal of the process plant and associated ore processing equipment and facilities (pipelines, crushers, conveyors);
- decommissioning/removal of the explosives magazine facilities;
- removal of transmission lines and electrical equipment;
- decommissioning of parts of the site road network;
- decommissioning of the potable water and sewage treatment systems;
- placement of any Type 2 material still on the surface into pits for permanent storage;
- regrading and stabilization of any stockpiles that are left on surface for the long term; and
- reclamation of the process solids management facility, mine rock storage area, process plant area and other developed areas.

4.6.1 Open-Pit Closure Measures

During the operations phase of the Project, the south and central pits would be used for permanent storage of Type 2 mine rock and process solids. During the active closure phase, these pits would be capped with a layer of Type 1 mine rock to prevent acid rock drainage. New drainage from the south and central pits would be directed to the north pit. Because the north pit would take years to fill, GenPGM confirmed that a boulder fence and signage would be placed around the north pit to prevent inadvertent access. Once filled, drainage from the north pit would report east within subwatershed 103 to the Biigtig Zibi.

4.6.2 Process Solids Management Facility Closure Measures

The closure of the process solids management facility would include re-grading and the creation of channels to restore the natural drainage patterns in subwatershed 106 and revegetation. As the Type 2 mine rock and tailings deposited in the process solids management facility during operations would need to be maintained in a saturated state to prevent acid rock drainage, the surface of the process solids management facility would be contoured to direct runoff to surface ponds in Cell 1 and Cell 2A. Post-closure drainage would be directed to Stream 6 (Angler Creek) once water quality is acceptable for direct discharge without treatment. Reclamation of the process solids management facility also includes establishing a vegetation cover.

4.6.3 Mine Rock Storage Area Closure Measures

The mine rock storage area would be partially reclaimed during operations. During operations, in areas that become inactive, horizontal surfaces would be covered with overburden and revegetated with native seeds. During the active closure phase, drainage water from the mine rock storage area would be monitored and, once it has been determined that the water quality is acceptable for discharge, water collection systems would be dismantled and flow would resume through the natural channels to the Biigtig Zibi.

4.6.4 Other Areas (Roads, Building Footprints, Run-of-Mill Stockpile, etc.)

Reclamation of other areas of the Site Study Area would include the establishment of vegetation cover.

4.7 POST-CLOSURE PHASE

Following active closure of the mine, various activities would continue at the site for a period of 40 to 45 years. During this phase, GenPGM would monitor progress of site restoration and stabilization and implementation of the Closure Plan. A phase-specific monitoring plan would be developed and would include specific programs that focus on evaluating the physical integrity of permanent man-made structures (e.g., dam safety inspections), the relative success of the implementation of closure and reclamation activities (e.g., revegetation success), and the potential effects of the closed mine site on the environment (e.g., surface water and groundwater quality monitoring). The nature and extent of these programs would be developed during detailed closure planning based on the results of the effects assessment and outcome of the environmental assessment process.

SECTION 5: NEED, PURPOSE, AND ASSESSMENT OF ALTERNATIVES

5.1 REQUIREMENTS FOR THE CONSIDERATION OF NEED, PURPOSE, AND ASSESSMENT OF ALTERNATIVES

This section addresses the need for, purpose of and assessment of alternatives for the Project. The purpose and alternative means are factors to be considered as per paragraphs 19(1)(f) and (g) of the *Canadian Environmental Assessment Act, 2012*. In accordance with Panel's Terms of Reference, the Panel's assessment was required to include a consideration of the purpose of the Project and the rationale or need for the Project.

The *Guidelines for the Preparation of an Environmental Impact Statement* (EIS Guidelines) required GenPGM to:

- define the problem or opportunity the Project is intending to solve or satisfy;
- present the rationale for proceeding with the proposed Project within the context of regional, provincial, and national economies, and consider the global implications of supply and demand on metal prices and markets. The "rationale or need for" and "purpose of" the Project were to be established from the perspective of the Proponent and provide the context for the consideration of "alternatives to" the Project; and
- assess "alternative means" of carrying out the various activities and components of the Project.

5.2 NEED AND PURPOSE OF THE PROJECT

Views of the Proponent

It is the Proponent's position that the current and emerging market conditions for platinum group metals and copper establish the need for the Project. The purpose of the Project is to secure a Canadian supply of these metals through the development and operations of this Project.

The Proponent in their description of the need for and purpose of the Project, relied in part on their independently prepared Feasibility Study. Platinum group metals (including palladium, platinum, and rhodium) are essential components of automotive catalytic convertors. In the Feasibility Study the Proponent noted that the introduction of more stringent vehicle exhaust emissions regulations in China and Europe has been followed by a greater demand for palladium and rhodium. The Proponent stated that there is a limited supply of these metals and

that some analysts expect the supply shortages to continue as more countries introduce more stringent vehicle exhaust controls.

The Proponent stated that copper is a key element in the production profile of the Project. They noted it is necessary for hydrogen fuel-cell vehicles and a critical mineral for electric vehicles and associated charging infrastructure, and the growth of renewable energy infrastructure. The current design of battery-electric automobiles does not require significant amounts of platinum group metals but does require up to four times more copper than internal combustion engines or diesel-powered automobiles. The Proponent stated that, with markets turning toward more energy-efficient and electrically powered vehicles, global demand for copper has increased and there is a projected production deficit.

GenPGM stated that the Feasibility Study demonstrated that the Project is technically and economically viable. This economic analysis was based on the following components:

- federally compliant resource estimates for the deposit;
- selected metal pricing and smelter terms;
- capital costs (buildings and infrastructure);
- operating costs (fuel, consumables, labour);
- metal production and revenues; and
- closure costs.

The Feasibility Study included resource estimates for two smaller palladium-copper deposits (Geordie and Sally) to which GenPGM has the mineral rights. However, these have not been included in the financial analysis or environmental assessment in support of the Project. During the hearing the Proponent confirmed that these deposits are not intended to be part of this environmental assessment or required in support of the rationale for the Project.

When questioned by MiningWatch Canada on the impact that current economics may have on the Project feasibility during the hearing, the Proponent stated that, while the price of diesel fuel has gone up, so has the price of palladium and that they have balanced out. The Proponent also stated that operation of the mine would bring employment and revenue to an area of the province that has seen employment numbers decrease recently.

GenPGM responded to concerns that, if the Project was not viable, the Project might not progress to proper closure. They stated that there would be a separate regulatory process overseen by the Ministry of Northern Development, Mines, Natural Resources and Forestry, which would determine the adequacy of the type and amount of financial assurance for the Project. The Proponent's economic analyses indicate that with the predicted grade, tonnage,

and mining and milling methods planned, and with anticipated closure costs, the mine would be profitable and would provide both jobs and economic stimuli to an area that has seen some setbacks due to closures of major industries and scaling back of the operations at Hemlo Gold Mine. The Proponent estimated that the Project would generate an average of 430 full-time jobs for an operational Project lifespan of more than 12.7 years, with expected spin-off increases in local employment and net economic benefits to the Town of Marathon, Ontario, and Canada from the Project.

Views of the Participants

A number of participants expressed concerns about the economic viability of the Project and the implications if the Proponent was not able to complete the Project, including the closure phase, as planned.

MiningWatch Canada stated that the Project relies on a low-grade deposit with a 3:1 stripping ratio of waste to ore, which they concluded would make it susceptible to fluctuations in the market price for metals. They shared their analysis of the history of the mine site, pointing out that, since the 1980s, several major mining companies have shelved plans to advance the development of this mine as a result of low metals prices. MiningWatch Canada submitted that GenPGM is attempting to capitalize on current trends in palladium markets, which saw prices per ounce rise to more than \$2,000 US for much of 2020 — significantly higher than the long-term average. MiningWatch Canada stated that 80% to 85% of palladium is used for catalytic converters, and speculated that industry substitution for platinum, the electrification of vehicles, or the selling off of Russian state stockpiles could eventually lead to a market collapse. Northwatch also questioned the long-term demand for copper, and cited conflicting market reports published by the Reuters and Bloomberg news agencies. MiningWatch Canada and Northwatch warned that if the Project was rendered unprofitable due to metal price fluctuations, the costs of remediation of the site would be borne by Ontario taxpayers.

The Town of Marathon and the Thunder Bay Community Development Corporation stated that “copper and platinum group metals are identified in Ontario as critical minerals” and “are integral metals to develop a low carbon technology”.

5.3 PANEL CONCLUSIONS

In reaching their conclusions the Panel found the following factors to be particularly relevant:

- The Feasibility Study concluded that the Project was economically viable based on the deposit and demand for the minerals.

- The financial costs of closure would be subject to a separate regulatory process to identify an appropriate amount and form of financial assurance for the Project.
- The Town of Marathon and the Proponent stated that copper and platinum group metals are considered by the governments of Ontario and Canada to be “critical” minerals to develop low carbon technologies.
- In accordance with the EIS Guidelines, the “need for” and “purpose of” the Project was to be established from the perspective of the Proponent.

The Panel concludes that the Proponent has adequately demonstrated the purpose of and need for the Project. This information was supported with a feasibility study that demonstrated the economic viability of the Project.

5.4 ALTERNATIVES TO THE PROJECT

Views of the Proponent

In considering “alternatives to”, the Proponent identified two options: proceeding with the Project as proposed and a “do nothing” alternative.

The Proponent stated that the principal advantages associated with proceeding with the Project, in addition to providing needed metals, was the positive economic activity that the Project would generate, including, but not limited to, training opportunities, direct and indirect job creation and business opportunities, increased household income, increased gross domestic product, and increased tax revenue for governments. They stated that the positive effects are notable locally, where unemployment rates are above the provincial average and recent nearby mine closures have increased the supply of a qualified workforce.

The Proponent noted that, without the Project, there would be no environmental effects, and no advantages would accrue as this represents the status quo. While potential adverse effects on the environment may be avoided under this scenario, it would result in unrealized benefits and use of an existing resource for which a global demand exists. In the absence of another feasible alternative, the Proponent concluded the Project remained the preferred alternative and the “do nothing” alternative was eliminated because it does not meet the purpose of the Project.

Views of the Participants

The Town of Marathon stated during the hearing that there are greater impacts to the community if there is no Project and therefore no new jobs. The Mayor stated that if there are jobs in Marathon, people are working and schools and recreation facilities remain open.

Alternatively, without jobs the town must shut down facilities, which in turn has an impact on the community. The Mayor stated that, when there are no local jobs, it is a struggle for those communities to survive.

MiningWatch Canada raised the alternative of recycling catalytic converters instead of developing the mine, stating that catalytic-converter palladium is infinitely recyclable. MiningWatch Canada also stated that, as the reliance on catalytic converters decreases, there will be more palladium available for recycling.

5.5 ALTERNATIVE MEANS

Views of the Proponent

The Proponent identified various alternative means for Project components and activities. The alternative means were first screened to ensure they were economically and technically viable and then subjected to a comparative evaluation based on their net environmental effects. The alternative means assessment was documented in the Environmental Impact Statement (EIS) and the EIS Addendum. Further information was provided to the Panel in response to Information Request 1-1. The purpose of the alternatives assessment was to identify, on a relative basis, the preferred alternative means. The preferred alternative means was then carried forward for more detailed assessment, including the identification of mitigation measures and the significance of Project effects. Table 5-1 is a summary of the findings of the Proponent's assessment of alternative means for Project components and activities. The Panel has drafted the table for clarity based on information provided in response to the Information Request.

Comments from Participants on the alternative means analysis were limited to two components: the source of electrical power and the lack of alternative assessments for post-closure drainage. The Proponent's views with respect to these comments are discussed below.

Source of Electrical Power –Transmission Line Location

During the hearing, questions were raised about the Proponent's choice for a transmission line route. The Proponent considered two options for the supply of electricity in the comparative assessment: a new transmission corridor running north from the Project to the Terrace Bay-Manitouwadge Transmission Line (Option 1), or a new transmission corridor running south from the Project along the proposed site access road and Camp 19 Road to a location near the Marathon Transformer Station connecting to the East-West Tie Transmission Line (Option 2).

The Proponent identified Option 1 as their preferred alternative based on its shorter length (2.2 km versus 7.4 km), straighter orientation, and technical feasibility (i.e., availability of property and potential to avoid interaction with existing infrastructure). They also flagged the

uncertainty associated with being able to connect to Option 2, the East-West Tie Transmission Line since an assessment by the Independent Electricity System Operator had been completed for Option 1 but not Option 2. They concluded that, while Option 2 is a technically feasible alternative, uncertainty associated with the outcome of the Independent Electricity System Operator's assessment and therefore the ability to connect could delay the start of the Project.

Water Drainage Post-Closure

With regard to concerns raised by the Biigtigong Nishnaabeg about post-closure water drainage into the Biigtig Zibi, the Proponent stated they did not identify any other discharge alternatives as part of the EIS. The sole technically and economically feasible approach identified by the Proponent was to direct drainage to the Biigtig Zibi from the mine rock storage area, as well as overflow from the pit when the pit fills. Acknowledging Biigtigong Nishnaabeg's continued concerns about drainage to the Biigtig Zibi, the Proponent indicated that, as they develop the closure plan and final configuration of the site, they are investigating if these concerns can be addressed, including directing the drainage away from the Biigtig Zibi.

Table 5-1: Summary of Proponent's Assessment of Technically and Economically Feasible Alternative Means

Project Component	Alternatives Considered (preferred alternatives in bold)
Site access road route to access the mine site during operation	Option 1: Existing Camp 19 Road
	Option 2: New site access road off Camp 19 Road ending 300 m east of process plant
	Option 3: New site access road off Camp 19 Road ending south of process plant
	Option 4: New site access road directly from Highway 17.
Source of electrical power for mine operation	Option 1: Connection to Terrace Bay-Manitouwadge Transmission Line (M2W)
	Option 2: Connection to the East-West Tie Transmission Line
	Option 3: Diesel generators installation
Aggregate and rock fill supply source	Option 1: Onsite sources
	Option 2: Offsite sources licensed sources in the surrounding region
Method of transporting concentrate for further processing ²	Option 1: Direct transport via truck
	Option 2: Transport via a combination of truck and rail
	Option 3: Transport via a combination of truck and ship

² In this instance Options 1-3 were all 'acceptable' alternatives. Option 2 was assessed in the EIS.

Project Component	Alternatives Considered (preferred alternatives in bold)
Process solids consistency	Option 1: Conventional and/or thickened slurry, with 45%–70% solids content
	Option 2: Paste or Filtered Tailings, with solids content of >85%
Solid non-hazardous waste disposal	Option 1: Collection and disposal by a third-party contractor offsite at a licenced facility
	Option 2: Collection and disposal in an onsite landfill
	Option 3: Collection and disposal in the PSMF
Approach to reclamation of the MRSA	Option 1: Passive natural reclamation
	Option 2: Proactive reclamation
Approach to reclamation of the PSMF	Option 1: Flow directed to Hare Lake
	Option 2: Flow/drainage directed to Stream 6 (Angler Creek)
PSMF/WTP discharge point during operations	Option 1: Discharge to Stream 6 (Angler Creek) or one of its tributaries
	Option 2: Discharge to Hare Lake
Onsite aggregate production	Option 1: West location
	Option 2: East location
Explosives technologies	Option 1: Bulk emulsion product
	Option 2: Site mixed emulsion technology
MRSA footprint	Option 1: Longer footprint to the east of the pit complexes within six subwatersheds
	Option 2: Reduced footprint located to the east of the pit complexes within 2 subwatersheds

MRSA = mine rock storage area; PSMF = process solids management facility; WTP = water treatment plant.

Note: Adapted from Table 2 in Information Request 1-1 (CIAR #749).

Views of the Participants

As noted above, Biigtigong Nishnaabeg were concerned that there was no assessment of alternatives to the discharge to the Biigtig Zibi during closure. They stated any post-operations discharge of mine-affected water to the Biigtig Zibi is unacceptable. They acknowledged the Proponent's commitment to work with them on the final closure plan.

In their written submission to the hearing, Northwatch identified concerns with the electricity supply to the mine site as described in the alternative means assessment. They expressed concern that there was insufficient rationale for the Proponent's preference for Option 1, the connection to the Terrace Bay-Manitouwadge Transmission Line, over the connection to the East-West Tie Transmission Line, and commented on the absence of a cost analysis and technical considerations, such as line load and stability.

5.6 PANEL CONCLUSIONS

In reaching their conclusions on Project alternatives, the Panel found the following factors to be particularly relevant:

- The Proponent has considered two "alternatives to": undertake the Project or do not undertake the Project.
- The Proponent has assessed technically and economically feasible alternative means for substantial Project components and activities.
- The Proponent identified only a single option for post-operations discharge points, indicating there were no technically and economically feasible alternatives.
- When Biigtigong Nishnaabeg raised a concern during the hearing about post-operations discharge points, the Proponent committed to work with them to address their concerns during the development of the closure plan.
- Biigtigong Nishnaabeg noted that any post-operations discharge of mine-affected water to the Biigtig Zibi is unacceptable.

The Proponent has considered two "alternatives to": undertake the Project or do not undertake the Project. The Proponent was required to provide an analysis of whether these "alternatives to" meet the need and achieve the Project's purpose from their perspective. The Panel finds that identification and analysis of these alternatives is therefore appropriate.

The Proponent systematically and traceably identified and compared a range of "alternative means" for major Project components and activities. However, the Proponent had not identified an alternative post-operations discharge point to the Biigtig Zibi, stating that there

were no other alternatives that were technically and economically feasible, in part due to site topography. In the response to Undertaking 31 and Biigtigong Nishnaabeg's position regarding discharge to the Biigtig Zibi, the Proponent committed to working with Biigtigong Nishnaabeg on an ongoing basis to review feasible Closure plan alternatives.

However, neither Biigtigong Nishnaabeg nor the Proponent had, at the close of the Panel's record, provided an alternative option to post-closure Biigtig Zibi discharge. As a result, the Panel considered the Project as proposed, including the effects of the proposed post-closure discharge in Section 9 (Surface Water Quality) and Section 21 (Effects on Indigenous Peoples) of this report. The Panel is satisfied the Proponent has adequately assessed the environmental effects of the alternatives to and alternative means of carrying out the Project.

The Panel recognizes that Project alternatives are refined as Project design and development progress, and assessment of effects continues.

PART 2: AQUATIC ENVIRONMENT

SECTION 6: GEOLOGY

6.1 REQUIREMENTS FOR THE CONSIDERATION OF GEOLOGY

This section addresses the characterization of site geology and the environmental effects of the Project on geochemistry and, in particular, the potential for acid rock drainage and metal leaching to affect surface water and groundwater. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under paragraphs 5(1)(a) and (c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required the Proponent to:

- provide detailed information that characterized the site geology, including investigations for the acid rock drainage and metal leaching potential of the overburden, waste rock, ore and low-grade ore, and tailings.
- assess Project components including the pit walls, waste rock dumps, low-grade ore and ore stockpiles, tailings/waste rock impoundments, borrow materials, plant site, and roads.

6.2 ASSESSMENT OF GEOCHEMISTRY

Views of the Proponent

GenPGM provided information on the Project's geological setting and materials that would be mined and processed to assess the effects on surface and groundwater quality. They noted that it was important to understand the physical characteristics of the different mine materials expected to accumulate and be disturbed, processed, and managed as part of the Project. They stated that the ore deposit contains some sulphide minerals and, as a result, the mine materials have been assessed for their potential to generate acid and/or leach metals and other constituents. The Proponent indicated the importance of specific management practices for each type of mine material to prevent acid generation and metal leaching, and therefore to protect water quality.

Geochemical characterization was used to quantify the loadings of chemical constituents of the mine materials that could result from acid rock drainage and metal leaching to evaluate their potential effects on water quality.

The Proponent indicated that characterization of mine materials at the Project site began in 2001, followed by intensive evaluations in 2007. Mine materials include overburden, soils, mine rock and process solids (tailings). The characterization included:

- a review and assessment of geology;
- chemical analyses;
- acid base accounting; and,
- the initiation of kinetic tests with humidity cells.

In their updated baseline studies submitted in November 2020, the Proponent noted none of the new information altered the original characterization of the site's geological conditions within the context of the environmental assessment process.

The Proponent stated that their approach to geochemical characterization consisted of understanding the mine materials and how these materials could influence water quality at the Project site. This included understanding the effects that the predicted effluent discharge, site drainage to surrounding watersheds during operations, and quality of natural drainage from the site after closure and decommissioning would have on water quality. The Proponent described three types of materials: overburden, mine rock, and process solids. They noted that their characterization focused on determining the proportions of each material, their potential for acid generation (Type 1 and Type 2) and their potential for metal leaching, which refers to the release of chemical constituents.

To examine the potential for acid generation, the Proponent conducted an acid-base accounting analysis of Type 1 and Type 2 materials based on the respective sulphide contents. They also examined the neutralization potential of the materials based on the content of carbonate minerals, such as calcium carbonate and calcium magnesium. Additional testing for metal leaching potential included the use of laboratory humidity cells simulating water percolation through the mine rock to analyze the metals that could be mobilized through leaching. The Proponent also used humidity cell and column tests to assess metal leaching from process solids. Column tests are performed to simulate Type 2 materials being submerged under water at mine closure.

The Proponent stated that only Type 2 materials, which were characterized as potentially acid-generating (PAG), may have an adverse effect on water quality. They indicated that, although Type 2 materials may generate acid, there is a lag time of decades before acid generation would occur.

Overburden Characterization

The Proponent stated that they collected overburden samples across the Project site at numerous locations between 2009 and 2020. They indicated that the samples were representative of the mine rock storage area, the north, south, and central pit areas, and the process plant location. The Proponent further indicated that additional samples were collected from geotechnical boreholes around the perimeter of the proposed location of the process solids management facility, and surrounding the Project perimeter.

The Proponent stated that all overburden samples were characterized for their physical attributes and metal contents and a subset were analyzed to evaluate leaching properties. They concluded that overburden materials across the Project site have low sulphide contents, and therefore have little to no potential to generate acid. In addition, they concluded that short-term leach testing indicated that leachate from overburden has low levels of dissolved metals. The Proponent indicated that overburden would be stockpiled for later use in site rehabilitation.

Mine Rock Characterization

The Proponent reported collecting numerous mine rock samples for testing in 2007 and 2010. The samples were spatially and lithologically representative (with respect to colour, composition, and texture) of material that would be excavated during mining. Mine rock is the material that would be removed from open pits during mining, stored onsite and not used in the mill process plant.

Based on testing results, the Proponent concluded that 85% to 90% of the mine rock would be Type 1 material, or non-acid generating. GenPGM noted that the remaining fraction of the mine rock would have elevated sulphide content and have the potential to generate acid. GenPGM referred to this fraction as Type 2 material and estimated it to be about 10% of the total mine rock inventory.

The Proponent indicated that the leaching tests showed that heavy metals such as aluminum, boron, chromium, cobalt, copper, iron, lead, silver, vanadium, and zinc could leach from the mine rock. They calculated laboratory-scale leaching loading rates for contaminants of potential concern (heavy metals) from Type 1 and Type 2 mine rock materials. The resulting calculations indicated that Type 1 mine rock has a low metal leaching rate while Type 2 mine rock has a high metal leaching rate, suggesting that heavy metals could affect the overall water quality of the site if Type 2 mine rock is not properly managed.

Process Solids Characterization

The Proponent noted that process solids are those materials that would come out of the process plant after the extraction of valuable minerals. They reported conducting two categories of testing: one on the process solids decant (water quality tests), and the other on

the bulk process solids (leaching and acid-generation tests). They noted that they obtained the process solids decant and bulk process solids from a pilot metallurgical extraction of the valuable ore using drill core samples collected at the site.

The Proponent indicated that the water quality analysis of the process solids decant showed that the dissolved concentrations of aluminum, chromium, iron, molybdenum, and zinc were low but marginally higher than the Provincial Water Quality Objectives. During operations, the decant water would overflow from the process solids management facility to the water management pond.

The Proponent indicated that Type 1 process solids would make up 90% to 95% of overall process solids generated during the mill process. In contrast, Type 2 process solids would be produced in smaller quantities and would represent between 5% and 10% of the total process solids generated.

The Proponent stated that leach testing suggested that metals such as aluminum, silver, boron, cobalt, chromium, copper, iron, lead, vanadium, and zinc could leach from the bulk process solids. However, the concentration of most of the contaminants of potential concern in the leachate for Type 1 process solids was below analytical detection limits. In contrast, for Type 2 process solids, concentrations of arsenic, cadmium, copper, molybdenum, nickel, selenium and vanadium were above detection limits, suggesting that heavy metals could have an effect on the overall water quality of the site if Type 2 process solids are not properly managed. The Proponent also determined laboratory-scale leaching loading rates for contaminants of potential concern from the Type 1 and Type 2 process solids.

6.3 METAL LEACHING AND ACID ROCK DRAINAGE

Views of the Proponent

Metal Leaching

Having characterized the mine materials, the Proponent then assessed the chemistry of both Type 1 and Type 2 mine rock and bulk process solids using humidity cell and column testing techniques in laboratory conditions (i.e., 20–25 °C) to determine the potential for metal leaching. The mine rock material used for their testing was taken from drill core samples, while the process solids were taken from the pilot metallurgical extraction. The Proponent indicated that the materials were ground to a small grain size prior to being used for the tests. They stated that the fine material has more surface area available for chemical reactions than the waste rock. They noted that only 1% of the waste rock would be of the same size as that used for the laboratory leaching test.

The Proponent stated that they used the results of the metal leaching rates to develop the chemical source terms (representing the chemical loading inputs from the mine facilities into water resources) used for the assessment of water quality. They noted that they developed chemical source terms of metal leaching for all mine components, including mine rock, the process solids, the pit walls, and the pit rubble.

The Proponent clarified that, to get from laboratory-scale to field-scale predictions, they adjusted the source terms of metal leaching by applying two scaling factors: temperature and particle size. They noted that a temperature correction factor of 0.17 was initially applied to estimate metal loads from the stockpile. On a recommendation from Natural Resources Canada, and to conform to the 2009 Canadian Mine Environment Neutral Drainage guidance, the temperature correction factor was later revised to 0.30. The Proponent also used a particle-size adjustment factor of 0.01.

The Proponent indicated that all adjusted chemical source terms for metal leaching were then used as inputs to the water quality model (MineMod) used to predict water quality during operations and post-closure. This model is described in the next section.

The Proponent committed to using field test cells to validate their inputs into the water quality model as materials become available during operations.

Acid Rock Drainage

The Proponent stated that they conducted an assessment to determine when the Type 2 mine rock might go acidic. They indicated that the assessment consisted of calculating the neutralization depletion of the material based on its sulphate leaching rate, total sulphide content, acid potential, and neutralization potential.

The Proponent reported that, based on the highest sulphide content, it would take about 10 years to completely deplete the neutralization capacity. They concluded that, while some of the Type 2 mine rock material with the highest sulphide content may go acidic during operations, much of the Type 2 mine rock would contain lower levels of sulphide and a higher neutralization potential, which would likely prolong the onset of any significant acid generation until operations of the mine have ceased. The Proponent stated that, as a precautionary measure, they would divert the drainage from the Type 2 temporary stockpiles to the open pits for collection and transfer it to the water management pond for management.

To properly manage potential acid-generating mine rock, GenPGM committed to implementing a mine rock segregation program. The plan would be developed prior to potential Type 2 material being mined and would remain in place until operations cease and all materials have been permanently covered. The plan would include:

- a management strategy focusing on the distribution of Type 1 (non-PAG) and Type 2 (PAG) materials, including the selection of materials to be used for site construction;

- stockpiling Type 1 rock in the mine rock storage area and only using Type 1 for site construction;
- storing Type 2 rock in designated areas to allow for effective drainage including permanent storage of Type 2 rock in a saturated state to prevent acid rock drainage after closure;
- developing a program of ongoing testing during operations to assess the metal leaching and acid-generating potential of mine rock being removed to confirm water quality predictions; and
- employing high-precision technology to identify ore grades with the deposit to segregate Type 1 and Type 2 mine rock as it is being mined from the open pits.

To properly manage Type 1 and Type 2 process solids in the process solids management facility, the Proponent committed to:

- sample Type 1 process solids during operations to verify the low sulphur content and confirm materials as non-PAG;
- separate Type 1 and Type 2 process solids in the process plant and manage each separately in the process solids management facility;
- permanently store Type 2 material below the water table and the Type 2 process solids with a 5 m layer of Type 1 process solids in the process solids management facility at closure;
- run humidity cell tests on Type 1 run-of-mill process solids to confirm water quality predictions; and
- undertake best efforts to avoid the temporary storage of Type 2 waste rock.

Where temporary storage is necessary due to emergency or risk to human health, the Proponent has committed to ensuring that Type 2 waste rock requiring temporary storage has a location with sufficient capacity for the volume of material and that the water management pond has sufficient capacity for the volume of leachate to be collected.

Views of the Participants

Citizens for Responsible Industry in Northwestern Ontario identified the lack of field-scale testing as a serious knowledge gap, noting that data from laboratory tests for leachate chemistry cannot be adequately upscaled to clearly interpret drainage chemistry for predictive purposes. They concluded that, without data from field-scale tests over an extended period of time, contaminant loading rates may have been underestimated by a factor of 1,000 or more.

The group also indicated that the Proponent used incorrect scaling factors which would reduce already-low predicted contamination.

Natural Resources Canada, the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) and the Ministry of Environment, Conservation and Parks generally agreed that the Proponent's geochemical characterization of the geological materials was sufficient. However, they expressed concerns regarding the potential for metals to leach from Type 1 materials, particularly the materials to be used for construction purposes on the site.

Biigtigong Nishnaabeg indicated they were concerned about the time to onset of acid conditions and the effects this could have on water quality. Biigtigong Nishnaabeg recommended that, if Type 2 mine rock had to be stored temporarily, the Proponent should ensure that the water management pond has sufficient capacity to collect the leachate.

6.4 WATER QUALITY MODEL

Views of the Proponent

GenPGM indicated that they used the results of geochemical characterization to predict the water quality associated with the mine rock storage area, ore stockpile, process solids management facility and water management pond during operations, closure, and post-closure. The predicted water quality for each mine feature was then used, together with the groundwater discharge rates estimated in a groundwater flow model, to assess the potential effects of the Project on the quality of groundwater and surface water receivers. The Proponent stated that this prediction was made using the MineMod model.

The Proponent stated that the structure of the model includes several components connected to one another to simulate the flow of water throughout the mine site. They further stated that they designed the model so that each component represents a specific feature of the mine site.

The model took into account precipitation, evaporation, and baseflow to predict the chemical concentration in the outflow of each feature. The Proponent noted that the model predicted the outflow chemical concentration as a function of the inflow from an upstream feature, the concentration in the inflow, a user-specified mass loading for the targeted feature, the volume of water in the feature, and the outflow rate of the feature.

The Proponent reported that the model predicted water quality up to the outlet of the water management pond. If the water does not meet regulatory guidelines for water quality at the outlet of the water management pond, the Proponent indicated water would be treated in a water treatment plant prior to release into Hare Lake. However, if the water does not require treatment, it would be released directly from the water management pond to Hare Lake.

During the hearing, the Proponent indicated that the MineMod model has been used extensively in Ontario, across Canada, and globally for more than a decade. They added that the model has been used on existing operations with “excellent validation” of results, as well as in regulatory settings and in support of closure plans and permitting in Ontario.

Views of the Participants

Citizens for Responsible Industry in Northwestern Ontario raised concerns regarding the proprietary nature of the model and noted that it had not been published in peer-reviewed scientific journals.

6.5 PANEL CONCLUSIONS AND RECOMMENDATIONS

In reaching their conclusions related to geochemistry, the Panel considered the following factors to be particularly relevant:

- Mine rock used for geochemical assessment was spatially and lithologically representative of materials that would be excavated during mining, and the process solids materials were obtained from a pilot metallurgical extraction of the valuable ore using drill core samples collected at the site.
- Information was provided by GenPGM on the use of the geochemical model in Ontario, elsewhere in Canada, and world-wide to predict water chemistry.
- Government agencies generally agreed that the Proponent’s geochemical characterization of the geological materials was sufficient.
- The Proponent’s adoption of the recommended temperature adjustment factor in their lab scale tests for determining contaminant loading in ore stockpile for the purposes of predictions from lab to field scale testing.
- Representatives of Citizens for Responsible Industry in Northwestern Ontario concerns that contaminant loading could have been greatly underestimated in geochemical testing.
- The information received from government agencies on monitoring of Type 1 and Type 2 materials throughout the mine phases, including undertaking field scale testing, suggests that further testing is necessary to mitigate risks of metal leaching and acid rock drainage.
- The Proponent has committed to carrying out field-scale tests once mine rock becomes available during operations, conducting an ongoing program of monitoring and assessment of the waste rock and tailings to validate model results, and continuing to

determine the segregation of Type 2 material to mitigate the risks of metal leaching and acid rock drainage.

The Panel accepts the Proponent's characterization of site geology, and notes that the Proponent's assessment of both surface and groundwater quality predictions for the Project relied on this geological characterization. The Panel is satisfied that the geochemical characterization of mine materials was adequate for the purposes of the environmental assessment. However, based on the Proponent's assessment of Type 2 material, the Panel finds that testing and segregation would be necessary to ensure that surface water and groundwater are protected from the potential effects of acid rock drainage and metal leaching.

The Panel accepts the Proponent's methodology for determining and applying scaling factors to laboratory testing to field-scale predictions. The Panel also accepts the information provided by the Proponent regarding the use of the water quality model, MineMod, and its use on existing operations in Ontario, elsewhere in Canada, and globally with excellent validation of water quality results predictions. However, the Panel notes the concerns expressed by Citizens of Responsible Industry in Northwestern Ontario regarding a knowledge gap in data from laboratory tests for leachate chemistry versus information needed from field-scale testing to accurately determine contaminant loading rates. The Panel notes the Proponent's commitment to incorporating field test cells into the water quality monitoring programs once run-of-mine material is available.

Recommendation 1: The Proponent should implement mitigation measures for Type 1 and Type 2 materials during all phases of the Project, including by:

- undertaking field-scale testing of geological materials prior to and throughout operations to refine the predictions of metal leaching and acid rock drainage and updating the management of Type 1 and Type 2 mine rock and process solids as necessary;
- separating Type 1 and Type 2 mine rock and process solids;
- managing Type 1 and Type 2 process solids separately in the process solids management facility;
- stockpiling Type 1 mine rock in the mine rock storage area and only using Type 1 materials for construction;
- avoiding temporary storage of Type 2 mine rock, unless not technically feasible. If avoiding temporary storage is not technically feasible, ensuring the temporary storage location has sufficient capacity for the volume of rock, and the water management pond has sufficient capacity for the volume of leachate collected from the temporary storage location; and

- storing Type 2 mine rock in designated areas that allow for effective drainage, including permanent storage in a saturated state to prevent acid rock drainage.

The Panel is satisfied that the Proponent's overall approach to characterizing the Type 1 and Type 2 mine material is appropriate. The Panel's recommendations outlined above feed into conclusions and further recommendations outlined in Section 7 (Groundwater), Section 8 (Surface Water Quantity), Section 9 (Surface Water Quality) and Section 10 (Fish and Fish Habitat).

SECTION 7: GROUNDWATER QUANTITY AND QUALITY

7.1 REQUIREMENTS FOR THE CONSIDERATION OF GROUNDWATER QUALITY AND QUANTITY

This section addresses the environmental effects of the Project on groundwater quantity and quality. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under paragraphs 5(1)(a) and (c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- describe the hydrogeological environment within the site, local, and regional study areas, establish groundwater quantity and quality baselines; and
- use modelling (e.g., three-dimensional numerical groundwater flow model) to support a hydrogeological assessment of the prediction of the influence of the mine during the construction, operations, active closure, and post-closure phases.

7.2 BASELINE GROUNDWATER CONDITIONS

Views of the Proponent

The Proponent stated that groundwater quantity (characterized by the elevation of the groundwater table) and flow would be affected by dewatering of waterbodies and open pits, lowering groundwater elevation from its original elevation (groundwater drawdown). Local rises in the elevation of the water table (groundwater mounding) could also occur.

The Proponent indicated that groundwater quality could also be affected by infiltration of water that comes into contact with the mine material (referred to as seepage). The chemical composition of the seepage could change the chemistry of the groundwater.

The Proponent indicated that, as groundwater flows through the ground from topographic highs to lows, it may discharge to surface water bodies, potentially affecting surface water quality and quantity. They indicated the travel time of groundwater from one point to another depends on the permeability of the ground, which can be characterized by its hydraulic conductivity. The travel time could be slow when the hydraulic conductivity is low, or fast when the conductivity is high.

To understand the effect of the Project on groundwater quantity and quality, the Proponent assessed the site topography, the baseline conditions, the effect of dewatering activities, the conductivity of the ground, the amount and chemistry of seepage that could be generated,

groundwater travel times from potentially contaminated sources to surface water, and the discharge rate of groundwater to surface water.

Groundwater Levels and Hydraulic Conductivity

The Proponent collected data for five years beginning in 2008 to establish a hydrogeology baseline. They installed 36 groundwater monitoring wells across the Site Study Area. They stated that rising head tests (used to determine the permeability of the ground to move water) were also performed on most existing monitoring wells. The Proponent noted that the baseline assessment included measurement of groundwater levels, hydraulic conductivity, groundwater discharge rates, and groundwater quality. They stated that they collected additional data in 2020 to verify their initial baseline data.

The Proponent noted that the topography across the site is rugged. Areas of the site characterized by topographic highs have a thin veneer of ground moraine or exposed bedrock. In contrast, areas characterized by topographic lows have thicker accumulations of overburden and organics.

The Proponent provided the baseline groundwater elevation contours within the site and indicated that the shallow groundwater flow is influenced by the site topography, which results in groundwater flow from topographic highs to discharge in wetland areas and surface water features associated with topographic lows. They indicated that the groundwater is generally less than 2 or 3 m below the surface.

The Proponent conducted hydraulic conductivity testing and observed lower hydraulic conductivity at increased depth below the ground surface, indicating that the material has less capacity to transmit water. In shallow bedrock (0 to 50 m below the surface) higher hydraulic conductivity was evident. The Proponent characterized this observation as two zones in their conceptual groundwater model for hydrogeology.

The Proponent concluded that the baseline groundwater elevations and flow direction observed in 2020 were consistent with their 2012 observations. They then used groundwater elevation data along with hydraulic conductivity results obtained from the monitoring wells to develop a groundwater model.

Groundwater Discharge Rate

The Proponent stated that they developed a steady-state, numerical, three-dimensional groundwater flow model, which they calibrated to the groundwater level at 20 monitoring wells. They compared the groundwater level predicted by the model with the average groundwater level at the monitoring wells. The Proponent noted that this comparison allowed them to determine if the groundwater model was reasonably capable of predicting groundwater levels of the baseline conditions. They reported that the predicted and measured groundwater levels were closely correlated.

The Proponent stated that they used the calibrated groundwater model to predict changes in groundwater levels, groundwater flow directions, and groundwater base flows to surface water bodies during the Project's operations and closure phases.

The Proponent predicted the baseline groundwater flow (discharge to surface water) and discharge rate for 17 subwatersheds and the Biigtig Zibi. The 17 subwatersheds are further described in Section 8 (Surface Water Quantity). The predicted annual baseline discharge rate varied from 4.8 m³ per day (for subwatershed 110) to 2243.8 m³ per day (for subwatershed 106). The Proponent also predicted the groundwater base flow for 10 individual surface water bodies within subwatersheds 101 through 105.

Groundwater Quality

The Proponent stated that, as the main pathway for groundwater at the Project site is to surface water, they compared the baseline groundwater quality to the Ontario aquatic protection values.

The Proponent determined values for each groundwater quality parameter at 19 wells situated in overburden and at 17 wells in bedrock. They then compared the results of the two assessments with the Ontario aquatic protection values. The Proponent concluded that the mean values of the baseline groundwater quality met the aquatic protection values at the site.

Views of the Participants

The Ministry of the Environment, Conservation and Parks noted that the Proponent's baseline monitoring indicated that groundwater recharge (baseflow) is not a significant component of flow in most surface water features at the site.

The Ministry of the Environment, Conservation and Parks indicated that baseline studies have not provided sufficient data to determine background concentrations of palladium or other platinum group metals in groundwater at the site. The Ministry stated that, prior to permitting, the Proponent would be required to complete sampling for platinum group metals, establish background levels, and develop site-specific assessment criteria in the absence of other assessment criteria.

7.3 EFFECT ON GROUNDWATER QUANTITY

7.3.1 Groundwater Elevation

Views of the Proponent

GenPGM's modelling predicted that, at the end of the operations phase, there would be 1 m of drawdown³ of groundwater from baseline conditions that extends between 500 m and 900 m from the edge of the pits. During closure, as the open pits fill with water, this drawdown would decrease slightly, and would not return to baseline levels.

The Proponent noted a mounding⁴ of the water table of up to 10 m in the vicinity of the mine rock storage area and the process solids management facility. Mounding caused by the mine rock storage area during operations is a result of the overprinting of surface water features. Mounding related to the process solids management facility is due to the placement and saturation of Type 2 materials. During closure, no changes to the groundwater table were predicted for the mine rock storage area or the process solids management facility.

The Proponent stated that, as there are no groundwater users located within the drawdown zone of the open pits or the mounding zone of the mine rock storage area or the process solids management facility, no effect would be predicted on the quantity for groundwater users.

The Proponent observed a decrease in the base flow in areas subject to groundwater drawdown. They also observed an increase in base flow in areas subject to water mounding, except in areas to be overprinted.

The Proponent's modelling predicted mounding of the water table in subwatershed 106, where the largest portion of the process solids management facility would be located, and an increase of base flow toward Stream 6 (Angler Creek). However, for the portion of Stream 6 (Angler Creek) that would be overprinted by the process solids management facility, there would be a removal of the base flow. The Proponent predicted that this would lead to a net decrease in base flow in Stream 6 (Angler Creek).

To capture the changing groundwater base flow, GenPGM added groundwater discharge to surface watercourses to the estimated mean annual flows of surface water bodies to derive the total surface water flow during all phases of the Project. Further discussion of the effects of

³ Groundwater drawdown is a reduction of groundwater elevation from its original elevation as a result of groundwater pumping.

⁴ Groundwater mounding is an increase of groundwater elevation as a result of water infiltration in an area characterized by a limiting layer such low permeability of the soil.

groundwater recharge flows on the aquatic environment can be found in Section 8 (Surface Water Quantity).

7.4 EFFECT ON GROUNDWATER QUALITY

7.4.1 Groundwater Seepage

Views of the Proponent

GenPGM identified four mine facilities which would be sources of seepage:

- the mine rock storage area;
- the process solids management facility;
- the ore stockpile; and
- the water management pond.

The Proponent stated that interception ditches would direct any precipitation from the toe of the east side of the mine rock storage area to the catch basins for Stream 2 and Stream 3. This is intended to prevent mine rock storage area contact water from reaching the Biigtig Zibi during operations. Catch basins were similarly incorporated into the design of the process solids management facility to collect contact water from this facility. The Proponent stated that contact water beneath the ore stockpile would flow to the central and south pits and then be pumped to the water management pond.

During operations however, the Proponent noted some contact water would enter the groundwater as seepage from the mine rock storage area would flow toward subwatersheds 101 and 102, which discharge to the Biigtig Zibi. Similarly, some seepage from the water management pond would flow toward subwatershed 101 and some seepage originating from the process solids management facility would flow toward subwatersheds 105, which discharges to Hare Lake, and toward subwatershed 106, which discharges to Stream 6 (Angler Creek). The Proponent estimated that the travel time for the movement of this groundwater flow is longer than 100 years.

During the post-closure phase, the Proponent predicted that, while seepage would continue to flow toward subwatersheds 101, 102, 105, and 106, actual discharge would not reach the surface during operations and closure, as the estimated travel time for this seepage is estimated to exceed 100 years.

As noted above, the Proponent predicted the quality of groundwater seepage from the four mine facilities based on geochemical characterization testing of materials. The quality of

seepage from the water management pond was predicted based on drainage from the berm of the water management pond, which would be constructed with mine rock.

The Proponent indicated that they compared predicted groundwater seepage concentrations with four standards, including the Metal and Diamond Mining Effluent Regulations, the *Guidelines for Canadian Drinking Water Quality*, the *Ontario Provincial Drinking Water Quality Standards* and the Ontario Aquatic Protection Values.

The Proponent predicted the following for seepage from Project components during operations and closure:

- **Mine rock storage area** – Seepage quality is predicted to be below the effluent limits of the *Metal and Diamond Mining Effluent Regulations*, meet the *Guidelines for Canadian Drinking Water Quality*, the *Ontario Provincial Drinking Water Quality Standards*, and the Ontario Aquatic Protection Values, except for nitrate, nitrite, arsenic, aluminium, copper, selenium, and vanadium. The Proponent indicated that the concentration of aluminum in the background groundwater quality exceeds the *Guidelines for Canadian Drinking Water Quality* and the *Ontario Provincial Drinking Water Quality Standards* and therefore cannot be attributed to the Project.
- **Process solids management facility** – Seepage quality is predicted to be less than the Metal and Diamond Mining Effluent Regulations, the *Guidelines for Canadian Drinking Water Quality*, the *Ontario Provincial Drinking Water Quality Standards*, and the Ontario Aquatic Protection Values.
- **Ore stockpile** – Seepage quality is predicted to be below the effluent limits of the *Metal and Diamond Mining Effluent Regulations*, less than the *Guidelines for Canadian Drinking Water Quality*, and the *Ontario Provincial Drinking Water Quality Standards* and meet the Ontario Aquatic Protection Values, except for copper. The ore stockpile would be decommissioned during closure.
- **Water management pond** – Seepage quality is predicted to be below the effluent limits of the *Metal and Diamond Mining Effluent Regulations*, and meet the *Guidelines for Canadian Drinking Water Quality* and the *Ontario Provincial Drinking Water Quality Standards* and the Ontario Aquatic Protection Values, except for nitrate, nitrite, arsenic, aluminium, copper, selenium, and vanadium. The Proponent indicated that aluminum was excluded from this list because the concentration of aluminum in the background groundwater quality exceeded the Federal and Provincial drinking water quality standards. In closure, the water management pond would be decommissioned once the quality of the water within the pond meets all the criteria for discharge to the environment.

The Proponent stated that there are no groundwater users located within the flow path of groundwater seepage associated with the four Project facilities. They indicated no effect on the quality for groundwater users is predicted.

Views of the Participants

Process Solids Management Facility

The Ministry of the Environment, Conservation and Parks stated it was satisfied that the risks associated with the process solids management facility have been properly identified and quantified. They indicated that, should the Project proceed, they would require further information and modeling as well as development of long-term monitoring and contingency plans.

Environment and Climate Change Canada indicated that the definition of “seepage” under the *Metal and Diamond Mining Effluent Regulations* included any seepage deposited into “water frequented by fish or in any place under any conditions where the deleterious substance ... may enter any such water.” They stated that, if seepage is deposited in a lake or stream that is fish-frequented, or deposited into surficial geological units (e.g., glacial till) or into underlying rock units that are hydraulically connected to nearby lakes or streams that are frequented by fish, then that seepage would be subject to the requirements of the Regulations. This seepage would be subject to monitoring and reporting requirements, including the requirement for an accurate measurement of seepage flow, physical sampling to measure concentrations of contaminants, and release through a final discharge point.

Environment and Climate Change Canada noted that an amendment to Schedule 2 of the *Metal and Diamond Mining Effluent Regulations* would be required to authorize the use of water bodies for mine waste disposal.

Environment and Climate Change Canada was of the view that the Proponent’s model did not fully account for seepage as it relates to the process solids management facility and mine rock storage area. Environment and Climate Change Canada stated that uncertainty about how much water would bypass the toe ditches and catch basins makes it difficult to assess and evaluate the potential effects of seepage, particularly for small watercourses in which seepage could become a major or dominant component of flow.

Environment and Climate Change Canada recommended the Proponent’s Water Management Plan account for the advective (transfer of a substance such as a contaminant by motion of a fluid) and mean travel times for seepage from the facility and update effects predictions for watercourses receiving seepage. They also recommended further follow-up and monitoring to verify that all seepage would be directed to treatment and discharged into Hare Lake.

Natural Resources Canada recommended that, to address the reporting of seepage and groundwater to surface water, and to guide the development of the monitoring plan, the Proponent should:

- report forecasted changes to groundwater-surface water interaction for the individual surface waterbodies (10 individual surface water bodies within subwatersheds 101, 102, 103, 104, and 105) represented in the numerical groundwater model in a manner consistent with reported changes in groundwater elevations;
- provide detailed reporting of the groundwater model results relating to the process solids management facility to ensure clarity on reported seepage quantities and flow pathways; and
- account for long travel times, consistent with groundwater model results in development of the monitoring plan.

Mine Rock Storage Area

The Ministry of the Environment, Conservation and Parks stated that it was satisfied that the risks associated with the mine rock storage area have been properly identified and quantified for the purposes of the environmental assessment. They noted that seepage discharging to the Biigtig Zibi had been predicted to result in no measurable change to water quality. They stated that decisions regarding water quality discharge from the pits toward the Biigtig Zibi during post-closure would need to consider contaminant loading from seepage in conjunction with discharge loading.

7.4.2 Groundwater Travel Time

Views of the Proponent

GenPGM noted that they included potential groundwater seepage discharge to surface water in their modelling. They indicated that, at each site where groundwater discharges to surface water, they used the values of contaminant concentrations for at-source seepage in their surface water model. They also modelled a worst-case scenario, assuming no decrease in contaminant concentrations along the groundwater flow path.

The Proponent used particle-tracking techniques to estimate groundwater travel times from the mine facilities to surface water bodies. Using a desktop assessment, they modelled the travel times from the footprint of each mine facility to surface water bodies via groundwater flow and let them travel along the direction of groundwater flow. The Proponent reported that, under those conditions, groundwater seepage from the mine facilities is not predicted to discharge to surface water bodies, even after 100 years.

Views of the Participants

Environment and Climate Change Canada stated that accounting for the movement of seepage and the time it takes to reach a surface water body is important in order to understand when a potential effect may occur. They noted that advective and mean travel times for seepage from the process solids management facility and mine rock storage area to streams in subwatersheds 101, 102, 105, and 106 were not provided for the operations and closure phases.

Citizens for Responsible Industry in Northwestern Ontario stated that the groundwater travel times could be much faster in fractured bedrock close to surface water than the Proponent's estimates. They also noted that groundwater travel time associated with the town of Marathon water supply was only two years.

Natural Resources Canada noted that groundwater model results typically include uncertainties. They stated that, while GenPGM's particle-tracking assessment may be considered representative of a larger and deeper bulk flow, there is some uncertainty in the travel time and the groundwater velocity in the shallower 10 m. Natural Resources Canada concluded that there is a greater potential for discharge in closer, small, local surface water bodies compared with Hare Lake, the Biigtig Zibi, and Stream 6 (Angler Creek).

7.4.3 Drinking Water Wells

Views of the Proponent

GenPGM's view was that groundwater in the Local Study Area (see Appendix 6) is unlikely to be used for drinking water, and they concluded that residual environmental effects for groundwater source for drinking water would therefore be minimal. They acknowledged some groundwater users along Highway 17 have wells downgradient of the process solids management facility and they indicated that the seepage pathways in this area are toward surface water receivers. They also noted that the proposed mitigation measures, such as tying the process solids management facility and geomembrane liner into bedrock and grouting fractured bedrock to prevent seepage, would further protect groundwater quality.

Views of the Participants

The Ministry of the Environment, Conservation and Parks expressed concerns regarding the risks of effects on surface waters (e.g., Hare Lake) and groundwater wells on the Highway 17 corridor from the process solids management facility. They indicated that further investigation, modelling, and development of contingency plans would be required prior to proceeding with approvals and permitting.

7.5 MITIGATION AND MONITORING

To mitigate adverse effects on groundwater quantity and quality, GenPGM noted it would develop and implement a groundwater monitoring and follow-up program. They committed to a number of measures, including:

- monitoring groundwater levels and water quality in monitoring wells upgradient, downgradient, and crossgradient of the mine facilities and installing additional monitoring wells in nearby key surface water features to monitor for changes in groundwater quality and flow regimes due to Project development;
- monitoring groundwater levels and water quality in background monitoring wells through the use of nested wells that comprise a screen completed in overburden and shallow bedrock to monitor vertical distribution of groundwater level and quality;
- conducting a water supply well inventory completed prior to site alteration in a stretch of properties along Highway 17, southwest of the Site Study Area, to confirm the number of users, well construction and the existing baseline groundwater quality conditions;
- collaborating with Biigtigong Nishnaabeg to identify any groundwater springs on the east side of the Site Study Area that are important to the community and consider them as part of the monitoring program;
- including triggers and thresholds for groundwater quality and quantity that alert the Proponent to changing conditions and implementing new or adjusting/modifying existing measures as required;
- developing a response plan with actions to be implemented if a threshold is crossed, including contingency options for seepage management; and
- developing a communication plan to notify well users in the event groundwater trigger thresholds are met.

7.6 PANEL CONCLUSIONS AND RECOMMENDATIONS

In reaching their conclusions on groundwater quantity and quality, the Panel considered the following factors to be particularly relevant:

- The Proponent committed to reviewing predicted versus actual groundwater modelling results throughout construction, operations, and closure. Further refinements of the groundwater model and a review of model predictions would be undertaken as warranted.

Groundwater Quantity

- The Project would be expected to have an effect on groundwater levels, but no groundwater users are located within the drawdown zone of the open pits or mounding of the water table in the vicinity of the mine rock storage area or the process solids management facility.

Groundwater Quality

- Over a 100-year period, groundwater seepage from the mine facilities would not be predicted to discharge to surface water bodies.
- Participants, including government representatives, expressed concerns that the Proponent's predictions for groundwater travel times from mine infrastructure to surface water bodies may be overestimated, noting the potential for faster movement in more fractured, shallower bedrock.
- No groundwater users are located within the flow path of groundwater seepage or within the drawdown and mounding water table zones in the vicinity of the mine rock storage area or the process solids management facility.
- The Ministry of the Environment, Conservation and Parks expressed concerns about the lack of baseline data for platinum group metals.
- Monitoring wells would be installed between contaminant source areas and downgradient water wells and surface water receivers, and data from these efforts would be used to update the groundwater monitoring prior to operations.

Drinking Water

- Concerns raised by the Ministry of the Environment, Conservation and Parks regarding the risks of effect from the process solids management facility on surface waters (e.g., Hare Lake) and groundwater wells on the Highway 17 corridor. They indicated a need for further investigation, modelling, and development of contingency plans prior to proceeding with approvals and permitting.
- The Proponent indicated that groundwater travel times would be slow (more than 100 years) due to the hydraulic conductivity and flow would primarily be away from wells along Highway 17.
- The Proponent committed to conducting a water well survey within and adjacent to the Site Study Area to confirm the results with the Ministry of Environment, Conservation and Parks water well records and permit-to-take-water database to review the existing monitoring well network and to enhance it if necessary.

Panel Conclusions on the Effect of Project Activities on Groundwater Quantity

The Panel understands that dewatering activities of the open pits during the Project would lead to a drawdown of groundwater in areas around the open pits. As the pits fill with water at closure, the drawdown would decrease slightly but would not be expected to return to baseline conditions. The Panel also understands that placement of Type 2 material in the process solids management facility and overprinting of surface water features by the mine rock storage area would lead to water mounding in areas around these infrastructures.

The Panel is of the view that the reduction in groundwater elevation from operations through closure and post-closure is an indication that the Project would affect groundwater quantity. The Panel also acknowledges the Proponent's statement that no groundwater users are located within the drawdown zone of the open pits, the mounding zone of the mine rock storage area, or the process solids management facility. The Panel accepts that the Project's effect from a quantity standpoint would have no effect on third-party activities as there are no groundwater users in the Project area.

The Panel also finds that a large portion of the groundwater collected during dewatering activities would end up in surface water, via the water management pond, either during operations or closure. The Panel is of the view that, in areas where surface water bodies are not overprinted, the loss in groundwater would to some extent be balanced by the gain of overland discharge of water to surface water bodies (i.e., effluent discharge to Hare Lake). The Panel also notes that the Project's effect on Stream 6 (Angler Creek) would result in a net decrease in base flow.

The Panel is satisfied with the approach that the Proponent has taken to incorporate changes in groundwater discharge rates (base flow reduction and increase) into their assessment of the Project's effects on surface water quantity further discussed in Section 8 (Surface Water Quantity).

Panel Conclusions on the Effect of Project Activities on Groundwater Quality

The Panel is of the view that the concentrations of nitrate, nitrite, arsenic, copper, selenium, and vanadium in the seepage from the mine rock storage area that are predicted to exceed the federal and provincial drinking water quality and the aquatic protection values are indications that the Project would have an effect on groundwater quality. The Panel also acknowledges the Proponent's predictions that there are no contaminants of concern (exceeding the federal and provincial drinking water quality and the aquatic protection values) associated with seepage from the process solids management facility.

The Panel acknowledges GenPM's statement that there are no groundwater users within the flow path of groundwater recharge. The Panel accepts that, from a quality standpoint, the Project would not affect drinking water activities as there are currently no groundwater users in

the Project area. The Panel also understands that the effects of seepage on the Biigtig Zibi have been predicted to result in no measurable change in the river's water quality.

The Panel finds that groundwater monitoring to verify seepage impact is warranted because the predicted seepage quality depends on the Proponent's geochemical characterization. The Panel is satisfied that the Proponent has committed to placing monitoring wells upgradient, downgradient, and crossgradient of the mine facilities to monitor for seepage effects, and that the Ministry of the Environment, Conservation and Parks would consider the effect of seepage when establishing effluent criteria for the mine effluent discharge to Hare Lake.

The Panel recognizes the importance of protecting water supply wells from contamination and is encouraged that monitoring and mitigation plans are planned as part of the permitting and approvals stage. The Panel finds that, if the Proponent implements their proposed mitigation measures, there will be no impact from the Project on drinking water quality associated with the wells along Highway 17.

The Panel is satisfied with the approach the Proponent has taken to incorporating seepage concentrations into their assessment of the Project's effects on surface water quality.

The Panel recommends that the Proponent implement the following mitigation measures to protect groundwater quality and quantity:

Recommendation 2: The Proponent should implement measures to limit seepage from the process solids management facility during operations, closure, and post closure, including:

- constructing a geomembrane liner, or better technology, tied into bedrock on the upstream face of the perimeter embankments (dams);
- grouting fractured bedrock; and
- intercepting any shallow seepage with seepage collection basins around the perimeter of the process solids management facility and returning it back to the water management pond or process solids management facility.

In addition to the recommended mitigation measures, the Panel recommends the Proponent implement a follow-up program:

Recommendation 3: The Proponent should develop and implement, in consultation with relevant government agencies and Indigenous communities, a groundwater follow-up program for all phases of the Project to verify the accuracy of the predictions, determine the effectiveness of mitigation measures, and implement adaptive management. The follow-up program should include:

- refinement of the predicted effects of the Project on groundwater quality and quantity by:

- collecting pre-construction baseline groundwater quality information for platinum group metals;
- further refining the groundwater model as more baseline data accumulate;
- adjusting the model predictions, particularly those related to groundwater travel times, which could affect contaminant loading to surface water receiving waters;
- measurement of groundwater levels to document changes in level and flow in response to dewatering of the open pits;
- monitoring of groundwater quantity and quality in wells upgradient, downgradient, and crossgradient of the mine rock storage area, process solids management facility, and open pit in addition to groundwater monitoring wells along the predicted flow paths of seepage from these mine features;
- measurement of water levels, flow (pumped volumes), and water quality (general chemistry and select dissolved metals) at regular intervals from groundwater monitoring wells; and
- a comparison of results with requirements established through permitting and with the predictions of the environmental assessment. Additional mitigation should be implemented if it is determined that the Project results in water quality or quantity measurements that exceed thresholds.

Recommendation 4: The Proponent should develop and implement, in consultation with relevant government agencies and Indigenous communities, a drinking water follow-up program for all phases of the Project to verify the accuracy of the predictions, determine the effectiveness of mitigation measures, and implement adaptive management. The follow-up program should include:

- a water supply well inventory, prior to construction, of the stretch of properties along Highway 17 southwest of the Site Study Area to confirm the number of users, well construction, and existing baseline groundwater quality conditions;
- consultation with Biigtigong Nishnaabeg to identify any groundwater springs on the east side of Site Study Area that are important to the community for consideration in the monitoring program;
- review and enhancement (as necessary) of the monitoring well network established as part of the groundwater follow-up program (Recommendation 3) to ensure appropriate up-, down-, and crossgradient coverage of key mine infrastructure in relation to drinking water wells and groundwater springs;

- monitoring and implementation of adaptive management in the monitoring well network; and
- development and implementation of a communication plan as part of the monitoring program to notify well users in the event groundwater trigger thresholds are met.

For both follow-up programs, the Proponent should determine the details of the sampling location, sampling frequency, parameters to be monitored, and adaptive management thresholds and measures in consultation with relevant government agencies and Indigenous communities.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on groundwater quantity or quality.

7.7 CUMULATIVE EFFECTS

Views of the Proponent

GenPGM stated that they found no spatial overlap between the residual effects of the Project on groundwater quantity and quality and residual effects of other projects or activities they identified for the cumulative effect assessment. The Proponent therefore indicated that cumulative residual effects on groundwater quantity and quality would not be expected.

Views of the Participants

The Panel did not receive any input from participants with respect to the cumulative effects on either groundwater quantity or quality.

Panel Conclusions and Recommendations

The Panel agrees with the Proponent that there is no spatial overlap between the residual effects of the Project on groundwater quantity and quality and the effects of other projects and activities.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to result in a cumulative effect on groundwater quantity or quality.

SECTION 8: SURFACE WATER QUANTITY

8.1 REQUIREMENTS FOR CONSIDERATION OF SURFACE WATER QUANTITY

This section of the Panel Report addresses the environmental effects of the Project on surface water quantity (hydrology). The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and also that inform the assessment of effects under paragraphs 5(1)(a), (b) and (c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- describe surface water hydrology at the site, local and regional study areas;
- establish hydrology baseline information; and
- assess changes to hydrology resulting from site construction, operations, active closure, and post-closure.

8.2 BASELINE

Views of the Proponent

Numerous streams drain the Project site flowing east into the Biigtig Zibi before ultimately draining into Lake Superior. Flowing westward, subwatershed 105 drains into Hare Lake prior to reporting to Lake Superior via Stream 5 (Hare Creek) and subwatershed 106 directly to Lake Superior via Stream 6 (Angler Creek).

Ten subwatersheds are within the Site Study Area (Figure 8-1) and a majority of the Project infrastructure falls within subwatersheds 101, 102, 103, 105, and 106. The beginning of the access road lies within subwatershed 116. Eight subwatersheds (107, 110, 111, 112, 113, 114, 115, and 117) are outside of the Site Study Area, but within the Local Study Area (see Appendix 6). Of these, only subwatersheds 112 and 117 would be affected by the Project.

To assess the Project's impact on hydrology, the Proponent established a baseline for surface water quantity. The baseline involved a local hydrology assessment, a regional hydrology assessment, and a climate change assessment.

For the local hydrology assessment, the Proponent implemented a baseline streamflow monitoring program during open-water conditions between 2008 and 2020. The initial program involved six hydrometric stations focused on streams draining into and out of Hare Lake and into Stream 6 (Angler Creek). An additional 11 stations, including stations flowing into the

Biigtig Zibi, were added subsequently. The Proponent reported that they used the data collected to develop stage (water level)-discharge (flow rate) relationships called rating curves.

For the regional hydrology assessment, the Proponent stated that they used seven gauging stations managed by Environment and Climate Change Canada within 100 km of the Project site. The data collected were then used to estimate mean annual flows, mean monthly flows, and low-flow statistics. The Proponent also conducted a flood frequency analysis to predict 2-year, 5-year, 24-year and 100-year peak flows and used that information to derive environmental flow relationships at the monthly scale. The Proponent then calculated regional flows for each subwatershed based on their respective surface areas.

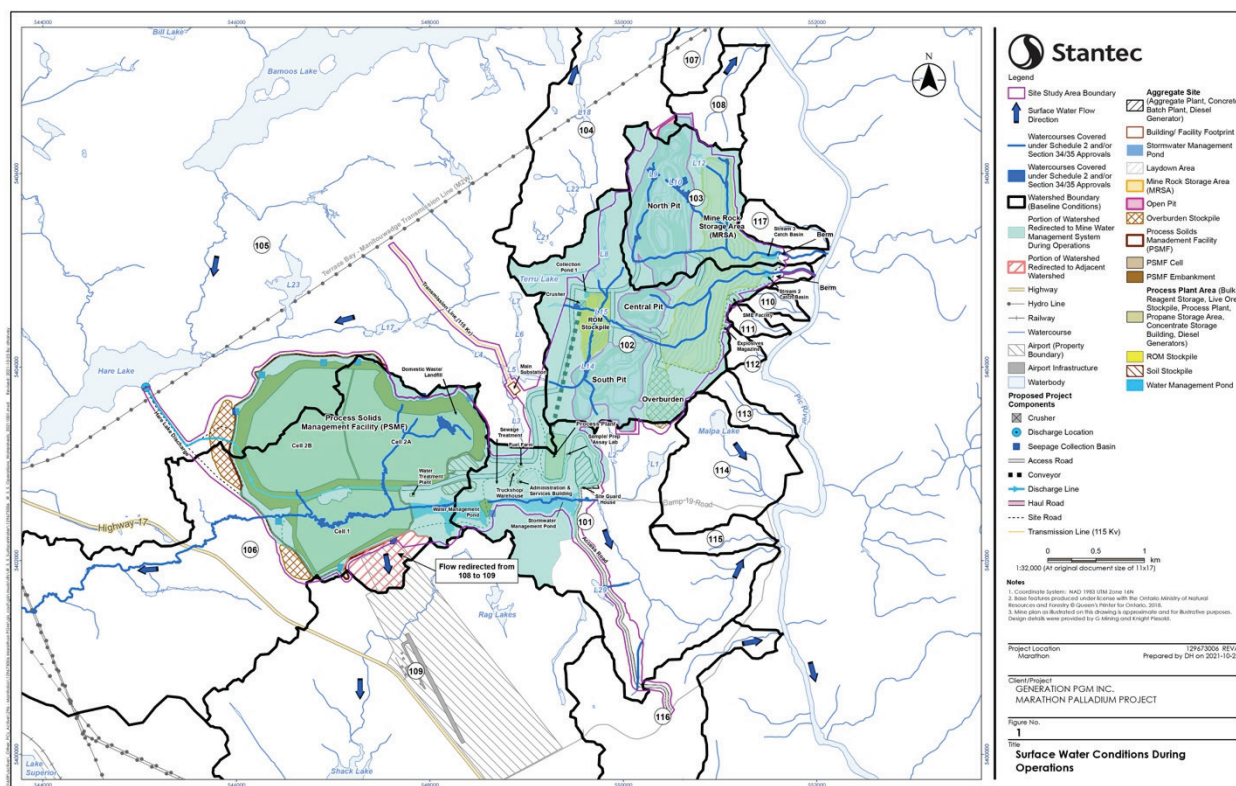


Figure 8-1: Surface Water Conditions during Operations Indicating Flow of Creeks (Source: CIAR #950, IR5-5)

For the climate change assessment, the Proponent collected 2012 climate information from four stations within 35 km of the Local Study Area, including Marathon, Marathon Airport, Pukaskwa National Park, and Hemlo Battle Mountain. These data were used to supplement barometric pressure data and to calculate mean annual precipitation, mean monthly precipitation, and temperature range. The Proponent updated the baseline in the Environmental Impact Statement Addendum with data from nine climatic stations within 40 km of the Local Study Area, including additional stations in Marathon, at the Marathon Airport, and in Pukaskwa National Park.

The Proponent concluded that the updated mean annual precipitation (818.2 mm per year) and temperature range (–13.4 °C in January to 15.1 °C in August) remained relatively consistent with what was observed in 2012. The Proponent also concluded that the mean monthly precipitation values were reasonably consistent with the data observed in 2012.

Views of the Participants

The Ministry of the Environment, Conservation and Parks commented that the prorating approach used by the Proponent to determine flows at the watershed level from the regional flow relationships that the Proponent established usually results in high degrees of uncertainty. Factors influencing the uncertainty could include the distance between the gauged and ungauged watersheds, the extent of site development, the land use within the watershed, the local soil types, the local climatic conditions, the watershed size, and others.

After considering the hydrology data, the Ministry of the Environment, Conservation and Parks requested that the Proponent conduct monitoring to collect baseline data for potentially affected surface water features prior to commencing Project activities. They indicated monitoring should include water level stations in Terru Lake, Lake 8, Lake 12, Lake 5, unnamed lakes in subwatershed 104, Hare Lake, and reference lake stations at lakes that would not be affected by the Project. The Ministry indicated that flow monitoring should be restarted, as part of a baseline update at stations S-8, S-9, S-10 and S-11. Moreover, stations S-24 and S-25, and reference stations, should all be equipped with flow monitoring instruments.

8.3 EFFECT ON HYDROLOGY

8.3.1 Methodology: Effect-Screening Threshold

Views of the Proponent

The Proponent used flows and water levels under pre-development conditions as the surface water baseline against which Project-related changes would be assessed during construction, operations and active closure, and post-closure phases. The Proponent based their effects assessment for water quantity on a 10% screening threshold compared with the baseline. The Proponent stated that a $\pm 10\%$ threshold was selected based on reported case studies, which indicate that a high level of ecological protection is provided when flow alterations are within 10% of the natural flow. Exceeding the 10% threshold indicates that the water level would go up or down by 10% or more.

The Proponent's threshold for significance relates to a change in surface water levels or flow within the Local Study Area that is above the existing flood maximums or below the minimum environmental flow required to sustain aquatic ecosystems during fish spawning seasons.

The Proponent clarified during the hearing that, for the assessment of the flow, they originally applied a 10% screening threshold based on mean annual flow. They then moved to a higher level of resolution by applying a mean monthly flow using the 10% screening threshold. The Proponent stated that they used the Tessman method⁵ to derive the environmental flows for each subwatershed using a combination of the mean annual flow and mean monthly flow.

The Proponent reported that, for subwatersheds with an expected mean annual flow decrease of greater than 10%, the mean monthly flow was compared with monthly baseline environmental flows. The residual effect was not considered significant if the predicted mean monthly flow was greater than the baseline environmental flows. In contrast, for subwatersheds with an expected increase in mean annual flow of over 10%, expected flood flows were compared with baseline conditions (existing flood maximums) to assess the potential for flooding and erosion.

The Proponent stated that the following Project activities would be expected to affect surface water quantity in the subwatersheds during the construction, operations, active closure, and post-closure phases:

- Construction – site preparation, construction of roads and mine infrastructure;
- Operations – ongoing water management and effluent discharge, stockpiling of mine rock and ore and dewatering of open pits;
- Active closure – removal of Project infrastructure, rehabilitation of disturbed areas and pit filling; and
- Post-closure – breaching of the mine rock storage area catch basins following completion of pit filling and subsequent overflow of the filled pit into subwatershed 103.

Baseflow from Groundwater to Surface Water Features

The Proponent observed that subwatersheds with groundwater drawdown generally revealed a decrease in the baseflow to surface water, whereas subwatersheds with groundwater mounding revealed an increased hydraulic gradient to surface water features. The Proponent indicated that they used the predicted changes in baseflow in the assessment of the Project's effects on surface water features. Further information is found in Section 7 (Groundwater).

⁵ Tessman, S.A. 1980. Environmental Assessment, Technical Appendix E, In Environmental Use Sector. *Reconnaissance Elements of the Western Dakota Region of South Dakota Study*. Water Resources Research Institute, South Dakota State University, Brookings, South Dakota.

View of the Participants

Environment and Climate Change Canada raised concerns regarding the screening threshold used by the Proponent. Environment and Climate Change Canada stated that the Fisheries and Oceans Canada threshold for an affected stream is a 10% instantaneous flow caused by the Project, while the Tessmann method used by the Proponent may allow for changes of greater than 10% on a monthly scale. Environment and Climate Change Canada stated that application of the Tessmann method is not appropriate as important effects involving a change of greater than 10% over daily and instantaneous time scales may have been missed, particularly in low-flow seasons. Environment and Climate Change Canada indicated that the Proponent should incorporate areas into the fish habitat compensation and offsite plan where the projected flow differs by more than 10% from the natural conditions.

The Ministry of the Environment, Conservation and Parks expressed a concern about the loss of groundwater discharge to surface water. They noted that de-watering required as part of the Project could reduce groundwater contributions to waterbodies near the open pit, potentially affecting those features. The Ministry also indicated that it is unclear if or how the Proponent accounted for the predicted changes in groundwater discharge within the predictions of potential impacts to surface water features (stream flow reduction).

8.3.2 Effect on Surface Water Flows

Views of the Proponent

The Proponent predicted that Project activities are expected to affect surface water flows in specific subwatersheds during the construction, operations, active closure, and post-closure phases.

The subwatersheds that would be overprinted by the Project infrastructure are listed in Table 8-1.

Table 8-1: Summary of the Subwatersheds Along with Their Names and Catchment Areas

Subwatershed ID	Stream	Catchment area (km²) (baseline)	Drainage destination	Infrastructure to be located within the catchment area
101	Stream 1	4.54	Biigtig Zibi	mine access road, process plant, stormwater management pond, water management pond, process solids management facility

Subwatershed ID	Stream	Catchment area (km ²) (baseline)	Drainage destination	Infrastructure to be located within the catchment area
102	Stream 2	3.50	Biigtig Zibi	run-of-mill stockpile, mine rock storage area, south pit, central pit
103	Stream 3	1.87	Biigtig Zibi	mine rock storage area, north pit
104	Stream 4 (Claw Lake)	3.46	Biigtig Zibi	north pit
105	Stream 5 (Hare Creek)	47.83	Lake Superior at Port Munro	transmission line, process solids management facility
106	Stream 6 (Angler Creek)	10.52	Lake Superior at Sturdee Cove	process solids management facility
108	n/a	0.57	Biigtig Zibi	none
109	n/a	12.04	Lake Superior at Peninsula Harbour	none
112	n/a	0.11	Biigtig Zibi	none
116	n/a	2.94	Biigtig Zibi	mine access road
117	n/a	0.26	Biigtig Zibi	none

Note: Adapted from Section 6.3.1, Table 6.4, and Figure 4 in Appendix D3 of the EIS Addendum (CIAR #727)

Process Solids Management Facility Discharge Scenario at Active Closure/Post-Closure

The Proponent assessed the impact of two closure scenarios (Scenario 1 and Scenario 2) in year 6 following the start of the active closure period. The assessment focused on the mean annual flow in subwatershed 102, 103, and 106.

Scenario 1 sees mine rock storage area and process solids management facility effluent discharge quality meeting requirements for discharge to the environment six years after the start of active closure. Collected water within the mine rock storage area and process solids

management facility would no longer be pumped to the open pit. Instead, the Stream 2 and 3 dams would be breached and flow would be restored to subwatersheds 102 and 103. Flow from the process solids management facility would also be restored to subwatershed 106. Under Scenario #1, the Proponent estimated that it would take 35 years to fill the open pits, without water from the mine rock storage area or process solids management facility to speed its filling.

Scenario 2 occurs if, six years after the start of active closure, the effluent discharge water quality in the mine rock storage area catch basins and process solids management facility are not acceptable for release to the environment. Water from both the mine rock storage area catch basins and the process solids management facility would continue to be directed to the open pit to accelerate pit filling. In this scenario, the Proponent estimated that it would take 17 years to fill the open pit.

Under either scenario, once the effluent discharge quality meets requirements and is acceptable for release, the Stream 2 and Stream 3 catch basin dams would be breached, returning flow through these watercourses and into the Biigtig Zibi.

Effect on Flows in Subwatersheds 101, 102, and 103 Draining to the Biigtig Zibi via Streams 1, 2, and 3

The Proponent observed that, during construction and operations, subwatersheds 101, 102, and 103 are expected to have mean annual flows that exceed the 10% threshold compared to baseline conditions. For each of these watersheds, the Proponent indicated that mean monthly flows would be below baseline environmental flows throughout construction and operations. The Proponent stated there would be a permanent loss of subwatershed 102, while flows in subwatersheds 101 and 103 would recover during the active closure and post-closure phases. The Proponent indicated that subwatersheds 102 and 103 were of high cultural and societal value to Indigenous groups.

Table 8-2: Change in Mean Annual Flow from Baseline for Subwatersheds 101, 102, and 103

	Construction	Operations	Active closure	Post-closure
Subwatershed 101	33% decrease	22% decrease	Increase to within 10% of baseline	Increase to within 10% of baseline
Subwatershed 102	98% decrease	97% decrease	Scenario 1: 66% decrease Scenario 2: 98% decrease	66% decrease

	Construction	Operations	Active closure	Post-closure
Subwatershed 103	96% decrease	95% decrease	Scenario 1: 73% decrease Scenario 2: 95% decrease	74% increase

Note: Adapted from Section 6.2.3.6.3 of the EIS Addendum (CIAR #727)

The Proponent stated that site rehabilitation of infrastructure in the headwaters of subwatershed 101 during active closure would restore flow to within 10% of the baseline.

For subwatersheds 102 and 103, the Proponent predicted the reduction in mean annual flow would continue to exceed the 10% threshold during active closure.

Under either Scenario 1 or 2, once the effluent discharge quality meets the requirements and is acceptable for release, the catch basin dams for Stream 2 and Stream 3 would be breached, returning flow through these watercourses, and into the Biigtig Zibi.

Following the filling of the open pit, or during Scenario 1 (in which water quality meets discharge criteria), the Stream 2 catch basin dam would be breached, allowing runoff and seepage to drain to the Biigtig Zibi via the existing Stream 2 channel. Post-closure, the western half of subwatershed 102 would have runoff redirected to watershed 103 through the central and northern pits. The Proponent indicated that subwatershed 102 would be expected to undergo permanent changes beginning with the construction phase and extending to post-closure, with mean monthly flows below the environmental flow threshold during both closure scenarios. The Proponent indicated that the ecological community within subwatershed 102 would adjust to this reduction in flows and useable habitat. However, the Proponent noted these habitat losses were accounted for in the draft Fish and Fish Habitat Offsetting Plan. This is discussed further in Section 10 (Fish and Fish Habitat).

During active closure, subwatershed 103 is predicted to have mean monthly flows that do not maintain environmental flows during both closure scenarios. Post-closure, mean annual flows would recover once the open pits fill and contribute to the subwatershed. The mean annual flow in subwatershed 103 is expected to increase by 74% from baseline due to a net increase in the watershed size with the addition of runoff from subwatershed 102.

The Proponent indicated that, while flood flow calculations in subwatershed 103 show an 88% increase from the baseline flood flow, the effects would be seasonal and confined to the subwatershed. The Proponent indicated that, prior to completion of pit filling and removal of the Stream 3 dam, the Stream 3 watercourse would be armoured with riverstone and engineered to minimize potential erosion resulting from a flood flow.

Effect on Flows in Subwatershed 105 Draining to Lake Superior at Port Munro via Stream 5 (Hare Creek)

The Proponent indicated that 2% of subwatershed 105 would be overprinted by the Project for the construction of the process solids management facility and process plant. The Proponent estimated the change in mean annual flow in subwatershed 105 would decrease by 2% during construction. The Proponent indicated the mean annual flow in subwatershed 105 would not exceed the 10% threshold compared with baseline conditions during construction. Therefore, the Proponent screened assessment of subwatershed 105 during the construction phase from further assessment. The Proponent indicated that subwatershed 105 was of high cultural and societal value to Indigenous groups.

During operations, the Proponent predicted a 12% increase in mean annual flow in subwatershed 105, exceeding the 10% threshold compared to baseline conditions. The Proponent indicated that the flood flow in subwatershed 105 would not be expected to have an increased flow greater than 10% compared to baseline during operations.

The Proponent expected flows in subwatershed 105 would return to within 1% of mean annual baseflow during active closure and post-closure.

Effect on Flows in Subwatersheds 104, 108, 109, and 111

The Proponent indicated that a small area of subwatersheds 104, 108, and 109 would be overprinted by the Project. No part of subwatershed 111 would be overprinted, but it would experience effects of mounding of the water table. The Proponent predicted the mean annual flow during construction, operations, active closure, and post-closure of all four of these watersheds would be below the 10% threshold compared with baseline conditions.

During construction, a decrease in mean annual flow of 1% was predicted in subwatersheds 104 and 108 draining to the Biigtig Zibi. An increase of 2% in the mean annual flow was predicted for subwatershed 109, draining west toward Lake Superior at Peninsula Harbour. No change in flow was expected in subwatershed 111 during construction. During operations, an increase in mean annual flow of 4%–5% was predicted for subwatersheds 104, 109, and 111. An equivalent decrease was predicted for subwatershed 108.

During active closure and post-closure, the mean annual flow would be expected to increase by 5%–6% in subwatersheds 104, 109, and 111. Flows would be expected to decrease by 8% in subwatershed 108 draining to the Biigtig Zibi.

Effect on Flows in Subwatersheds 107, 110, 113, 114, 115, and 117

The Proponent stated that subwatersheds 107, 110, 113, 114, 115, and 117 are not within the Site Study Area and would not be expected to have subwatershed loss due to Project infrastructure. The Proponent predicted the mean annual flow during construction,

operations, active closure, and post-closure would be below the 10% threshold compared with baseline conditions.

No changes to flow were predicted for the construction phase. During operations, a change to the mean annual flow of less than 4% was forecasted in each of the six watersheds. A 1% decrease in subwatershed 107 was forecasted due to permanent lowering of the groundwater table in the vicinity of the open pits. A 1%–4 % increase in flows was forecast for the other five subwatersheds due to mounding of the water table in the vicinity of the mine rock storage area.

During active closure and post-closure, subwatershed 107 would experience a 1% decrease in mean annual flows compared with baseline conditions. The other five subwatersheds would see an increase of 1%–5% in mean annual flow compared with baseline conditions. The Proponent screened out these six watersheds from further assessment as the net change in both watershed area and hydrology during the life of the Project was expected to be less than 10%.

Effect on Flows in Subwatershed 116

The Proponent indicated that approximately 2% of subwatershed 116 would be overprinted by construction of the site access road. The Proponent predicted the mean annual flow during the construction, operations, active closure, and post-closure phases would be below the 10% threshold compared with baseline conditions.

No changes to flow were predicted for the construction phase. The Proponent predicted a 4% increase in mean annual flow during operations compared with baseline conditions due the imperviousness of the access road surface, resulting in less runoff infiltrating the groundwater system. During active closure and post-closure, the site access road would be scarified and rehabilitated, reducing its imperviousness and restoring conditions similar to baseline.

The Proponent screened out this watershed from further assessment as the net change in both watershed area and hydrology during the life of the Project was expected to be less than 10%.

Effect on Flows in Subwatershed 112

The Proponent indicated that subwatershed 112 is outside the Site Study Area. It is situated within the Local Study Area and comprises two small headwater streams that converge and drain east to the Biigtig Zibi. No Project infrastructure would be expected to overprint this watershed. The Proponent indicated that no changes to mean annual flow would be expected in subwatershed 112 during construction.

The Proponent reported that the mean annual flows in subwatershed 112 would be expected to exceed the 10% threshold compared with baseline conditions during operations, active closure, and post-closure as a result of changes to surface water and groundwater.

The Project would result in an increase in mean annual flow of 53% from baseline during operations, and 58% during active closure and post-closure, exceeding the 10% threshold compared with baseline conditions. The Proponent indicated that the flood flow in subwatershed 112 was not expected to increase by more than 10% compared with baseline. The Proponent noted that subwatershed 112 was not expected to recover post-closure. The Proponent stated that subwatershed 112 could be mitigated through implementation of erosion control measures to reduce the potential for scouring and erosion.

Effect on Water Levels in Hare Lake

The Proponent stated that hydrologic-induced change in Hare Lake was expected to be negligible. No water would be expected to be discharged to Hare Lake during construction. The total net flow is expected to decrease by 2% during construction and increase by 12% during operations, when effluent would be discharged into the lake.

The Proponent predicted a change of less than 5% in Hare Lake water levels during construction (a decrease of 0.25 cm) and operations (an increase of 1.16 cm). During active closure and post-closure conditions, Hare Lake would be expected to normalize back to baseline conditions, with a 0.2 cm decrease in the water level.

The Proponent indicated that the largest incremental change would occur during operations, in the low-flow month of August, when changes in water levels in Hare Lake would be up to 2.3 cm higher than at present. The Proponent observed that the total outflow during operations in August would still be below monthly baseline outflows for other months where discharge would occur. They noted that water levels currently fluctuate in Hare Lake by more than 1 m over the course of a year, and the incremental increase during operations could be “well accommodated” by the system.

Effect on Water Levels in the Biigtig Zibi

The Proponent stated that changes in flow to the Biigtig Zibi were expected to be negligible due to large watershed contribution to the Biigtig Zibi as a whole, and the relatively small subwatersheds associated with the mine footprint.

Overall, the Proponent predicted a change of less than 1% in mean annual flows in the Biigtig Zibi during construction, operations, active closure, and post-closure phases. At construction and through to post-closure, the Proponent also predicted a 0.13% – 0.15% decrease in mean monthly flows in May (high flow), as well in data indicating the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year peak flows in the Biigtig Zibi.

The Proponent predicted a reduction in total flow during closure of 0.10%. Post-closure, flow from subwatersheds 102 and 103, and additional contributions to total flow from the filled pit lakes, would be returned to the Biigtig Zibi, which would see an increase of 0.05% in total flow from baseline conditions.

The Proponent noted that expected flows in the Biigtig Zibi throughout the construction, operations, closure, and post-closure phases would not exceed the 10% threshold compared with baseline conditions.

The Proponent indicated that under extreme dry conditions, a water deficit could affect the process plant operations. To avoid processing reductions or shutdown, the Proponent indicated supplemental water would be taken from the Biigtig Zibi. The Proponent stated that, under these extreme dry conditions only, a supplemental water taking of up to 300 m³ per hour, representing 0.17% of the mean annual flow of the Biigtig Zibi, could be required.

The Proponent recognized that under dry weather conditions, the Biigtig Zibi would also be experiencing low flows, potentially at or below the flow required to sustain aquatic life. As a result, supplemental water takings from the Biigtig Zibi could be restricted or prohibited.

The Proponent committed to developing a low-flow trigger for the Biigtig Zibi that considers the environmental flows and is protective of the river. The Proponent reported during the hearing that they would rely on the existing Water Survey of Canada station on the Biigtig Zibi to monitor flows. The Proponent concluded that they would take water from the Biigtig Zibi only when the flows exceed the low-flow trigger and in accordance with any Ministry of the Environment, Conservation and Parks permit to take water.

Effect on Flows in Subwatershed 106 Draining to Lake Superior at Sturdee Cove via Stream 6 (Angler Creek)

The Proponent indicated that the process solids management facility would overprint the eastern portion of subwatershed 106, including the headwaters and eastern portion of Stream 6 (Angler Creek) that flows west and discharges to Lake Superior via Sturdee Cove. Water would be directed to the water management pond before being discharged into Hare Lake (subwatershed 105). The Proponent noted that a small portion of Stream 6 (Angler Creek) not overprinted by Project infrastructure would be orphaned and redirected to subwatershed 109. The Proponent acknowledged that Stream 6 (Angler Creek) was of high cultural and societal value to Indigenous groups.

During construction, the mean annual flow of Stream 6 (Angler Creek) would be expected to decrease by 33%. During operations, the decrease in mean annual flow would be 36%. The Proponent indicated the mean annual flow during construction and operations would exceed the 10% threshold compared with baseline conditions.

The Proponent stated that all months of the year would be expected to see more than a 10% decrease in flows compared with baseline during construction and operations. Mean monthly flows would also be expected to be below baseline environmental flows, the minimum environmental flow required to sustain aquatic ecosystems during fish spawning seasons for January, February, March, July, August, and December during construction, operations, and

closure (Scenario 2). The Proponent predicted fluctuations in water levels, including both increases and decreases in flows exceeding 10% during closure Scenario 1 and post-closure.

Table 8-3: Change in Mean Annual Flow from Baseline for Subwatershed 106

	Construction	Operations	Active closure	Post-closure
Subwatershed 106	36% decrease	33% decrease	Scenario 1: 4% decrease Mean monthly water levels fluctuate within 10% of baseline Scenario 2: 33% decrease	4% decrease Mean monthly water levels fluctuate within 10% of baseline

Note: Adapted from Section 6.2.3.6.3 of the EIS Addendum (CIAR #727)

The Proponent indicated that, under both closure scenarios, the mean annual flow in subwatershed 106 would remain the same as during operations, until the effluent discharge quality meets requirements and is acceptable for release. At that time, process solids management facility cell wall 1A would be removed, effectively reconnecting the orphaned upper reaches of Stream 6 (Angler Creek) and the watershed area occupied by the facility itself.

The Proponent committed to assessing the technically and economically feasible supplemental flow options for Stream 6 (Angler Creek) and to minimizing disruptions to the system where possible.

Views of the Participants

Biigtigong Nishnaabeg expressed concern about the Project's effects on Stream 6 (Angler Creek) as a portion of that waterbody would be overprinted by the process solids management facility. Biigtigong Nishnaabeg requested that flows in Stream 6 (Angler Creek) be maintained within 10% of the mean monthly flow. They stated that Stream 6 (Angler Creek) is an extremely important area to the past, present and future of Biigtigong Nishnaabeg, their culture, rights and interests. They indicated that supplemental flow should be continued through construction, operations, and closure until natural flows are restored in Stream 6 (Angler Creek).

Pays Plat First Nation expressed concern regarding the Proponent's assessment of the potential Project effects on flow in the Biigtig Zibi, particularly during dry weather.

8.4 MITIGATION AND MONITORING

View of the Proponent

To avoid or reduce Project-related effects on surface water quantity, the Proponent proposed the following mitigation measures:

- Limit and stage construction footprint (within the Site Study Area) to the extent practicable.
- Maintain existing drainage patterns with the use of culverts.
- Inspect culverts periodically. Remove accumulated material and debris upstream and downstream of the culverts to prevent erosion, flooding, habitat damage, property damage, and mobilization of sediment.
- Maintain access roads by periodically regrading and ditching to improve water flow, reduce erosion, and manage vegetation growth.
- Attenuate peak discharges and augment baseflows to the environment using Project water storage features (i.e., catch basins, collection ponds, and the stormwater management pond).
- Collect runoff and groundwater seepage from the open pits and run-of-mine stockpile within collection pond 1.
- Pump excess water from collection pond 1 to the water management pond for treatment and discharge to Hare Lake.
- Recycle contact water for use as process water.
- Construct and use existing subwatershed boundaries to divert fresh water away from Project components.
- Assess downstream watercourses in subwatersheds 103 and 112 for possible erosion control measures to reduce the potential for scouring and erosion.

Other mitigation measures would include:

- Appropriately size water management design features (e.g., retention and collection ponds, drainage infrastructure, ditches) to manage water volumes associated with storm and/or flow events.
- Design the mine rock storage area catch basin to accommodate a 1-in-100-year storm event.

- Plan to discharge only that water from the site that is considered excess from a management/need point of view (e.g., recycle and re-use water as much as practical).
- Divert surface water runoff from undisturbed areas away from disturbed areas.
- Discharge water from the site in a manner consistent with the natural hydrography of the receiving water body.
- Monitor the quantity of water taken from Hare Lake, the Biigtig Zibi, and other surface water sources, along with flow triggers, according to the requirements of permits to take water.
- Monitor the quantity of water discharged from the site.
- Restore natural drainage patterns to the extent possible at the end of the mine life.

The Proponent stated that the monitoring plan for hydrology would be developed based on regulatory requirements for water quantity and to confirm their predictions. They stated that the monitoring program would comprise the following elements:

- weather monitoring at a weather station installed at the mine site to understand current weather events, track seasonal trends and snowpack accumulation as well as weather forecast monitoring to anticipate the onset of dry weather conditions;
- water level stations at select locations within ponds and/or lakes to monitor water levels and volumes during construction, operations, and closure;
- pump flow monitoring to Hare Lake, from the open pit, mine stormwater pond, catch basins and water management ponds; and
- flow monitoring stations at select locations within watercourses during construction, operations, and closure, with cross-sections of the watercourse at the flow monitoring stations taken at regular intervals to develop and/or expand upon rating curves for stations within the Local Study Area.

The Proponent further indicated that the full extent of the monitoring program would be determined by federal and provincial guidelines as well as consultation with government agencies and applicable stakeholders. They would review surface water hydrological stations at regular intervals to add or remove monitoring stations from the monitoring program in accordance with the value of the station in monitoring the effects of the Project on the environment. Monitoring locations identified as part of regulatory approval would be removed from the monitoring program once the required amendments were approved.

The Proponent stated that monitoring would continue during closure of the site and flow monitoring stations would remain in subwatersheds 101 through 117 and the Biigtig Zibi, to determine the timing of re-establishment of flow.

When the Proponent was asked by the Panel about supplementing flows to Stream 6 (Angler Creek) during the hearing, they indicated the lack of a stable source or supply of water means it would not be technically feasible to supplement flows in this watercourse throughout the life of the mine. In addressing outstanding issues raised by Biigtigong Nishnaabeg, the Proponent committed to minimizing disruptions and assessing, in consultation with Biigtigong Nishnaabeg, feasible supplemental water flow options for Stream 6 (Angler Creek) to minimize disruptions to this waterbody during operations.

Views of the Participants

The Ministry of the Environment, Conservation and Parks mentioned a need to add water level monitoring stations at Terru Lake, Lake 8, Lake 12, Lake 5, unnamed lakes in subwatershed 104, Hare Lake, and reference lake stations to the hydrology monitoring program, for all phases of the Project.

Furthermore, the Ministry of the Environment, Conservation and Parks indicated that onsite water management infrastructure should be monitored regularly and the monitoring data incorporated into the water balance model to validate water balance predictions for the life of the Project.

Pays Plat First Nation, the Ministry of the Environment, Conservation and Parks, and Fisheries and Oceans Canada expressed concern about the lack of contingency measures and triggers and thresholds set out in the monitoring plan for stream flow.

8.5 PANEL CONCLUSIONS AND RECOMMENDATIONS

In reaching their conclusions on the effects of the Project on surface water quantity the Panel considered the following factors to be particularly relevant:

- Government agencies were in agreement that additional data were necessary to establish adequate baseline streamflows for all surface water features that could be affected by the Project.
- Subwatersheds 104, 105, 107, 108, 109, 110, 111, 113, 114, 115, 116, and 117 would not exceed the 10% threshold compared with baseline conditions required to sustain aquatic ecosystems during any phase of the Project.
- Subwatersheds 102, 103, 105, and 106 were identified as of cultural and/or societal importance to Indigenous groups.

- Subwatersheds 101, 102, and 103 would exceed the threshold for baseline environmental flows during construction and operations. During active closure, flows within subwatershed 101 would recover.
- Subwatershed 102 would not recover to baseline flow during active closure or post-closure.
- Subwatershed 103 would see an 88% increase in flow post-closure, and a potential for increased erosion.
- Subwatershed 112 would not be affected by construction activities. During operations, active closure, and post-closure, there would be a flood flow increase (53%–58%) from the baseline flood flow.
- Subwatershed 106 and Stream 6 (Angler Creek) would be expected to experience a decrease in flow of more than 10% compared with baseline conditions during construction and operations; mean monthly flows would also be expected to be below the minimum environmental flow required to sustain aquatic ecosystems for six months of the year.
- Subwatershed 106 would experience fluctuating water levels during closure Scenario 1 and post-closure.
- The Proponent committed to assessing supplemental water flow measures for Stream 6 (Angler Creek), in consultation with Biigtigong Nishnaabeg; however, no technically and economically feasible options were presented.
- Biigtigong Nishnaabeg stated that Stream 6 (Angler Creek) is an extremely important area to their culture, rights, and interests.
- Predicted supplemental water needs in extreme dry conditions represent 0.17% of the mean annual flow of the Biigtig Zibi.

The Panel finds that the Proponent's streamflow assessment generally covered monitoring stations located on (or on streams flowing to) Hare Lake, Stream 6 (Angler Creek), and the Biigtig Zibi, but additional data are necessary to establish an adequate baseline streamflow and measure the effects of the Project. The Panel agrees that the Proponent's proposed monitoring program should be broadened to locations identified by the Ministry of Environment, Conservation and Parks, to more accurately predict and monitor the Project's effect on hydrology.

The Panel understands that there would be sufficient ecological protection within 11 of the subwatersheds potentially affected by the Project (subwatersheds 104, 107, 108, 109, 110, 111, 113, 114, 115, 116, and 117).

The Panel notes that, during construction activities and operations, baseline environmental flows would not be maintained within affected subwatersheds 101, 102, and 103 draining to

the Biigtig Zibi via streams 1, 2, and 3, respectively. While flows within subwatershed 101 would recover during active closure, the mean monthly flows would still be below the baseline environmental flows within subwatersheds 102 and 103. While baseline environmental flows within subwatershed 102 would not be maintained post-closure, there would be a significant flow recovery within subwatershed 103. However, this increase in flow would result in a significant flood flow increase (88%) from the baseline flood flow. The Panel did not hear specifically from Indigenous groups about the ecological or cultural importance of subwatersheds 101, 102, and 103. While the Panel finds there would be residual effects from the Project on each of these three watersheds, these residual effects would not be significant post-closure.

The Panel finds that, aside from subwatershed 106, the subwatersheds that would be the most affected by the Project are the subwatersheds draining to the Biigtig Zibi, a waterbody that has a high cultural and societal value for Indigenous communities, including subwatershed 102 (flow reduction), subwatershed 103 (increase flood flow) and subwatershed 112 (increase flood flow). The Panel finds that the implementation of effective erosion control measures within subwatershed 103 and subwatershed 112 is warranted.

The Panel notes that flows within subwatershed 105 draining to Lake Superior at Port Munro via Stream 5 (Hare Creek) would not exceed the 10% threshold during construction, active closure, and post-closure, compared with baseline conditions. The Panel notes that there would be an insignificant (1%) flood flow decrease from the baseline flood flow within subwatershed 105 during operations. The Panel finds residual effects to subwatershed 105 could be expected, but notes that these residual effects would not be significant.

The Panel notes that the mean monthly flows during construction activities and operations would be below baseline environmental flows within subwatershed 106 draining to Lake Superior at Sturdee Cove via Stream 6 (Angler Creek). While under Scenario 1, flows in subwatershed 106 would recover to within 10% of the natural flow, this would not be the case under Scenario 2. Post-closure flows within subwatershed 106 would recover and stay below the 10% threshold to provide ecological protection.

The Panel acknowledges that the Proponent has committed to assessing feasible supplemental water flow options for Stream 6 (Angler Creek) to minimize disruptions to this watercourse during operations. However, at the close of the Panel's record, no feasible option had been identified.

The Panels finds that, without supplemental water flows, Stream 6 (Angler Creek) could be negatively affected for more than 20 years. This would, in the Panel's opinion, affect Indigenous communities using this water body for cultural activities, and would also negatively affect living organisms, as the baseline environmental flow would not be maintained. Effects that could result from the change in hydrology of Stream 6 (Angler Creek) are discussed in more detail in Section 10 (Fish and Fish Habitat) and Section 21 (Effects on Indigenous Peoples).

With respect to the Biigtig Zibi, the Panel recommends the Proponent develop low-flow triggers for the taking of water under extreme dry conditions, and monitor flows in the Biigtig Zibi.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 5: The Proponent should implement mitigation measures to prevent or reduce Project-related effects on surface water quantity, including:

- recycling site contact water for use as process water;
- using a water management system to manage water volumes and attenuate discharges during construction and operations;
- discharging water during operations in a manner consistent with natural conditions;
- implementing measures to reduce the potential for scouring and erosion in downstream watercourses in subwatersheds 103 and 112; and
- in consultation with Indigenous groups, restoring natural drainage patterns within the Site Study Area to the extent possible as part of closure reclamation.

Recommendation 6: The Proponent should monitor flows in the Biigtig Zibi and develop low-flow triggers for extreme dry conditions. Once the low-flow trigger is reached, the Proponent would need to reduce, or cease taking water from the Biigtig Zibi. Water taking would occur in accordance with requirements imposed by the Ministry of Environment, Conservation and Parks.

In addition to the recommended mitigation measures, the Panel recommends the Proponent implement a follow-up program:

Recommendation 7: The Proponent should develop and implement, in consultation with relevant government agencies and Indigenous communities, a surface water quantity follow-up program for all phases of the Project to verify the accuracy of the predictions, determine the effectiveness of mitigation measures and implement adaptive management. The follow-up program should include:

- pre-construction collection of water level and flow information, including:
 - water level monitoring data for Hare Lake, Terru Lake (in subwatershed 102), Lake 8 (in subwatershed 102), Lake 12 (in subwatershed 103), Lake 5 (in subwatershed 105), and unnamed lakes in subwatershed 104;
 - flow monitoring data at stations S-8 (on the stream in subwatershed 104 flowing to the Biigtig Zibi), S-9 (upstream of inlet to Hare Lake), S-10 (on the inlet to Hare Lake), and S-11 (on the Hare Lake outlet creek); and

- flow and water level monitoring at station S-24 (outlet of subwatershed 113 to the Biigtig Zibi) and station S-25 (outlet of subwatershed 110 to the Biigtig Zibi) and develop rating curves for those stations;
- monitoring of water quantity to compare to predicted effects during construction, operations, active closure, and post-closure, including:
 - measurement of water quantity, level, flow gauging, and depth and flow profiling, at point-source discharge locations and receiving water bodies, including Lake 1, Lake 2, Lake 8, Malpa Lake, Hare Creek, Stream 6 (Angler Creek) and those identified in Table 1 in the response to IR 5-7;
 - monitoring at various times of the year, consistent with provincial permitting requirements; and
 - monitoring at reference stations that would not be impacted by the Project;
- comparison of results of monitoring with the predictions of the environmental assessment and applicable regulatory criteria or objectives; and
- implementation of additional mitigation measures should the results of monitoring indicate that effects are greater than predicted or mitigation measures are not effective (a trigger threshold of 100-year flood flows for flow increase and a threshold of three consecutive months during which the mean monthly flow is 10% less than the predicted mean monthly for flow reduction should be used).

The Proponent should determine the details of the sampling location, sampling frequency, parameters to be monitored, and adaptive management thresholds and measures in consultation with relevant government agencies and Indigenous communities.

The Panel finds that, despite mitigation, the Project is likely to have a residual effect of low to moderate magnitude on the hydrology and flows in subwatersheds 101, 102, and 103, and the Biigtig Zibi.

The Panel is of the view that the hydrology of Stream 6 (Angler Creek) would be altered throughout construction and operations. Stream 6 (Angler Creek) would not return to pre-Project baseline conditions during active closure, or in the post-closure phase, but would continue to experience flow conditions that differ from baseline effects into the future. In consideration of environmental flows and the importance of Stream 6 (Angler Creek) to Indigenous communities, the Panel finds that the Project is likely to have a residual effect of high magnitude that lasts for more than 20 years, and is likely irreversible.

The Panel concludes that the Project is likely to cause a significant adverse environmental effect on the hydrology of Stream 6 (Angler Creek).

In addition to the recommended mitigation measures and follow-up program the Panel relied on in making their determination above, the Panel recommends:

Recommendation 8: The Proponent should further engage with relevant government agencies and Indigenous communities to identify options for supplementing water for Stream 6 (Angler Creek) to minimize disruptions to this waterbody during construction and operations without compromising other water sources.

8.6 CUMULATIVE EFFECTS

Views of the Proponent

The Proponent reported finding no spatial overlap between the residual effects of the Project and the residual effects of other projects or activities in their cumulative effects assessment. The Proponent stated that they did not anticipate any cumulative residual effects on surface water quantity.

Views of the Participants

The Ministry of the Environment, Conservation and Parks, quoting from the document *Ecological Flow Requirements to Support Fisheries in Canada*, noted the “probability of degradation to ecosystems sustaining fisheries increases with increasing alteration to the natural flow conditions. Thus, the assessment of alterations to the flow regime should be considered in a cumulative sense, and not only on a project-by-project basis.”

Fisheries and Oceans Canada stated that flows in the Biigtig Zibi are not expected to be altered significantly, but changes in peak flows may cause Lake Sturgeon to change the way they use the habitat. Despite the small magnitude of Project-related changes in the Biigtig Zibi flows, this change should be considered in the context of cumulative effects and potential shifting baselines.

Ginoogaming First Nation stated that they were currently discussing with the Proponent the possibility of improving flows in the Biigtig Zibi watershed by removing previously installed dams associated with the forestry industry.

Panel Conclusions and Recommendations

In reaching their conclusions on the cumulative effects of the Project on surface water quantity, the Panel considered the following factors to be particularly relevant:

- Subwatershed 106 is expected to experience a greater than 10% decrease in flows compared with baseline conditions during construction and operations; mean monthly

flows are also expected to be below the minimum environmental flow required to sustain aquatic ecosystems for six months of the year.

- Subwatershed 106 would experience fluctuating water levels during active closure (Scenario 1) and post-closure.
- Mean annual flows in the Biigtig Zibi are expected to change by less than 1% throughout all Project phases.
- Predicted supplemental process water needs in extreme dry conditions represents 0.17% of the mean annual flow of the Biigtig Zibi.

The Panel heard that the Biigtig Zibi would experience minor variations in flow during all Project phases. The Panel concludes that the effects of the Project on water quantity in the Biigtig Zibi would be minor.

The Proponent indicated there would be no spatial overlap between Project effects on water quantity and the effects from other projects or activities. The Panel notes that the Proponent indicated that flows in the river fluctuate significantly over the course of the year as a result of water control structures upstream at Twin Falls, on the Kagiano River, and at Waboosekon Lake on the upper Biigtig Zibi.

The Panel is of the view that limiting the scope of cumulative effects assessment for water quantity effects to the Regional Study Area, which intersects the river for only a few kilometres, provides a relatively narrow understanding of the potential cumulative effects. In the discussion of cumulative effects assessment in Section 3 (Mandate of the Panel and Scope of Review), the Panel describes the “shifting baseline syndrome,” whereby the effects of previously built projects are included within the baseline of a given valued ecosystem component. The Panel questions how there can be no spatial overlap of Project effects on water quantity in the Biigtig Zibi with those of past, present, or reasonably foreseeable projects, when water levels and/or flows are known to “fluctuate significantly.” Further, the Proponent indicated that new hydroelectric facilities have been proposed for Manitou Falls and High Falls, which are located on the Biigtig Zibi, and that these dams would presumably have an additional effect on water flows in the river. These facilities do not appear to have been considered in the cumulative effects assessment. However, the Panel finds the Project would make a small, incremental contribution to changes in flow in the Biigtig Zibi. Any subsequent change to water levels in Lake Superior is negligible.

The Panel also heard that subwatershed 106, which drains to Stream 6 (Angler Creek), would experience important fluctuations in flows during the Project’s construction and operations phases, and in closure Scenario 1. The Panel is satisfied with the Proponent’s explanation that there would be no spatial overlap between Project effects on water quantity in Angler Creek and effects due to other projects or activities.

Water quantity in the Biigtig Zibi is an important aspect of Lake Sturgeon habitat, a species of significance to Biigtigong Nishnaabeg and a species at risk. More information on potential Project effects on Lake Sturgeon, including cumulative effects, is presented in Section 10 (Fish and Fish Habitat).

The Panel concludes that, the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on surface water quantity.

SECTION 9: SURFACE WATER QUALITY

9.1 REQUIREMENTS FOR THE CONSIDERATION OF SURFACE WATER QUALITY

This section addresses the environmental effects of the Project on surface water quality. The Panel considers these to be environmental effects that must be assessed under the EAA and that inform the assessment of effects under paragraphs 5(1)(a), (b), and (c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- provide baseline information on water quality and aquatic ecology, and describe their sampling protocols and analytical methods;
- assess the environmental effects of the Project on water quality and aquatic ecology.

9.2 SURFACE WATER QUALITY BASELINE

Views of the Proponent

GenPGM established a surface water quality baseline based on sampling data of all subwatersheds within the Project site collected between 2008 and 2012 and between 2013 and 2019. Based on a comparison of the 2008–2012 baseline and the 2013–2019 baseline, they concluded that surface water quality had not changed appreciably. The Proponent had initiated routine water quality sampling, including additional benthic community sampling, in 2021, but the results were pending at the close of the hearing. The Proponent committed to continue sampling background water quality at key locations on a monthly basis during the ice-free season to support future detailed design and permitting.

The Proponent tested for metals, including arsenic, cadmium, cobalt, copper, iron, lead, mercury, molybdenum, nickel, selenium, zinc, and dissolved aluminum. Other parameters, including alkalinity, ammonia, dissolved organic carbon, nitrate, pH, phosphorus, sulphate, total hardness, total nitrogen, and total suspended solids, were also measured. The average and maximum values, measured for the subwatersheds and for the Biigtig Zibi, were compared with Provincial Water Quality Objectives.

The Proponent reported that heavy metals such as arsenic, cadmium, mercury, molybdenum, nickel, and selenium were not detected at their respective method detection limit or were below Provincial Water Quality Objectives. Measured pH values were also within the 6.5 to 8.5 range specified by Provincial Water Quality Objectives. In subwatersheds 101–106 and the Biigtig Zibi, the Proponent reported finding naturally high concentration levels, iron,

phosphorus, copper, and dissolved aluminum, that exceeded Provincial Water Quality Objectives.

A baseline mercury concentration was reported by the Proponent for Hare Lake, Stream 6 (Angler Creek) and the Biigtig Zibi. They stated that baseline mercury was below the federal guideline of 26 ng/L based on the method detection limits they used for the analysis.

During the hearing, the Proponent explained that the method detection limit used for the data collected after 2014 was 1 or 2 nanograms per litre (ng/L) for mercury. They committed to continue mercury analysis with 1 or 2 ng/L as the detection limit.

The Proponent acknowledged a request expressed during the hearing to include platinum group metals in the baseline characterization but noted that not all elements can be tested in Canada at this time, and detection limits can be problematic.

Views of the Participants

The Ministry of the Environment, Conservation and Parks stated that data collected by the Proponent to date is sufficient to characterize existing conditions for most surface water quality parameters and locations for the purpose of the environmental impact assessment. Nevertheless, the Ministry recognized a need for continued sampling to characterize the baseline parameters using current data and to capture missing data. They indicated their requirement that baselines for current surface water quality be defined by data collected over at least two years of monthly sampling or three years of quarterly sampling. The Ministry of the Environment, Conservation and Parks noted that the Proponent's commitment to continue monthly water quality sampling at key locations during the ice-free season to support future detailed design and permitting requirements is satisfactory.

The Ministry of the Environment, Conservation and Parks requested that the updated baseline include additional surface water and sediment baseline sampling for platinum group metals that were not measured by the Proponent. The Ministry indicated that the baseline sampling for platinum group metals should begin as soon as possible — before site disturbance and discharge. Health Canada also noted the absence of predictions regarding platinum group metals and the effect they may have on water quality, referring to information reported by organizations such as the European Medicines Agency, the United States Occupational Safety and Health Administration and World Health Organization Regional Office for Europe that have set exposure limits for platinum salts as emerging contaminants of concern. Natural Resources Canada indicated that recent science suggests that palladium is more soluble and toxic to aquatic life.

The Ministry of the Environment, Conservation and Parks as well as Environment and Climate Change Canada asked that a lower method detection limit be used to characterize background data for mercury. The Ministry of the Environment, Conservation and Parks requested that the analysis be conducted with a method detection limit of 0.1 ng/L. The Ministry also requested that methylmercury analysis be conducted with a method detection limit of 0.02 ng/L, noting that a lower detection limit would help detect the potential for mercury to bioaccumulate and trigger additional monitoring requirements.

The Ministry of the Environment, Conservation and Parks commented on the Proponent's use of copper benchmarks of 0.005 milligram per litre (mg/L) set by the Provincial Water Quality Objective and 0.003 mg/L set by the Canadian Council of Ministers of the Environment. The Ministry is of the opinion that the benchmark for copper should be based instead on the new Federal Environmental Quality Guidelines.

9.3 SITE WATER MANAGEMENT

Views of the Proponent

GenPGM described how they planned to manage contact water during preparation of the site, and the construction, operations, active closure, and post-closure phases. They stated that a key component of the proposed water management plan is the water management pond and its associated dams. Construction of this facility would begin two years before the start of operations.

A schematic of water management during construction and operations is provided in Figure 9-1.

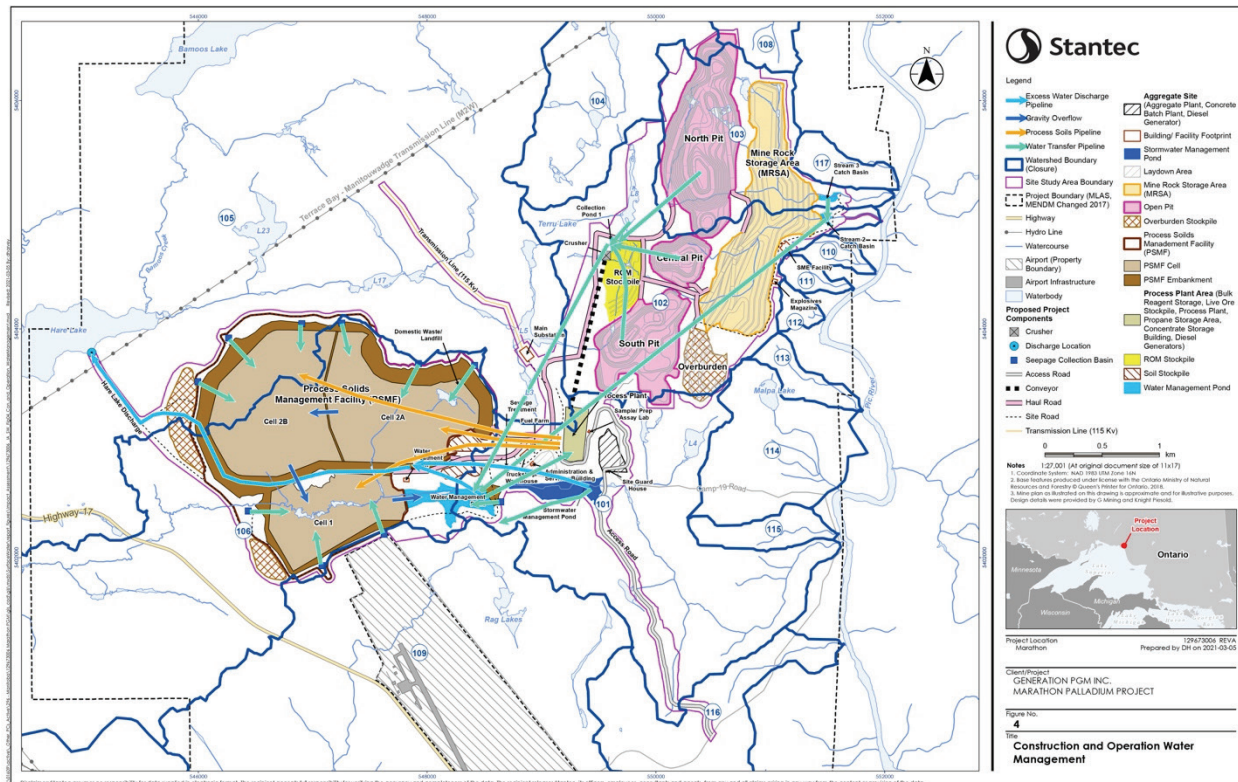


Figure 9-1: Construction and Operations Water Management (Source: CIAR #727)

Construction Phase

The Proponent stated that the focus of the management of contact water during the preparation of the site would be on controlling runoff from areas that are cleared for site development purposes. The primary management tools include stormwater drainage channels and retention ponds to manage runoff and reduce suspended solids loads. The Proponent further clarified that cofferdams would be installed in the local drainages and catchment areas during site clearing and construction of the water management pond to collect runoff water from the disturbed areas. Mitigation measures to control sediments would include retention in the basins and other technologies such as geotubes and filter bags.

The Proponent stated that the objective during construction activities would be to collect and manage runoff through the water management pond and there would be no discharge of water to surface water features. Domestic sewage would be collected in holding tanks and/or portable bathroom facilities that would be pumped out daily for treatment offsite.

Operations Phase

The Proponent stated that the Project would generate wastewater during operations from the process plant, groundwater seepage, runoff and other contact water, and domestic sewage.

The Proponent indicated that runoff from the west side of the mine rock storage area would report to the open pits, then be transferred to collection pond 1, adjacent to the run-of-mine stockpile. Runoff from the east side of the mine rock storage area would report to the mine rock storage area catch basins. Runoff from the process plant area, truckshop/warehouse area, laydown area and the aggregate plant area would be collected in a stormwater management pond.

The Proponent indicated that they would stockpile soils and overburden material for later use in site rehabilitation. They indicated that runoff from areas around stockpiled overburden would be captured by collection ditches and/or berms, report to catch basins and collection basins, and then be pumped and managed through the water management pond. The Proponent also proposed various mitigation measures to avoid or reduce Project-related effects such as erosion of the disturbed areas and/or soil stockpiles.

The Proponent reported that a domestic sewage treatment plant would be designed to remove solids, coliform bacteria, and other contaminants from the domestic sewage to meet regulatory limits for discharge to the environment. They proposed to direct the treated domestic sewage effluent to the process solids management facility, where it would mix with other sources of mine-related water. As a result, only the excess solids from the domestic sewage treatment would be hauled off site for final disposal.

Contact water (i.e., any water that has been in contact with contaminants of concern), including water from the open pits, mine rock storage area catch basins, process plant, process solids management facility, and stormwater management pond, would be transferred to the water management pond via a water transfer pipeline system. Additionally, the Proponent indicated that groundwater seepage generated around the process solids management facility and the mine rock storage area during the operations of the mine would be collected and pumped to the water management pond. They proposed to discharge excess mine effluent from the water management pond, either directly or after treatment if necessary, to Hare Lake.

The Proponent noted that some seepage would originate from the mine rock storage area during operations, bypass the toe ditches and catch basins, and flow toward subwatersheds 101 and 102, ultimately discharging to the Biigtig Zibi. In addition, seepage originating from the process solids management facility during operations would flow toward subwatershed 105, which discharges to Hare Lake, and subwatershed 106, which discharges to Stream 6 (Angler Creek). The Proponent indicated that the predicted travel times of the groundwater seepage to the surface receivers is longer than 100 years and that it is therefore not realistic to include the effect of seepage in surface water quality modeling during operations. However, seepage was accounted for in modelling during closure.

The Proponent estimated that the water management pond would have approximately 1.1 million m³ of storage capacity. The Proponent stated that, during operations of the mine, water from the water management pond would be reused in the process plant. Only excess water

(referred to as mine effluent in this report) would be discharged from the water management pond to Hare Lake, either directly or after treatment in the water treatment plant if necessary. The Proponent further indicated that, depending on the water quality in the water management pond, they would determine whether temporary mitigation solutions, such as a mobile treatment unit, would be needed. If a more permanent solution for water treatment is deemed necessary, the Proponent was of the view that detailed design and construction of a permanent water treatment plant would require one season, or a year.

The Proponent's modelling indicated mine effluent discharged into Hare Lake would meet all water quality parameters, except for dissolved phosphorus and total suspended solids. Dissolved phosphorus would be present in the wastewater from the process plant as a result of the use of a phosphorus (phosphate)-based reagent. The Proponent indicated that phosphorus levels would be mitigated mainly via source control and, if necessary, through a water treatment plant prior to final discharge to Hare Lake. The Proponent recognized that, if not mitigated, there would be an increased potential for nutrient enrichment. The Proponent proposed using passive means (i.e., settling in the water management pond) and active means (i.e., filtering) if required, as a mitigation measure to achieve the regulatory limits for total suspended solids in the effluent prior to discharge to Hare Lake.

The Proponent stated that mine effluent would meet a total phosphorus concentration of 0.02 mg/L through their mitigation strategy for phosphorus. They also indicated that all other parameters of the mine effluent, including heavy metals and total ammonia, would meet regulatory discharge limits for the protection of aquatic biota. The Proponent reported that the process plant itself would remove metals because of the high pH involved in processing. If necessary, they would be able to rely on the additional capacity of Cell 1 within the process solids management facility for temporary storage of water not meeting discharge criteria. The Proponent further indicated that ammonia would be removed through natural processes in the water management pond, but if mitigation is necessary, they would rely on an explosives management plan to control nitrogen in the mine effluent.

The Proponent indicated that other chemical reagents, such as potassium amyl xanthate, methyl isobutyl carbinol, aerofroth, carboxymethyl cellulose, Drewfloc 2279 polymers, and lime would be utilized in the mill process stream at rates and associated concentrations below the levels at which they become toxic to aquatic biota and human health. They further stated that they estimated that 99% of these reagents would be attached to the concentrate, which would be shipped off site as a product. The remaining 1% would be attached to solids conveyed in the process solids management facility.

The Proponent proposed a seasonal discharge schedule over eight months (April to November) and estimated that the highest annual quantity of mine effluent to discharge would be equivalent to 350 m³ per hour if discharge occurs daily; this is equivalent to approximately 2 million m³ annually. The Proponent stated that the mine effluent would be discharged to the

south side of Hare Lake via a multi-port diffuser at a water depth of 3 m, roughly 10 m from the shoreline.

Based on an evaluation of the mixing zone, the Proponent concluded that meromixis (poor mixing) in Hare Lake would not be anticipated. They also concluded that the temperature regime of the lake would not be affected by discharge to Hare Lake. The Proponent has committed to monitoring for meromixis as part of surface water monitoring and to developing a contingency plan as part of any future permitting.

Active Closure and Post-Closure Phases

The Proponent anticipates that mine effluent discharge to Hare Lake would cease during the active closure phase and water would continue to be collected from the different locations of the site and diverted to the open pits for storage and filling of the pits. They stated that the south pit would be filled with mine rock following operations and drainage channels would be constructed to direct water from the south pit to the central pit and from the central pit to the north pit. The Proponent predicted that the pits would provide water storage for several decades.

The Proponent indicated that the pit lakes would take 17 to 30 years to fill. They modelled water chemistry for the post-closure phase and indicated that they would assess both the filling rate and water quality during the filling period and adjust their model accordingly.

Once filled, the north pit would overflow eastward via the Stream 2 channel under the mine rock storage area to the Biigtig Zibi. The Proponent committed to monitoring water quality in the pit lakes as they fill to understand how the quality could evolve over time. They noted that the 17-to-30-year period would allow sufficient time to react and implement mitigation measures, should monitoring demonstrate that water in the pit lakes was not going to be acceptable for direct discharge to the Biigtig Zibi. The Proponent indicated that they could pump water from the pit to prevent its rise to the release level and treat it before discharge. They further stated that in-pit treatment, which would consist of adding certain reagents directly to the pit, mixing the water, and then allowing the reagents to settle to the bottom of the pit, could also be implemented. The Proponent's modelling indicated there would be no (or in some cases only incremental) changes in chemical concentrations in the Biigtig Zibi relative to baseline concentrations once post-closure discharge occurred. They stated there would be no exceedances of water quality benchmarks. In response to concerns raised by Biigtigong Nishnaabeg, the Proponent committed to ongoing discussions to explore whether options that can avoid discharge to the Biigtig Zibi during closure would be technically and economically feasible.

GenPGM stated that surface runoff and seepage from the rehabilitated process solids management facility during the post-closure phase would be directed to subwatershed 106 via Stream 6 (Angler Creek). On the west side of the mine rock storage area, runoff from catchment

areas around the open pit and the mine rock storage area would report to the pit. On the east side of the mine rock storage area, runoff would report to subwatersheds 102 and 103, which flow into the Biigtig Zibi. Once the water level of the open pit reached the level of the drainage within subwatershed 102, water would flow through the base of the mine rock storage area to the Biigtig Zibi.

The Proponent recognized that the eastern portion of Stream 6 (Angler Creek) would be overprinted by construction of the process solids management facility. They indicated that their predictions show small and incremental increases in the concentrations of a number of constituents in Stream 6 (Angler Creek) post-closure, relative to background, but no constituents were expected to exceed their respective water quality benchmarks.

Views of the Participants

The Ministry of the Environment, Conservation and Parks raised concerns regarding the effects of seepage from the process solids management facility. They noted that the Project would overprint part of Stream 6 (Angler Creek) and could reduce the creek's ability to naturally absorb contaminants; this could potentially result in impaired water quality from seepage.

Environment and Climate Change Canada stated that the overburden stockpiles should be located entirely in subwatershed 102 to avoid drainage flow to subwatershed 101, which is a tributary of the Biigtig Zibi. Environment and Climate Change Canada advised that, if this is not technically feasible, the drainage should be collected and diverted away from Lake 4, which is located in the northeast of subwatershed 101, to avoid contaminating the lake.

Operations Phase

Michipicoten First Nation raised concerns about the Proponent's strategy to deal with mine effluent. They indicated that, based on their experience, a cost-effective mitigation plan for reducing nutrients (both phosphorus and nitrogenous substances) in treated mine effluent and stormwater runoff is to use a wetland treatment lagoon prior to release of water to local surface waters. They indicated that a wetland treatment lagoon should be examined and included in the site design as an option.

Michipicoten First Nation and Environment and Climate Change Canada raised concerns that nutrients such as phosphorus in mine effluent could exacerbate existing eutrophication problems in local watersheds and create anoxic conditions. This could in turn increase methylmercury production and bioaccumulation in fish tissue. Michipicoten First Nation indicated that watersheds in the vicinity of the Project currently have fish tissue methylmercury levels that have triggered provincial restrictions on human fish consumption, and that fish in Hare Lake have the highest levels, followed by the Biigtig Zibi. This is discussed in Section 10 (Fish and Fish Habitat), and Section 17 (Human Health). Michipicoten First Nation highlighted

the importance of establishing effluent-loading objectives for nutrients that could exacerbate the existing eutrophication problem in local watersheds.

The Ministry of the Environment, Conservation and Parks requested that the Proponent reassess their management strategy for phosphorus. The reassessment should consider a total phosphorus discharge limit (benchmark) of 0.01 mg/L in Hare Lake instead of the 0.02 mg/L benchmark.

Health Canada noted that concentrations of chemical reagents that would be used during onsite processing of minerals were not predicted in the mine effluent. Biigtigong Nishnaabeg indicated that they are concerned about the potential long-term effects of using poorly studied chemical reagents on surface water quality and fish and other wildlife consumed by their community.

The Ministry of the Environment, Conservation and Parks also expressed concern that mine effluent discharge from April through November could result in changes to the thermal properties of Hare Lake and Stream 5 (Hare Creek). The Ministry noted that, in the assessment of mixing conditions in Hare Lake using the CORMIX model, the Proponent did not evaluate how the worst-case discharge scenario under the lowest 7-day average flow that occurs on average once every 20 years would affect the waterbody. The Ministry asked that the worst-case scenario assessment include the potential for zero flow at the outlet of the lake and potential mitigation measures that would be enacted by the Proponent in this scenario.

Active Closure and Post-Closure

Biigtigong Nishnaabeg raised concerns regarding any mine-related discharges to the Biigtig Zibi at any stage of the project. Biigtigong Nishnaabeg indicated that discharge to the Biigtig Zibi would negatively affect water chemistry and result in an adverse effect on the community's Aboriginal title, rights, and interests. The risk associated with the water chemistry in the pit lake was also highlighted by Natural Resources Canada. Biigtigong Nishnaabeg requested that the Proponent develop and regularly update a separate pit lake water quality model for both the north and central pits to better understand the risks associated with the discharge of water from the pit lakes. Biigtigong Nishnaabeg further requested that these water quality models consider various rates of pit lake in-filling ranging from 17 to 30 years, and how including or excluding other contact water inputs from the site could affect the water chemistry in the pit lakes.

The Ministry of the Environment, Conservation and Parks noted that mine rock storage area seepage water and the pit lakes would discharge to the Biigtig Zibi and that further monitoring, modelling, and development of contingency plans as well as establishment of effluent limits for any discharges to the river would be necessary.

9.4 MERCURY AND METHYLMERCURY

Views of the Proponent

Site preparation activities, including clearing, grubbing, and stripping of vegetation, topsoil, and other organic materials, are generally seen as a potential source of release and mobilization of mercury from the soil into adjacent watersheds. GenPGM recognized the risk of mercury mobilization to local surface waters during land clearing and proposed a set of mitigation measures to address the potential effects including:

- keeping vegetated buffer zones between cleared areas and waterbodies;
- sediment and erosion control; and
- use of stormwater management pond to collect run-off.

The Proponent further stated that they would be collecting run-off for future transfer to the water management pond to become part of the overall water balance of the site.

The Proponent stated that the Project is not a source of mercury, and there is no expectation that mercury loading associated with the Project through operations would be a concern in Hare Lake. Nor do they expect that conditions in Hare Lake would enhance mercury methylation.

The Proponent also reported that phosphorus could exacerbate eutrophication and create anoxic conditions that can result in an increase of methylmercury production by sulphate/sulphur-reducing bacteria. The Proponent stated they would manage the discharge of phosphorus to Hare Lake to minimize the risk of eutrophication. They indicated that treatment technologies exist to meet a total phosphorus discharge limit (benchmark) of 0.01 mg/L in Hare Lake.

During operations of the mine, the Proponent predicted sulphate levels would increase from 3.5 mg/L (baseline) to 4.5 mg/L on average in Hare Lake. They also predicted an increase of sulphate from 3.5 mg/L (baseline) to 7.2 mg/L on average in Stream 6 (Angler Creek) post-closure.

The Proponent noted that discharge water quality modelling predicted that the normal mixing cycle of Hare Lake would prevent anoxic conditions and sediments from becoming present and potentially increasing methylation rates. They also indicated that the mine waste management plan is their primary action for mitigating sulphate concentrations in mine drainage. They noted that, through this plan, Type 2 mine rock and Type 2 process solids would be treated as separate waste streams. The Proponent further noted that these waste streams would be compartmentalized for storage and submerged to mitigate the production of sulphate.

Views of the Participants

The Ministry of the Environment, Conservation and Parks is of the opinion that the risk of mercury mobilization associated with land clearing at the Project site is relatively low. The Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) shared the same opinion and noted that the Project development area is relatively low in wetland coverage and dominated by thin, well-drained soils and therefore they expect the area to be at low risk of increased mercury mobilization from tree-harvesting activities. Both agencies also agreed that the Proponent's proposed mitigation measures to reduce the risk of mercury mobilization are appropriate.

MNDMNRF stated that the Proponent's proposed mitigation measures, including minimizing clearing, establishing vegetated buffer zones, and controlling erosion and sediment movement to water bodies, are appropriate to reduce risk of mercury mobilization. Regardless, an effective mitigation strategy should also include controlling and/or containing surface water runoff as well as sediment around the area being cleared and the resulting overburden stockpiles.

Environment and Climate Change Canada and Biigtigong Nishnaabeg raised concerns regarding the predicted increase of sulphate deposits in Hare Lake and Stream 6 (Angler Creek). Although the Provincial Water Quality Objectives and the Canadian Council of Ministers of the Environment objectives have no limits for sulphate, sulphate deposits in waterbodies could be an issue due to their potential to enhance methylmercury production. Environment and Climate Change Canada stated that even small amounts of sulphate could stimulate sulphate reduction in waterbodies where sulphate is limited, which can lead to increased methylmercury production. This typically happens under anoxic conditions when insufficient oxygen is present in waterbodies. The Ministry of the Environment, Conservation and Parks stated that effluent limits and/or objectives for sulphate would be considered for inclusion in the environmental compliance approval.

Environment Canada and Climate Change identified a need for phosphorus monitoring at the source to ensure that phosphorus levels in the receiving environment remain at or below provincial water quality objectives.

Biigtigong Nishnaabeg acknowledged that, because the proposed area of discharge to Hare Lake is shallow, atmospheric mixing is likely in that area and conditions in the Lake would allow for oxygen to diffuse through the water column. However, they were more concerned for deeper areas in Hare Lake, where anoxic conditions could develop in late summer (August and September) as well as in late winter during long periods of ice cover.

9.5 SURFACE WATER QUALITY MITIGATION AND MONITORING

Views of the Proponent

GenPGM proposed several mitigation and monitoring measures to reduce the risk posed by contaminants of potential concern in surface water, including:

- developing and implementing, in conjunction with Biigtigong Nishnaabeg, a site-wide water management plan that provides an integrated framework to manage water quality, including provision for water management practices for each of the primary site aspects, and areas of the site where there is contact water;
- supporting Biigtigong Nishnaabeg's water quality and aquatic monitoring efforts, including developing adaptive management measures and associated triggers, and working with associated communities to develop a framework to share results and assess the performance of the water management plan;
- engaging Biigtigong Nishnaabeg in the design and implementation of the water quality monitoring programs and obtaining their approval of proposed monitoring plans and programs;
- continuing background water quality sampling on a monthly basis during ice-free seasons and collecting additional data at all phases of the life of mine to characterize effects on water quality, water resources and fish and fish habitat, specifically for the Biigtig Zibi and subwatershed 101, and monitoring subwatersheds 102 and 103, which are largely overprinted by the mine rock storage area;
- monitoring water quality in the water management pond, the mine effluent to be discharged, Hare Lake, Hare Creek, Stream 6 (Angler Creek), the Biigtig Zibi, the mine rock storage area perimeter ditching and catch basins, pit lakes during closure as they fill up, natural drainage restoration, and the outlet of Lake 8;
- monitoring for heavy metals (total and dissolved concentrations) including platinum group metals, mill reagents, and other parameters such as total suspended solids, alkalinity, total ammonia, acidity, dissolved organic carbon, total dissolved solids, nitrate, pH, conductivity, chloride, sulphate and total hardness, and specific components related to mercury, phosphorus, and other indicators of eutrophication;
- continuing mercury data analysis with a detection limit of 1 or 2 ng/L, meeting the required total phosphorus discharge benchmark of 0.01 mg/L in Hare Lake and at all phases of life of mine and implementing best practices to prevent mercury methylation, such as stripping organic soils in advance of flooding an area;

- monitoring of meromixis in Hare Lake and developing a contingency plan as part of the permitting process;
- engaging with Biigtigong Nishnaabeg in the design and implementation of the mercury monitoring plan and obtaining Biigtigong Nishnaabeg's approval of the plan;
- collecting and monitoring water associated with the mine rock storage area and implementing treatment measures to ensure inadvertent discharge to the Biitig Zibi meets applicable regulatory criteria;
- developing and implementing, in conjunction with Biigtigong Nishnaabeg, focused monitoring programs on waterbodies of significance to Indigenous communities, such as the Biigtig Zibi, the outlet of Hare Creek at Port Munro and Stream 6 (Angler Creek), and the outlet at Sturdee Cove, that include the collection of surface water, sediment, benthic invertebrates, and fish tissue samples and monitoring for mercury, phosphorus and other indicators of eutrophication; and
- during closure, collecting and updating a separate pit lake water quality model considering various scenarios of rate of pit-lake infilling and how other contact water inputs from the site could affect the pit lake model.

Views of the Participants

Participants, including the Ministry of the Environment, Conservation and Parks, Biigtigong Nishnaabeg, and Health Canada, noted that the Proponent's proposed water quality monitoring plan did not include methylmercury, platinum group metals, or chemical reagents. The Ministry of the Environment, Conservation and Parks also noted that the Proponent's proposed environmental monitoring and management programs did not include a monitoring strategy and mitigation plan (including triggers for remedial action) to detect and mitigate conditions that may indicate the beginning of meromixis in Hare Lake.

9.6 PANEL CONCLUSIONS AND RECOMMENDATIONS

In reaching their conclusions on surface water quality, the Panel considered the following factors to be particularly relevant:

- a comprehensive baseline for water quality based on monthly sampling for two years or quarterly sampling for three years that includes data for platinum group metals;
- the Proponent's assertion that the water management infrastructure would be designed with sufficient capacity to avoid discharges during site preparation and construction and that the site water management plan to manage water quality throughout all phases of mine life would maintain care and control of water for all downstream uses;

- the Proponent's information noting the Project effluent would not be a source of mercury;
- confirmation of a low level of risk of mercury mobilization from land clearing;
- regulatory requirements that the method detection limit (0.1 ng/L) be used to characterize background data for mercury and that methylmercury analysis be conducted with a method detection limit of 0.02 ng/L;
- concern raised by Environment and Climate Change Canada and Biigtigong Nishnaabeg about a predicted increase in the concentration of sulphate deposits in Hare Lake and Stream 6 (Angler Creek) and the actions proposed by the Proponent to segregate, store, and submerge Type 2 mine rock and process solids to mitigate the production of sulphate;
- modelling from the Proponent indicated mine effluent discharged into Hare Lake would meet all water quality parameters, except for dissolved phosphorus and total suspended solids.
- the Proponent's proposal to reduce phosphorus via source control and if necessary, through the water treatment plant prior to final discharge to Hare Lake, including meeting the required total phosphorus discharge limit (benchmark) of 0.01 mg/L in Hare Lake as recommended by the Ministry of the Environment, Conservation and Parks;
- the Proponent's proposal to use passive means (i.e., settling in the water management pond) and active means (i.e., filtering) prior to discharge into Hare Lake to mitigate effects from total suspended solids;
- concerns raised by the Ministry of the Environment, Conservation and Parks on the timing and potential stratification of Hare Lake, including the lack of modelling of a worst-case discharge scenario under the lowest-flow condition in Hare Lake;
- concerns expressed by Biigtigong Nishnaabeg about the predicted increase of nitrate and total ammonia concentrations in Stream 6 (Angler Creek) post-closure;
- Biigtigong Nishnaabeg's request for no discharge to the Biigtig Zibi post-closure;
- the Proponent's commitments to either pump water from the pit lake to prevent its rise to the release level and treat it before discharge, or implement in situ water treatment within the pit to ensure the quality meets all discharge requirements;
- commitments made by the Proponent to ongoing discussions with Biigtigong Nishnaabeg to explore whether options that can avoid discharge to the Biigtig Zibi during closure would be technically and economically feasible; and
- the Proponent's commitment to a comprehensive water quality monitoring program.

The Panel finds that the baseline data, although gathered over a long period of time, are limited and do not fully reflect the current conditions. The Panel is satisfied that the Proponent would update the surface water quality baseline information prior to any potential permitting stage. The Panel understands that the parameters and frequency of data collection involved in establishing a comprehensive surface water quality baseline would be determined in consultation with regulatory bodies.

The Panel acknowledges the Proponent's assurances that the proposed water management system would be designed with sufficient capacity to avoid discharges during site preparation and construction activities. However, the Panel is of the view that it is critical that proposed water infrastructure be designed, operated, and maintained in a manner that ensures the safe storage of water and, in particular, that the infrastructure be designed to minimize the risk of overflow of water to the Biigtig Zibi during operations.

Although the Proponent indicated that the concentrations of chemical reagents associated with toxic effects are higher than the concentrations that would be used in the process plant, the Panel finds that, in the absence of supporting rigorous modelling, there are uncertainties about the fate of the reagents, their concentrations in the mine effluent, and how they could react with other chemicals as they are released into the environment. The Panel acknowledges the views presented by Health Canada and Biitigong Nishnaabeg in this regard and is persuaded that during operations of the mine, there would be a need to monitor the proposed chemicals and their toxicity in the water management pond prior to the discharge of mine effluent.

The Panel notes that removal of phosphorus from effluent discharge is a critical aspect of the Project. The Panel observes that, although the Proponent has proposed mitigation measures to address total suspended solids, they did not predict the concentration in the final discharge. The Panel acknowledges the Proponent's assurances that technologies are available and can be designed to achieve the required discharge limit for total phosphorus. The Panel finds that, if such technologies are available, designed, implemented, properly operated and adequately maintained, they would protect Hare Lake from the negative effects of phosphorus. The Panel understands that effluent discharge requirements are typically imposed by the Ministry of the Environment, Conservation and Parks through environmental compliance approvals that the Proponent is obligated to obtain prior to discharging effluent into the environment.

The Panel understands that evaluation of the worst-case discharge scenario under the lowest-flow condition in Hare Lake would be required to determine the final discharge criteria at the permitting stage. Although the Proponent indicated that the quality of water in the water management pond would be equivalent to the quality of effluent that would be discharged to Hare Lake for all parameters, except for phosphorus and total suspended solids, the Panel finds that uncertainties remain about the actual water quality constituents and their concentrations. The Panel observes that most of those parameters apply to heavy metals and total ammonia. The Panel notes that caution regarding water quality in the water management pond would be

necessary as no treatment has been explicitly proposed by the Proponent for those parameters. The Panel finds that monitoring of the water in the water management pond is warranted prior to the discharge of effluent. The Panel concludes that early identification of potential issues can facilitate the implementation of an adaptive management plan to protect downstream receivers. The Panel understands that mobile water treatment units that can be brought quickly to the Project site are available as emergency back-up.

The Panel agrees with participants and the Proponent that mercury and methylmercury are critical parameters due to the effect on fish quality and consequences for human health. The Panel is satisfied that the information presented by the Ministry of the Environment, Conservation and Parks and MNDMNRF indicates the risk of mercury mobilization from soils at the Project site is low.

The Panel observes that the detection limit for mercury that the Proponent committed during the hearing to use (1 or 2 ng/L) is still higher than the detection limit recommended by the Ministry of the Environment, Conservation and Parks (0.1 ng/L for mercury and 0.02 ng/L for methylmercury). The Panel accepts the recommendation and understands that the lower detection limit requested by the Ministry of the Environment, Conservation and Parks would help determine the potential for mercury and bioaccumulation and trigger additional monitoring requirements when appropriate.

The Panel understands that the Proponent is confident that appropriate mitigation measures would be implemented to minimize the potential for anoxic conditions to develop in Hare Lake. The Panel understands that the temperature of the effluent and the temperature in the lake must be monitored and controlled to limit the potential for meromixis. The Panel is of the view that measures taken to restrict the timing of effluent discharge during periods of low water and limited mixing would reduce the risk further.

The Panel recognizes the concerns raised by participants regarding discharge to the Biigtig Zibi and in particular Biigtigong Nishnaabeg's request that no discharge occur at any stage of mine operations. The Panel accepts the commitment by the Proponent to implement control measures to treat any water releases to the river to ensure the quality meets all discharge requirements and the further mitigation and monitoring measures outlined above.

The Panel acknowledges the Proponent's specific commitments to either pump water from the pit lakes during post-closure to prevent its rise to the release level and treat it before discharge, or implement in situ water treatments within the pit to ensure water quality meets all regulatory discharge requirements. The Panel is encouraged by the collaborative approach outlined by the Proponent and Biigtigong Nishnaabeg to implementing comprehensive monitoring and follow-up programs specifically addressing water quality in the pit lakes and any discharges to the Biigtig Zibi.

The Panel is of the view that a broader monitoring plan that takes uncertainties into account would reduce the risk of water quality impairment and facilitate implementation of an adaptive management plan to protect aquatic living organisms. The Panel is satisfied that the Proponent, in consultation with Indigenous communities and regulatory agencies, has committed to broadening their proposed monitoring program during the permitting stage.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 9: The Proponent should implement, during all phases of the Project, control measures for erosion and sedimentation in the Site Study Area to prevent effects on the quality of water frequented by fish, in accordance with the requirements of the *Fisheries Act*. The Proponent should maintain these measures during all phases of the Project until all disturbed ground has been permanently stabilized, suspended sediment has resettled to the bed of the waterbody or settling basin, and runoff water is clear. The Proponent should take into account periods of flooding, heavy rainfall, and frost when designing and implementing these measures, inspect sediment control measures regularly, and repair any damage as soon as technically feasible.

Recommendation 10: The Proponent should partner with Biigtigong Nishnaabeg to develop and implement a site-wide water management plan throughout all phases of the Project. The plan should include integrated framework to manage water quality including all recommendations made by the Panel on water quality in this section.

Recommendation 11: The Proponent should implement mitigation measures to protect receiving waterbodies, including Hare Lake, the Biigtig Zibi, and Stream 6 (Angler Creek) from contamination during the operations, active closure, and post-closure phases and to meet regulatory discharge limits for the protection of aquatic biota:

- Develop and implement mitigation measures for phosphorus such that the total phosphorus benchmark of 0.01 mg/L in Hare Lake is not exceeded as a result of the Project.
- Monitor water quality in the water management pond prior to the discharge of effluent and, if necessary, implement water treatment or other mitigation measures prior to discharge. Parameters to monitor include phosphorus, total suspended solids, mercury, all other heavy metals (total and dissolved concentrations), chemical reagents, alkalinity, total ammonia, acidity, dissolved organic carbon, total dissolved solids, nitrate, pH, conductivity, chloride, sulphate, total hardness, temperature, un-ionized ammonia, and platinum group metals.
- Monitor water quality in the pit lakes and conduct water quality modelling separately for each pit lake during active closure and post-closure to determine the mitigation measures necessary to protect the Biigtig Zibi post-closure.

- Regularly monitor water quality in the mine rock storage catch basins, and treat as necessary during operations. Ensure that in the case of an overflow event due to precipitation above both the 1-in-100-year storm storage and pumping capacities, discharge does not impair the water quality of the Biigtig Zibi.
- Monitor the water quality in the pit lakes post-closure, and, if necessary, implement pit lakes water treatment or other mitigation measures to ensure continued protection of the Biigtig Zibi post-closure.
- Delay release of effluent into Hare Lake during operations until Hare Lake is free of ice and locate the diffuser outlet within Hare Lake to minimize any potential effect on stratification.
- To prevent increases in methylmercury production, avoid discharging or reduce the amount of effluent to Hare Lake during periods when anoxic conditions could potentially develop in the lake, as determined by the Ministry of the Environment, Conservation and Parks.

Recommendation 12: The Proponent should implement mitigation measures to prevent mercury mobilization and release to surface water bodies during all phases of the Project:

- Maintain a minimum 30 m vegetated buffer zone between cleared areas and waterbodies that are not being overprinted as a result of the Project.
- Manage sediment and erosion detailed in Recommendation 9.
- Use a stormwater management pond to collect run-off for transfer to the water management pond.
- Undertake progressive reclamation concurrently over all phases of the Project to stabilize and vegetate any disturbed areas as soon after the disturbance as possible.

In addition to the recommended mitigation measures, the Panel recommends the Proponent implement follow-up programs:

Recommendation 13: The Proponent should undertake further consultation with relevant government agencies and Indigenous communities to develop and implement a site-wide water quality follow-up and monitoring program for all phases of the Project, verify the accuracy of the predictions, determine the effectiveness of mitigation measures, and implement adaptive management. At a minimum, the follow-up program should include:

- pre-construction sampling of water quality in Hare Lake, the Biigtig Zibi and Stream 6 (Angler Creek) including:

- collection of additional data for benthic communities and all parameters measured during the 2008–2012 and 2013–2019 sampling campaigns;
- collection of baseline data for platinum group metals;
- collection of mercury and methylmercury data with method detection limits acceptable to the Ministry of the Environment, Conservation and Parks;
- monitoring of waterbodies and mine effluent to compare against predicted effects, including monitoring:
 - water quality in Hare Lake, Biigtig Zibi (extending downstream of the Project to the mouth of Lake Superior), Stream 5 (Hare Creek) to its outlet at Port Munro, and Stream 6 (Angler Creek) to its outlet at Sturdee Cove;
 - total ammonia and un-ionized ammonia in Hare Lake;
 - dissolved oxygen in Hare Lake, the Biigtig Zibi, and Stream 6 (Angler Creek);
 - methylmercury in Hare Lake, the Biigtig Zibi, and Stream 6 (Angler Creek);
 - platinum group metals in mine effluent to be discharged into Hare Lake; and
 - acute toxicity and sub-lethal toxicity to fish in mine effluent to be discharged in Hare Lake;
- an evaluation, in consultation with the Ministry of the Environment, Conservation and Parks, of the worst-case discharge scenario in Hare Lake under the lowest 7-day average flow condition that occurs on average once every 20 years to revise the predicted effects; and
- implementation of additional mitigation measures should the results of monitoring indicate that the effects are greater than predicted or mitigation measures are not effective.

Recommendation 14: The Proponent should develop a follow-up program to validate the effects predicted by the meromixis model for Hare Lake. As part of the program, the Proponent should monitor the thermal regime of Hare Lake during operations and implement additional mitigation measures as necessary to ensure that the natural process of temperature stratification and mixing is maintained.

For both follow-up programs, GenPGM should determine sampling locations, frequencies and parameters, and adaptive management thresholds and measures in consultation with Environment and Climate Change Canada, the Ministry of the Environment, Conservation and Parks, and Indigenous communities.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on surface water quality.

9.7 CUMULATIVE EFFECTS

Views of the Proponent

GenPGM stated they found no spatial overlap between the residual effects of the Project and the residual effects of other projects or activities they identified. They also stated that they do not expect any cumulative effects to result from pit lake discharge to the Biigtig Zibi or other discharges, such as to the Hemlo Gold Mine or the Manitouwadge mining camp, or to the Black River, which flows to the Biigtig Zibi and ultimately to Lake Superior. To support their claim, the Proponent noted that those external activities are responsible in part for the baseline conditions against which the Project's effects have been assessed. The Proponent also noted that their water quality analysis shows all parameters would be below their respective thresholds for the protection of aquatic life close to the Project site and in more downstream areas, including the Biigtigong Nishnaabeg community reserve lands. The Proponent noted that, at the discharge location to the Biigtig Zibi, drainage from the Project site represents less than 1% of the flow in the river.

With regard to concerns about the mercury disposal site south of Marathon, the Proponent noted that the site has been closed in accordance with the regulatory requirements of the province and that it is clay-lined and clay-capped. The Proponent recognized that treated effluent from the AV Terrace Bay Inc. mill discharges to Blackbird Creek, which enters Lake Superior in Jackfish Bay, but this activity has no spatial overlap with the Project.

Views of the Participants

Pays Plat First Nation reported concerns regarding the Proponent's conclusion about the cumulative effects on surface water quality, including validation of the Proponent's model predictions during the activities of the Project, the potential for cumulative effects resulting from accidents and malfunctions, and the potential for cumulative effects along the north shore of Lake Superior.

Pays Plat First Nation noted contaminants from the mine effluent could reach Peninsula Harbour and Jackfish Bay. This could occur via the predominant westerly currents in Lake Superior. Pays Plat First Nation indicated that the EIS fails to adequately assess the effects of contaminants resulting from the combined effect of the Project and other existing or planned projects in the area.

Citizens for Responsible Industry in Northwest Ontario stated that the Proponent's scoping of cumulative effects did not consider Lake Superior's watershed as a whole. They identified two areas of concerns on Lake Superior near Marathon, including Peninsula Harbour and the Jackfish Bay. The group stated that in their opinion, the Proponent had not considered all the possible effects within Lake Superior's watershed. They noted that treated water from the Hemlo Gold Mine discharges into Black River, which enters the Biigtig Zibi approximately 18 km downstream of the Project. The group concluded that the Hemlo Gold Mine and the Project would cumulatively affect the water quality in Lake Superior.

Citizens for Responsible Industry in Northwest Ontario also noted that, although the AV Terrace Bay pulp mill is 100 km from the Project, it affects the waters of Lake Superior and should therefore be considered in any assessment of the cumulative effect on Lake Superior. The group also expressed a concern about the Marathon landfill, aggregate sites in the Local Study Area (see Appendix 6), and the former mercury disposal site south of Marathon.

Michipicoten First Nation stressed that discharging nutrients and phosphorous into Hare Lake, and ultimately Lake Superior, results in methylmercury contamination that is not contained in any specific geographic location but can spread throughout the lake over time.

The protection of Lake Superior's water quality is also of the utmost importance to the Jackfish Metis Association.

Panel Conclusions and Recommendations

The Panel understands that the baseline sampling for the Project includes the existing effect of downstream external activities, such as discharges from the Hemlo Gold Mine into the Black River, which is a tributary of the Biigtig Zibi.

The Panel observes that the predictions for the Project estimated by the Proponent appear to indicate that water quality parameters would be below their respective thresholds for the protection of aquatic life. However, the Panel is of the view that a slight change in water quality could lead to additive effects on the downstream aquatic environment. Due to implementation of the proposed measures to minimize the risk of any contamination to receiving water bodies, as well as the commitment to a rigorous monitoring program, the Panel considers the potential for cumulative effects on water quality to occur in the Biigtig Zibi as low.

The Panel has heard and understands the concerns about the need to protect Lake Superior from potential sources of contamination. The importance of Lake Superior to the Indigenous communities cannot be understated. The Panel is satisfied that the existing environmental conditions in the lake would not be exacerbated by the Project.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on surface water quality.

SECTION 10: FISH AND FISH HABITAT

This section addresses environmental effects of the Project on fish and fish habitat, including effects on aquatic species at risk. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and under paragraph 5(1)(a) of the *Canadian Environmental Assessment Act, 2012*. They also inform the assessment of effects under paragraphs 5(1)(b) and (c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required the Proponent to:

- provide baseline information that characterized fish habitat, fish habitat use and fish community, including aquatic species of conservation concern, within each water body and their inter-connecting channel(s) in the context of the local and regional sub-watershed areas;
- characterize existing metal levels, including mercury, in fish muscle and liver in areas that may be impacted by effluent or seepage from the mine; and
- identify potential effects on fish and fish habitat during all phases of the Project.

The Panel's Terms of Reference required that the Panel's assessment include a consideration of the extent to which biological diversity (e.g. ecosystems and/or species diversity) is affected by the Project, including any listed wildlife species, its critical habitat or the residences of individuals of that species as those terms are defined in subsection 2(1) of the federal *Species at Risk Act*, as well as any impact it may have on a provincially threatened or endangered species and/or its protected habitat. For the aquatic environment, this included consideration of Northern Brook Lamprey (*Icthyomyzon fossor*) Great Lakes – Upper St. Lawrence populations, and Lake Sturgeon (*Acipenser fulvenscens*) Great Lakes – Upper St. Lawrence populations.

10.1 BASELINE

10.1.1 Fish and Fish Habitat

Views of the Proponent

Waterbodies near the Project include small ponds and lakes. Numerous streams drain the Project site and flow east into the Biigtig Zibi before ultimately draining into Lake Superior or west directly into Lake Superior via Stream 6 (Angler Creek). Further information on the hydrology of the Project site is provided in Section 8 (Surface Water Quantity).

Between 2001 and 2012 GenPGM carried out three environmental baseline assessments of fish and fish habitat. In addition, an updated baseline study was carried out in 2020. The Proponent defined the Local Study Area as the maximum area within which changes to fish habitat from the Project were predicted (see Appendix 6). The objective of the sampling programs was to sample all lakes within this Local Study Area and representative upper, middle and lower reaches of each of the applicable subwatersheds to provide a realistic representation of fish presence and absence, species composition, and general abundance for the water bodies in the area.

The Proponent stated that the current and existing baseline data were sufficient to accurately define species presence and relative abundance by waterbody, and fish habitat conditions.

The Proponent indicated that repeated baseline sampling confirmed a number of headwater watercourses and waterbodies within the Project footprint do not support fish at any time of the year. Where fish do occur within the Site Study Area, the community is generally limited to small-bodied (forage) fish.

The Proponent described the following baseline conditions:

- The Hare Lake fish community comprises primarily coolwater species, including Northern Pike and Yellow Perch.
- Biigtig Zibi watershed tributaries in the immediate vicinity of the Project (Streams 1, 2, 3, and 4) afford limited nursery and potential spawning habitats within their lowest reaches for migratory species (Rainbow Trout and Chinook Salmon), as well as resident species (Brook Trout and Slimy Sculpin).
- Stream 5 (Hare Creek), below the Highway 17 crossing, supports a coldwater fish community and spawning and nursery habitats for both migratory and resident salmonids.
- The upper reaches of Stream 6 (Angler Creek) are largely fishless, with some areas having Brook Stickleback. Within its lowest reaches, below a cascade barrier, this creek provides a limited amount of nursery and spawning habitat for coldwater migratory species from Lake Superior, including Steelhead (Coastal Rainbow) Trout.
- Lake 8 is a long, narrow, and shallow lake, with limited connectivity to downstream habitats. It is inhabited only by Brook Stickleback.
- The fish community in the Biigtig Zibi is diverse, with a variety of cool- and coldwater fish species, such as Lake Sturgeon and Walleye. Lake Sturgeon move up and down the Biigtig Zibi during spawning migration and utilize the lower river for foraging.

Views of the Participants

Streams

The Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) noted that Streams 1, 2, 3 and 6 currently support populations of small-bodied, stream-resident Brook Trout. These fish may move downstream, contributing to fisheries in the Biigtig Zibi (Streams 1, 2, and 3 only) and ultimately Lake Superior. They also stated that the lower reach of Stream 6 (Angler Creek) supports a spawning run of salmonids and is a popular Steelhead (Coastal Rainbow) Trout angling spot for the residents of Marathon and surrounding communities.

Biigtigong Nishnaabeg indicated that the downstream extent of Stream 6 (Angler Creek) is inhabited by Rainbow Trout and Chinook Salmon, which are species of importance to the community. They also noted that Stream 6 (Angler Creek) provides nursery and spawning habitat for migratory coldwater species from Lake Superior as well as other small-bodied species.

Pays Plat First Nation noted that the streams in and near the Project area have migratory salmonids and provide exceptional rearing capacity for the migratory fish.

Hare Lake

Fisheries and Oceans Canada indicated that Hare Lake is a unique coldwater lake in the area. They stated that several fish physiology and life processes are dependent on the natural process of temperature stratification and mixing that occurs twice per year.

MNDMNRF confirmed that the native, naturally reproducing fish community in Hare Lake is a coldwater community. They also indicated that, typical of other small oligotrophic lakes in the region, Hare Lake also supports a coolwater fish community in the shallow margins of the lake.

Biigtigong Nishnaabeg observed that they have seen the fishery in Hare Lake change from a coldwater fisheries to a coolwater fishery. They indicated that fish populations in Hare Lake historically consisted of Lake Trout and Lake Herring (Cisco). They noted the lake has been transitioning to one dominated by Northern Pike and Yellow Perch. Biigtigong Nishnaabeg suggested that this transition was possibly linked to eutrophication, or general warming of Hare Lake.

Data Collection

Fisheries and Oceans Canada expressed concern about the data collected and indicated that the productive capacity data collected for Hare Lake and Streams 1, 2, 3, 5, and 6 (Angler Creek) and other areas have not been collected over a sufficient time period to capture natural variation, seasonal variation, or variation introduced by the choice of sampling method.

Fisheries and Oceans Canada concluded the data were insufficient to establish and monitor for success of mitigation (offsetting) measures.

Fisheries and Oceans Canada recommended the Proponent address baseline data gaps prior to Project construction.

MNDMNRF stated that stream habitat in the Site Study Area was dependent on both groundwater and surface water inputs to support completion of the life cycles of coldwater fish species. They expressed concern that the Proponent's approach to determining the presence or absence of representative fish, species composition, and general abundance for the water bodies in the Project area did not properly capture species residency and community characteristics. The Ministry also indicated that the sampling undertaken by the Proponent did not describe the coldwater fisheries community in Hare Lake in sufficient detail to support the future monitoring of the lake's habitat.

Biigtigong Nishnaabeg expressed concern with the outdated pre-disturbance fisheries data for affected subwatersheds of the Biigtig Zibi, specifically subwatersheds 101, 102, and 103. In particular, they noted that no fisheries surveys have been conducted since 2011. This gap in water quality and fish and fish habitat data used by the Proponent to assess Project-induced effects on these water bodies and associated impacts on Biigtigong Nishnaabeg's Aboriginal Title rights would need to be resolved with up-to-date data to adequately quantify the losses to the fishery and to develop sufficient offsetting and fisheries compensation.

Pays Plat First Nation stated that the quantity of fish loss is unknown as a result of the lack of overall data. Pays Plat First Nation indicated that the current description of benthic communities in the waterbodies across the Project site, and particularly Hare Lake, was insufficient to establish an adequate monitoring benchmark.

10.1.2 Baseline Concentrations of Metals in Fish

Views of the Proponent

The Proponent noted that they conducted an analysis of metals in fish tissue in Hare Lake and Bamooos Lake from 2009 to 2013. The purpose of the analysis was to determine past levels of metals, including mercury in fish tissues, for both forage fish and key species of interest.

The Proponent indicated that the results of the analyses were compared with available data from the Ministry of Environment, Conservation and Parks. The 2009 data were also compared with Ontario's consumption guidelines in the *Guide to Eating Ontario Fish* (2017) to determine if any of the fish posed a risk to human consumption. Further discussion on the effects of the Project on human health, including those of mercury levels in fish, is found in Section 17 (Human Health).

In 2021, the Proponent conducted additional fish tissue sampling from Hare Lake and the Biigtig Zibi; however, these data were not available at the close of the record. The Proponent indicated this sampling was in support of ongoing country foods studies and preliminary environmental effects monitoring. They indicated that they were planning to collect additional fish tissue samples in 2022, including additional species and locations.

Views of the Participants

Environment and Climate Change Canada indicated that baseline data on concentrations of metals in fish are important to adequately monitor changes in metal bioaccumulation rates, including those of mercury in fish during mining operations. Environment and Climate Change Canada and the Ministry of the Environment, Conservation and Parks noted that, as fish tissue collection was limited to walleye from the Biigtig Zibi and Northern Pike and Spottail Shiner from Hare Lake and involved only five fish of each species, the sample sizes were not large enough to establish statistically significant baseline data. Environment and Climate Change Canada indicated that results of the fish tissue collections in 2021 and planned collections for 2022 are needed.

The Ministry of the Environment, Conservation and Parks stated that neither they nor the Proponent should rely on mean fish tissue contaminant concentrations when assessing current contaminant levels in fish in the study area waterbodies, as fish of larger sizes will have higher concentrations of contaminants than those of smaller lengths. They indicated that fish tissue contaminant data should be assessed based on size-standardized results to allow for the determination of fish consumption advisories for different lengths of fish of different species.

The Ministry of the Environment, Conservation and Parks recommended that additional fish tissue collection be carried out for both the Biigtig Zibi and Hare Lake. They indicated that this fish tissue data should be used as a baseline condition against which GenPGM would monitor potential changes in fish tissue contaminant concentrations over the life of the mine.

Michipicoten First Nation observed that background levels of mercury in the Canadian Shield can produce problematic levels of methylmercury in fish when the watershed is subjected to modest eutrophication. Citing a 2016 Environment and Climate Change Canada study that examined a possible increase in methylmercury as a result of anthropogenic activities and climate change, they noted that the Proponent's fish tissue monitoring program would likely find increased methylmercury in fish over the next few decades, regardless of contributions from the Project. Michipicoten First Nation indicated that background data and appropriate effluent contaminant-loading objectives coupled with ongoing aquatic studies are needed in order to confirm the Project is not a significant contributor to increased mercury in fish tissue.

10.1.3 Project-related Changes to Fish and Fish Habitat

This section of the Panel report discusses Project-related changes to fish and fish habitat. This section also presents fish habitat offset as required under the *Fisheries Act* and compensation as required under the *Metal and Diamond Mining Effluent Regulations* Schedule 2.

Views of the Proponent

The Proponent identified five potential effects on fish and fish habitat as a result of the Project:

- fish mortality or death of fish by means other than fishing;
- change resulting in direct physical alteration, disruption, or destruction of fish habitat;
- change in water quantity (flow);
- change in water quality; and
- change in benthic invertebrate communities.

The areas with anticipated fisheries impacts are specified in Figure 10-1.

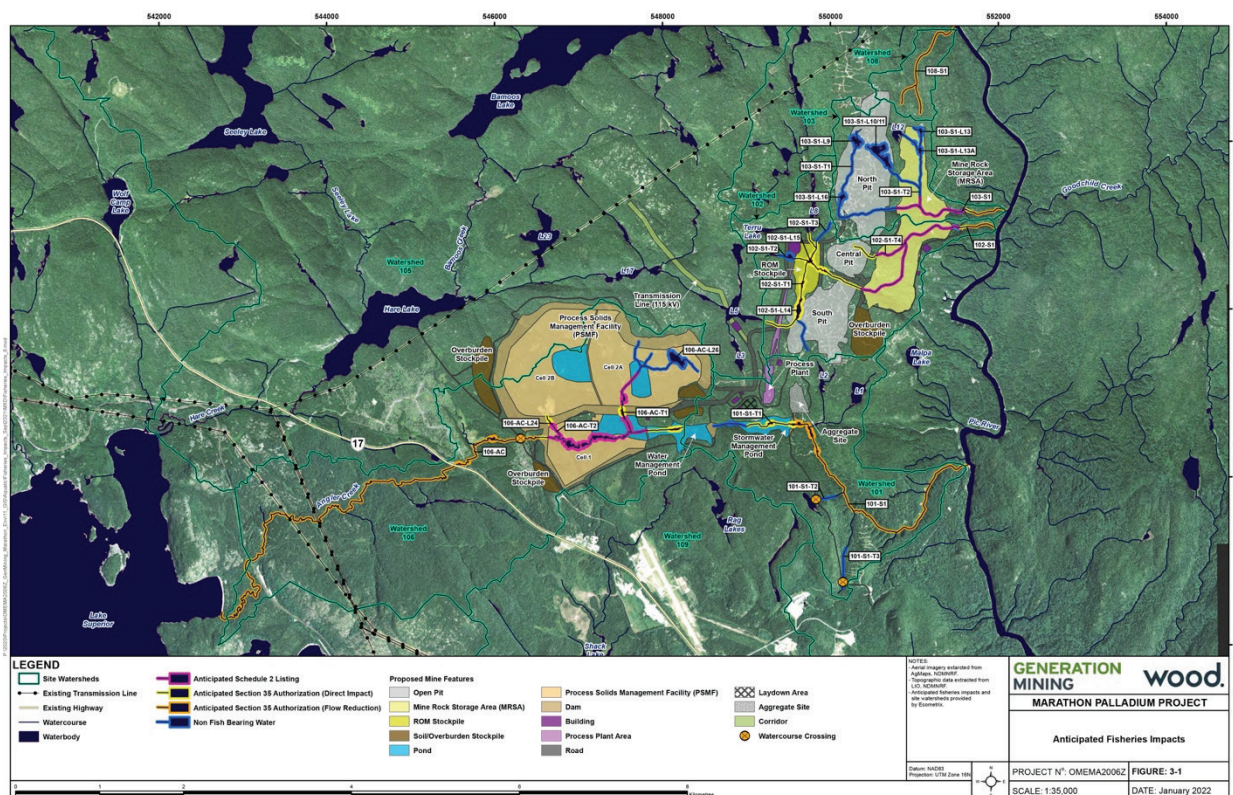


Figure 10-1: Areas with Anticipated Effects on Fish and Fish Habitat (CIAR #983)

10.1.4 Fish Mortality

Views of the Proponent

GenPGM noted that detonation of explosives near water has the potential to cause lethal or sub-lethal effects on fish. Rapid changes to water pressure or particle velocities in the substrates can result in morphological and physiological damage to fish, larvae, and eggs. To avoid lethal and sub-lethal effects, the Proponent indicated that blasting would occur beyond the required setback distance. The Proponent committed to avoiding, when possible, the use of explosives near water and, when near water, complying with Fisheries and Oceans Canada's *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters*. They indicated that lethal effects from blasting activities are not expected.

The Proponent indicated that Project-related lethal effects on fish associated with infilling of existing fish habitat may result in death to fish, despite mitigation measures. This activity is addressed further in the discussion of habitat alteration, disruption, and destruction.

Views of the Participants

Fisheries and Oceans Canada stated that blasting activities that occur near fish-frequented waterbodies have the potential to cause behavioural changes, injury, or death in fish. They observed that the 100 kiloPascal (kPa) overpressure threshold identified by the Proponent is not accepted as "a code of practice" to avoid harm to fish. Fisheries and Oceans Canada indicated a 50 kPa threshold is more protective of fish, including their sensitive life stages, and recommended GenPGM adopt this threshold.

10.1.5 Habitat Alteration, Disruption, and Destruction

Views of the Proponent

GenPGM reported that the Project would result in a loss of 12.33 ha, which is the combined area of direct and indirect effects on fish and fish habitat. They quantified direct habitat loss as 100% of the area subjected to overprinting (infilling of waters frequented by fish) regardless of whether it would be restored during a subsequent Project phase. Indirect impacts such as flow reductions to creeks and small drainages were also quantified as 100% of the habitat as a worst-case assumption.

The Proponent calculated 12.33 ha of direct and indirect effects as including:

- direct effect to waterbodies frequented by fish (4.56 ha);
- indirect effect due to flow reduction (4.25 ha); and

- mine waste⁶ deposited into fish habitat (3.52 ha).

The Proponent identified subwatersheds 101, 102, 103, and 106 as the primary fish-bearing watersheds that would be fully or partially overprinted. As a result of overprinting of these subwatersheds, and a redirection of water away from the upper portions of related tributaries, flow in the lower reaches of these tributaries would also be reduced.

GenPGM calculated the reduction in flow in subwatersheds by deriving the environmental flows using the mean annual flow and mean monthly flows (Tessman Method). Further discussion on the methodology for the calculation of environmental flows is provided in Section 8 (Surface Water Quantity).

The Proponent identified a potential residual effect should the predicted change in mean monthly flow exceed 10% of the baseline environmental flows, noting that changes of less than 10% were not anticipated to require offsets.

Based on their calculations, the Proponent indicated the flow in Stream 1 would be reduced for the operational life of the mine but return to mean annual flow levels similar to present values (+8%) following closure. They stated the flow in subwatersheds 102 and 103 would be lost during operations due to overprinting by the open pit and rock stockpile.

The Proponent noted the flows in Stream 6 (Angler Creek) would be reduced by 36% during construction and operations. This would reduce the amount of available fish habitat in the lower reaches of Stream 6 and decrease the productive capacity of the watercourse. The Proponent indicated that all behaviours, including feeding, spawning, and migratory travel, would likely be affected to some degree. They indicated that 2.5 ha of required offsets are specific to the indirect loss of fish habitat during construction and operations in Stream 6 (Angler Creek). Site closure would involve the restoration of site drainage, including directing runoff from the rehabilitated process solids management facility into Stream 6 (Angler Creek). The Proponent indicated that discharge would be directed to Stream 6 (Angler Creek) once water quality in the rehabilitated process solids management facility was acceptable, leaving a reduction from baseline levels of 4% in the mean annual flow.

Once construction began, Lake 8 would be isolated from downstream portions of subwatershed 102 by mine-related infrastructure. The Proponent would intend to maintain water levels in Lake 8 within normal ranges to protect and maintain fish habitat by diverting water to the site water management system when levels are high enough that it would otherwise be naturally discharging through its outlet.

The Proponent proposed offsets and compensation for the Project's predicted direct and indirect effects in accordance with the *Fisheries Act* and the *Metal and Diamond Mining Effluent*

⁶ Mine waste as defined under the *Metal and Diamond Mining Effluent Regulations*.

Regulations. They indicated that an additional 3.43 ha of non-fish bearing waterbodies would be affected by the Project, but would not require compensation or offsetting.

Further information on changes to water quantity and flow in these subwatersheds can be found in Section 8 (Surface Water Quantity).

Views of the Participants

Fisheries and Oceans Canada noted a discrepancy between the method used by the Proponent to assess the effects of the Project on fish habitat, and the *Framework for Assessing the Ecological Flow Requirements to Support Fisheries in Canada*. Fisheries and Oceans Canada noted that the resolution (mean annual flow) used by the Proponent was too coarse to predict how changes in flow would affect fish in the upper and the lower reaches of the watershed differently. This made it impossible to predict how changes in groundwater flow may affect spawning areas or overwintering habitat, and could result in missing some upper watershed effects. Fisheries and Oceans Canada recommended that the Proponent conduct a biological risk assessment in which a 10% decrease in mean monthly flows, rather than annual flows, is predicted. However, Fisheries and Oceans Canada stated that addressing this uncertainty would not yield a different significance determination, but would help achieve successful mitigation measures and monitoring by establishing a valid baseline.

MNDMNRF indicated that populations of Brook Trout in Streams 1, 2 and 3, which flow into the Biigtig Zibi, may be harmed by reduced base flows as a result of a loss of headwater drainage area and have some effect on Brook Trout populations in Lake Superior. They also indicated that the lower flows predicted in Stream 6 (Angler Creek) may affect future habitat suitability for the spawning run of salmonids in the lower reaches of this creek, reducing spawning success and resulting in a smaller fish population at this location.

The Ministry of the Environment, Conservation and Parks advised that the potential effect of removing water from Lake 8 should be assessed.

Biigtigong Nishnaabeg stated that they “consider any reduction of fish productivity in Stream 6 (Angler Creek), especially salmonid productivity, because of these flow reductions, unacceptable.”

Pays Plat First Nation noted that they were concerned about the dewatering of streams that provide rearing habitat for migratory fish. They also indicated that, at present, water levels in Lake 8 are maintained by a beaver dam. Should the dam fail, as is often the case, water levels in Lake 8 could drop below what is suitable for maintaining self-sustaining fish populations.

10.1.6 Change in Water Quality

Views of the Proponent

GenPGM indicated that the primary water quality effect during site preparation and construction is from the mobilization of suspended material into surface water. In addition, by-products from the detonation of explosives, including ammonia or similar compounds, can be toxic to fish and other aquatic biota.

During operations, the primary potential water quality effect on fish and fish habitat is from the discharge to Hare Lake. The Proponent indicated that water treatment would reduce the magnitude of any residual effects (thermal, physical, and chemical), resulting in a small and localized mixing zone around the location of treated effluent discharge that contains metals and other constituents. The Proponent stated that they expected effluent discharged to Hare Lake would meet benchmarks for the protection of aquatic biota, within 150 m or less of the discharge point. They did not anticipate that effluent discharge to Hare Lake would negatively affect the seasonal cycle of stratification and mixing within Hare Lake on which coldwater fish communities rely. They stated that there was no indication that a change in the thermal properties of Hare Lake due to the increase in seasonal effluents discharged from April through to November would occur, anticipating that the temperature of the discharge would be similar to that of ambient water and that any small temperature differences would dissipate within metres of the discharge location.

Thermal modelling of Hare Lake is further discussed in Section 9 (Surface Water Quality).

Views of the Participants

The Ministry of the Environment, Conservation and Parks stated that meromictic lakes have layers of water that do not intermix, resulting in permanent stratification and a zone of anoxic water that cannot obtain oxygen from the atmosphere. Few organisms can survive in this layer, and the potential for concentration of contaminants in this lower, isolated zone of the water column and sediments is relatively high. The Ministry indicated that it was important to detect and mitigate conditions that may indicate the beginning of meromixis in Hare Lake as an oxygenated bottom layer in Hare Lake is crucial to coldwater fish. They indicated this was particularly true during the warmer summer months when fish frequent deeper and colder waters.

MNDMNRF recommended delaying effluent release until Hare Lake is free of ice and then locating the diffuser outlet within the upper mixed waters (epilimnion) to minimize the potential for stratification.

Biigtigong Nishnaabeg indicated they were concerned about the potential for sub-lethal effects on fish resulting from contaminants of potential concern and changes to water quality parameters that influence fish habitat. They also stated they have zero tolerance for the Project to increase the rate of mercury methylation in any Project-affected waterbodies beyond the already high concentrations observed in baseline studies.

Michipicoten First Nation noted that information provided by the Proponent for future predicted selenium concentrations within the north and central pit lakes suggests selenium levels may pose a risk to aquatic biota.

Pays Plat First Nation expressed concern with respect to the decreased diversity and quantity of fish species in Hare Lake as a result of the Project. They also expressed concern regarding contamination of fish habitat through decreased groundwater and surface water quality as a result of seepage from mine facilities.

Further participant views related to mercury and fish consumption are presented in Section 17 (Human Health).

10.1.7 Benthic Invertebrate Communities

Views of the Proponent

GenPGM noted that overprinting by mine development may result in the direct destruction of benthic invertebrate habitat and death of benthic invertebrates. The use of explosives in and near fish habitat may also result in the physical and/or chemical alteration of that habitat.

The Proponent indicated that no effects on sediment quality or benthic invertebrates are anticipated in Hare Lake or in the Biigtig Zibi.

Views of the Participants

Biigtigong Nishnaabeg indicated that they are concerned about potential effects on fish and fish habitat due to changes in the primary productivity of waterbodies.

Pays Plat First Nation stated that benthic communities are key components of aquatic ecosystem and adverse Project effects could have consequences that permeate through the trophic levels.

10.2 MITIGATION AND MONITORING

Views of the Proponent

GenPGM noted that construction mitigation measures proposed for surface water quality, such as erosion and sediment control methods, would also mitigate potential effects on fish and fish habitat. Changes to surface water quality are further discussed in Section 9 (Surface Water Quality).

To protect fish and fish habitat, the Proponent indicated that the timing of in-water works would avoid restricted periods to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed. The timing restrictions are generally:

- April 1 to June 15 – avoidance of in-water work in tributaries that support spring-spawning salmonid species, and coolwater spring-spawning fish species; and
- September 1 to June 15 – avoidance of in-water work in tributaries that support fall spawning species.

The Proponent further committed to conducting instream work during low-flow periods (i.e., summer or winter) to further reduce the risk to fish.

The Proponent also committed to preparing and executing a fish salvage plan during the initial period of construction and operations, and to relocating fish from affected waterbodies prior to in-water works.

The Proponent stated that the primary means of mitigating effects on benthic invertebrate communities would be through implementation of a fish habitat offsetting plan. In addition, other mitigation measures for fish and fish habitat, such as blasting setbacks, water quality management, and erosion and sediment control, would minimize effects on benthic invertebrates.

According to the Proponent, fish monitoring programs would focus on water bodies of importance to Indigenous communities, such as the Biigtig Zibi extending downstream of the Project to the mouth of Lake Superior, Hare Lake, the outlet of Hare Creek at Port Munro and Stream 6 (Angler Creek), and the outlet at Sturdee Cove. The Proponent indicated these programs would include the collection of surface water, sediment, benthic invertebrates, and fish tissue samples, monitoring for mercury, as well as phosphorus, and other indicators of eutrophication.

The Proponent stated that pre-operational surveys would be conducted at Hare Lake and on the Biigtig Zibi to further characterize baseline conditions, and ongoing sampling would be completed in accordance with Environment and Climate Change Canada's environmental

effects monitoring program guidelines and the *Metal and Diamond Mining Effluent Regulations* throughout the operation of the mine, and in accordance with the Closure Plan.

Views of the Participants

Fisheries and Oceans Canada recommended that the Proponent develop a temperature-specific monitoring program for Hare Lake to maintain the natural process of temperature stratification and mixing, and to validate the effects predicted by the Proponent's model.

The Ministry of the Environment, Conservation and Parks indicated that a water quality program dedicated to monitoring for the onset and effects of poor mixing in Hare Lake was crucial, with a contingency plan in case of the onset of meromictic conditions.

MNDMNRF indicated that permitting conditions under the *Fish and Wildlife Conservation Act, 1997*, would address timing windows for disruption of both fish and wildlife cycles resulting from proposed fish salvage and relocation activities during construction. The Ministry indicated they would rely on monitoring of effluent release, as specified within the Environmental Compliance Approval, to address concerns with respect to supporting fish populations.

Pays Plat First Nation recommended developing a monitoring program for Hare Lake to identify signs of the onset of meromictic conditions. They also indicated that monitoring of benthic communities was critical, particularly in Hare Lake. They noted that the Proponent should establish reliable benchmarks that allow them to decide whether observed changes in the benthos are a consequence of Project activities or natural variation.

Michipicoten First Nation stated that additional studies of possible selenium toxicity are warranted for both the pit lakes and the Biigtig Zibi, as eutrophication is known to increase the rate of methylation of selenium.

10.2.1 Fish Habitat Offsetting and Compensation Plan

Views of the Proponent

GenPGM submitted a draft Fish Habitat Offset and Compensation Plan to address regulatory requirements under the *Fisheries Act* and *Metal and Diamond Mine Effluent Regulations*. The plan described the potential fish habitat offset and compensation measures proposed for the estimated 12.33 ha of impacted waterbodies.

The Proponent described their offsetting and compensation strategy as an "attempt to balance the anticipated needs and expectations of the regulatory fisheries approvals process and recognize that there are limited opportunities for fish habitat restoration within the immediate Project area due to the local terrain and nature of the existing fish habitats."

The proposed offset or compensation measures in the GenPGM draft plan, and their approximate area of offset (in hectares) include:

- colonizing seven fishless lakes with the fish salvaged from the Project (13.25 ha);
- Shipyard Road (Thunder Bay) fish habitat creation and enhancement of nursery and/or rearing habitat for Coaster Brook Trout (4.0 ha);
- Replacement of the Camp 19 Road crossing and habitat enhancement to remove the barrier near the Biigtig Zibi and improve fish passage for salmonids (0.75 ha); and
- Lake 8 habitat enhancement and increasing community diversity (2.2 ha).

The Proponent indicated that community-focused measures (complementary measures), including habitat restoration and/or research support, would comprise up to 10% of the offset amount. They committed to supporting a Biigtigong Nishnaabeg hatchery program, as described below.

The Proponent has stated it would continue to work with regulators to finalize the offsetting plan and develop an associated monitoring plan. They also indicated they would continue to collaborate with Indigenous communities, including Biigtigong Nishnaabeg, and work to integrate community-focused measures into the offsetting plan prior to Fisheries and Oceans Canada approval.

Views of the Participants

Fisheries and Oceans Canada noted that the Proponent's plans to colonize seven fishless lakes account for approximately two thirds of the area proposed for offsetting measures. Fisheries and Oceans Canada stated that, while the approach is aligned conceptually with their guiding principles on offsetting, the conservation of amphibians present in the waterbodies was not compatible with the establishment of a fish population.

Fisheries and Oceans Canada also expressed concern with many of the other mitigation measures proposed by GenPGM, noting they expected "significant additional work will be necessary before an acceptable offsetting plan is completed." However, they were "of the opinion that there are no technical barriers that would prevent the Proponent from achieving an acceptable offsetting plan."

Fisheries and Oceans Canada stated that monitoring and follow-up programs would be required to ensure that the Project does not cause harmful effects on fish and fish habitat beyond what has been offset. They indicated that monitoring would also serve to verify that mitigation (including offsetting) measures were effective. They were of the view that the Proponent could develop an effective monitoring strategy if gaps in baseline, reference, and control data were

identified and a plan to close these gaps was developed in a timely manner. However, they noted that, to date, such a program has not been provided.

MNDMNRF indicated that the fishless waters identified by the Proponent for stocking with fish salvaged during mine construction were also identified as Significant Wildlife Habitat and may currently support significant populations of newts. The Ministry stated that stocking is not acceptable where the introduction of fish could have an adverse effect on existing newt populations. MNDMNRF proposed working with the Proponent to identify alternative stocking locations prior to the issuance of permits.

Biigtigong Nishnaabeg indicated that the offsetting and compensation measures must align with the interests and priorities of the community, as the Project would result in substantial changes to the aquatic resources of their Exclusive Title Area. As stewards and guardians of lands and waters, Biigtigong Nishnaabeg stated they must be afforded the opportunity to lead, and have ownership over, offsetting and compensation measures for the Project.

Biigtigong Nishnaabeg informed the Panel of the small-scale Brook Trout hatchery they have been operating since 2018 to give students the opportunity to observe fish development. They noted that they are not currently allowed to rear the 10,000 eggs they are provided yearly by MNDMNRF to later life stages, nor to stock them into local waterbodies. Biigtigong Nishnaabeg stated that they envision expanding the community hatchery to establish self-sustaining Brook Trout populations within their Exclusive Title Area. They requested the Proponent's support to develop a program to rear the Brook Trout to later life stages for stocking in acceptable local lakes and watercourses. They indicated this would support the Proponent's offsetting and compensation requirements and serve as a complementary measure. Biigtigong Nishnaabeg indicated that this would also provide nature-based learning opportunities for students, and foster conservation.

Pays Plat First Nation indicated that the Proponent's draft Fisheries Offsetting Plan is insufficient as it assumes that the productivities of the habitats to be destroyed and created are equivalent. They stated the plan lacks adequate measures of success because the baseline data are deficient and do not account for time lags in the restoration of productivity. Pays Plat First Nation also observed that the fish salvage and stocking measures proposed in the plan may result in extensive winter mortality of relocated fish.

Pays Plat First Nation indicated that failure of the existing beaver dam on Lake 8 would eliminate the proposed offset measures for that waterbody, causing a net loss of fish productivity. They stated that, "given the unsuitability of the habitat, the uncertainty of success, and the fluctuating nature of the system, the habitat enhancement of Lake 8 should not be considered an appropriate offsetting measure."

The Métis Nation of Ontario requested their environmental monitors be present for fish capture and rescue activities.

10.2.2 Panel Conclusions and Recommendations

In reaching their conclusions on fish and fish habitat, the Panel considered the following factors to be particularly relevant:

- The Project would result in a loss of 12.33 ha of fish habitat from overprinting, flow reduction, and the deposition of mine waste.
- Fisheries and Oceans Canada, MNDMNR, Biigtigong Nishnaabeg, and Pays Plat First Nation all expressed concern with the data collected for fish and fish habitat. They requested that additional baseline fish and fish habitat data and fish tissue collection be carried out.
- During construction, the main change to water quality affecting fish habitat is through the mobilization of suspended material into surface water features, requiring standard erosion and sediment control measures.
- The Proponent committed to a fish salvage plan to relocate fish from affected waterbodies, prior to in-water works.
- The Proponent and government agencies agreed that the timing of in-water works should avoid restricted periods to protect fish, including their eggs, juveniles, spawning adults and/or the organisms upon which they feed.
- The Proponent and Fisheries and Oceans Canada agreed that blasting activities that occur near fish-frequented waterbodies have the potential to cause behavioural changes, injury, or death in fish, but could be mitigated by implementing overpressure and setback distances.
- The Proponent submitted a draft Fish Habitat Offset and Compensation Plan to address regulatory requirements under the *Fisheries Act* and *Metal and Diamond Mine Effluent Regulation*. The Proponent would be required to continue to work with regulators to finalize the offsetting plan and to develop an associated monitoring plan before proceeding with the Project.
- Fisheries and Oceans Canada stated there were no technical barriers that would prevent the Proponent from achieving an acceptable offsetting plan.

Stream 6 (Angler Creek)

- The Proponent, Indigenous groups, and MNDMNRF agreed that the lower reaches of Stream 6 (Angler Creek) provide nursery and spawning habitat for coldwater migratory species from Lake Superior, including salmonids that could be affected by a reduction in flows in Stream 6 (Angler Creek). This would occur during construction and operations, reducing the amount of available fish habitat in the lower reaches of Stream 6 (Angler Creek) and decreasing the habitat suitability, potentially resulting in a smaller population at this location.
- The Proponent, Indigenous groups, and government agencies agreed that the confluence of Stream 6 (Angler Creek) and Lake Superior is an important location for fishing by Indigenous people, including Biigtigong Nishnaabeg and Pays Plat First Nation.
- Biigtigong Nishnaabeg stated that they “consider any reduction of fish productivity in Angler Creek, especially salmonid productivity, because of these flow reductions, unacceptable.”

Hare Lake

- According to the Proponent, the primary potential water quality effect on Hare Lake coolwater fish and fish habitat during operations is from effluent discharge.
- Fisheries and Oceans Canada stated that Hare Lake is unique in the area. Fish in the lake are dependent on the natural process of temperature stratification and mixing that occurs twice per year.
- The Proponent stated that the water in Hare Lake would meet benchmarks for the protection of aquatic biota, within 150 m or less of the discharge point. Effluent discharged to Hare Lake would be of a temperature similar to that of lake water, and not expected to affect the coolwater fish habitat in Hare Lake.
- MNDMNRF recommended delaying effluent release until Hare Lake is free of ice to minimize any potential effects on stratification.
- The Ministry of the Environment, Conservation and Parks noted that an oxygenated cold, deeper bottom layer was crucial to supporting coldwater fish, particularly during the warmer summer months.
- Biigtigong Nishnaabeg were concerned about eutrophication in Hare Lake and stated they have zero tolerance for the Project to increase the rate of mercury methylation in any Project-affected waterbodies beyond the already high concentrations observed in baseline studies.

The Panel finds that the Proponent has proposed appropriate mitigation measures, including erosion and sediment control, timing in-water works and blasting to avoid sensitive periods, and a fish salvage plan, to reduce the effects on fish and fish habitat. Additionally, the Panel recommended mitigation measures for water quality in Section 9 (Surface Water Quality) that would be necessary to limit the effects on fish and fish habitat.

The Panel is of the view that, when implemented, the above measures would sufficiently mitigate any effects on the fish and fish habitat that are not included in the offset and compensation plan.

The Panel accepts that the most appropriate means of mitigating this loss of habitat from overprinting is through implementation of fish habitat offsets. The Panel agrees with the premise that a fish habitat offset and compensation plan would address unavoidable effects on fish and fish habitat due to the Project. The Panel notes that, as drafted, the plan was not widely accepted by government agencies or Indigenous groups. However, having heard that Fisheries and Oceans Canada believes appropriate offsetting measures can be identified, the Panel is of the view that an acceptable offset and compensation plan can be developed. The Panel is also encouraged that the Proponent has demonstrated a willingness to work with regulators and Indigenous groups to finalize such a plan.

The Panel understands further development and approval of offsetting measures and compensation are required to address regulatory requirements under the *Fisheries Act* and *Metal and Diamond Mine Effluent Regulation*. The Panel is also of the view that government agencies are well-placed to ensure any chosen offset measures do not result in further effects on the environment.

The Panel is of the view that, while minor changes in flows in the Biigtig Zibi may occur as a result of the Project, such changes are not likely to have an overall effect on fish and fish habitat in that watercourse. Further discussion regarding Lake Sturgeon in the Biigtig Zibi is provided below.

The Panel is of the view that the measures recommended in Section 9 (Surface Water Quality) are appropriate to mitigate changes in the water temperature and chemistry of Hare Lake. Ongoing monitoring of potential eutrophication and meromixis in the lake would further reduce the potential for effects on fish and fish habitat. As a result, the Panel does not anticipate an effect on coolwater fish habitat or fish communities in Hare Lake.

With respect to Stream 6 (Angler Creek), the Panel is of the view that, while a reduction in flow is likely to result in a residual effect on that specific salmonid population, the effect is not of consequence when looking at the overall effect on fish and fish habitat in the Local Study Area. Further, the Panel is of the view that the loss 2.5 ha of fish and fish habitat in Stream 6 can be appropriately offset. However, the Panel notes that any fish-habitat offsetting or compensation proposed for Stream 6 (Angler Creek) would not mitigate changes to, or prevent the potential

loss of, this important Indigenous fishing location. The Panel discusses this further in the Section 21 (Effects on Indigenous Peoples).

The Panel encourages the Proponent and regulators to continue collaborating with Indigenous groups, and in particular Biitigong Nishnaabeg, on the development of community-focused measures. The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 15: The Proponent should avoid using explosives in or near water. When this is necessary, the Proponent should use Fisheries and Oceans Canada's *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters* to identify appropriate setback distances to avoid lethal or sub-lethal effects to fish, including ensuring an overpressure above 50 kPa is not reached in fish-bearing waters.

Recommendation 16: The Proponent should adhere to timing windows when conducting work within or adjacent to water (within 30 m) to protect fish, including their eggs, juveniles, spawning adults, the organisms upon which they feed, and where they migrate as per Ontario's *In-water Work Timing Window Guidelines* (2013) and Fisheries and Oceans Canada's *Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat* (2017). Restrictions for in water work and work adjacent to (within 30 m) waterbodies are in effect for the following:

- comply with Northwestern Ontario timing restrictions for in-water work in all potentially affected waterbodies to protect spring-spawning species present in the Local Study Area;
- comply with Northwestern Ontario timing restrictions for in-water work in all potentially affected waterbodies to protect fall spawning species present in the Local Study Area;
- complete in-water work during periods of low flow (e.g., summer, fall, or winter) to further reduce the risk to fish and their habitat or to allow work in water to be isolated from flows; and
- minimize in-water work during wet, windy, and rainy periods that may increase erosion and sedimentation.

Recommendation 17: Prior to commencement of in-water work, the Proponent should develop and implement a fish salvage plan to relocate fish from habitats that will be lost as a result of the Project to suitable habitats outside the Site Study Area. This should be done in consultation with relevant government agencies and Indigenous groups.

Recommendation 18: Continue to work directly with Fisheries and Oceans Canada and other relevant stakeholders, including provincial regulators and Indigenous communities, to finalize

and implement an offsetting and compensation plan that addresses fish and fish habitat losses caused by Project components or activities, as required under subsection 35(2) of the *Fisheries Act* and Schedule 2 of the *Metal and Diamond Mining Effluent Regulations*. As part of the plan, the Proponent should:

- conduct the necessary sampling and analysis as directed by Fisheries and Oceans Canada in order to determine final requirements for offsetting and compensation; and
- work with Biigtigong Nishnaabeg and Fisheries and Oceans Canada to advance and include the Fish Hatchery program, which aims to establish a self-sustaining Brook Trout population, into the offsetting and compensation plan as a means to offset fish and fish habitat losses from the Project.

In addition to the recommended mitigation measures, the Panel recommends the Proponent implement a follow-up program:

Recommendation 19: Develop and implement a fish and fish habitat follow-up program in consultation with Fisheries and Oceans Canada, other relevant government agencies, and Indigenous groups to verify the predictions of the environmental assessment and determine the effectiveness of mitigation measures, including offsetting. As part of the program, the Proponent should:

- address existing gaps in baseline needed to inform the follow-up program and effectively determine adaptive management thresholds and success thresholds, including a sampling plan to address these gaps with timelines associated with data collection relative to anticipated Project effects;
- explicitly identify areas of uncertainty in the effects predictions and how the monitoring program would address those by pairing each with measurable physical or biological parameters;
- determine the parameters, including flow, groundwater, sediment, benthic communities, and fish communities, that need to be monitored in order to verify the predictions of effects on fish and fish habitat;
- monitor these parameters to verify the predictions of effects on fish and fish habitat during operations, active closure and post-closure, including in: Hare Lake, the Biigtig Zibi extending downstream of the Project to the mouth of Lake Superior, Stream 5 (Hare Creek) to its outlet at Port Munro, and Stream 6 (Angler Creek) to its outlet at Sturdee Cove; and

- set adaptive management thresholds and implement response measures should thresholds be exceeded, including appropriate success indicators and thresholds for the final accepted offsetting measures.

Recommendation 20: The Proponent should develop a monitoring and follow-up program with Biigtigong Nishnaabeg, Pays Plat First Nation, and other Indigenous communities for Stream 6 (Angler Creek) prior to the start of construction to verify the predictions of Project effects on (a) fish and fish habitat and other aquatic life in Stream 6 (Angler Creek), as well as (b) other traditional and cultural uses of Stream 6 (Angler Creek). The Proponent should implement this program during construction and operations in consultation with Biigtigong Nishnaabeg, Pays Plat First Nation, and other Indigenous communities. Selected fish species incorporated into the monitoring program should be representative of fish present and of interest to local communities.

The Panel finds that the residual effects to fish and fish habitat would be limited to the Local Study Area, which includes Angler Creek. The Panel understands that the effect on fisheries in Angler Creek is of importance to Indigenous communities. The Panel also finds that fish habitat compensation and offsetting overseen by Fisheries and Oceans Canada would be satisfactory in offsetting the loss of fish habitat.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented and offsetting occurs, the Project is not likely to cause a significant adverse environmental effect on fish or fish habitat.

10.3 CUMULATIVE EFFECTS

Views of the Proponent

GenPGM identified these cumulative residual effects: change in habitat and change in fish mortality. They did not anticipate cumulative residual effects on fish due to changes in surface water quality.

Through their cumulative effects assessment, the Proponent noted that effects on fish habitat from the Project would overlap with effects from timber harvesting. The Proponent assumed that timber harvesting could have a residual effect on fish habitat through increased erosion and sediment loads; changes in water quality, hydrology, and thermal regimes through loss of canopy; and loss of hydraulic connectivity. These effects would overlap temporally over the life of the Project, and spatially within the Regional Study Area (see Appendix 6). The Proponent did not expect cumulative effects on fish habitat with the other activities identified in the project inclusion list.

In assessing cumulative effects on fish mortality, the Proponent excluded activities associated with permitted fish mortality, such as recreational and traditional fishing. They identified potential cumulative effects on fish mortality with existing and proposed hydroelectric power projects in the Regional Study Area. Fish mortality could be expected from fish passage through the facility during downstream migration, entrainment of resident fish, and impingement of fish against screens/trash racks. The Proponent did not expect cumulative effects on fish mortality with the other activities identified in the project inclusion list.

The Proponent predicted the Project's contributions would be negligible and stated that these cumulative effects would happen with or without the Project.

Views of the Participants

Biigtigong Nishnaabeg expressed concern that Project-related effects could contribute to the concentration of mercury in fish tissue, particularly in Hare Lake, Stream 6 (Angler Creek), and the Biigtig Zibi.

Pays Plat First Nation noted that a decrease in the water quality of Hare Lake due to mine effluent and migration of contaminants into Lake Superior could result in cumulative effects for mercury and consumption restrictions for fish. Pays Plat First Nation recalled that, in the 1940s, effluent from the pulp mill in Terrace Bay began to be discharged into the waters of Lake Superior, leading to a decline of the fishery in Jackfish Bay.

The Red Sky Métis Independent Nation indicated they were concerned about the Project's effects on fish as well as the cumulative effects on fish and water quality in the Robinson Superior Treaty area.

Panel's Conclusions and Recommendations

The Panel agrees with GenPGM that Project-related residual effects on fish habitat could interact with effects from timber harvesting activities and hydroelectric facilities within the Regional Study Area. However, the Panel finds that, following implementation of recommended mitigation, and the offsetting plan, the Project's effects on fish and fish habitat within the Regional Study Area would be minimal as the Project would result in negligible changes to fish and fish habitat in the Biigtig Zibi and Lake Superior.

The Panel discusses the cumulative effects of mercury and methylmercury concentration in fish in Section 17 (Human Health).

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on fish or fish habitat.

10.4 NORTHERN BROOK LAMPREY

The Great Lakes – Upper St. Lawrence population of the Northern Brook Lamprey (*Icthyomyzon fessor*) is listed federally as a species of special concern under the *Species at Risk Act*. The Northern Brook Lamprey is also classified as a species of special concern under the Ontario *Endangered Species Act*.

The province of Ontario defines “special concern” as meaning the species lives in the wild, is not endangered or threatened, but may become so due to a combination of biological characteristics and identified threats. Federally, “special concern” refers to species that should be managed to prevent them from becoming endangered or threatened.

10.4.1 Current Condition of Northern Brook Lampreys and Their Habitat

Views of the Proponent

The EIS and EIS Addendum state that Northern Brook Lamprey is known to occur within the Regional Study Area, in the lower reaches of the Biigtig Zibi, downstream of the Project. At the hearing, GenPGM confirmed that there were limited federal and provincial records of Northern Brook Lamprey at the confluence of the Biigtig Zibi and Lake Superior, approximately 20 km downstream of the Project. They confirmed that no Northern Brook Lamprey, or their larvae (ammocoetes), were obtained during baseline electrofishing in tributaries to the Biigtig Zibi or on the Project site.

Views of the Participants

Based on a single 1978 Royal Ontario Museum data point at the mouth of the Biigtig Zibi, Fisheries and Oceans Canada confirmed that Northern Brook Lamprey are potentially present in the Project area. Fisheries and Oceans Canada noted that additional data referenced in the Committee on the Status of Endangered Wildlife in Canada assessment confirm the species is found in the Biigtig Zibi but does not provide specific locations.

The federal *Northern Brook Lamprey Management Plan* (2018) is in place for the species. The management plan identifies the conservation activities and land use measures needed to ensure, at a minimum, that a species of special concern does not become threatened or endangered. The plan states that the nonparasitic Lamprey is distributed in streams throughout the Great Lakes basin (except Lake Ontario) and in southwestern Quebec. In the Great Lakes basin, which comprises most of its range, about 50% of the streams the species is known to inhabit are subjected to chemical treatment for Sea Lamprey control, which causes mortality at the larval stage. However, in untreated streams, the species is still abundant.

Fisheries and Oceans Canada confirmed that past surveys of Stream 5 (Hare Creek) and Stream 6 (Angler Creek) by the Sea Lamprey Control Centre found no northern brook lampreys. Streams 1, 2, and 3, have not been sampled by the Sea Lamprey Control Centre, nor do they receive lampricide treatment.

Fisheries and Oceans Canada indicated that a series of specific considerations must be integrated into the electrofishing sampling design to increase the likelihood that Lamprey ammocoetes would be detected. As the sampling methodology in the environmental impact statement did not describe specific efforts to confirm the presence or absence of Northern Brook Lamprey, Fisheries and Oceans Canada advised it was unlikely that GenPGM's efforts to detect ammocoetes were adequate.

Fisheries and Oceans Canada indicated that the population status of the Northern Brook Lamprey in the region is dependent on resident populations that spawn upstream of lampricide application, noting that the use of lampricide and habitat modification were the primary threats in the Great Lakes basin. Fisheries and Oceans Canada stated that the Biigtig Zibi, adjacent to and upstream of the Project, receives treatment to suppress invasive Sea Lamprey. Northern Brook Lampreys are affected by the lampricide at approximately the same rate as the invasive species. Fisheries and Oceans Canada expected that any Northern Brook Lampreys in the Biigtig Zibi originated from untreated tributaries where spawning occurs and move downstream by larval drift.

Fisheries and Oceans Canada indicated that, based on their understanding of the habitat characteristics of the streams in the Project area that drain into the Biigtig Zibi, Streams 1, 2 and 3 have the potential to support a resident population of Northern Brook Lampreys.

MNDMNRF indicated that the Project was within the known range of the Northern Brook Lamprey, but could not confirm if the species was within the Project area itself. The Ministry added that pollution, changes in water levels, and changes in water temperatures also had the potential to affect Lamprey habitat suitability.

Biigtigong Nishnaabeg indicated that Northern Brook Lampreys had been recorded within the lower sections of the Biigtig Zibi, downstream of the Project.

10.4.2 Project-Related Effects on Northern Brook Lampreys and Their Habitat

Views of the Proponent

GenPGM did not identify any effects specific to the Northern Brook Lamprey, or its habitat. They stated that, as no significant adverse residual effects on the Biigtig Zibi are predicted, no interactions are expected between the Project and any potential Northern Brook Lamprey populations in the Biigtig Zibi. At the hearing, the Proponent indicated no specific monitoring

program was planned for Northern Brook Lampreys, but noted that the species would be identified through an aquatic environmental monitoring program if they were present in the study area.

Views of the Participants

MNDMNRF indicated that Northern Brook Lampreys likely inhabit the tributaries in subwatersheds 2 and 3 that would be overprinted during construction, and therefore a loss of species and their habitat can be expected. However, the Ministry indicated that they did not have any specific concerns related to Northern Brook Lampreys associated with the Project.

Fisheries and Oceans Canada indicated that residual effects on Northern Brook Lampreys would be unlikely in the Biigtig Zibi. However, with respect to the Project area, Fisheries and Oceans Canada indicated that the presence of Northern Brook Lampreys in Streams 1, 2, and 3 should be confirmed.

Fisheries and Oceans Canada recommended the Proponent design a sampling program specifically to increase confidence that Northern Brook Lampreys are absent in streams that may be affected by the Project and that drain into the Biigtig Zibi. This sampling program should take into consideration, in consultation with Fisheries and Oceans Canada, the most recent available science on effective methods to capture ammocoetes, including targeted habitat components, electrofishing settings, and seasonal knowledge of the life history of the species. Should any Northern Brook Lampreys be found, Fisheries and Oceans Canada indicated the Proponent should generate an effects assessment and update the offsetting plan as appropriate.

Fisheries and Oceans Canada indicated that a potential offsetting measure for Northern Brook Lampreys could include the establishment of a native Lamprey population upstream of areas where lampricide is currently applied to control invasive Sea Lamprey.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on Northern Brook Lampreys, the Panel considered the following factors to be particularly relevant:

- Great Lakes – Upper St. Lawrence populations of the Northern Brook Lamprey are listed as a species of special concern under respective federal and provincial legislation.
- Fisheries and Oceans Canada confirmed that Northern Brook Lamprey are potentially present in the Project area, according to the species at risk mapping tool.

- Fisheries and Oceans Canada agreed with the Proponent and the Ministry of the Environment, Conservation and Parks that residual effects from the Project to Northern Brook Lampreys in the Biigtig Zibi are unlikely.
- The presence or absence of Northern Brook Lamprey in Streams 1, 2, and 3 is uncertain. Although no Lampreys or their ammocoetes were found during sampling conducted by the Proponent, the sampling program was not specifically designed to detect the species.

Recommendation 21: To address uncertainty in relation to the presence of Northern Brook Lampreys in the Local Study Area, the Panel recommends that:

- Prior to construction, GenPGM conduct electrofishing surveys in Streams 1, 2, and 3 to confirm the presence of Northern Brook Lamprey populations.
- Electrofishing sampling should be designed for the detection of Lamprey ammocoetes, and confirmed with Fisheries and Oceans Canada and MNMNR prior to conducting the surveys. This sampling program should take into consideration the most recent available science on effective methods to capture ammocoetes, including targeted habitat components, electrofishing settings, and seasonal knowledge of life history of the species.
- The surveys should inform the fish and fish habitat offsetting plan required by Fisheries and Oceans Canada as part of the *Fisheries Act* authorization for the Project.

The Panel appreciates that there is uncertainty associated with the presence or absence of the Northern Brook Lamprey in Streams 1, 2 or 3 as the sampling program was not specifically designed to detect the species. Should surveys determine its presence in Streams 1, 2, and/or 3, and in keeping with a precautionary approach, the Panel concludes that a residual effect to the species would occur. However, the Panel is confident that the effect could be considered within the fish and fish habitat offsetting plan and offset appropriately.

The Panel concludes that, if the recommended follow-up program is implemented, and offsetting is applied as necessary, the Project is not likely to cause a significant adverse environmental effect on Northern Brook Lampreys.

10.4.3 Cumulative Effects

The federal *Management Plan for the Northern Brook Lamprey (Ichthyomyzon fossor), Great Lakes – Upper St. Lawrence populations, in Canada* (2018) identifies lampricide use to manage invasive Sea Lampreys as the main threat to the species in the Great Lakes. In addition, many constructed and natural barriers are impassable to Northern Brook Lampreys due to their poor swimming ability. This can result in habitat and population fragmentation, including the loss of

spawning areas and habitat used at all life stages. Consequently, available habitat may be reduced, potentially limiting dispersal.

Views of the Proponent

GenPGM observed that Fisheries and Oceans Canada uses lampricide within the Biigtig Zibi to control invasive populations. As noted above, the Proponent did not anticipate a likely interaction between the Project and Northern Brook Lamprey.

Views of the Participants

Fisheries and Oceans Canada stated that that Northern Brook Lamprey's population status in this region is dependent on resident populations that spawn in tributaries upstream of lampricide application. Fisheries and Ocean Canada's Northern Brook Lamprey Management Plan acknowledges that lampricide toxicity to native Lampreys has been demonstrated and lampricide use has inadvertently resulted in a decrease in the distribution of native Lampreys throughout the Great Lakes watershed.

Panel Conclusions and Recommendations

The Proponent, government agencies, and Indigenous groups have all acknowledged the importance of the Northern Brook Lamprey. The Panel notes that this is a species of "special concern," both federally and provincially; it is neither threatened nor endangered. While lampricide is the main threat to the native species, the Panel notes that maintaining populations in the Biigtig Zibi depend on the presence of upstream spawning areas. The Panel finds that, should the species be discovered in the tributaries of Streams 1, 2, and 3, the Project's effects on the fish habitat in those tributaries, as described above, would make a cumulative contribution to existing effects on Great Lakes – Upper St. Lawrence populations of the Northern Brook Lamprey.

The Panel finds in this instance, that, while past projects and existing threats, including the application of lampricide, have had effects on the species, these pre-existing effects are not yet significant. The Panel is of the view that the residual effects of the Project, in combination with existing effects, on potential Northern Brook Lamprey habitat in Streams 1, 2, and 3 would not be significant.

The Panel concludes that the Project, in combination with other projects and activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Northern Brook Lamprey populations.

10.5 LAKE STURGEON

Great Lakes – Upper St. Lawrence populations of the Lake Sturgeon (*Acipenser fulvescens*) are designated as threatened by the Committee on the Status of Endangered Wildlife in Canada. This population is listed as endangered under the Ontario *Endangered Species Act*.

10.5.1 Current condition of Lake Sturgeon and Their Habitat

Views of the Proponent

GenPGM acknowledged the importance of Lake Sturgeon as a species at risk and a species of significance to Biigtigong Nishnaabeg. GenPGM indicated that Lake Sturgeon are known to use Biigtig Zibi during spawning migration, and foraging habitat is reported downstream of the Project.

Views of the Participants

Biigtigong Nishnaabeg noted that Lake Sturgeon move extensively up and down the Biigtig Zibi during spawning migration and have been found to use the lower reaches of the river closer to Lake Superior for foraging. Biigtigong Nishnaabeg indicated that the Biigtig Zibi is one of approximately 12 tributaries to Lake Superior that still support Lake Sturgeon spawning. They also observed that the Biigtig Zibi is an important water body for Lake Sturgeon.

Biigtigong Nishnaabeg noted that, Trent University conducted a radio telemetry and spawning assessment study between 2007 and 2010, as summarized in a 2011 M.Sc. thesis (the “Ecclestone study”). To address existing knowledge gaps, the Ecclestone study monitored the movement patterns of Lake Sturgeon in Biigtig Zibi and identified and assessed habitat.

The study, which was submitted to the panel by Fisheries and Oceans Canada, found three unique migration patterns. To forage, Lake Sturgeon either remain at the mouth of the river, near Lake Superior or migrate approximately 20 to 30 km upriver to deeper pools. The study identified a key foraging area approximately 2 km downstream of the Project. During spawning, Lake Sturgeon migrated upstream to spawn at the base of the lower rapids, upstream of the Project area.

Fisheries and Oceans Canada also acknowledged the importance of this area to Lake Sturgeon and, citing the Ecclestone study, noted that resting habitat at the base of the rapids is likely heavily used by Lake Sturgeon as deep pools are uncommon in the Biigtig Zibi.

Fisheries and Oceans Canada indicated that Lake Sturgeon are currently under consideration for listing on Schedule 1 of the *Species at Risk Act*. Fisheries and Oceans Canada further noted that, once an aquatic species is added to the *Species at Risk Act* list as endangered or threatened,

prohibitions automatically apply; however, the timeline for completion of a listing decision is unknown.

Fisheries and Oceans Canada cautioned that, in the case of federally listed species at risk, there may be a lower threshold for harm or the destruction of critical habitat than is generally recognized as deleterious for fish, as defined by subsections 32(1) and 58(1) of the *Species at Risk Act*, respectively. Fisheries and Oceans Canada indicated that the Proponent should identify and consider potential future scenarios in which water quality in the Biigtig Zibi may be affected by the Project to ensure compliance with both the *Fisheries Act* and *Species at Risk Act* in the event Lake Sturgeon are federally listed as threatened or endangered during the course of the Project.

10.5.2 Project-Related Effects on Lake Sturgeon and Their Habitat

Views of the Proponent

GenPGM stated at the hearing that they did not anticipate that the Project and its activities would interact with Lake Sturgeon or Sturgeon habitat. They indicated that they had identified no residual effects resulting in changes in water quantity in the Biigtig Zibi. Water quality is expected to be below benchmarks that are protective of aquatic life, including all life stages of Lake Sturgeon. The Proponent predicted less than a 1% change in Biigtig Zibi flows throughout the construction, operations, active closure, and post-closure phases of the mine.

In response to concerns regarding a potential washout of Camp 19 Road into habitat used by Lake Sturgeon in the Biigtig Zibi, the Proponent confirmed that the culvert at the crossing of subwatershed 101 near the Biigtig Zibi had previously been replaced. They noted that the bank has been stabilized with riprap cobble and no longer presents an erosion risk. The Proponent reported that they did not anticipate a need for further stabilization to prevent washouts on Camp 19 Road. They indicated that, if stabilization of Camp 19 Road was needed at some point, they would follow best practices to avoid erosion.

The Proponent identified several mitigation strategies to protect Lake Sturgeon from potential indirect Project effects, including proactive management of water quality and the mobilization of suspended sediments to the Biigtig Zibi and respecting setbacks that are protective of potential blasting effects during use of explosives.

The Proponent indicated that it had no specific plans to develop a program to characterize the morphology of Lake Sturgeon habitat in the Biigtig Zibi at the Stream 1 confluence based on what they concluded were negligible risk of effects. They indicated that, if stabilization issues were to develop in the area around the culvert at the confluence of Stream 1 and the Biigtig Zibi, the response plan would be to implement such a program. The Proponent committed to monitoring the access road and Camp 19 Road for potential stability issues.

The Proponent indicated that additional monitoring specific to Lake Sturgeon may be developed through discussions with MNDMNRF and Environment and Climate Change Canada. The Proponent also noted it could implement a response plan to protect Lake Sturgeon from adverse effects if a need is indicated by information collected during follow-up monitoring programs.

Views of the Participants

Fisheries and Oceans Canada indicated that the Project does not involve an increase in accessibility to the Biigtig Zibi, the addition of fish, fishing for Lake Sturgeon, or the removal of barriers to migration within the Biigtig Zibi watershed. As a result, Fisheries and Oceans Canada did not anticipate an increase in illegal harvests, exploitation, or species invasion that would affect Lake Sturgeon. Fisheries and Oceans Canada also indicated that no effects on migration as a result of habitat fragmentation were expected, as the Biigtig Zibi would not be directly affected by Project infrastructure.

While Fisheries and Oceans Canada did not expect flows, particularly peak flows, to be altered significantly, they stated that loss of flow in the area downstream of affected tributaries could result in localized alteration of the morphology of the pools that Lake Sturgeon use, and change the way the species use their habitat. They recommended the Proponent characterize the morphology of Lake Sturgeon habitat in the lower rapids prior to the beginning of any work, undertakings, or activities that may affect the Biigtig Zibi, and develop a monitoring plan capable of detecting changes to this habitat.

Fisheries and Oceans Canada clarified at the hearing that the morphological characterization would include understanding the shape of the riverbed, the width of the cross-axial profile, and substrate composition, to detect changes over time.

Fisheries and Oceans Canada has indicated that the new Camp 19 Road culvert is perched, and acts as a barrier to fish passage. As such, it would likely need to be replaced during Camp 19 Road upgrades. Fisheries and Oceans Canada concluded that any works associated with either the existing road or the crossing have the potential to affect Lake Sturgeon habitat, but added that the likelihood of such effects is low. Fisheries and Oceans Canada indicated mitigation measures such as isolating the culvert while it is being replaced to reduce the risk of sedimentation, pumping water around the site during construction, and real-time turbidity monitoring are likely sufficient to reduce the risk of these activities. They noted that conditions outlining necessary mitigation measures would be included in any *Fisheries Act* authorization, should the Project be approved. Fisheries and Oceans Canada recommended an assessment of potential erosion concerns surrounding Camp 19 Road, specifically within the lower rapids area of the Biigtig Zibi. A plan to avoid or mitigate any identified concerns should also be developed.

The Ministry of the Environment, Conservation, and Parks indicated the main threats to the survival and recovery of Lake Sturgeon are habitat alteration and fragmentation, including dams and other river barriers, poor water quality, harvesting, invasive species, and climate change.

The Ministry of the Environment, Conservation, and Parks stated at the hearing that the Proponent's conclusions that there would be no significant effects on Lake Sturgeon appear to be reasonable and valid at this time.

Pays Plat First Nation stated that elimination or destruction of the Lake Sturgeon foraging area in the Biigtig Zibi riverbank in the event of a washout of Camp 19 Road would impact their Indigenous rights.

Panel Conclusions and Recommendations

In reaching their conclusions on Lake Sturgeon, the Panel considered the following factors to be particularly relevant:

- Great Lakes – Upper St. Lawrence populations of Lake Sturgeon are designated as threatened by the Committee on the Status of Endangered Wildlife in Canada. Provincially, this population is listed as endangered in Ontario.
- Great Lakes – Upper St. Lawrence populations of Lake Sturgeon are under consideration for listing on Schedule 1 of the *Species at Risk Act* as a threatened species.
- No residual effects on Lake Sturgeon are anticipated under normal Project operating conditions. GenPGM has proposed mitigation measures to prevent degradation of water quality in the Biigtig Zibi. They predicted a less than 1% change in Biigtig Zibi flows during construction, operations, active closure, and post-closure phases.
- Fisheries and Oceans Canada and the Proponent agreed that effects on the Biigtig Zibi are not anticipated as:
 - the river is not being directly impacted by Project infrastructure;
 - flow in the river is not expected to be altered significantly; and
 - the Project does not involve an increase in accessibility to the Biigtig Zibi, the addition of fish, fishing for Lake Sturgeon, or the removal of barriers to migration within the Biigtig Zibi watershed.
- No increases in illegal harvests, exploitation, species invasion, migration, or habitat fragmentation for Lake Sturgeon are expected.

- As a precautionary measure, Fisheries and Oceans Canada proposed the Proponent characterize the morphology of Lake Sturgeon habitat in the lower rapids prior to the beginning of any work, undertakings, or activities that may affect the Biigtig Zibi, and develop a monitoring plan capable of detecting changes to this habitat.

Recommendation 22: In following their precautionary approach to the assessment of effects on species at risk, the Panel recommends the Proponent, in consultation with Fisheries and Oceans Canada and Indigenous groups, develop a follow-up and monitoring program to verify the predictions of the effects of the Project on Lake Sturgeon. The program should include:

- characterization of the morphology of Lake Sturgeon habitat in the lower rapids area of the Biigtig Zibi prior to the beginning of any work, undertakings, or activities that may affect the Biigtig Zibi;
- morphological characterization of the shape of the riverbed, the width of the cross-axial profile, and substrate composition at specific reference sites, sampled over a period of time suitable for detecting changes;
- a monitoring plan capable of detecting changes as a result of the Project in Lake Sturgeon habitat in the lower rapids of the Biigtig Zibi; and
- identification and implementation of adaptive management measures if changes are detected.

The Panel concurs with Fisheries and Oceans Canada and the Proponent that no notable changes are expected to the Biigtig Zibi that would in turn adversely affect Lake Sturgeon or their habitat. However, as this is a species at risk important to Biigtigong Nishnaabeg and — consistent with the precautionary principle and as advised by Fisheries and Oceans Canada — it is important to avoid unforeseen adverse effects on Lake Sturgeon. The Panel therefore finds that a baseline assessment of the morphology of Lake Sturgeon habitat in the lower rapids of the Biigtig Zibi and the development and implementation of a monitoring plan capable of detecting changes to this habitat would provide the appropriate level of protection for Lake Sturgeon.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on Lake Sturgeon.

10.5.3 Cumulative Effects

The provincial Recovery Strategy for Lake Sturgeon in Ontario states that, in less than 200 years, overexploitation and habitat alteration resulted in dramatic declines in Lake Sturgeon throughout much of their historical range. The strategy suggests that this likely occurred because Lake Sturgeon are not able to adapt rapidly to changes in their environment caused by multiple stressors. It notes that Lake Sturgeon are vulnerable to habitat fragmentation and altered river conditions, and that changes in habitat suitability can be constrained by water levels, river flows, sedimentation, and water quality, which may also affect the availability of food. The recovery strategy states that “[a] clear understanding of the locations of important habitats and linkages between them are key considerations in managing habitat. Important habitats should be identified within the river and lake systems currently occupied by Lake Sturgeon and afforded protection.”

Views of the Proponent

GenPGM stated that they did not anticipate the Project and its activities would interact with Lake Sturgeon or their habitat. They stated the 0.14% change in mean annual flow of the Biigtig Zibi from Project activities is expected to be negligible. They identified no residual effects of water quantity in the Biigtig Zibi.

The Proponent acknowledged the presence of water control structures associated with hydroelectric generation upstream on the Biigtig Zibi, outside of the Regional Study Area.

Views of the Participants

Fisheries and Oceans Canada stated that changes in peak flows in the Biigtig Zibi may cause Lake Sturgeon to alter the way they use their habitat and any incremental change in flow should be considered in the context of cumulative effects. As noted above, Fisheries and Oceans Canada also cautioned that, in the case of federally listed species at risk, there could be a lower threshold for harm or the destruction of critical habitat than is generally recognized as deleterious for fish under the *Species at Risk Act*.

The Ecclestone study noted that, at present, the abundance of Lake Sturgeon in the Great Lakes is estimated to be less than 1% of its historical level, and 27 populations have been extirpated from historically active tributaries in the Great Lakes. The study noted that estimates suggest that Lake Sturgeon require a minimum home range of 250 to 300 km of unimpeded river-lake habitat to complete their life cycle. It further observed that hydroelectric developments alter flow regimes and hinder the species' spawning ability and behaviour.

Panel Conclusions and Recommendations

The Proponent, government agencies, and Indigenous groups have all acknowledged the importance of the Biigtig Zibi to Lake Sturgeon. Existing and future hydroelectric power projects on the Biigtig Zibi and its tributaries, and timber harvest in the Regional Study Area, both have the potential to contribute cumulatively to ongoing habitat alteration of the river.

The Panel notes that Lake Sturgeon have identified migration routes, and foraging, spawning, and resting habitat immediately upstream and downstream of the Project.

The Panel finds that the Project would likely have an effect, although minor, on flows, and the timing of flows, in the Biigtig Zibi. Although these changes are unlikely to have an effect on overall fish habitat, the Panel understands that Lake Sturgeon are particularly vulnerable to altered river conditions, and may be affected by minor, incremental changes to habitat, including flow. The Panel understands that the 0.13% decrease in flow is based on an annual average. Cumulative changes to flow in the Biigtig Zibi on a monthly, and even weekly, basis could affect sensitive life stages of Lake Sturgeon and should be carefully considered by industry and government.

Further, the Panel acknowledges that all species at risk have already experienced significant adverse effects due to past projects and activities, including cumulative effects, and that this cannot be discounted. Due to the minor change in flow to the Biigtig Zibi, the Panel concludes that a precautionary approach is warranted.

For the reasons stated above, the Panel considers that any incremental effect to an already at-risk species, such as Lake Sturgeon would therefore be significant.

The Panel concludes that the Project, in combination with other projects and activities that have been or will be carried out, is likely to cause a significant adverse cumulative effect on Lake Sturgeon habitat due to changes in flow of the Biigtig Zibi.

PART 3: TERRESTRIAL ENVIRONMENT

SECTION 11: TERRAIN, SOILS AND VEGETATION

11.1 REQUIREMENTS FOR THE CONSIDERATION OF TERRAIN, SOILS AND VEGETATION

This section addresses the environmental effects of the Project on terrain, soils and vegetation. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- characterize the baseline terrain and soils;
- identify potential effects on terrain and soils;
- characterize the baseline vegetative communities within the area potentially affected by the Project;
- identify potential effects on vegetation during all phases and on all components of the Project including the mine site, transmission line and access road; and
- assess the potential effects of the Project species known to be important to Indigenous Peoples and groups.

11.2 BASELINE

Views of the Proponent

GenPGM reported that the general elevation around the proposed mine site is slightly higher than the overall regional topography. A central ridge transects the Project site along the north-south axis, which generally runs to the west of the proposed primary pit. This ridge is the primary watershed divide; water to the east of the divide drains to the Biigtig Zibi, whereas water to the west of the divide drains to Lake Superior.

The Proponent found that there are extensive areas of bedrock outcrops within the Site Study Area and that the topsoil and overburden layers are relatively thin.

Overall, metal contents of the topsoil and overburden materials met or were only slightly elevated above background site condition standards for uncontaminated soils, indicating that site overburden material would be suitable for use as reclamation material.

The Proponent stated that the Site Study Area is mostly covered by mature mixed wood (57%) and conifer forests (38%). Other ecosites, including wetlands, uplands, and rock barren, cover slightly more than 5% of the Site Study Area.

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 Biigtig Zibi. The forests of the Site Study Area exhibit an uneven age distribution, with 25% of the forest cover being over-mature (150-plus years), about 22% of the forest in the 121- to 130-year age group, and 29% aged 71–90 years of age. There is almost no (< 4 ha) young forest (i.e., < 40 years of age) due to a lack of recent natural or anthropogenic disturbance.

Wetlands are small and limited in development in the Site Study Area, in part due to the small waterbodies, rugged topography, and thin soils. The Proponent did not formally evaluate any of the wetlands in the Site Study Area but concluded that they would not meet the criteria for provincial significance due to their small size, low diversity, limited hydrological function, and paucity of special features.

Non-forested communities include rock barrens, talus, cliff/rock faces, and anthropogenic habitats such as hydro transmission lines and gravel pits. As defined by the provincial ecological land classification system, these open communities typically have less than 25% tree cover. These ecosites are dominated by shrubs and stunted trees, typically over shallow, bedrock-controlled soils of various textures.

Approximately 360 species of vascular plants have been documented in the Site Study Area, and an unknown number of species of bryophytes (mosses, lichens, and liverworts) and fungi are part of these forest and non-forest ecosystems.

Approximately 60 species of herbaceous species, shrubs, fungi, bryophytes, and trees of Indigenous interest were identified by the Proponent as potentially present within the Site Study Area. Plants of interest identified by Indigenous communities grow in forests, wetlands, upland habitats, and rock barrens.

A total of 40 non-native species have been observed in the Local Study Area (see Appendix 6). This represents approximately 11% of the species documented to date in the Local Study Area. In comparison, approximately 38% of the known species in Ontario are considered non-native. Non-native species, such as clovers, oxeye daisy, common plantain, and little yellow rattle, were most abundant along trails and roads, and many typically do not invade natural communities. However, several species that are potentially invasive were newly observed in the Local Study Area in 2020, including tansy, bull thistle, and purple loosestrife.

Less than 1 ha of anthropogenic ecosites have been mapped within the Site Study Area, but extensive unmapped disturbed areas from mineral exploration, such as trenches, trails, and roads, can be found along the main north-south axis of the Site Study Area. Approximately 70 ha of human-modified habitat is found in the Local Study Area, including the transmission line right-of-way, which passes through the northern part of the Site Study Area.

Views of the Participants

The Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) agreed with the characterization of the forest community by the Proponent and considered the baseline information gathered to be appropriate.

MNDMNR stated that the Proponent's baseline assessment of wetlands was sufficient and offered no comments with regard to the need for additional assessments to determine if the wetlands were of provincial significance. They stated that the size of the wetlands affected that decision.

11.3 ENVIRONMENTAL EFFECTS

The Proponent assessed effects on both soil quantity and quality. Changes in soil quantity could occur through the removal and relocation of soil and overburden as part of the development of the Project site or through erosion or the sliding of stockpiles. Changes to soil quality could occur due to air emissions and fugitive dust deposited on surfaces within the Local Study Area. The potential for metals leaching from overburden is discussed in Section 9 (Surface Water Quality).

Regarding vegetation, the Proponent identified two types of environmental effects associated with the Project: direct effects from the clearing and removal of vegetation, and indirect effects from edge effects, dusting, encroachment of invasive species, and changes in the groundwater regime. The Proponent indicated that direct effects would occur during the Project's construction and active closure phases, while indirect effects would occur during all phases.

11.3.1 Effects on Soil and Overburden

Views of the Proponent

The Proponent stated that changes in soil quantity were principally associated with construction, and, to a lesser extent, operations. During construction, topsoil and overburden would be removed to clear and excavate the Site Study Area. The Proponent estimated site development would require the excavation and stockpiling of approximately 2 million m³ of soil and overburden. This material would be relocated to a single stockpile south of the mine rock

storage area. An additional 674,000 m³ would be excavated and placed in several small stockpiles along the western margin of the process solids management facility.

The Proponent stated that some overburden could be used in the development of Project infrastructure and for reclamation purposes. Material remaining in the overburden stockpiles at closure would be used for site reclamation purposes. Horizontal surfaces would be covered with overburden and/or topsoil and subsequently revegetated using native seeds.

Stockpiled soil and overburden material may be subject to erosion and sliding. To prevent or limit erosion and to preserve overburden stockpiles for future reuse, the Proponent explained that in-design mitigation, including the construction of stockpiles to a natural angle of repose (a height:width ratio of approximately 1:1), would ensure that stockpiles would be maintained to reduce the susceptibility of the soil to erosion. The Proponent would also seed stockpiles to stabilize soils and provide erosion protection where natural regeneration does not occur (i.e., given the nature of these material stockpiles from a growth medium perspective, the Proponent assumed some degree of natural revegetation).

With regard to changes in soil quality, the Proponent indicated the effects would be associated principally with construction and operations as the likelihood and rates of fugitive air emissions would be greater during these periods. The Proponent conducted air quality modelling that included characterization of fugitive air emissions, determining that no material changes in the concentrations of soil constituents were expected to accrue in the Local Study Area.

The Proponent predicted that effects on soils would not be significant, and they committed to a follow-up monitoring program to verify predicted effects, including soil sampling and analysis of metals at air quality monitoring stations and regular evaluations of the geotechnical stability of structures.

11.3.2 Direct Effects on Vegetation: Vegetation Loss

Views of the Proponent

The Proponent indicated in the EIS Addendum that development of the Site Study Area would result in the loss of 1,081 ha of forest, 21.4 ha of open wetlands, 9.8 ha of sparsely vegetated open-water habitat, 6.8 ha of non-forested upland, less than 1 ha of cliff, rock barren and talus communities, and three rare species: Alga Pondweed, Oakes' Pondweed, and Alpine Woodsia.

While the Proponent provided revised numbers for vegetation loss during the hearing, the Panel has assessed the effects of the Project based on the numbers presented in the EIS Addendum, as these were the numbers the Proponent used in the full analysis made available to participants.

Forests

Approximately 1,081 ha of forest would be lost through land clearing and development of the Site Study Area. The Proponent would restore part of the Site Study Area to self-sustaining forests during closure (see Section 11.3.3 below for discussion of the Proponent's conceptual Closure Plan). At the request of the Panel during the hearings, the Proponent predicted more specifically that approximately 487 ha of the Site Study Area would be restored to forest cover during post-closure.

The Proponent indicated that the type of forest found in the Site Study Area is common and widespread in the Regional Study Area (see Appendix 6) and that the loss of forest in the Site Study Area is therefore not predicted to jeopardize the long-term viability of these forests in the adjacent landscape.

Wetlands

Approximately 21.4 ha of open wetlands and an additional 9.8 ha of sparsely vegetated open-water habitat would be lost through the development of the Site Study Area. The Proponent stated that these ecosites are common in the Regional Study Area.

The Proponent indicated that they would preserve wetlands and implement vegetated buffers around areas outside of the mine footprint, such as the transmission line.

The Proponent stated they would restore part of the Site Study Area to wetlands once operations ceased and the mine is decommissioned. At the request of the Panel during the hearings, the Proponent predicted that approximately 4.5 ha of the Site Study Area would be restored to wetlands during closure.

The Proponent has determined that the effects on wetlands would be irreversible and of high duration (effects extend for centuries beyond the life of the Project) but negligible in magnitude. The Proponent stated that the loss of wetlands in the Site Study Area is not predicted to jeopardize the long-term viability of wetlands in the adjacent landscape.

Non-Forested Uplands and Rock Barren

The Proponent stated that approximately 6.8 ha of non-forested upland would be lost through the development of the Site Study Area. Less than 1 ha of cliff, rock barren, and talus communities would be lost; however, the extent of talus may be underestimated due to the scale of mapping used for the Ontario Forest Resource Inventory.

In response to a request by the Panel during the hearings, the Proponent predicted that non-forested ecosites would form a larger proportion of the Site Study Area during and after closure. The Proponent predicted that there would be an additional 387.6 hectares of non-

forested vegetated habitat, 104 hectares of open rock barren, and 119 hectares of open water compared with baseline.

The Proponent determined that the effects on non-forested ecosites would be irreversible and of high duration but negligible in magnitude. The Proponent stated that non-forested ecosites are common in the Regional Study Area and that the loss of non-forested upland and rock barren in the Site Study Area is therefore not predicted to jeopardize the long-term viability of these ecosites in the adjacent landscape.

Rare Plants

No plant species at risk and protected by federal or provincial legislation would be lost due to the Project; however, three provincially rare species would be lost through the development of the Site Study Area.

Alga Pondweed is categorized as imperilled provincially. One of the four known occurrences in the Regional Study Area would be lost due to the filling of two small lakes (L26 and L26a) to create the process solids management facility.

Oakes' Pondweed is not provincially rare but is regionally rare according to the Thunder Bay District Checklist. Two of the five known occurrences of Oakes' Pondweed listed in the Thunder Bay District Checklist would be lost due to the filling of the two lakes.

Alpine Woodsia is categorized as imperilled provincially. One of the 10 known occurrences of this fern in the Regional Study Area would be removed for Project development.

The Proponent noted that occurrences of these species may be underestimated in the Local and Regional Study Areas. Because there is abundant suitable habitat, there has been few botanical survey for these species, which are difficult to differentiate from other similar species.

The Proponent stated that the loss of these rare plant species could be partially mitigated by transplanting individuals to suitable habitat outside the Local Study Area. Prior to infilling of lakes L26 and L26a, the Proponent would transfer Alga and Oakes' Pondweed to ecologically similar waterbodies in the Local Study Area and Alpine Woodsia would be placed on moist rock faces or cliffs outside the Site Study Area.

Transplanted pondweed species would be monitored at least once during the first season following transplanting, and attempts would be made to visit them during the optimal season to detect flowering. The Proponent would monitor Alpine Woodsia at least twice during the summer after transplanting and water them if necessary and again the following two years to document survivorship. The Proponent would provide documentation on the success of transplant methods to MNDMNR as the information would be helpful in other similar situations in the future. The Proponent estimated that transplantation would have a moderate to high degree of success.

The Proponent indicated that the Project's effects on rare species would be reversible once the Project is complete; however, they stated that they would not actively transplant the species back into the Site Study Area as part of site reclamation.

Plant Species of Indigenous Interest

The Proponent provided estimates of the potential abundance of each species of Indigenous interest in the Site Study Area and Local Study Area using an ecosite-based approach and assessed the effects of development on these species as part of their vegetation effects assessment. The Panel took into account this assessment by the Proponent in Section 21 (Effects on Indigenous Peoples).

Views of the Participants

Regarding wetlands, Environment and Climate Change Canada concluded that the Project would cause a direct loss or indirect impairment of wetlands in the Site Study Area; however, a majority of the lost wetlands are classified as open wetlands, which appear to be abundant in the Local Study Area and Regional Study Area. Environment and Climate Change Canada stated that, provided the Proponent meets the commitments made in their Fish Habitat Compensation Plan, the effects of the Project on wetlands could be effectively mitigated.

Regarding wetlands, MNDMNRF stated that there is no provincial requirement to re-establish wetlands as a form of mitigation.

Regarding rare plants, MNDMNRF responded to Panel questioning during the hearings regarding the potential significance of the loss of rare plant species due to the Project. They agreed with the Proponent's statements regarding potential under-documentation of the species. They stated that these species are considered rare due to the limited number of known records in the province. However, they stated that vast areas of Northwestern Ontario that have not been surveyed could provide potential habitat, and therefore it is possible that these species are under-documented province-wide. MNDMNRF did not provide a definitive conclusion regarding the loss of these species due to consideration of these factors and for this reason they did not comment further on this topic in their written submission. MNDMNRF stated that, while they support transplanting, it can be challenging depending on the microsite conditions the species need to become established.

Biigtigong Nishnaabeg, Ginoogaming First Nation, the Métis Nation of Ontario, Pays Plat First Nation, and the Red Sky Métis Independent Nation all provided comments regarding their use of vegetation species of interest that could be affected by the Project. These views are presented in Section 21 (Effects on Indigenous Peoples).

The Métis Nation of Ontario noted errors in the Proponent's assessment of vegetation, including incorrect naming and categorization of species. They noted that these errors do not

provide confidence in the scientific rigour, integrity, and oversight of the Project or indicate that the Proponent is properly incorporating Indigenous knowledge.

The Métis Nation of Ontario raised concerns about the effects on mycorrhiza fungi networks that support the forest. Several mushroom species that use these networks are considered valued ecosystem components by the Métis, and they noted that disturbance of this network would have larger, long-term effects on the surrounding forest. They pointed out that the science regarding how long it would take for these networks to regenerate is poorly understood and that the conditions needed for regeneration can be highly variable and unpredictable.

The Métis Nation of Ontario also raised concerns about the loss of wetland communities. They stated they were concerned about how the Project's effects on wetlands may affect other ecological and biological systems, as well as the Métis way of life.

11.3.3 Progressive Reclamation and Closure

Views of the Proponent

The Proponent committed to preparing a regulatory Closure Plan in accordance with the requirements set out in the Ontario *Mining Act*, Ontario Regulation 240/00, as a means to mitigate the effects of the Project. The Proponent is developing a conceptual plan for the post-closure landscape and is consulting with regulatory agencies and Indigenous groups regarding the composition of the closure landscape that would be included in the plan. The Closure Plan would be finalized by the Proponent and submitted to the MNDMNRF during the regulatory process following the environmental assessment.

The Proponent stated that the overall intent of the Closure Plan would be to restore the site to a self-sustaining ecosystem that would provide terrestrial and aquatic habitats and the potential for traditional pursuits.

The Proponent committed to rehabilitating as much of the mine site as possible to a natural, even-aged, conifer-dominated forest after active closure. The Proponent's conceptual closure landscape included approximately 487 ha of forests, 4.5 ha of wetlands, 388 ha of non-forested vegetation, 104 ha of open rock barren, and 133 ha of open water. The Proponent noted that these values were considered approximate ($\pm 10\%$ to 20%) pending consultation with agencies and Indigenous communities.

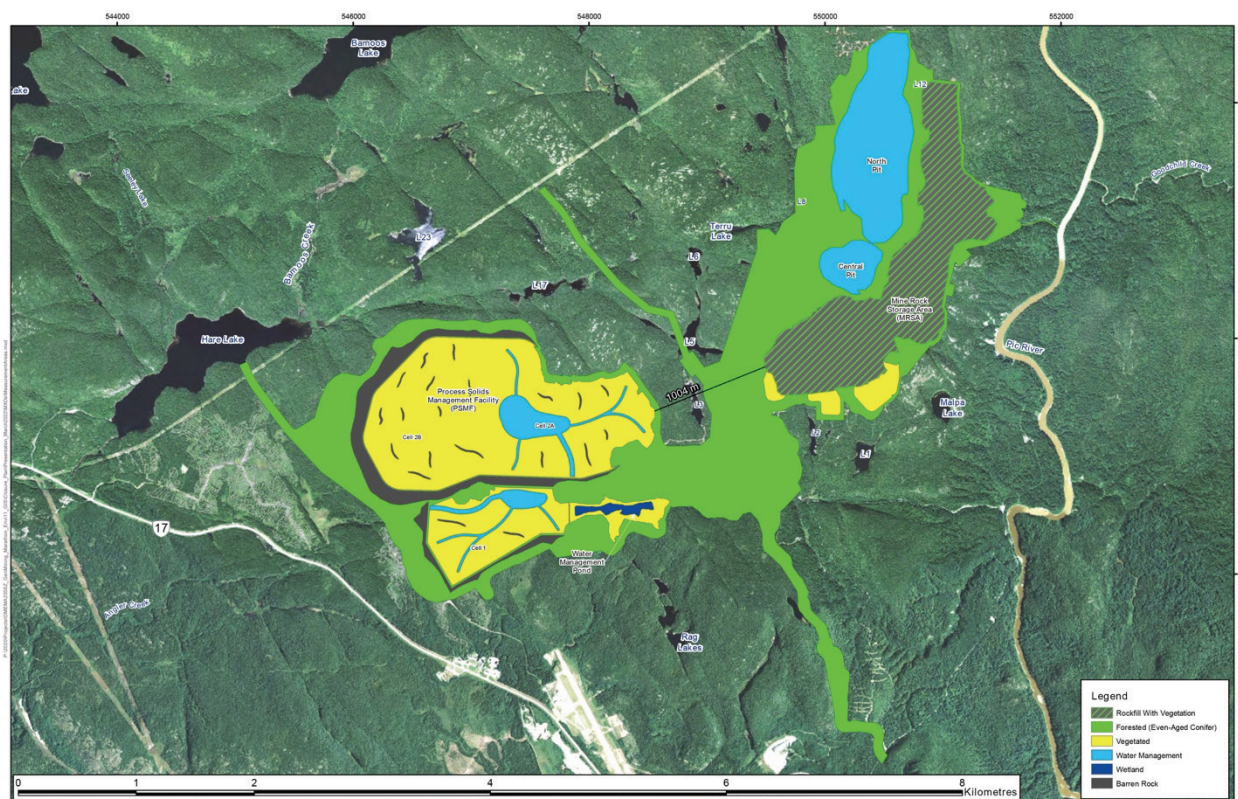


Figure 11-1: Proponent's Conceptual Plan for the Post-Closure Landscape
(Source: CIAR #1210)

The Proponent stated that revegetation of disturbed areas would be accomplished by a combination of hydroseeding and/or direct seeding of native trees, shrubs, forbs, and graminoids (grasses, sedges, and rushes) and, if required, hand planting of native shrubs and trees. These directed rehabilitation efforts would also help accelerate natural regeneration of the site by improving the physical environment through increased shade, leaf litter accumulation, and moisture retention.

The Proponent's conceptual closure landscape includes the creation of an approximately 1 km wide, even-aged, treed conifer corridor across the site between the reclaimed process solids management facility and open pits. Areas that would not be suitable for reforestation would include areas that are too wet, areas with thin soils, and the majority of the process solids management facility for safety reasons. The Proponent would undertake vegetation trials during operations to finalize the suitability of waste rock stockpiles as a site for reforestation.

In areas that are conducive to tree growth, the Proponent predicted that regrowth would occur gradually over decades following active closure and that rehabilitated areas would develop into mature forest over successive decades. However, productive commercial forest would not likely be restored in the Site Study Area.

The Proponent stated that it is unlikely that wetland communities lost due to the Project would be restored to their original state. During active closure, the Proponent would convert the water management pond into a wetland, resulting in approximately 4.5 ha of wetlands in the Site Study Area post-closure. Although other new areas of wetland communities could develop in low-lying areas, including water management features on the process solids management facility, most of the reclaimed areas in the Site Study Area would be expected to develop into upland vegetation communities post-closure.

The flat surfaces of the mine rock storage area would be revegetated and are anticipated to be planted with a mix of shrubs, non-woody vegetation, and trees (pending vegetation trials). The mine rock storage area slopes are anticipated to naturally revegetate over time and would ultimately include a mixture of vegetation and rock faces that provide additional local diversity.

The process solids management facility would be reclaimed to include a mixture of native shrubs, herbaceous vegetation, and other non-invasive species, as well as rock features and ponds.

The transmission line and roads would be decommissioned and seeded at closure to re-establish vegetation that support caribou.

Revegetation would also include common milkweed to provide habitat for Monarch butterflies, and native wildflowers to provide nectar and/or pollen sources for Monarchs and Yellow-banded Bumble Bees.

The Proponent plans to monitor the success of silviculture treatments and would be required to do so as part of their Closure Plan.

Prior to mine closure, the Proponent would undertake progressive reclamation activities, including stabilizing and seeding the overburden stockpiles and re-vegetating the horizontal benches on the mine rock storage area. Progressive reclamation (as applicable) would include vegetation trials to support recommendations for final covers and seeding mixtures at closure.

The Proponent stated that Indigenous communities would continue to be engaged in the development of the Closure Plan and that additional details regarding the incorporation of plant species of interest to Indigenous communities, including the identification of suitable locations, would be provided. The Proponent committed to engaging Biigtigong Nishnaabeg in end land use planning for the Project site and ensuring the site is designed to support habitats and species of interest to Biigtigong Nishnaabeg. The Proponent also committed to obtaining Biigtigong Nishnaabeg's consent with respect to their final Closure Plan and to reviewing feasible Closure Plan alternatives with Biigtigong Nishnaabeg on an ongoing basis.

Views of the Participants

MNDMNRF stated that, although no decisions have been made regarding the Proponent's Closure Plan, they recognized that the Proponent planned to follow well-established industry standards, and had not yet proposed any procedure, techniques or technology that had not been applied successfully elsewhere in Ontario. MNDMNRF stated that they would be completing an independent review of the Project, its monitoring program, and the predicted effects when the Proponent submits a closure plan for the site according to the *Mining Act* after the environmental assessment is completed.

MNDMNRF explained during the hearings that the main objective of closure is to return the site to its pre-disturbance state to the extent feasible and have it become self-sustaining. They explained that they would receive annual inspection data and reports from the Proponent during closure on how the ecosystem is performing and progressing toward being self-sustaining, and that staff would conduct inspections of the site if there is an identified issue on site or approximately once every three years. MNDMNRF confirmed that they would take into account the Panel's recommendations regarding closure so long as they conform to *Mine Rehabilitation Code of Ontario* (Schedule 1, Ontario Regulation 240/00).

MNDMNRF stated they preferred the mine site be rehabilitated to a functioning forest ecosystem that provides for long-term Crown Forest Health following Project closure. They stated that the *Crown Forest Sustainability Act* provides mechanisms to help ensure the sustainability of Ontario's Crown forests, such as the administration and regulation of forest management planning, including forest renewal. However, MNDMNRF stated that they agreed with the Proponent that it is unlikely that commercial forests will be restored in the Site Study Area. They stated that, because these areas do not have the ability to be restored to continuous forests, the Project would create a fragmented landscape. MNDMNRF commented that the information presented by the Proponent about future conditions resulting from the restoration of cleared areas is conceptual in nature. They requested a more thorough analysis and understanding of the land-clearing effects of the Project, including the proportions to be restored to various future habitat types, such as forested ecosites and/or vegetation community types. This would assist with developing appropriate monitoring targets and goals upon which to evaluate decommissioning and rehabilitation efforts, in addition to allowing for a better understanding of the future wildlife utilization and colonization. In response to MNDMNRF's comments, the Proponent provided more information on the composition of the site post-closure.

MNDMNRF stated that they supported the Proponent's proposed use of vegetation trials during operations to determine the most feasible means of reclaiming the mine rock storage area and that it was their understanding that this area was going to be primarily grassland vegetation. They stated that the growth of forests in the Site Study Area would depend on the

amount of soil and overburden available and suggested that the Proponent could import additional topsoil to create the conditions needed for forest growth.

Environment and Climate Change Canada recommended that as much of the mine site as possible should be reforested, not just revegetated.

In their closing remarks, Environment and Climate Change Canada acknowledged that the Proponent identified a plan to increase reforested habitat post-closure to 487.1 ha (+/- 10-20%) but that the Proponent has not made a commitment to implement this plan. They stated that even if implemented, the Project would still result in 593.9 ha of forested habitat in the Site Study Area being permanently removed from the landscape.

Biigtigong Nishnaabeg noted during the hearings that the sequencing of the Closure Plan after the environmental assessment represents a fatal flaw in the process. They stated that complete closure planning must be considered at the environmental assessment stage of a project review to fully understand and mitigate potential environmental changes arising from the Project.

During the hearing Biigtigong Nishnaabeg stressed that the Proponent must support Biigtigong Nishnaabeg in leading the non-engineering aspects of the post-closure design site-wide to ensure that they consider the community's traditional knowledge and land use and meaningfully incorporate Biigtigong Nishnaabeg's end land use goals for the Project.

In their closing remarks, Biigtigong Nishnaabeg acknowledged the Proponent's commitments in Undertaking 31 addressed many of their issues. Biigtigong Nishnaabeg emphasized that the Proponent had committed to obtaining the full and informed consent of Biigtigong Nishnaabeg with respect to the Project's final Closure Plan. Biigtigong Nishnaabeg explained that they expected MNDMNR to acknowledge that this threshold of consent must be met prior to the issuance of any formal approval of the Proponent's final Closure Plan. Along with the commitment to obtaining Biigtigong Nishnaabeg's consent for the final Closure Plan, the Proponent also committed to reviewing feasible alternatives to the Closure Plan with Biigtigong Nishnaabeg.

Biigtigong Nishnaabeg noted during the hearings that MNDMNR's site reclamation objective is to have the site return to pre-disturbance conditions so that the habitat and species that are re-established on the site reflect those that were present before the mine was developed. Biigtigong Nishnaabeg stated that, while this objective is likely to align with their objectives for the majority of disturbed area, there may be situations where this is not the case and they may like to see a different type of habitat established instead of what was present prior to the Project. In these instances, Biigtigong Nishnaabeg recommended that their community decide how these areas are reclaimed and what types of habitats and species they ultimately support.

The Métis Nation of Ontario has also expressed interest in closure planning to ensure the revegetation is conducive to supporting Métis harvests in the future.

The Métis Nation of Ontario requested the list of species and seed stock used for re-vegetation is as local as possible, certified to be weed-free, and does not include invasive species. Métis citizens expressed interest in participating in the re-vegetation phases and would like to establish an environmental monitor with the Proponent.

11.3.4 Indirect Effects on Vegetation: Edge Effects, Dusting, Changes to Groundwater Regime and Encroachment of Non-Native Species

Views of the Proponent

The Proponent assessed five indirect effects on vegetation that could occur outside the Site Study Area as a result of the Project: edge effects of increased sunlight, wind, temperature and evapotranspiration; effects of fugitive dust fall; encroachment of non-native species; and changes to the groundwater regime.

Edge Effects

Habitat edge effects, including increased sunlight, wind, ambient temperature, and rates of evapotranspiration, are predicted to occur along the boundary of the Site Study Area and where linear corridors (roads and transmission lines) are proposed.

Effects on vegetation in the Local Study Area from fragmentation and edge effects are predicted to begin during site preparation and construction, increase during operations, and diminish at closure following the re-establishment of vegetation.

The Proponent predicts approximately 34 ha of vegetation in the Local Study Area (a buffer approximately 10 m wide surrounding the edge of the Site Study Area) could be affected by edge effects of increased sunlight, wind and resultant evapotranspiration.

Dusting

Areas adjacent to the Site Study Area were predicted to experience covering from fugitive dustfall.

Effects on vegetation in the Local Study Area from dustfall were predicted to begin during site preparation and construction, increase during operations, and diminish at closure following the re-establishment of vegetation.

Vegetation within 30 m of the Site Study Area boundary (102 ha), and even more so within 10 m of the Site Study Area boundary (29 ha), would be expected to have the greatest potential for dustfall effects.

One occurrence of Braun's Holly Fern, which is a rare species designated as provincially vulnerable, is located 45 m from the edge of the Site Study Area and could be affected by dustfall, although it is beyond the 30 m distance within which the greatest dustfall effects are predicted to occur.

The Proponent committed to mitigating dust emissions from the Project (see Section 15 (Atmospheric Environment)). The Proponent also committed to continuous monitoring of dustfall during construction and operations. The Proponent noted that the locations where dustfall monitoring would be conducted would be identified during development of the ambient air quality monitoring plan, and typically would occur at locations of maximum dustfall and other locations of interest. The Proponent stated that, because Braun's Holly Fern is a species of interest, they would locate dustfall monitoring jars at locations to provide representative data for this species. The results of the monitoring would be compared with environmental assessment predictions and appropriate regulatory criteria. Additional mitigation efforts would be employed in the event that the Project results in measured levels greater than these criteria; these may include the use of alternative or additional dust suppressants or focused dust suppression where increased dustfall levels would be experienced.

Encroachment of Non-Native Species

Clearing and site development in the Site Study Area would create a large, poorly vegetated area that may be susceptible to colonization by non-native plant species already present on the site (including the soil bank) or from elsewhere. Propagation of non-native species into disturbed habitats, within 30 m of Project components, may occur due to the movement of machinery, equipment, and vehicles along transportation corridors or through imported fill. Invasive species can displace native vegetation, most likely understory species.

Effects on vegetation in the Local Study Area from encroachment of non-native species were predicted to start during site preparation and construction, increase during operations, and reduce at closure following the re-establishment of vegetation.

The Proponent committed to implementing a variety of measures to prevent the establishment of invasive or noxious plants, including progressive reclamation of disturbed lands and cleaning construction vehicles when they enter the site.

The Proponent committed to conducting surveillance monitoring around the Site Study Area to identify the presence, colonization and encroachment of invasive and noxious plants within and around disturbed areas. Should invasive or noxious plants be identified, the Proponent committed to manually removing the species and confirmed that they would not be using herbicides in the Site Study Area. The Proponent also committed to communicating with Indigenous groups about invasive species monitoring and detection.

Changes to Groundwater Regimes

Approximately 442 ha in the Local Study Area, outside the limits of the Site Study Area, were predicted to experience at least a 0.5 m increase in groundwater levels compared with baseline conditions due to mounding of the water table associated with the mine rock storage area and the process solids management facility. Approximately 400 ha in the Local Study Area, outside the limits of the Site Study Area, were predicted to experience at least a 0.5 m decrease in groundwater levels compared with baseline conditions due to the pit lakes water level being lower than the original baseline water table elevation. Wetlands were expected to be more sensitive to changes in groundwater and could result in changes to the vegetation species found in these areas.

Alterations to the topography and drainage patterns in the Site Study Area were predicted to affect soil moisture regimes and indirectly affect vegetation. The change in moisture was predicted to maintain similar overstory and understory conditions, with a slightly greater abundance of herbaceous plant and moss species preferring slightly moister conditions. Many of the predominant boreal tree species (e.g., Black Spruce and Balsam Fir) in the Local Study Area have rather broad tolerance with respect to soil moisture regimes.

One occurrence of Oakes' Pondweed, the third of the five known occurrences of the species listed in the Thunder Bay District Checklist, is located within the Local Study Area, where an increase in groundwater levels would be predicted. The Proponent indicated that this submergent species is located in an area that is strongly influenced by beaver activity, which can result in dramatic and sudden rises or drops in water levels that far exceed the surface water effects of the Project, and therefore the Proponent anticipated that the changes from the Project would not have significant effects on this species.

Views of the Participants

MNDMNRF stated that, because the area of predicted habitat loss would not be restored to continuous forest, residual effects of the site disturbance would persist beyond mine closure. After the initial loss, MNDMNRF expects that there would be a post-rehabilitation change from continuous forest to fragmented forest, creating an "edge-dominated" habitat.

Biigtigong Nishnaabeg noted that the Proponent committed to prohibiting the use of chemical methods to maintain vegetation along the Project's transmission line right of way, and all other Project infrastructure, and that the Proponent committed to outline further details in the invasive species and vegetation management plans. Biigtigong Nishnaabeg also noted that the Proponent committed to considering Biigtigong Nishnaabeg's invasive species mitigation recommendations when developing the invasive and noxious species management contingency plan.

The Métis Nation of Ontario noted previous experiences with dust from mining operations causing effects on moss and lichen, but added that the effects were likely reversible. The Métis Nation of Ontario stated that their staff and Regional Consultation Committee members had spoken with the Proponent in the past to present best practices that are in line with regulations to ensure the Project would not allow for the proliferation of noxious or invasive species. They noted that this is an example of the Proponent being open to hearing from Métis Nation of Ontario citizens and taking their concerns into account.

11.4 PANEL CONCLUSIONS AND RECOMMENDATIONS

The Panel agrees with the Proponent's assessment regarding changes to soil quantity and quality.

In reaching their conclusions on the direct effects of the Project to vegetation, the Panel considered the following factors to be particularly relevant:

- The Project would result in a loss of approximately 1,116 ha of vegetation.
- The vegetation communities that would be lost within the Site Study Area are not unique within the Local Study Area and Regional Study Area.
- The majority of concerns from participants were related to the conceptual nature of the Closure Plan.
- The Proponent has committed to reforest as much of the Site Study Area as possible; however, the total amount of each vegetation community on the closure landscape, including forests, is conceptual at this time.
- It would take approximately 40–70 years for any forests to re-establish post-closure, and the Proponent expects commercial forests would not return.
- The Proponent has committed to engage with Indigenous communities regarding revegetation, including obtaining consent from Biigtigong Nishnaabeg on the Closure Plan.
- The Proponent would require regulatory approval by MNDMNRF on their Closure Plan.
- The Proponent would be required by MNDMNRF to submit annual site inspection data on the status of the ecosystem during the post-closure phase.
- The Proponent has committed to relocating rare plant species from the Site Study Area to the Local Study Area and monitoring the success of the transplanting.
- The Proponent and the MNDMNRF agree that rare plants could be under-represented due to a lack of studies of the region.

- The Proponent and the Ministry of Environment, Conservation and Parks agreed that wetlands identified in the Site Study Area were not likely to meet the criteria to be considered Provincially Significant Wetlands.

In reaching their conclusions on the indirect effects of the Project to vegetation the Panel considered the following factors to be particularly relevant:

- The dusting of vegetation outside the Site Study Area would be mitigated, monitored and adaptively managed (see Section 15 (Atmospheric Environment)). This would include the known location of Braun's Holly Fern in the Local Study Area.
- Many of the predominant boreal tree species have relatively broad tolerance with respect to soil moisture regimes, and the change in moisture is predicted to maintain similar overstory and understory conditions.
- The Proponent has a plan to prevent the establishment of invasive species in the Site Study Area.

In the context of the Local Study Area, the Panel considers that there would be a high-magnitude effect on the landscape due to direct loss of vegetation in the short term. The Panel does not consider reclamation to be a mitigation measure but agrees with the Proponent that the Project site would be revegetated in the long term. The Panel notes that in the context of the Regional Study Area, the vegetation communities are not unique. The Panel understands that the Proponent has prepared a conceptual closure plan and that they have committed to reforesting as much of the Site Study Area as possible to even-aged conifer forests. Although the Panel finds this commitment to be vague, the commitment by the Proponent to obtain consent from Biigtigong Nishnaabeg on the Closure Plan provides additional confidence regarding the eventual outcomes of the site, including the vegetation communities. The Panel notes that the Proponent has not prepared a follow-up monitoring program regarding closure. The Panel understands that inspection reports would be required by MNDMNRF; however, they find this measure to be passive in nature and expects that the Proponent would take a proactive approach to developing a comprehensive follow-up program.

The Panel recommends that the Proponent implement the following mitigation measures related to vegetation:

Recommendation 23: Review feasible Closure Plan alternatives with Biigtigong Nishnaabeg and seek mutual agreement with Biigtigong Nishnaabeg on the Closure Plan prior to submitting it to MNDMNRF.

Recommendation 24: Prior to construction, transfer reproductive structures of Alga and Oakes' Pondweed to ecologically similar waterbodies within the Regional Study Area and transplant individuals of Alpine Woodsia to one or more other moist rock faces or cliffs within the Regional Study Area.

Recommendation 25: To prevent the colonization and encroachment of invasive species, conduct regular surveillance monitoring within and around the Site Study Area to identify the presence of invasive and noxious plants. Should monitoring identify the presence of invasive or noxious plants, use manual or mechanical methods to remove the plants without the use of herbicides. Determine in consultation with relevant government agencies and Indigenous groups the timing and methods for surveillance monitoring.

Recommendation 26: Conduct seeding during progressive reclamation and closure reclamation using methods that would accelerate natural regeneration of the Site Study Area by improving the physical environment through increased shade, litter accumulation, and moisture retention, including by direct planting of native trees and shrubs. Determine in consultation with Indigenous groups, prior to construction, the appropriate seed mixes and seedlings to use during progressive reclamation and closure reclamation.

Recommendation 27: Undertake closure reclamation, once operations have ceased and in consultation with Indigenous groups and relevant government agencies, to return the Site Study Area to a self-sustaining ecosystem that includes areas of even-aged conifer forests and in accordance with the *Mining Act* requirements for mine closure.

In addition to the above key mitigation measures, the Panel recommends the Proponent implement follow-up programs:

Recommendation 28: The Proponent should develop and implement, with Indigenous groups and relevant government agencies, prior to closure, a follow-up program to verify the effectiveness of closure reclamation with regard to the objectives of the provincially approved Closure Plan and the recommendations of the Panel. The follow-up program should include methods, timing, duration, thresholds, and adaptive management measures.

Recommendation 29: The Proponent should develop and implement, in consultation with relevant government agencies and Indigenous communities, a follow-up program to verify the effectiveness of the transplantations of rare plant species. The follow-up program should include:

- monitoring (including presence, density, cover) of transplanted Pondweed at least once during the first season following transplanting, ideally during the optimal season to detect flowering;

- monitoring (including presence, density, cover) of transplanted Alpine Woodsia at least twice during the summer after transplanting, and the following two years, and water if necessary;
- sharing results on the success of transplant methods to MNDMNRF including recommendations regarding success.

Recommendation 30: The Proponent should monitor dustfall as part of the Air Quality follow-up program described in Section 15 (Atmospheric Environment), including at the location where Braun's Holly Fern is found in the Local Study Area in order to verify the accuracy of the predictions and determine the effectiveness of mitigation measures regarding the effects of dustfall on vegetation during construction and operations.

GenPGM should determine the details of the follow-up program including monitoring locations, monitoring frequency, parameters to be monitored, and adaptive management thresholds and measures in consultation with relevant government agencies and Indigenous communities.

The Panel notes that Recommendations 24 and 29 would only need to be considered under the Ontario *Environmental Assessment Act*.

The Panel concludes that, if the recommended mitigation measures and closure reclamation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on vegetation.

11.5 CUMULATIVE EFFECTS

Views of the Proponent

Soils

The Proponent reported that the residual effects on soil quantity would be restricted to the Site Study Area and residual effects on soil quality would be restricted to the Local Study Area. They stated that effects from other projects and activities in the Regional Study Area on soil would be expected to be limited to a localized area surrounding those other specific projects and activities. They concluded that no spatial overlap between these projects and activities and the residual Project effects related to soil were anticipated and, accordingly, they did not expect any cumulative effects on soil quantity and quality.

Forests

The Proponent stated that approximately 1,051,138 ha (91.1%) of the Pic Forest Management Unit, used as the Regional Study Area for assessing cumulative effects on forested vegetation, comprises forested communities. Timber harvesting in the Regional Study Area has the greatest capacity for direct and indirect disturbance of forest cover. The Proponent reported that 17,514 ha of forest is scheduled to be harvested within the Pic Forest Management Unit between 2020 and 2021. During the life of the mine, the area cleared for commercial forestry in the Pic Forest Management Unit is predicted to be at least two orders of magnitude (100 times) larger than the footprint of the Site Study Area. The current timber harvesting rate is approximately 5,000 to 10,000 ha per year. The Proponent noted that the level of disturbance associated with timber harvesting as presented in the Forest Management Plan is considered sustainable by the provincial government.

Other activities could result in an incremental loss of forest-type vegetation. Land clearing associated with wind and hydro-power developments and mineral exploration would remove forest-type vegetation but these disturbances are expected to be relatively small — from several to tens of hectares in size. Land clearing associated with the development of wind farms is expected to be larger in scale. The Proponent reported that land clearing would occur on about 188 ha of the approximately 2,400 ha Coldwell project site, affecting White Birch, Black Spruce, and Balsam Fir mixedwood stands. The Superior Shores project is estimated to account for approximately 25% of that area, or 47 hectares.

With respect to forest fragmentation, the Proponent noted that the 1,116 ha Site Study Area is larger than the average clearcut of 495 ha in the Pic Forest Management Unit for the 2019-2029 period. In addition, 87% of the areas disturbed by wildfire over the last 60 years in the Pic Forest Management Unit were from fires greater than 1,000 ha in size.

The Proponent stated that the cumulative change in forest cover in consideration of all projects and activities would not be materially different than that represented by commercial timber harvesting alone, indicating that such rates of harvesting have been deemed sustainable. Forested communities that have been harvested in the past were expected to be renewed as a result of revegetation activities by forestry companies and natural revegetation. As such, any loss of forest as a result of timber harvesting was considered a temporary loss (not permanent) by the Proponent, allowing the percentage of forest cover within the Regional Study Area to remain relatively consistent over time. Any small increment in harvesting associated with other activities does not affect this conclusion, particularly given that commercial forestry within the Regional Study Area has routinely been cutting much less than its allocated harvest, leaving ample additional area that could still be cleared sustainably by other industrial activities, including this Project.

Wetlands and Non-Forested Upland

The loss of wetlands due to the Project represents less than 0.2% of the 11,430 ha of the open wetland ecosites found within Schreiber Ecodistrict 3W-5 (Regional Study Area for wetlands, rock barrens, other non-forested communities, and rare plants) based on ecosite mapping. An additional eight other non-forested wetland ecosites account for an additional 9,932 ha within the Regional Study Area. The Proponent noted that these numbers were likely a substantial underestimate of available open wetland abundance in the Regional Study Area as a result of unmapped wetlands. The loss of non-forested uplands within the Site Study Area represents less than 0.4% of the 1,404 ha of the ecosites found within Ecodistrict 3W-5.

The Proponent reported that a relatively small proportion of the areas that would be cleared for energy and mining projects were expected to be non-forest cover type vegetation. The Proponent noted that, although the non-forest cover of the Regional Study Area (Schreiber Ecodistrict 3W-5) and the Pic Forest Management Unit shared some area, planned future timber harvest areas in the Pic Forest Management Unit did not overlap with Ecodistrict 3W-5 and therefore did not warrant further consideration from a cumulative effects perspective for non-forest vegetation types.

The Proponent stated that non-forest vegetation types on the Project site represented small percentages (< 1%) of those same ecosites found within Ecodistrict 3W-5 and the contribution of the Project to the overall effect would therefore likely be small. Additional incremental losses that may result from projects or activities were not expected to contribute to the overall losses.

View of the Participants

Northwatch stated that forest management activities, including the extraction of trees and silvicultural practices such as scarification (with attendant carbon loss), pesticide application, and construction and maintenance of an extensive road network, were also industrial activities taking place in the Lake Superior watershed. Northwatch stated that these activities should also be considered in the cumulative effects assessment.

They also stated that the Proponent's conclusion that the Project's contribution to cumulative effects was negligible was not supported by the claim that the forest industry did not utilize their full harvest allocation. They also stated that the Proponent's analysis did not consider ecological themes such as forest fragmentation and its effects on flora and fauna species, including mortality, breeding, and abundance.

The Crown Consultation Team reported that the Métis Nation of Ontario raised concerns regarding cumulative effects on vegetation during consultation activities. The Métis Nation of Ontario shared that climate change had affected the harvesting area in the Local and Regional Study Areas, specifically for plants and wildlife. The Métis Nation of Ontario indicated the combined effects of the Project and the planned forest harvest within the Pic Forest Management Unit should be evaluated.

Panel Conclusions and Recommendations

In reaching their conclusions on the cumulative effects on vegetation, the Panel considered the following factors to be particularly relevant:

- The cumulative change in forest cover in consideration of all projects and activities would not be materially different than that represented by commercial timber harvesting alone and such rates of harvesting have been deemed sustainable.
- Non-forest vegetation types on the Project site represent small percentages (< 1%) of those same ecosites found within the Regional Study Area and additional incremental losses that may result from other projects or activities are not expected to contribute to the overall losses.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out is, is not likely to cause a significant adverse cumulative effect on soils or vegetation.

SECTION 12: WILDLIFE SPECIES

12.1 REQUIREMENTS FOR THE CONSIDERATION OF WILDLIFE

This section addresses the environmental effects of the Project on provincially regulated wildlife species, including migratory birds. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012*. Effects on migratory birds must be assessed under paragraph 5(1)(a) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- describe and identify the terrestrial species, including migratory birds, and their habitat, at the site and within the local and regional study areas, any wildlife corridors and physical barriers to movement that exist within the Project area, and all protected and conservation areas established by federal, provincial, and municipal jurisdictions; and
- identify the effects of the Project on wildlife and migratory birds.

The Panel's Terms of Reference required that the Panel's assessment include a consideration of the extent to which biological diversity (e.g., ecosystems and/or species diversity) is affected by the Project.

12.2 MAMMALS

12.2.1 Baseline

Views of the Proponent

The Proponent reported several taxa of wildlife with ranges within the Regional Study Area (see Appendix 6), including at least 24 species of mammals. Mammals observed with trail cameras in 2020 included American marten (*Martes americana*), beaver (*Castor canadensis*), black bear (*Ursus americanus*), grey wolf (*Canis lupus occidentalis*), moose (*Alces alces*), snowshoe hare (*Lepus americanus*), and white-tailed deer (*Odocoileus virginianus*). Grey wolves were the most observed species by trail cameras, followed by black bear and moose.

The Proponent conducted a moose aerial survey in March 2013, observing one moose in the Local Study Area (see Appendix 6) and a second one northeast of Bamooos Lake. One or two moose individuals were recorded by trail cameras deployed in 2020. Historical moose observations suggest that moose populations have been relatively stable over the last 25 years.

In 2015, approximately 2,828 and 3,539 moose were estimated to be in Wildlife Management Units 21A and 21B, respectively. The proportion of each Wildlife Management Unit in the Pic Forest Management Unit suggests there are approximately 2,600 moose in the Regional Study Area. The Proponent stated that current moose population levels meet (WMU 21A)⁷ or exceed (WMU 21B)⁸ target objectives at the landscape scale.

Many furbearers — aquatic and forest dwelling — exist or possibly exist onsite including beaver, American marten, grey wolf, and black bear. Aerial surveys in 2010 indicated beaver presence on at least seven waterbodies or watercourses in the Site Study Area. Beaver is a commonly hunted (trapped) species in the Local Study Area.

Grey wolves were the most observed species by trail cameras, and signs (i.e., scat, tracks) of wolves were widespread across the Local Study Area along roads and trails. Field results (i.e., trail cameras) indicate that a pack of wolves (two adults and three pups) used at least the southwestern and central portions of the Site Study Area in 2020. The Proponent noted that overall wolf numbers are reported to have increased regionally, with a predicted wolf density in the Regional Study Area of approximately 12 or 13 wolves per 1,000 km². Based on home range data, this suggests that the Site Study Area represents only a portion of the home range of one wolf pack.

Black bear signs were widespread throughout the Site Study Area; however, bears were most frequently observed along the access road near the landfill in previous field work and again in 2020.

Views of the Participants

Biigtigong Nishnaabeg noted that the 2021 moose population estimate for WMU 21B is 2,346, as reported by the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF). Compared with the 2015 population estimate that the Proponent used in the *Environmental Impact Statement Addendum* (EIS Addendum), Biigtigong Nishnaabeg indicated this represents an alarming short-term regional population decline within their Exclusive Title Area.

MNDMNRF stated that the Proponent's suggestion that the moose populations in WMU 21A and WMU 21B are "relatively stable" is dependent upon the temporal scale being examined. MNDMNRF stated that Ontario's moose population peaked in early 2000 and has declined by over 20% since 2004 and that the last three aerial surveys indicated that the populations have

⁷ The objective for WMU21A for 2030 is a population 2,800–3,800 (2018 population noted as 2928).

⁸ The objective for WMU21B for 2030 is a population of 2,400–3,100 (2015 population noted as 3539).

been declining. More recent moose population estimates are 2,888 moose in WMU 21A in 2018 and 2,346 moose in WMU 21B in 2020. As the EIS Addendum only included data up to 2011-2012, the most recent population changes and updated population range objectives that came into use for the 2016 harvest plans are not captured in these estimates. Moose population estimates are just within (WMU 21A) or just below (WMU 21B) the ranges of their respective WMU-specific moose population objectives. Current MNDMNRF moose management efforts are being directed toward reaching the WMU-specific moose population objective ranges.

MNDMNRF stated that many factors can influence shifts in the relative distribution and abundance of moose on the landscape, and estimating the relative influence of any factor (e.g., climate, predation, or disease) can be challenging. Information on the current size of each moose population and its demographics inform decisions to increase, maintain or decrease a population and the issuing of moose tag quotas for regulated hunts.

12.2.2 Environmental Effects

Views of the Proponent

GenPGM noted in the EIS Addendum that mammals, including moose, furbearers (e.g., beavers, American martens, and grey wolves), as well as black bears were of particular importance in the assessment due to their intrinsic ecological importance, traditional use by Indigenous and other communities, and potential sensitivity to development.

The Proponent identified the following environmental effects on wildlife and wildlife habitat associated with the Project:

- habitat removal and alteration leading to disturbance or destruction of bird nests and young during breeding season;
- habitat fragmentation and wildlife displacement due to loss of habitat and/or prey;
- sensory disturbance;
- potential for collisions with Project infrastructure and vehicles; and
- potential for habituation to human presence and supplemental food sources.

As discussed in Section 11 (Terrain, Soils and Vegetation), the Project would result in a loss of approximately 1,116 hectares of vegetation. GenPGM states that the activity with the greatest potential interaction with wildlife is the removal of forest cover and associated vegetation for Project development during site preparation and construction resulting in the loss of approximately 1,081 ha of forest, 21.4 ha of open wetlands, 9.8 ha of sparsely vegetated open water habitat, 6.8 ha of non-forested upland, and less than 1 ha of cliff, rock barren and talus

communities. During active closure, the Proponent would revegetate the Site Study Area. Further discussion on this can be found in Section 11 (Terrain, Soils and Vegetation).

Moose

The Proponent reported that the Site Study Area contains suitable moose habitat as it has abundant mountain maple and other preferred moose browse; however, they stated that the Site Study Area does not appear to represent high-quality moose habitat relative to other areas in the Regional Study Area according to habitat-mapping models. The Site Study Area was modelled as having lower overall carrying capacity (for moose) compared with other areas in the Regional Study Area, providing generally poor winter habitat, poor cover (particularly summer thermal cover), and limited identified aquatic feeding areas relative to the rest of the Regional Study Area.

The Proponent noted that a moose aquatic feeding area is identified by MNDMNR in *the Pic Forest Management Unit Plan* 300 m north of the Local Study Area, and determined that it would not be affected by the Project.

One or two moose are expected to be affected by habitat loss in the Site Study Area, but given their mobility, it is expected they would be displaced rather than killed by the forest clearing. The Proponent expects that moose could become habituated to noise and are likely to return to using areas of the Local Study Area. Although moose can be sensitive to anthropogenic activities and avoid areas where occasional or unpredictable disturbances occur, they often habituate to non-threatening constant or ongoing disturbances.

The Proponent stated that, overall, the potential effects on moose populations from the Project due to habitat loss appear limited as the current moose population levels meet or exceed target objectives at the landscape scale. Additionally, the recovery of some habitat during site rehabilitation activities after closure, including shrubby browse along the transmission line corridor and likely revegetation of the mine rock storage area and process solids management facility with forbs and grasses (soil stabilization) would support the moose population. As succession continues and forested areas begin to expand, early successional shrub and tree species are expected to provide increased moose browse. The Proponent also noted that, approximately 20 years after suspension of mining operations, moose are regularly observed using partially rehabilitated areas of the former Inmet Zinc Mine at Winston Lake, 20 km northwest of Schreiber.

Furbearers

Beaver and marten are among the most trapped species in the Local Study Area and are the focus of the Proponent's assessment on furbearers. Grey wolves and black bears are covered in the following sections.

The Proponent found habitat suitability for beavers to be variable in the Site Study Area and broader Regional Study Area according to habitat modelling. Lodges (active or inactive) were found on at least 11 waterbodies smaller than 10 ha in the Site Study Area in 2020, with beaver activity found along most large stream systems as well.

Martens prefer mature to old-growth mixedwood and conifer-dominated forests with abundant coarse woody debris. Approximately 62% of the Site Study Area was modelled by the Proponent as preferred marten habitat and the species' presence was confirmed using the Site Study Area west of Malpa Lake.

The Proponent reported that the loss of actual and potential beaver habitat in the Site Study Area is minor relative to available habitat in the surrounding landscape. Potential available habitat in the Regional Study Area is likely underestimated as beavers can also use larger waterbodies and create ponds on watercourses. In addition to habitat availability, beaver and marten abundance is also regulated by other factors (e.g., disease, predation, trapping) and as a result, modelled habitat availability in the study areas may not be at carrying capacity with respect to beaver or marten population size.

Additionally, the Proponent reported that the loss of marten habitat in the Site Study Area (691 ha) only represents 0.2% of the available habitat in the Regional Study Area (392,000 ha).

The Proponent stated that they expect furbearers present in the Site Study Area would translocate during site clearing. They noted that furbearers more tolerant of human disturbance (e.g., red foxes) may become accustomed to human activity and move back to the periphery of the site, after clearing activity. Furbearer species less tolerant of open habitats or anthropogenic disturbance (e.g., the Canada lynx, fisher, and American marten) may be completely displaced during construction and operations.

At closure, site rehabilitation could potentially provide suitable habitat for furbearers. Martens, red foxes, and short-tailed weasels that prey upon small mammals could become more prevalent within the partially rehabilitated open areas of the Site Study Area. Additionally, potential impairment from fugitive dustfall, sensory disturbances, and edge effects would lessen as the site activity diminishes toward the end of operations. The Proponent noted that it may be several decades before preferred tree species would be available as a major food source for beavers and preferred habitat available for martens.

The Proponent reported that former mine projects have observed that approximately 20 years after suspension of mining operations, red foxes, snowshoe hares, short-tailed weasels, and least and eastern chipmunks are using partially rehabilitated areas. Beavers, river otters, and American mink may recolonize riparian and aquatic habitats in the Site Study Area or Local Study Area. Some furbearers (e.g., martens) are also generally adapted to life in disturbance-driven boreal forests.

The Proponent predicted mortality of furbearers and larger mammals would be negligible during clearing. An increase in the mortality of species that use roadways more frequently for foraging or travel is anticipated but restricted to the Site Study Area.

Grey Wolves

The Proponent reports that wolf abundance and distribution within the Site Study Area is at least partly dependent on the availability of prey (primarily beaver, moose, and white-tailed deer); however, the proximity of the municipal landfill, which is immediately south of the Site Study Area, may also provide scavenging opportunities. Mortality from human sources (e.g., hunting, trapping, and vehicle collisions) may also limit the abundance of grey wolves in the Regional Study Area.

Site development and construction are expected to displace wolves to other parts of their home range due to loss of habitat and potential prey. Since grey wolves can become habituated to anthropogenic activities, and given their present location, it is expected that wolves displaced by the Project would remain in the local landscape. The Proponent also noted that, if there are changes to potential wolf prey due to changes in vegetation, and those prey species become habituated to human activities associated with operations in the Site Study Area, wolves may follow.

The Proponent reported that the extent to which active closure would have an effect on grey wolves is largely tied to the availability of prey. Grasses and forbs from early vegetation rehabilitation efforts may attract deer and ultimately wolves, with moose and beavers predicted to return with the establishment of woody vegetation.

The Proponent also predicted that residual effects from vehicle collisions may be higher for species such the grey wolf that use roadways more frequently for foraging or travel.

Effects on grey wolf populations may have implications for Indigenous Peoples through indirect effects on Registered Trapline Area TR022 (Biigtigong Nishnaabeg's Community Trapline) as discussed in Section 21 (Effects on Indigenous Peoples).

Black Bears

The Proponent described black bears as habitat generalists that depend heavily on forested areas for food resource and security (e.g., escape trees for cubs). Open disturbed areas such as roadsides, cutovers, and burns are used for foraging. The black bear is an ecologically and socio-economically important species.

The Proponent stated that clearing of the Project footprint would result in the loss of black bear habitat, at least for the duration of operations. Habitat suitability modelled by the Proponent suggested the existing habitat in the Site Study Area may be of a lower suitability for black bears compared with other portions of the Regional Study Area. However, habitat models have

not been validated for the boreal forest, and the presence of a landfill immediately to the south of the Site Study Area that may increase suitability in the local landscape through additional food supply has not been included.

Additionally, the Proponent noted that black bear abundance is regulated by factors other than modelled habitat availability, such as food availability and hunting. They stated that modelled habitat in the study areas may not be at carrying capacity with respect to bear population size.

Because black bears can become habituated to anthropogenic activities, and given their present location, the Proponent stated that the bears displaced by the Project would be expected to remain in the local landscape, including within Registered Trapline Area TR022 (Biigtigong Nishnaabeg's Community Trapline). At active closure, revegetation efforts would likely create open habitats that may be a source of forage for bears.

With regard to human-wildlife interactions, the Proponent stated that black bears and other wildlife may experience adverse health effects from anthropogenic food sources, and/or that habituation may lead to the forced relocation or death of problem wildlife due to human safety concerns. The Proponent would implement waste control measures and a policy and training program for wildlife interactions, as well as practices designed to discourage wildlife from frequenting the Site Study Area (e.g., no feeding) and reduce the potential for mortality.

Mitigation and Monitoring

The Proponent proposed several measures to mitigate the effects of the Project on mammals, including moose, furbearers, grey wolves and black bears. In addition to progressive reclamation and closure reclamation, the Proponent has proposed roadway management measures to reduce the risk of collisions, including:

- provision of adequate sight lines on roads;
- posting speed limits;
- plowing practices that provide gaps for mammals to exit roads;
- removal of roadkill from roads; and
- proper handling and disposal of road salt in order to decrease moose presence near roads.

The Proponent would also manage waste, provide training to staff regarding waste management, and prohibit hunting to reduce wildlife-human interactions and wildlife mortality.

The Proponent also committed to developing a wildlife follow-up and monitoring plan in consultation with regulatory agencies and Indigenous communities, and would put it in place for all Project phases. The plan would include recording wildlife fatalities or interactions conducted through a self-reporting program that would apply to all onsite personnel. The

Proponent stated that additional mitigation measures could be established based on the outcomes of monitoring, including wildlife deterrents, fencing or screening, and draining of roadside salt ponds to reduce potential attractions for animals.

In addition to these measures, the Proponent committed to engaging with Biigtigong Nishnaabeg to determine and implement monitoring and mitigation for potential effects on species of high importance to their community.

Views of the Participants

MNDMNRF stated that, because the area of habitat loss predicted would not be restored to continuous forest, residual effects of the site disturbance would persist beyond mine closure. After the initial loss, MNDMNRF expected that there would be a change post-rehabilitation from continuous forest to fragmented forest, creating an “edge-dominated” habitat that could result in shifts in local species and effects on populations and community structures, changes to shelter, and an overall displacement of wildlife. MNDMNRF noted a lack of detail on predicted future habitat conditions, making any future wildlife habitat suitability proposed by the Proponent conceptual in nature. MNDMNRF stated that this lack of detailed future conditions makes it challenging to assess long-term effects on wildlife habitat, evaluate the effectiveness and progress of active closure in rehabilitation, and adaptively manage or set targets and goals for achieving desired future habitat outcomes. In MNDMNRF’s opinion, the outcomes and success of the rehabilitation plan for wildlife species and communities would be more predictable if more details were provided in the Closure Plan on the composition and structure of the intended future vegetation communities, and the effects on adjacent habitat in the Local Study Area.

At the hearing, MNDMNRF noted that significant long-term effects on wildlife with small home ranges are anticipated. MNDMNRF acknowledged that wildlife with large home ranges and the ability to disperse more readily, such as moose, would experience less disruption due to loss of habitat. In their hearing submission, MNDMNRF noted that it would be preferable to see site rehabilitation better emulate natural disturbance patterns and return forests to productive lands, including areas of mature forest.

MNDMNRF also noted that various authorization(s) would be required, including authorization to interfere with or destroy a mammal den (of furbearers and black bears), beaver dam, or a black bear in a den. The conditions of any authorization would address timing windows for avoiding disruption to wildlife lifecycles, such as the timing of relocations. Conditions associated with wildlife in the *Lakes and Rivers Improvement Act* approvals, such as Significant Wildlife Habitat, would also have to be considered.

Biigtigong Nishnaabeg had concerns with the Proponent’s management of domestic waste and its effect on wildlife habitat quality. They stated that ineffective waste management during construction and operations may attract wildlife (e.g., bears and small furbearers) to the Project

site, causing a change in movement toward a temporary new food source (e.g., Project-related domestic waste) and potentially dangerous habitat (e.g., near heavy equipment activity).

Biigtigong Nishnaabeg noted that the grey wolf is a wildlife species of interest and that site development and operation would result in an appreciably different habitat after closure compared with what is currently present.

The Métis Nation of Ontario expressed concern about revegetation post-closure and the Proponent's view that species that prefer open, early successional, or edge habitats may benefit. The Métis Nation of Ontario requested details on species that do not prefer open, early successional, or edge habitats and how the rehabilitated areas would affect these species within the Site Study Area compared with species that prefer this habitat type (e.g., moose vs. caribou).

12.2.3 Panel Conclusions and Recommendations

In reaching their conclusions on the direct effects of the Project to mammals the Panel considered the following factors to be particularly relevant:

Moose

- The Site Study Area does not appear to provide high-quality moose habitat relative to other areas in the Regional Study Area, according to habitat mapping models.
- Current moose population levels exceed target objectives at the landscape scale for WMU 21A (based on a 2018 population estimate) and are below target objectives for WMU21B (based on a 2021 population estimate).
- Biigtigong Nishnaabeg and MNDMNRF noted that moose populations are declining.
- MNDMNRF noted there is less of a significant long-term effect from habitat changes to wildlife with large home ranges and the ability to disperse more readily, such as moose.
- The recovery of some habitat during site rehabilitation activities after closure would support the moose population.

Furbearers

- There is active beaver habitat in the Site Study Area and beavers are commonly trapped in the Local Study Area.
- Aerial surveys in 2010 indicated the presence of beavers on at least seven waterbodies or watercourses in the Site Study Area.

- Approximately 62% of the Site Study Area was modelled by the Proponent as preferred marten habitat, and the species was confirmed to be present in the Site Study Area west of Malpa Lake.
- The loss of beaver and marten habitat in the Site Study Area is predicted to be minor relative to available habitat in the Regional Study Area.
- Furbearer species less tolerant of open habitats or anthropogenic disturbance, such as martens, may be completely displaced during construction and operations.
- The Proponent noted that it may be several decades before preferred tree species are available as a major food source for beavers and before preferred habitat is available for marten.
- MNDMNRF noted that various authorization(s) would be required, including authorization to interfere with or destroy a furbearer den or beaver dam.

Grey Wolves

- Grey wolves are widespread in the Local Study Area, including along roads and trails.
- Because grey wolves can become habituated to anthropogenic activities, and given their present location, it is expected that wolves displaced by the Project would remain in the local landscape.
- The Proponent reported that the potential magnitude of the effects of active closure on grey wolves is tied to the effect on the availability of prey.

Black Bears

- Indications of the presence of black bears (e.g., scat) were widespread throughout the Site Study Area; however, the bears were most frequently observed along the access road near the landfill.
- Habitat suitability modelled by the Proponent suggested less existing black bear habitat in the Site Study Area relative to other areas of the Regional Study Area.
- Because black bears can become habituated to anthropogenic activities, and given their present location, the Proponent stated that some bears displaced by the Project could be expected to remain in the local landscape.
- At closure, revegetation efforts would likely create open habitats that could be a source of forage for bears.

- The Proponent would implement waste control measures and a policy and training program for wildlife interactions, along with practices to reduce wildlife potential in the Site Study Area (e.g., no feeding) and the potential for mortality.
- Biigtigong Nishnaabeg stated that ineffective waste management during construction and operations could attract wildlife (e.g., bears and small furbearers) to the Project site, causing a change in movement toward a temporary new food source (e.g., Project-related domestic waste) and potentially dangerous habitat (e.g., near heavy equipment activity).
- MNDMNRF noted that various authorization(s) would be required, including authorization to interfere with or destroy a black bear or mammal den, or black bear in a den.

The Panel notes that the Site Study Area provides habitat for many species of mammals; however, no unique habitat that is not available elsewhere in the Local Study Area and Regional Study Area was identified. The Panel agrees with the Proponent that these wildlife species would be able to relocate from the Site Study Area during construction and operations. The Panel also agrees that, during active and post-closure, habitat would be created and would eventually be useable to many of these species. This habitat would not likely be of the same quality and so a residual effect would remain.

With regard to moose populations, the Panel understands that both Biigtigong Nishnaabeg and MNDMNRF noted declines in the populations in the area. The Panel does not believe the Project would have a significant effect on the population size due to the size of the Project and the habitat available elsewhere. Additionally, the Panel understands that MNDMNRF generally manages the population size through hunting quotas.

With regard to mortality of these species, the Panel agrees with the Proponent's proposed mitigation measures to reduce risk of vehicle collision and recommends that Biigtigong Nishnaabeg be consulted on the waste management procedures.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 31: Once operations have ceased, undertake closure reclamation to return the Site Study Area to a self-sustaining ecosystem that includes habitat types that support a variety of mammals, including moose.

Recommendation 32: Prohibit employees and contractors associated with the Project from fishing, hunting, harvesting, and using recreational vehicles in the Site Study Area.

Recommendation 33: Implement measures, during all phases of the Project, to prevent or reduce the risks of collisions between vehicles and wildlife, taking into account provincial guidelines, including:

- speed limits on the Project roads, including the access road;
- rights of way to provide adequate lines of sight to give advance warning of wildlife, particularly on corners;
- employee driver training to reduce risk of collision; and
- protocols for plowing roads in winter that provide gaps through which mammals can easily exit the road.

Recommendation 34: Implement measures to prevent wildlife-human interactions on site including:

- proper onsite management and offsite disposal of food refuse, lubricants, and other waste that may be attractive to wildlife; and
- policies and training programs for employees and contractors regarding practices to reduce wildlife interactions.

The Panel also recommends that the Proponent implement a follow-up program:

Recommendation 35: The Proponent should develop and implement a follow-up program to verify the effectiveness of mitigation measures to reduce wildlife mortality. The Proponent should implement a self-reporting program to be followed by all employees to record all wildlife fatalities or interactions within the Site Study Area. If collision hot spots are identified or if mitigation measures are found to be ineffective, the Proponent should implement additional measures that could include wildlife deterrents, fencing, or screening, or draining roadside salt ponds to reduce their potential attraction to animals. The Proponent should develop the follow-up program in consultation with relevant government agencies and Indigenous groups and implement the program throughout construction, operations, and active closure.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on mammals.

12.3 AMPHIBIANS

12.3.1 Baseline

Views of the Proponents

Ten species of amphibians were confirmed to be present in the Site Study Area, 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. Anurans (frogs and toads) were routinely heard during the three nocturnal surveys along the main access road and by acoustic recorders, particularly in June and early July.

GenPGM stated that amphibian surveys were not conducted at most waterbodies in the Site Study Area or Local Study Area due to significant logistical challenges and health and safety concerns associated with conducting nocturnal surveys at dozens of remote waterbodies. Data on the presence of newts and relative abundance in waterbodies were gathered incidentally while conducting minnow-trapping.

Four waterbodies (Lake 9, Lake 10/Lake 11, Lake 13a, and Lake 16) in the Site Study Area and an additional four (Lake 1, Lake 2, Lake 22, and Malpa Lake) in the Local Study Area have confirmed newt populations; no fish were detected in these eight waterbodies.

12.3.2 Environmental Effects

Views of the Proponent

Development of the Site Study Area would result in the loss of amphibian habitat. GenPGM considered all nine of the fishless waterbodies greater than 500 m² in size as Significant Wildlife Habitat for amphibians according to draft Ecoregion 3W criterion schedules⁹ (wetlands and pools > 500 m² with at least 20 breeding individuals of a salamander or newt species or at least four anuran species). As a precautionary measure, the Proponent also considered all other fishless waterbodies > 500 m² within the Site Study Area and Local Study Area as candidate Significant Wildlife Habitat for amphibians, as newts may have been undetected and/or there may be a sufficient diversity and abundance of breeding frog and toad species to meet the Ecoregion 3W significance threshold.

The Proponent stated it would mitigate any effects on amphibians by developing an amphibian salvage and translocation plan, in discussion with responsible government agencies. This would

⁹ The *Significant Wildlife Habitat Technical Guide* provides descriptions, information, references, and criteria of wildlife habitats for the province of Ontario that are to be considered for significance.

be implemented prior to disturbance of amphibian habitat. This approach would be applied to nine fishless waterbodies > 500 m² in size within the Site Study Area, including four with known newt populations and five with candidate Significant Wildlife Habitats. The plan would involve translocation of larvae and adults during development of the Site Study Area but prior to draining of lakes to similar pond habitat in the Local Study Area or adjacent watersheds (receptor ponds). The methodology would follow the *Guidelines for Mitigation Translocations of Amphibians: Applications for Canada's Prairie Provinces* and timing would ideally occur between the beginning of July and the end of August so that eggs or larvae, and adults of all potential species, would be present in the donor waterbodies within the Site Study Area. Lake 1 and Lake 2 in the Local Study Area were proposed by the Proponent as receptor ponds for translocated amphibians, with Malpa Lake and Lake 22 potentially suitable but less preferred due to more difficult access (which would increase transport and handling time).

The Proponent noted that both anuran and newt larvae survival is generally low, even in intact habitat, due to a range of factors such as predation and desiccation. The Proponent reported that eastern newt larval survivorship is less than 1% to 2% in most ponds. The Proponent expected low survival rates for both anuran and newt larvae, and the eastern newt in particular, as this species is likely to be the least widespread and least abundant of the species likely to be translocated. The Proponent did not anticipate considerable competition with resident amphibians in receptor ponds.

By implementing aquatic amphibian translocations as mitigation, the Proponent stated that the loss of amphibian habitat in the Site Study Area (nine fishless waterbodies > 500m²) was not considered to be significant at the local scale. Thirty fishless waterbodies > 500 m² (as well as additional smaller ones), at least four of which have confirmed newt populations, would remain unaffected in the Local Study Area and would be considered as Significant Wildlife Habitat by MNDMNR using the precautionary approach. These waterbodies would continue to serve as amphibian breeding habitat for both resident and translocated amphibians.

Views of the Participants

MNDMNR noted that current surveys lack sufficient detail to confirm the Significant Wildlife Habitat classification for amphibians stated by the Proponent. Further, the Ministry stated that the Proponent did not address how these habitat features would be dealt with (e.g., maintained adjacent to Site Study Area, loss of habitat in Site Study Area, relocation) or how overpopulation in receptor waterbodies would be avoided. MNDMNR recommended that, without further population estimates, a precautionary approach should be taken and all fishless waterbodies with a minimum of 20 breeding adults should be considered Significant Wildlife Habitat.

MNDMNR also raised concerns regarding the proposed locations for the stocking of fish salvaged during mine construction activities and the effects of these stocked fish on amphibian

communities. The Ministry recommended the Proponent identify alternative locations, acceptable to MNDMNRF, due to the possibility that restocking locations identified by the Proponent may support significant populations of newts that could be affected by any fish introductions.

At the hearing, MNDMNRF stated that they anticipated significant long-term effects on wildlife with small home ranges, particularly species that solely or primarily inhabit the Site Study Area, such as amphibians. MNDMNRF continued to discuss the effects of overprinting,¹⁰ which would result in the loss of candidate Significant Wildlife Habitat. In the case of amphibians, this includes both aquatic and terrestrial environments. While MNDMNRF noted that the success rate and feasibility of relocating amphibians is uncertain, the Ministry supports this measure as one of the best options to mitigate the effects of overprinting.

MNDMNRF also noted that various authorizations (e.g., a wildlife scientific collector's authorization) would be required to carry out some of the proposed mitigation measures. They stated that insufficient information is available to meet the needs of MNDMNRF at this time, particularly in relation to relocating amphibians, due to knowledge gaps with respect to existing community structures and densities at both the source and relocation areas. The conditions of any authorization would address timing windows for avoiding disruption of wildlife lifecycles, such as relocation timing. Additionally, any conditions associated with wildlife in the *Lakes and Rivers Improvement Act* approvals, such as Significant Wildlife Habitat, would have to be considered.

12.3.3 Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on amphibians, the Panel considered the following factors to be particularly relevant:

- potential long-term effects on wildlife, such as amphibians, that have small home ranges;
- the loss of nine fishless waterbodies > 500 m² in the Site Study Area, including four fishless waterbodies that are confirmed to support newt populations;
- the Proponent's decision to consider all fishless waterbodies > 500 m² within the Site Study Area and Local Study Area as candidate Significant Wildlife Habitat for amphibians; and

¹⁰ Overprinting is the overlap of the Project footprint on existing features resulting in their removal.

- 30 fishless waterbodies > 500 m² (as well as additional smaller ones), at least four of which have confirmed newt populations, would remain unaffected in the Local Study Area.

The Panel recommends that the Proponent implement the following mitigation measure:

Recommendation 36: Translocate amphibians from the nine fishless waterbodies > 500 m² within the Site Study Area to similar habitat within the Local Study Area, including L1 and L2, prior to construction. The Proponent should follow methodologies described in the *Guidelines for Mitigation Translocations of Amphibians: Applications for Canada's Prairie Provinces (2018)*.

The Panel notes that Recommendation 36 would only need to be considered under the Ontario *Environmental Assessment Act*.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on amphibians.

12.4 MIGRATORY BIRDS

12.4.1 Baseline

Views of the Proponent

GenPGM identified marsh birds and non-resident songbirds that use the Site Study Area for a portion of their annual migration, as migratory birds. Studies for the Project documented 97 bird species at the Site Study Area and an additional 35 species were detected nearby in the Regional Study Area. Based on observed densities of breeding birds in the Local Study Area and updated density models, it is predicted that 8,700 birds inhabit the Site Study Area, for an approximate total density of 7.8 birds/ha. Pine siskin, white-throated sparrows, golden-crowned kinglets, black-throated green warblers, and American redstarts were the most commonly recorded species.

Non-forested areas of the Site Study Area are composed of small wetland features, including fen, meadow marsh and thicket swamp habitat, and eight small lakes that provide limited habitat for migratory birds, including at least seven species of waterfowl. In 2011, an aerial survey of 50 lakes and ponds in the Local Study Area found a single pair of nesting waterfowl on each waterbody, mostly hooded mergansers, ring-necked ducks, and common goldeneyes.

The Proponent reported finding no nesting colonies and no migratory stopover sites or Significant Wildlife Habitat for birds in the Site Study Area. There is also no substantial shorebird habitat for resident breeders or migrants.

12.4.2 Environmental Effects

GenPGM determined the potential Project effects on migratory birds include changes to habitat quality, quantity, and fragmentation and the potential for increased mortality.

The clearing of approximately 1,116 ha of the Site Study Area would result in the temporary loss of habitat for some 8,700 forest birds. The Proponent's assessment also noted that, by assuming a density of one or two nesting pairs per waterbody, 10 to 20 pairs of waterfowl could potentially be displaced by site development and construction in the Site Study Area.

To avoid injury or mortality of migratory birds during site clearing, the Proponent has committed to clearing outside of the breeding season — between May 1 and August 31 — or if clearing is required during this time, to survey for nests and avoid clearing trees or brush where nests are found. The Proponent noted that many boreal songbirds have a fairly low site fidelity and may not return to the Site Study Area after site clearing. Those that do return would be displaced and would have to find suitable breeding habitat in the surrounding landscape.

With the proposed mitigation of clearing outside the breeding season, returning migratory birds are predicted by the Proponent to be less likely to be negatively affected than year-round resident bird species, such as grouse, northern saw-whet owls, Canada jays, common ravens, and chickadees, that may loosely hold territories throughout the non-breeding season.

The Proponent also stated that avian species are fairly resilient to disturbance, given that they breed in a boreal forest, which is largely a disturbance-driven ecosystem due to wildfire and forest outbreaks and windthrow.

The Proponent proposed addressing loss of habitat through progressive reclamation and closure reclamation of the Site Study Area, including the access road and transmission line, and returning it to a vegetated state. This activity would include approximately 487 ha of forest and 387 ha of non-forest vegetated habitat.

The Proponent stated that open-country bird species that are presently rare or absent in the Site Study Area are likely to increase on restored lands, but as revegetation progresses and succession leads to trees species replacing grasses over the long term, more forest dwelling species would use the site.

Residual effects from direct loss of habitat in the Site Study Area are expected to be greatest for forest-dependent birds, as forest habitats account for more than 90% of the Site Study Area area and forest-dwelling species currently dominate the avian community at the Site Study Area. The Proponent stated that the effect of loss of forest habitat on bird populations is

uncertain because breeding habitat is likely not limiting for at least some species (e.g., those limited instead by wintering habitat or other mortality factors), and displaced birds may be able to occupy vacant territories nearby.

The Local Study Area encompasses approximately 20 ha of wetlands and little of the emergent marsh preferred by most marsh birds. Some waterbodies would eventually be re-established during active closure and post-closure. New waterbodies could include the conversion of the water management pond to wetland habitat and the filling of the pits. But the resulting waterbodies would likely not have the same productivity and characteristics of those lost during development of the Site Study Area. The Proponent stated that similar habitat is widespread, with more than 11,000 remaining waterbodies of similar size (i.e., < 10 ha) in the Regional Study Area. Given the apparent low density of wetland (waterfowl) birds in the Site Study Area and limited wetland habitat, the Proponent anticipates negligible residual effects for such species.

Likewise, the Proponent expected residual effects on shorebirds to be negligible given the low density of spotted sandpipers, solitary sandpipers, or other shorebirds (nesting or migrating) and limited shoreline habitat in the Site Study Area relative to the availability and abundance in the Regional Study Area, where there is approximately 9,700 km of shoreline and more than 9,200 waterbodies. Furthermore, there are no large beaches, mudflats, or other suitable habitat for migrating birds in the Site Study Area or Local Study Area, particularly compared with habitat availability along the Lake Superior shoreline or muddy riverbanks and mouth of the Biigtig Zibi.

With respect to the loss of migratory bird habitat, the Proponent predicted residual effects of the Project would arise from the loss of approximately 1,116 ha of suitable habitat in the Site Study Area. With remediation at closure, GenPGM expected some of this loss would be mitigated. The residual environmental effects of a change in habitat quantity were not predicted to be significant because the decrease in habitat is not expected to threaten the long-term viability of migratory birds in the Regional Study Area, where suitable habitat is abundant and widespread.

The Proponent also reported that sensory disturbance from noise and light can cause indirect effects on habitat loss during construction and operations. Potentially affected areas include those within 500 m of the Site Study Area, primarily along the southern periphery of the Project footprint and some to the northwest of the pits and processing facility. Mitigation of light and noise are discussed in Section 15 (Atmospheric Environment) and Section 16 (Acoustic Environment) respectively.

The Proponent stated that if birds and wildlife come into contact with or ingest water or adjacent vegetation around the process solids management facility, exposure is not expected to pose a threat because concentrations of metals and other potential constituents are generally expected to remain below the guidelines used for the protection of livestock.

The Proponent stated that wildlife species are expected to avoid the Site Study Area and affected parts of Local Study Area due to other effects, such as noise, light, and vibrations. While habituation to noise is anticipated, and some species may return to the Local Study Area, returning migratory birds would likely avoid the Site Study Area and be displaced to available habitat elsewhere in the Regional Study Area.

To further support expectations that waters with increased levels of contaminants, such as the process solids management facility, are not an issue for migratory birds, the Proponent noted that the region is not on a major flyway, the Site Study Area currently provides only limited waterfowl habitat, and the densities of waterfowl using the small waterbodies in the Site Study Area are expected to continue to be low. The Proponent used this guideline, which is intended to protect agricultural water uses for livestock, as a reasonable threshold for protection of birds.

To deter birds from the process solids management facility, the Proponent committed to ensuring the embankments of the facility remain free of vegetation to discourage use by waterfowl, and use visual and auditory bird deterrents around the facility, once operational.

In addition to the measures already identified for wildlife and birds throughout this section, the Proponent committed to mitigating effects on habitat quality, and direct mortality of birds by:

- using directional lighting to reduce potential disorientation and collision with windows;
- installing luminescent and/or reflective markers on transmission lines over Canoe Lake to reduce collisions with Project infrastructure;
- clearing vegetation within 50 m of building windows to reduce potential bird abundance and strikes; and
- removing roadkill to reduce the risk to scavenging birds.

The Proponent committed to monitoring the process solids management facility for use by waterfowl and other wildlife and, if problematic (i.e., if birds or wildlife were to come into contact with contaminated waters), additional mitigation measures would be implemented and adapted, if required.

The Proponent also committed to monitoring bird collisions with Project buildings and, if monitoring indicates elevated window strikes at the Project site (e.g., > 50 bird deaths/year), employing additional mitigation measures as necessary (e.g., non-reflective films on problematic windows).

Views of the Participants

MNDMNRF commented that existing bird populations would be affected by the permanent loss of continuous forested habitat, resulting in a loss of individual birds in the Site Study Area. They

noted that suitable habitat exists in the surrounding area, but it is unknown if bird species would adapt.

MNDMNRFP stated that, while the creation of fragmented forest may benefit bird species currently less common to the area, rehabilitation is not likely to return the Site Study Area to continuous forest but would instead create more forested edge and fragmented habitat. These fragmented areas could become isolated from one another by a mosaic of different habitats, unlike the original forest. Some species would adapt to the new conditions, while others would not. There may also be new species immigrating into the areas. Overall, it is anticipated that the habitat changes would adversely affect interior bird species while potentially benefitting edge-loving species; however, MNDMNRFP considers this habitat fragmentation to be tolerable at this size and scale.

MNDMNRFP also noted that various authorization(s) would be required for the Proponent to destroy and/or possess nests or eggs. The conditions of any authorization would address timing windows for avoiding disruption to wildlife lifecycles, such as relocation timing. An approval under the *Lakes and Rivers Improvement Act* would address requirements regarding Significant Wildlife Habitat.

Environment and Climate Change Canada noted that direct temporary and permanent removal of migratory bird habitat would have an effect on local bird populations; however, they expected that the birds would relocate to similar habitat adjacent to the site and that sufficient habitat was available to support the displaced birds.

Environment and Climate Change Canada noted approximately 10–20 pairs of waterfowl would be displaced due to site development and construction in the Site Study Area. They acknowledged that potentially up to 160 ha of aquatic habitat would be created as part of the Closure Plan as pits gradually fill with water, but were concerned that the characteristics of these features may not make them suitable for use by waterfowl during any life stage.

With respect to wetland habitat, Environment and Climate Change Canada concluded that the Project would cause the direct loss or indirect impairment of wetlands in the Site Study Area. The majority of the wetlands to be lost are classified as open wetlands, which appear to be abundant in the Local Study Area and Regional Study Area. Environment and Climate Change Canada indicated that commitments made by the Proponent in relation to the Offsetting Plan for fish and fish habitat would effectively mitigate the effects on wetlands.

Environment and Climate Change Canada noted that there would be a significant lag between removal and regeneration of forest stands with habitat suitable for forest birds post-closure. Furthermore, if the entire site is remediated at the same time, age class, structure, and species composition would not produce the same habitat as currently exists without a silviculture plan. Environment and Climate Change Canada suggested that reclamation presents an opportunity

to manage the forest composition for a variety of habitat requirements for forest birds including area-sensitive species and species at risk.

With regard to noise from ongoing operations, Environment and Climate Change Canada noted that noise would be constant and could affect waterfowl and forest bird use of suitable habitat in the immediate vicinity as well as the reproductive success of songbirds that sing to attract mates.

A change in mortality risk was also noted as a concern by Environment and Climate Change Canada. Project works or activities that are potentially destructive or disruptive to birds, their nests, or eggs should be avoided at key locations and during key periods, including the breeding periods and periods of high usage, such as migration and/or feeding. Environment and Climate Change Canada stated that, while avoidance is the best approach, appropriate mitigation measures should be developed and implemented to avoid inadvertent harm or disturbance, help maintain sustainable populations of migratory birds, and minimize the risk of detrimental effects on migratory birds.

Environment and Climate Change Canada also raised concerns about contaminated waters and spills of process-affected water, process chemicals, hydrocarbons, and other substances with the potential to affect water quality for migratory birds. It is Environment and Climate Change Canada's opinion that there is insufficient information on the potential effects associated with migratory birds interacting with waters with increased levels of contaminants in the Site Study Area.

Overall, Environment and Climate Change Canada advised that the Project would cause a permanent loss of migratory bird habitat, directly affecting local forest birds and waterfowl populations. However, they added that, because displaced birds would potentially relocate to adjacent similar habitats, the Project would not likely disturb the regional stability of migratory bird populations if the Proponent meets their stated commitments. Environment and Climate Change Canada advised that the effects of the Project on the regional bird populations could be effectively mitigated and suggested the following measures:

- Develop, with Environment and Climate Change Canada and appropriate provincial agencies, a reclamation plan that describes the management of habitat requirements for a variety of forest birds and waterfowl.
- Implement mitigation measures consistent with Environment and Climate Change Canada's guidance on *Avoiding Harm to Migratory Birds*.
- Continue the Forest Bird Monitoring Program and waterfowl surveys during the construction, operations, and closure phases of the Project. Use that information along with baseline survey results to verify effects predictions and corresponding reclamation prescriptions.

12.4.3 Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on migratory birds, the Panel considered the following factors to be particularly relevant:

- Birds would be displaced, long-term to permanently, from the Site Study Area.
- Closure reclamation would create more forested edges and open and fragmented habitat; however, there is a lack of detail on future predicted habitat conditions of the closure landscape.
- The Proponent committed to avoiding harming migratory birds and their nests during clearing and to taking measures during operations to deter migratory birds from coming into contact with infrastructure and the process solids management facility.
- Environment and Climate Change Canada's expert advice is that the Project would likely not disturb the regional stability of migratory bird populations, provided that GenPGM implements their commitments regarding birds.

The Panel finds that the Project would adversely affect migratory bird habitat on a long-term basis, but the information presented indicates there is little risk that birds would be directly harmed as a result of the Project. Additionally, the Panel notes that there is adequate bird habitat elsewhere within the Local Study Area and Regional Study Area.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 37: Conduct all Project activities, including site clearing, in accordance with the *Migratory Bird Convention Act* and *Fish and Wildlife Conservation Act* and consistent with Environment and Climate Change Canada's guidance on *Avoiding Harm to Migratory Birds*. This includes:

- conducting site clearing outside the breeding season for migratory birds; and
- if site clearing outside the breeding season is not technically feasible, developing additional measures in consultation with Environment and Climate Change Canada to avoid effects on migratory birds and their nests or eggs, such as conducting surveys for nest sites, marking nest sites, and protecting those nest sites from clearing.

Recommendation 38: Reduce the attractiveness of the process solids management facility to birds from the beginning of its operation until a vegetation cover has been established over it, by:

- keeping the embankments of the process solids management facility free of vegetation; and

- using visual and auditory bird deterrents.

Recommendation 39: Install luminescent and/or reflective markers on transmission lines over Canoe Lake where there is a greater risk of bird collision due to the topography and presence of waterbodies.

Recommendation 40: Undertake progressive reclamation and closure reclamation to provide habitat requirements for a variety of birds and waterfowl in consultation with Environment and Climate Change Canada and the Province of Ontario. The Proponent should consider time lags, age class, structure, and species composition to ensure that forest composition is managed for a variety of habitat requirements for forest birds.

In addition to the recommended mitigation measures, the Panel recommends the Proponent implement a follow-up program to:

Recommendation 41: The Proponent should develop and implement a follow-up program to determine the effectiveness of mitigation measures related to reducing bird mortality during construction, operation and active closure by:

- monitoring the process solids management facility for use by waterfowl and other wildlife; and
- monitoring bird collisions with Project buildings and, if monitoring indicates elevated window strikes at the Project site (> 50 bird deaths/year), implementing additional mitigation measures such as non-reflective films on problematic windows.

Recommendation 42: The Proponent should develop and implement a follow-up program to verify the accuracy of the predictions of the Project's effects on birds by conducting forest bird and waterfowl surveys during the construction, operations, and closure phases of the Project. Survey information along with baseline survey results should also be used to inform closure reclamation.

GenPGM should determine the details of the follow-up programs including monitoring location, monitoring frequency, parameters to be monitored, and adaptive management thresholds and measures in consultation with relevant government agencies and Indigenous communities.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on migratory birds.

12.5 CUMULATIVE EFFECTS

Views of the Proponent

GenPGM assessed the potential cumulative effects on wildlife species, including furbearers, moose, grey wolves, black bears and migratory birds associated with both direct and indirect changes to habitat, changes to wildlife passage and movement patterns, and changes in wildlife mortality. Regarding future projects or activities that would overlap those of the Project, the Proponent noted that the Magino Mine was outside the Regional Study Area and infrastructure-related projects planned in Biigtigong Nishnaabeg were associated with previously built-up areas. Both were excluded from their assessment of cumulative effects for wildlife. The Proponent stated that proposed wind and hydroelectric power developments, timber harvesting, and mineral exploration would be reasonably foreseeable activities in the Regional Study Area that would overlap with the residual effects of the Project on wildlife.

The Proponent stated that direct loss of wildlife habitat would likely be relatively small in the case of the hydroelectric power developments and mineral exploration, possibly on the order of several hectares to tens of hectares. Direct wildlife habitat loss associated with the Coldwell and Superior Shores wind farms would be expected to be approximately 188 ha and 47 ha, respectively. Timber harvesting in the Regional Study Area would be the largest contributor to the direct loss of wildlife habitat, based on planned cutovers. Approximately 17,514 ha of forest are scheduled to be harvested in the Pic Forest between 2020 and 2021, and the area cleared for commercial forestry in the Pic Forest during the life of the mine would be at least two orders of magnitude (or 100 times) larger than the footprint of the Site Study Area. Although cleared areas are regenerated after commercial harvesting, it takes approximately 70 to 80 years for a mature forest to return to a harvestable state. Given this time lag and the fact that more than 105,000 ha are planned to be logged on the Pic Forest Management Unit during the 2021–2031 period, commercial forestry would have a much more profound effect on the availability of mature forest in the Regional Study Area compared with the Project. The Proponent reported that MNDMNRF has deemed such rates to be sustainable from a wildlife habitat perspective. The Proponent stated that contributions of the Project and other activities would be relatively minor in comparison and would not affect this conclusion. Additionally, the Proponent stated that wildlife habitat is abundant in the Regional Study Area.

The Proponent identified indirect effects, including sensory disturbance (e.g., dustfall, light pollution, noise, and vibration), encroachment of invasive plant species, and changes to local hydrological and hydrogeological conditions, that could act cumulatively. The Proponent stated that such indirect effects would be associated with some phases of wind and hydroelectric power developments, mineral exploration, and timber harvesting. However, given the combined footprints of the Project and other projects and activities as a proportion of the Regional Study Area, the combined effect is expected to be relatively small in magnitude.

The Proponent stated that habitat fragmentation and the associated effects on wildlife movement would likely be relatively small in magnitude in the case of the hydroelectric power developments and mineral exploration. Fragmentation and effects on movement associated with the development of proposed wind farms would be more substantial in nature, given their relative spatial footprints. Timber harvesting in the Regional Study Area would be the largest contributor to habitat fragmentation based on planned cutovers. However, the Proponent noted that wildlife movement corridors are not limiting in the Regional Study Area and that the cumulative change in habitat fragmentation due to all planned projects and activities is not materially different than that represented by commercial timber harvesting alone.

The Proponent stated that wildlife mortality risk associated with the development of proposed wind farms would likely be associated with land clearing, the operation of vehicles and equipment, and bird and bat strikes with infrastructure such as buildings, wind turbines, and overhead cabling. Timber harvesting in the Regional Study Area could change the mortality risks due to land clearing and the operation of vehicles and equipment. For context, the Proponent cited studies that stated, on average, an estimated 1,167 birds are killed annually for every 100 km of road in Canada, and an estimated 2.5 million to 25.6 million birds die annually in Canada from collision with transmission lines. The Proponent stated that relative risks can be inferred based on the amount of land that would be cleared, and that, from this perspective, timber harvesting would pose the greatest mortality risk; all other projects and activities would be minor in comparison.

Overall, the Proponent characterized the cumulative effects on wildlife as low in magnitude (the combined contribution is likely low within the context of the Regional Study Area), high in duration (the cumulative effect would extend beyond the life of the individual projects and activities), high in frequency (the cumulative effect would occur continuously during construction and operations), and medium in terms of reversibility (wildlife habitat would regenerate, at least in part, over time). The Proponent predicted that the overall adverse cumulative residual environmental effect on wildlife would not be significant, largely on the basis that the cumulative change in wildlife habitat due to all planned projects and activities is not materially different than what is represented by commercial timber harvesting alone.

Views of the Participants

Environment and Climate Change Canada identified indirect effects of habitat loss via structural changes to the existing forest habitat that could result in shifts of species assemblage that favour species utilizing forest edges. Other projects in the area will also affect local habitat availability, and cumulatively these projects have the potential to affect the migratory bird community (including species at risk). Environment and Climate Change Canada noted that all projects may temporarily decrease the amount of mature to over-mature forest habitat while increasing shrub thicket habitat and younger forest. The community species abundance of

forest birds could therefore decrease while community richness increases with habitat diversity.

12.5.1 Panel Conclusions and Recommendations

The Panel did not hear extensive evidence about the effects of past projects and activities on wildlife and notes that the Proponent included the effects of past projects and activities in baseline scenarios. The Panel believes that foreseeable future wind and hydroelectric developments are not likely to affect wildlife and wildlife habitat to a large degree. The Panel notes that future timber harvesting presents the greatest potential to interact cumulatively with the effects of the Project; however, the Panel understands that the provincial government has determined that the rate of timber harvesting is sustainable from a wildlife habitat perspective.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on wildlife that are not listed species at risk.

SECTION 13: CARIBOU

13.1 REQUIREMENTS FOR THE CONSIDERATION OF CARIBOU

This section addresses the environmental effects of the Project on caribou. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- provide baseline description and address issues related to species at risk for the areas potentially affected by the Project, including the mine site, transmission line corridor and access road; and
- identify the effects of the Project on species at risk.

13.2 REGULATORY AND POLICY SETTING

The boreal population of Woodland Caribou (*Rangifer tarandus caribou*) (caribou) are listed as threatened under the *Species at Risk Act* (Schedule 1) and Ontario's *Endangered Species Act*. The Project is within the Lake Superior Coastal Range, which is a 10-km-wide linear range along the north shore of Lake Superior and includes populations on offshore islands and on the mainland. Between the Lake Superior Coastal Range and the caribou ranges to the north is an area of Discontinuous Distribution for which the primary conservation intent is to maintain and enhance connectivity between the coastal range and the caribou ranges to the north.

Ontario's *Endangered Species Act* prohibits killing, harming, harassing, capturing, or taking species listed as endangered or threatened, and damaging or destroying habitat. Activities that negatively affect the species at risk or its habitat are likely to contravene the prohibitions set out in the Act unless authorized through a permit, agreement or conditional exemption set out in the regulations made under the Act. An Overall Benefit Permit, granted under paragraph 17(2)(c) of the Act, is one means of authorizing activity otherwise contravening the prohibitions.

A series of policy initiatives have been developed in response to the classification of caribou as threatened. Ontario's *Woodland Caribou Recovery Strategy* was prepared in 2008 and Ontario's *Woodland Caribou Conservation Plan* was released in 2009. Some direction for managing caribou in the Lake Superior Coastal Range and the area of Discontinuous Distribution has been provided in the plan and a management approach has been under consideration by Ontario, but they have not been finalized for this caribou population. The Project also falls entirely

within the Pic Forest Management Unit and the associated Forest Management Plan for the 2021–2031 period also provides habitat management direction for caribou.

In October 2012, the Government of Canada published the *Recovery Strategy for the Woodland Caribou, Boreal Population (Rangifer tarandus caribou) in Canada*, which was replaced in 2020 by the *Amended Recovery Strategy for the Woodland Caribou, Boreal population (Rangifer tarandus caribou) in Canada*. The recovery goal for boreal caribou outlined in the strategy is to achieve self-sustaining local populations in all ranges throughout their current distribution in Canada, to the extent possible. The federal recovery strategy states that maintaining a long-term self-sustaining status for boreal caribou ranges depends on connectivity within and between ranges, and indicates that irreversible range retraction or permanent breaks in range connectivity should be avoided. Current evidence supports the conclusion that the recovery of all local populations is biologically and technically feasible.

The federal recovery strategy for the caribou identifies 65% undisturbed habitat in a range as a disturbance management threshold; this threshold applies to all ranges in Ontario, including the Lake Superior Coastal Range. Environment and Climate Change Canada's position is that the federal recovery strategy recognizes that there may be some ranges where alternative/unique approaches are required; however, until such alternatives are determined (e.g., through a federally approved range plan), the national disturbance threshold will apply.

Pukaskwa National Park is located approximately 20 km southeast of the Project. Parks Canada has a legislated role under the *Species at Risk Act* with respect to the protection and recovery of species at risk, including the boreal population of woodland caribou on lands administered by Parks Canada. Caribou recovery is a priority identified in the *Pukaskwa National Park of Canada Management Plan (2014)*. Additionally, the *Multi-species Action Plan for Pukaskwa National Park of Canada (2017)* applies to lands and waters occurring within the boundaries of the park and identifies actions, outcomes and timelines for caribou habitat and monitoring.

13.3 BASELINE

Views of the Proponent

Population

Caribou are considered less resilient than moose or white-tailed deer in their ability to withstand and recover from human disturbance and other stressors, as they are vulnerable to predators, breed for the first time at a later age, have only one young per year, and have larger home ranges. The Proponent reported that the overall caribou population in the Lake Superior Coastal Range has dramatically declined within the last decade due to wolves crossing over to both the Slate Islands and Michipicoten Island via ice bridges in 2014. The Proponent reported that the Ministry of Northern Development, Mines, Natural Resources and Forestry

(MNDMNR) translocated six caribou to Caribou Island and nine to the Slate Islands during the early winter of 2018. The Proponent stated that some of the translocated caribou have given birth, and it is estimated that the number of caribou on the Slate Islands has grown to approximately 30 animals. The Proponent reported that there are likely no more than 50 animals on offshore islands in the Lake Superior Coastal Range, compared to more than 700 a decade ago.

Caribou populations in the mainland portion of the Lake Superior Coastal Range are small and vulnerable to extirpation. In Pukaskwa National Park, populations declined from a high of 30 individuals in the late 1970s to only four in 2009. The Proponent reported that, today, caribou are considered to be locally extirpated from Pukaskwa National Park. MNDMNR estimated approximately 55 caribou can be found in the mainland Lake Superior Coastal Range and nearshore islands; however, the Proponent stated that, based on observed caribou signs from the most recent surveys, the remaining mainland population may be closer to MNDMNR's lower-confidence interval of 13 animals.

The Proponent has reported that there is no evidence of caribou use within the Site Study Area including no historical or current observations or other sign of caribou in the survey data or the trail camera data. The Proponent stated that the potential for caribou to interact with the Project is very low and that there is a real risk that the mainland population could become locally extirpated before the Project becomes operational. The Proponent noted several factors leading to their conclusion that caribou within the Lake Superior Coastal Range may not persist, including: low population numbers; low probability of immigration from offshore islands; increased abundance of predators such as wolves and black bear; ongoing logging and anthropogenic disturbances; potentially increased risk of parasite or other pathogen transmission from white-tailed deer; and, a lack of management.

Caribou Habitat

The Proponent stated that caribou typically have large individual annual home ranges of approximately 200–4,000 km² in large intact boreal forest and peatland landscapes. Caribou typically occur at low densities that are insufficient to support abundant populations of predators such as wolves and, to a lesser extent, black bears. In addition, they noted that the older forests and peatlands that caribou typically occupy offer insufficient food for other prey such as moose and deer, further protecting caribou from wolf predation. The Proponent reported that biologists believe that caribou disperse across the landscape in low numbers and actively select mature and older, conifer-dominated forests to minimize contact with predators.

The Proponent stated that caribou habitat is typically a shifting configuration of large patches of mature forest, which varies due in large part to fire cycles and other natural disturbances. Logging and other anthropogenic disturbances have added another layer of variability to woodland caribou habitat use.

The Proponent reported that the landscape in the Lake Superior Coastal Range is fragmented with various types of disturbances (anthropogenic and natural). The terrain is rugged, and the habitat currently exists in a finer and sparser pattern, with no large uniform patches of habitat typical of northern continuous ranges.

The Proponent described the following typical habitat types for caribou in Ontario: calving and nursery habitat, winter preferred habitat, winter useable habitat, and refuge habitat.

Typical calving and nursery habitat in Ontario consists of islands on large lakes and treed “islands” within large peatlands, where cows can isolate themselves and their calves from predators. Female caribou show a high degree of site fidelity to traditional calving/nursery areas, typically using them every year in the absence of disturbances such as wildfire.

Preferred winter habitat consists of mature and old upland conifer stands dominated by jack pine and black spruce, particularly those on lower-productivity sites and those rich in ground lichens. Winter-useable (non-preferred) habitat is generally where the soil and/or landform types are conducive to perpetuating conifer-dominated forests, and may provide suitable winter habitat in the future. The Proponent stated that the Pic River Forest is currently lacking immature, mature, and pure old conifer forest units. This lack of conifers directly correlates with the reduced availability of winter caribou habitat; however, the Proponent noted that caribou may use “atypical” habitats in the Coastal Range if they can find suitable refuge from predators, as demonstrated by the historical presence of caribou on Michipicoten Island.

Refuge habitat consists of forest that may be suitable for caribou year-round and includes low-productivity winter sites with lichen as well as well-stocked upland mature and old conifer with little lichen abundance.

The Proponent reported that ground lichens found in old conifer-dominated stands are one of the main foods for caribou in much of Ontario, but are unsuitable forage for deer and moose, which prefer younger forests with abundant browse such as willows, red osier dogwood, and eastern white cedar. The Proponent stated that lichens growing in trees in older conifer forests along the Lake Superior coast provide similar forage for caribou, but not moose or deer. The Proponent also reported that aerial surveys conducted in the winter in the Lake Superior Coastal Range and adjacent area of Discontinuous Distribution suggest that caribou might also use smaller pockets of lichen-rich openings on bedrock knobs; the Proponent hypothesized that the low productivity of these sites may contribute to lower moose use and hence a lower risk of predation by wolves.

Federal and Provincial Habitat Characterization

Caribou habitat is categorized by both the federal and provincial governments. Federally, under the *Species at Risk Act*, a species' critical habitat is defined as "habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species."

The Proponent stated that the Site Study Area likely does not currently meet the criteria for critical habitat under the *Species at Risk Act* due to its forest composition and high level of disturbance. However, the Proponent noted that Environment and Climate Change Canada considers all areas within the Lake Superior Coastal Range to be potential critical habitat, and that the Site Study Area could potentially serve as critical habitat in the future.

Provincially, habitat is categorized according to the *General Habitat Description for Woodland Caribou*. Category 1 habitats are high-use nurseries, winter-use areas, and travel corridors. Category 1 habitat features or areas have the lowest tolerance to alteration before their function, or usefulness, in supporting caribou is compromised. Category 2 habitats are seasonal ranges and Category 3 are the remaining areas within the range that support caribou indirectly by maintaining the overall refuge function within the range.

The Proponent noted that the original habitat categorization by the province using the *General Habitat Description for Woodland Caribou* in 2013, had only Pic Island as Category 1, with the remainder of the Coastal Range in the vicinity of the Project considered Category 2, except for urban areas and infrastructure that were Category 3. Based on the Ministry of the Environment, Conservation and Parks' updated habitat categorization, approximately 20,263 ha of the Lake Superior Coastal Range west of Marathon is classified as Category 1. Most of this is on the mainland south of Highway 17 (15,859 ha, 78.3%) and on the Slate Islands (3,736 ha, 18.4%). No Category 1 habitat was identified within the Site Study Area. At its nearest point, the Site Study Area is approximately 450 m from the nearest Category 1 habitat.

The Proponent noted that much of the area south of Highway 17 between Neys Provincial Park and Marathon, recently categorized as a Category 1 by the Ministry of the Environment, Conservation and Parks, is fragmented by infrastructure and other anthropogenic development and is considered heavily disturbed according to caribou habitat models. The Proponent suggested that the initial 2013 categorization of caribou habitat may better reflect current habitat suitability and use by caribou.

Views of the Participants

Environment and Climate Change Canada stated that critical habitat is identified in the amended federal recovery strategy for boreal caribou ranges including the Lake Superior Coastal Range as:

- the area within the range that provides an overall ecological condition that will allow for an ongoing recruitment and retirement cycle of habitat, which maintains a perpetual state of a minimum of 65% of the area as undisturbed habitat; and
- biophysical attributes required by boreal caribou to carry out life processes.

Environment and Climate Change Canada confirmed that all areas of the range, including the Site Study Area, are considered critical habitat and noted that, according to the recovery strategy, recovery of the Lake Superior Coastal Range local population is currently considered biologically and technically feasible.

The Ministry of the Environment, Conservation and Parks stated that Ontario's position on habitat within the Lake Superior Coastal Range is that *all* areas within the range contribute to caribou habitat availability at some point and support caribou life processes. Similarly, the absence of caribou observations in any given area of the Lake Superior Coastal Range is not necessarily indicative, in and of itself, of the absence of caribou.

The Ministry of the Environment, Conservation and Parks stated that caribou have demonstrated high use in close proximity to the Project area during sensitive time periods in their life, including the calving and nursery period (May 1 to September 15), as well as during the winter period (December 1 to March 31) and, as such, Ontario has designated this particular geography as a Category 1 High Use Area according to the general habitat description under the *Endangered Species Act*.

Parks Canada noted that, until the last decade, boreal caribou were regularly occurring within the boundaries of Pukaskwa National Park. Despite the current low numbers of caribou observed within the park and the range, Parks Canada continues to protect critical habitat for boreal caribou, monitors former calving habitat using wildlife cameras, and educates visitors and Canadians on boreal caribou conservation in Pukaskwa National Park.

Biigtigong Nishnaabeg stated that caribou are highly susceptible to disturbance and that the offshore islands have provided safety and refuge for breeding habitat. Biigtigong Nishnaabeg stated that caribou have most likely disappeared from the Lake Superior Coastal Range mainland and that they persist on islands only after a close call with extirpation in the late 2010s. They stated that any potential effects of the Project must be considered carefully.

Biigtigong Nishnaabeg also stated that both Ontario and Canada have done an inadequate job in ensuring that caribou do not disappear. They stated that Ontario has not met the policy commitments outlined in the *Ontario Woodland Caribou Recovery Strategy* (2008) or the *Woodland Caribou Conservation Plan* (2009). They stated that Ontario hasn't provided any guidance related specifically to the Lake Superior Caribou Range, more than four years after launching an explicit consultation effort related to the range.

The Jackfish Metis Association stated that well over 125 years ago, herds of caribou ranged through this region. They stated that for many reasons, it is unlikely that caribou will ever return to the region.

13.4 PROJECT EFFECTS

The Proponent stated that the main Project effect on caribou is the potential for reduced connectivity within the Coastal Range and adjacent ranges. Other potential effects of the Project on caribou are the loss of potential habitat through clearing of the Site Study Area, the impairment of potential habitat in the Local Study Area from sensory disturbance, injury or mortality due to collisions with Project infrastructure or vehicles, and potential impairment of movement in the Local Study Area due to sensory disturbance.

For the purposes of assessing the effects of the Project on boreal caribou, the Proponent has defined the Local Study Area as a 10 km buffer around the Site Study Area (see Appendix 6). The Regional Study Area includes the entire Lake Superior Coastal Range plus a 10 km buffer (see Appendix 6).

13.4.1 Loss of Caribou Habitat

Views of the Proponent

The Proponent provided the results of various modelling exercises to identify and characterize caribou habitat that could be affected by the Project within the Site Study Area, Local Study Area and Regional Study Area.

The Proponent modelled caribou refuge habitat and winter (preferred and useable) habitat using an MNDMNRF model based on the most recent available Forest Resource Inventory for Forest Management Units overlapping the Lake Superior Coastal Range and the area of Discontinuous Distribution. The Proponent indicated that these are the only approved caribou habitat models for Ontario.

The Proponent anticipated no effects on calving habitat as there are no known calving areas in the Site Study Area or Local Study Area.

An analysis of modelled caribou habitat indicated there are approximately 106 ha of caribou winter habitat (41 ha of preferred habitat and 65 ha of usable habitat) within the Site Study Area. This represents approximately 0.9% of the available winter habitat (both preferred and usable) within the Local Study Area and less than 0.2% of that available in the Regional Study Area west of Pukaskwa National Park.

The Proponent's analysis of modelled caribou habitat also indicated there are approximately 732 ha of caribou refuge habitat (221 ha preferred) within the Site Study Area. This represents roughly 4.0% of the available refuge habitat within the Local Study Area, and less than 0.8% of refuge habitat available in the Regional Study Area west of Pukaskwa National Park.

The Proponent also reported that, according to a modelling exercise to determine the level of natural and anthropogenic disturbance, only 2.9 ha of winter habitat identified in the Site Study Area is considered undisturbed and most of the refuge habitat in the Site Study Area is considered disturbed. They stated that overall disturbance levels according to the modelling were 42% in the Local Study Area, 28% in the Regional Study Area, and 29% in the Lake Superior Coastal Range, noting the 35% maximum-disturbance threshold above which caribou populations are less likely to be self-sustaining over the long-term (according to the federal recovery strategy for boreal caribou).

The Proponent noted that confirmed current use of the Site Study Area by grey wolves and black bears, as well as alternative prey (i.e., moose, white-tailed deer, and beaver), reduces the suitability of potential caribou habitat, refuge or otherwise, in the Site Study Area. The Proponent also noted that caribou populations have been declining in the coastal range despite relatively low levels of disturbance and that the federal and provincial disturbance models may have poor predictive power for linear ranges, such as the Lake Superior Coastal Range, with extensive linear anthropogenic features.

The Proponent stated that the residual effects of the Project on direct habitat loss arise from the loss of approximately 106 ha of potential caribou winter habitat in the Site Study Area (albeit only 2.9 ha are undisturbed). The Proponent indicated they would conduct progressive reclamation and revegetation during closure to mitigate effects (see Section 11 (Terrain, Soils and Vegetation)).

Views of the Participants

Regarding habitat modelling, the Ministry of the Environment, Conservation and Parks noted that the concepts of "refuge habitat" and "winter habitat" were used by the Proponent out of their intended context, which is to inform forest management planning under Ontario's *Crown Forest Sustainability Act* (1994). The Ministry of the Environment, Conservation and Parks also disagreed with the Proponent's characterization of disturbance and confirmed that the entire Project footprint (approximately 1,116 ha) currently contributes to supporting caribou in the Lake Superior Coastal Range.

Environment and Climate Change Canada clarified that their caribou habitat disturbance models, which were used by the Proponent, are part of a broad national approach identified in the federal recovery strategy. Environment and Climate Change Canada recommended local and more detailed information be taken into consideration, including the fact that the Site Study Area currently has only 0.2 ha of human disturbance and remains 97% forested. As such,

the Site Study Area currently allows for the passage of caribou and should be considered critical habitat as identified in the federal recovery strategy.

13.4.2 Effects on Caribou Habitat due to Sensory Disturbance

Views of the Proponent

The Proponent stated that the Category 1 areas within 1 or 2 km of the Site Study Area have the highest likelihood of being affected by indirect effects from the Project. The Proponent noted that Ontario's *General Habitat Description for Woodland Caribou* (2013) states that development or recreational activities that result in sensory disturbance within 10 km of Category 1 Caribou High Use Areas could potentially displace caribou during sensitive periods. The Proponent stated that caribou are more tolerant of disturbance in the coastal range, and 10 km may be an overly conservative zone of influence to disturbance. The Proponent noted that Pic Island was likely used as calving and nursery habitat in the recent past and is only 6–7 km from a busy campground and Highway 17. The Proponent also cited Environment and Climate Change Canada's *Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou, (Rangifer tarandus caribou), Boreal Population, in Canada* (2011) which states that disturbances have been shown to influence calf recruitment at a minimum of 500 m and up to 2 km.

The Proponent noted that no legislated noise limits apply to wildlife, including caribou. However, Environment and Climate Change Canada's *Environmental Code of Practice for Metal Mines* (2009) does provide guidance for noise¹¹ thresholds on wildlife. It recommends that ambient noise from mining operations and their affect on wildlife (including caribou) should meet the objectives for residential areas (i.e., the sound pressure level from mining activities should not exceed 55 decibels (dBA) during the day and 45 dBA at night according to Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (2017). The Proponent modelled noise contours for 50 dBA and 45 dBA, finding that neither noise contour reached Highway 17, which marks the northern boundary of the Category 1 caribou habitat as delineated by the Ministry of the Environment, Conservation and Parks. The Proponent predicted that noise from the Project would largely be attenuated by the time it reached the highway. They found that additional noise from the Project at the highway is expected to be no more than 0.5 dBA above ambient levels. This is within the guidelines for wildlife found in Environment and Climate Change Canada's *Environmental Code of Practice for*

¹¹ Decibels (dB) are the unit used to measure sound pressure levels. A-weighted decibels (dBA) are decibels that are modified to account for human hearing sensitivity. Peak linear decibels (dBLin) are used when describing blast air overpressure and are not directly comparable with dBA levels.

Metal Mines (2009), and compliant with a threshold of 50 dBA or a 10 dB increase over ambient levels used for nesting birds, which are sensitive receptors.

With regard to blasting, no legislated air blast overpressure limits apply to wildlife. As with the general noise guidance noted above, air blast overpressure limits for boreal caribou should meet the objectives for residential areas (i.e., < 120 dBLin. The Proponent found that the 120 dBLin air blast overpressure contour does not reach Category 1 habitat.

The Proponent stated that they would implement noise mitigation and monitoring as described in Section 16 (Acoustic Environment). The Proponent does not intend to apply the timing restrictions described in the *General Habitat Description for Woodland Caribou* (2013). They stated that, although no blanket timing restrictions for caribou are being proposed for use at the Project, a protocol would be developed to guide construction and operations if caribou were observed at the Project site. This would include, for example, suspension of blasting and other operations likely to cause disturbance if caribou were observed at the site, and the immediate contacting of appropriate provincial agencies.

The Proponent anticipated no negative impacts on Category 1 caribou habitat based on the following considerations: the relative lack of Project-related sensory effect that would reach Highway 17 compared with highway traffic and other anthropogenic disturbances; the lack of a documented caribou nursery or winter use in this area; and that much of this habitat is equidistant to the Project and the Town of Marathon. In addition, the Proponent stated that the modelling of noise and overpressure supports the conclusion that no significant effects from noise are expected in the Category 1 caribou habitat, notwithstanding that there appears to be little to no actual use of the delineated Category 1 habitat by caribou in the Local Study Area.

Views of the Participants

The Ministry of the Environment, Conservation and Parks stated that development activities that result in sensory disturbance within 10 km of Category 1 areas could potentially displace caribou during sensitive time periods. This is supported by research in Ontario that demonstrates that caribou distance themselves from sensory disturbances during sensitive time periods at distances of 10–15 km from the disturbance. Environment and Climate Change Canada cited studies which have shown that effects of roads, transmission lines, cabins, or mines on caribou behaviour have been detected at distances of 1.5–10 km and beyond. Environment and Climate Change Canada noted that the Proponent's assertion that Lake Superior Coastal Range caribou are "more tolerant to disturbance" than caribou in northern ranges was not substantiated by data.

The Ministry of the Environment, Conservation and Parks was of the opinion that the noise assessment is not relevant to impacts on caribou and that potential noise impacts from the Project on caribou in the Category 1 habitat cannot be reliably discerned with the information

provided. Overall, the Ministry disagreed with the Proponent's assertion that the effects of noises emanating from the Project site during construction and operations would have little to no impact on the adjacent Category 1 habitat. Environment and Climate Change Canada agreed that the effects of sensory disturbances were underestimated.

The Ministry of the Environment, Conservation and Parks stated that sustained sensory effects on Category 1 habitat over the life of the mine would result in a prolonged period of functional impairment of the Category 1 habitat into the future, and that this constitutes a significant and longer-term impact for caribou in the Lake Superior Coastal Range. Both the Ministry of the Environment, Conservation and Parks and Environment and Climate Change Canada recommended conducting tree clearing, blasting, drilling, crushing, or any other activities that emit loud noises, outside of the sensitive caribou timing windows for calving (May 1 to Sept 15) and winter use (December 1 to March 31).

13.4.3 Effects on Caribou Habitat Connectivity and Caribou Movement

Views of the Proponent

Connectivity between and within ranges is important for the persistence of caribou populations by facilitating genetic and demographic exchange. The Proponent stated that the Site Study Area is approximately 6 km in width and has the potential to be at least a partial barrier to movement by caribou, particularly during the anticipated two-year site-development phase and 12.7-year operating life of the mine. The Proponent stated that the potential risk would be reduced at closure with partial site rehabilitation.

Semi-quantitative resistance models were developed by the Proponent to address information requests from the Panel regarding landscape connectivity. The objective of the resistance models was to identify the greatest potential barriers to caribou movement in the landscape. The Proponent created separate models to assess connectivity for caribou under existing conditions, during construction/operations, and at 5- and 50-years post-closure. Potential movement pathways were identified where caribou could travel around or through the Site Study Area. The Proponent noted that there were challenges and limitations predicting caribou behaviour in response to these disturbance features and uncertainty remains as to the strength of potential avoidance effects and related impacts on connectivity.

The Proponent's baseline assessment of connectivity revealed that the Site Study Area has less resistance to potential caribou movement compared with more heavily developed areas, including the Marathon town site and Peninsula Road, the corridors along Highways 11 and 627, and Neys Provincial Park campground (Figure 13-1). Potential connectivity is available and virtually unimpeded north of the Site Study Area due to a lack of forest harvesting occurring in this area. The area south of the Site Study Area is not suitable for resident caribou and caribou movement is less likely; however, transient caribou are known to traverse the area.

The Site Study Area would be completely cleared during the construction phase and would be an active mine during operations, so it was given a resistance score of 100% (Figure 13-2). A buffer of 500 m around the Site Study Area received a high resistance score due to sensory effects such as smell, light, and noise. The Proponent stated that movement corridors would still be available for potential use north of the Site Study Area.

The Proponent’s modelling revealed that post-closure connectivity improves due to the abatement of sensory effects such as noise from the active mine site. Initial improvement (after 5 years) is modest (Figure 13-3), but improves by 50 years (Figure 13-4), due to maturation of the established conifers into a forest that can serve as refuge habitat. The Proponent planned to include a 1-km wide forested travel corridor in the post closure landscape. The Proponent stated that this strategically placed treed corridor would potentially provide connectivity in a northwest-southeast direction, allowing caribou to move within and between ranges in addition to the movement corridors north of the Site Study Area.

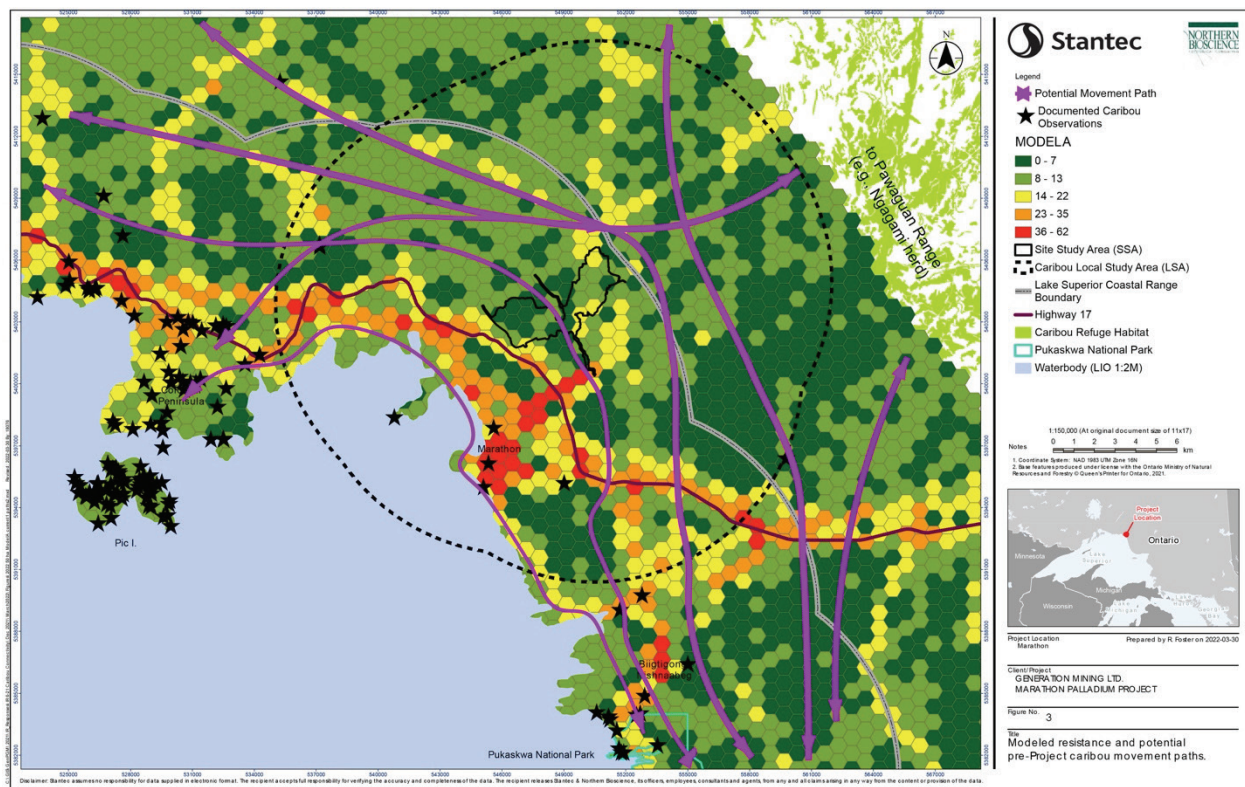


Figure 13-1: Baseline Scenario (Source: CIAR #1209)

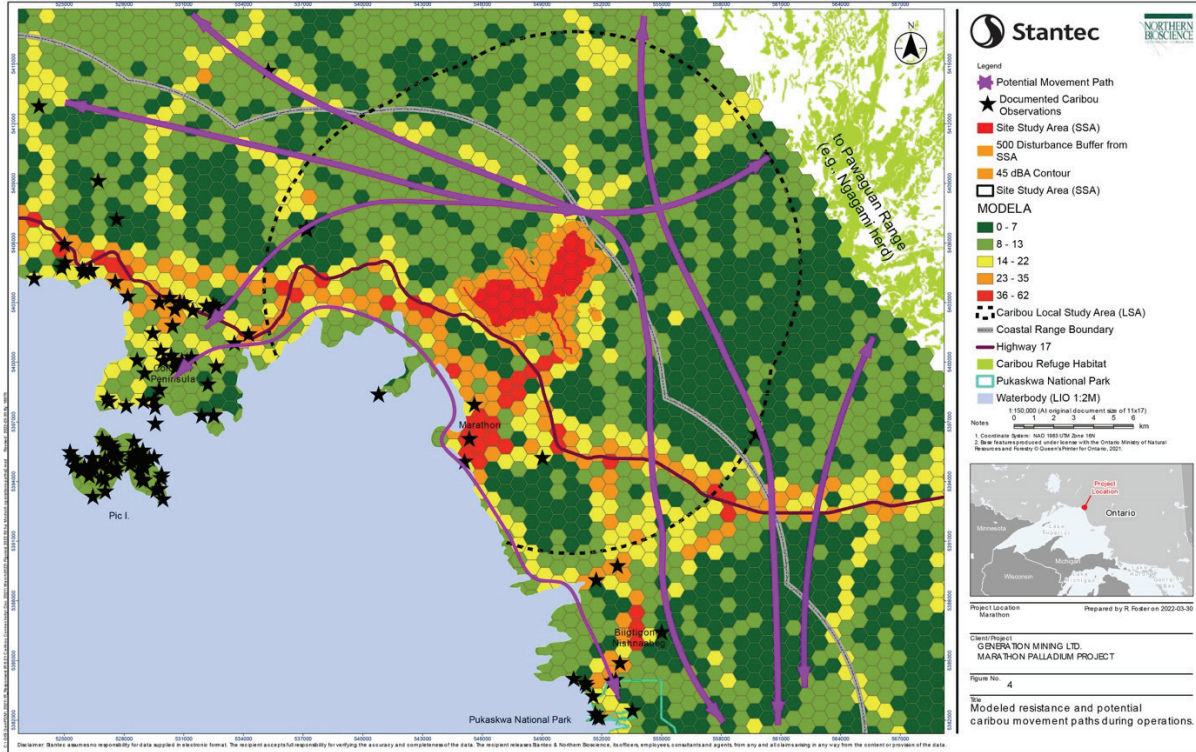


Figure 13-2: Construction and Operations Scenario (Source: CIAR #1209)

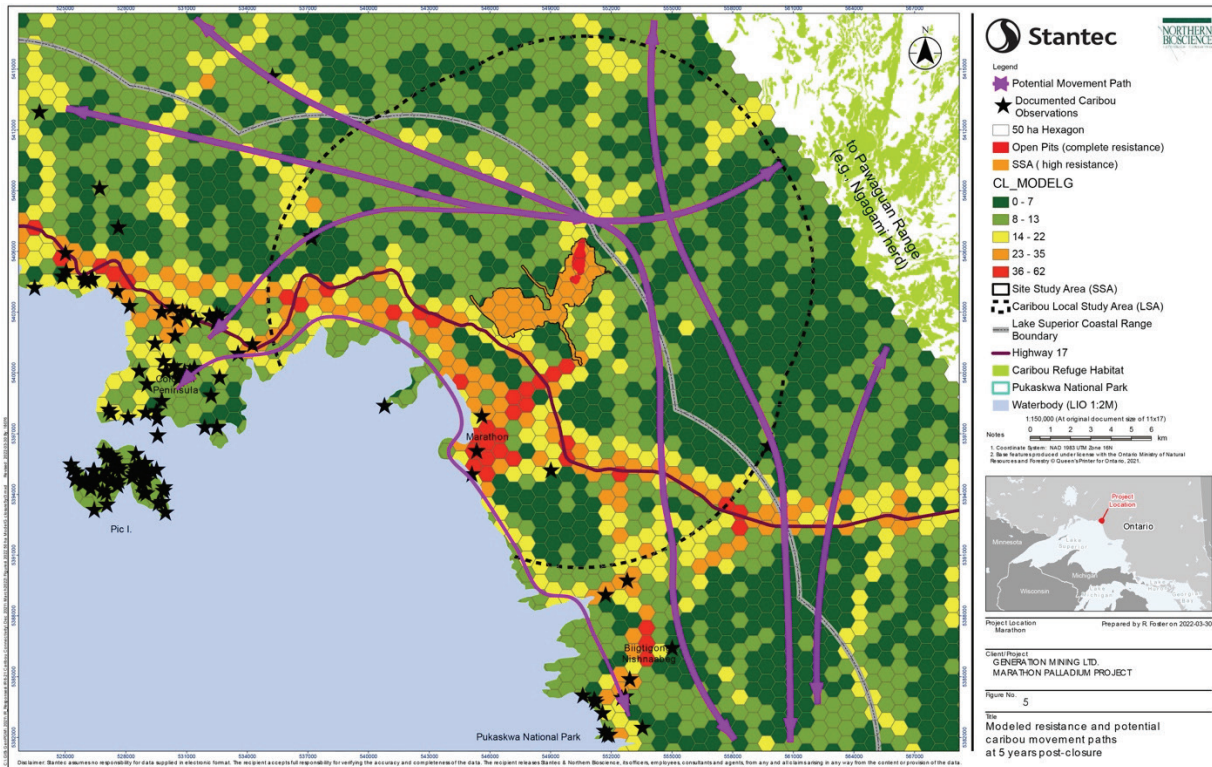


Figure 13-3: Five Years Post-Closure Scenario (Source: CIAR #1209)

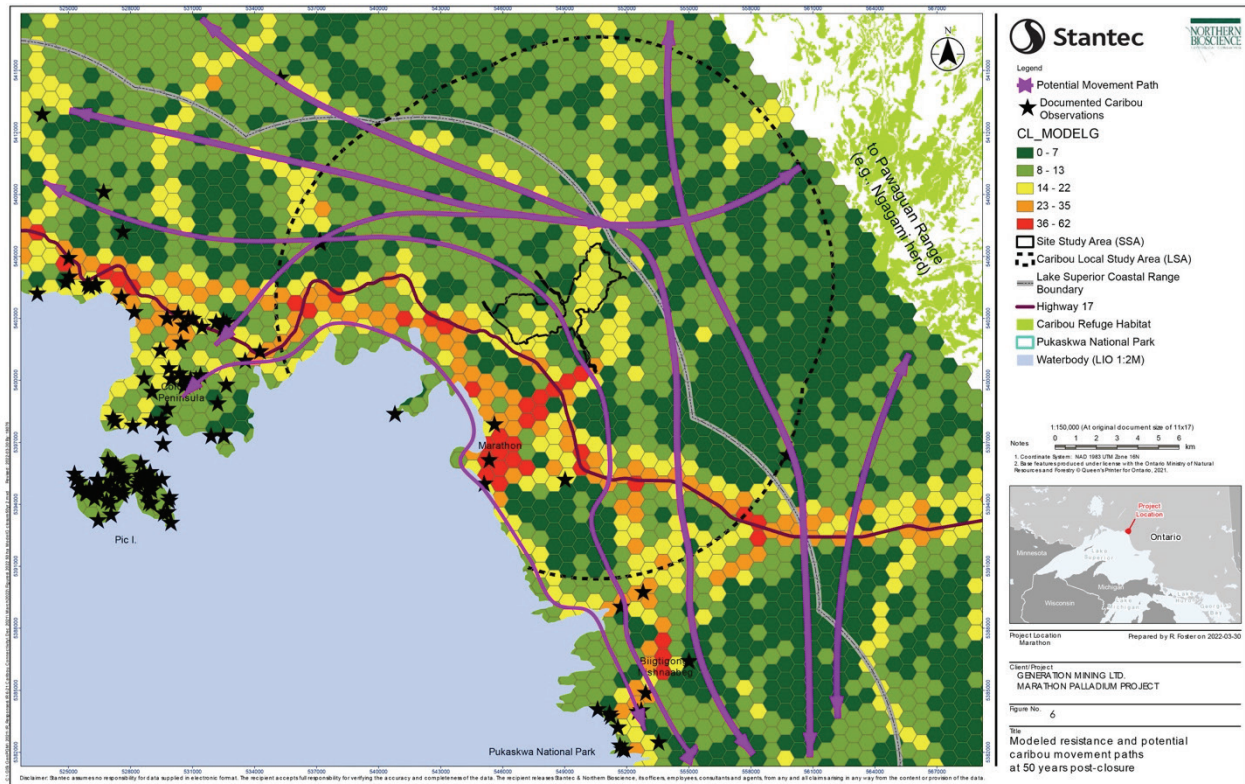


Figure 13-4: 50 Years Post-Closure Scenario (Source: CIAR #1209)

The Proponent stated that their model aligned well with areas of low resistance north and east of the Site Study Area, and with the undisturbed conditions found on Pic Island. However, the Proponent noted that resistance values provide little explanatory power for the documented caribou observations within the Town of Marathon. These likely represent caribou moving along the shoreline until they encounter the town.

The Proponent stated that the modelling exercise is not intended to probabilistically predict where caribou may move through the Project area or elsewhere in the broader landscape. They noted it is difficult to theoretically predict where or how caribou may move through the Coastal Range and adjacent discontinuous range, particularly given the absence of recent telemetry data or consistent aerial or ground surveys.

The Proponent noted that the Lake Superior Coastal Range is unique among boreal caribou ranges in Canada due to its location, isolation, small size, long linear shape, and the inclusion of Lake Superior nearshore islands as refuge habitat. Zones of Influence of sensory disturbance observed from caribou studies in other jurisdictions and environments may not be similar to the Lake Superior Coastal Range, making it difficult to understand or predict avoidance effects and predict potential effects on connectivity.

The Proponent also stated that they cannot accurately predict how caribou would respond to noise from the Project. Noise may not necessarily prevent caribou from passing near the

Project, but it may accelerate their rates of travel, as has been observed for caribou in some studies as they approach highways, particularly when traffic density is high.

The Proponent stated that caribou are a wide-ranging terrestrial mammal and even members of the less-mobile woodland caribou ecotype are capable of diverting around the Project site. The Proponent stated that the limited historical telemetry data indicate that caribou are capable of moving relatively large distances through coastal and discontinuous ranges. Genetic data also support a conclusion of high mobility of boreal caribou.

The Proponent concluded that, based on the evidence, they expected no significant effects on habitat connectivity or critical habitat as a result of the Project. However, the Proponent also stated that the Project could potentially affect connectivity through the Site Study Area and Local Study Area during construction, operations and/or post-closure. The Proponent noted that connectivity supports the maintenance of critical habitat.

Regarding caribou north-south connectivity and movement, the Proponent stated that they anticipated no significant effects from the Project given that the Project is located immediately north of Marathon. The Proponent stated that the potential caribou movement corridors identified by MNDMNR to the east and west of the Project would provide potential connectivity between the Lake Superior Coastal Range and ranges to the north.

Views of the Participants

The Ministry of the Environment, Conservation and Parks, Environment and Climate Change Canada and Natural Resources Canada all expressed concerns regarding the Proponent's connectivity analysis, including the level of scientific rigour, and suggested the Project's effects on connectivity were underestimated. The Ministry of the Environment, Conservation and Parks recommended the use of quantitative movement models for the connectivity analysis, which would allow formal tests of sensitivity to model inputs.

Environment and Climate Change Canada stated that caribou require habitat connectivity throughout their range to access seasonal resources and maintain genetic diversity. They explained that the federal recovery strategy states that maintaining a long-term self-sustaining status for boreal caribou ranges depends on connectivity within and between ranges and that irreversible range retraction or permanent breaks in range connectivity should be avoided.

Environment and Climate Change Canada stated that, without mitigation, the Project would have the potential to affect caribou movement within the range during all phases of the Project, should caribou be present on the mainland portion of the range. Environment and Climate Change Canada added that the destruction of critical habitat that would be expected to occur due to the loss of connectivity is not consistent with the *Species at Risk* recovery strategy for the caribou.

The Ministry of the Environment, Conservation and Parks indicated that there is a significant likelihood that the Project footprint would be a physical barrier to caribou movement and connectivity. They stated the Proponent did not provide suitable actions to mitigate the impacts to caribou connectivity, and that the Project would have long-term impacts on connectivity within the Lake Superior Coastal Range.

The Ministry of the Environment, Conservation and Parks also stated that the Project would likely have less of an effect on north-south movements of caribou between the Lake Superior Coastal Range and ranges further north (e.g., Nipigon Range and Pagwachuan Range).

Parks Canada advised that connectivity within the Coastal Range and between ranges is expected to affect the success of future recovery measures in Pukaskwa National Park. They referenced studies that stated that translocation efforts into the Park were unlikely to succeed under current conditions and that long-term recovery and survival of caribou would likely be hampered by habitat conditions outside of park boundaries, as well as by a lack of connectivity with more northern populations.

Biigtigong Nishnaabeg stated that caribou are highly susceptible to habitat fragmentation and loss of ecosystem integrity may make them more susceptible to predation and other negative factors.

Biigtigong Nishnaabeg noted that, while re-establishing caribou along the Lake Superior strip is important, as long as the species is restricted to a narrow band, their long-term prospects will remain tenuous. Biigtigong Nishnaabeg noted that the way within-range connectivity is facilitated is especially important to Biigtigong Nishnaabeg. They added, however, that they did not think a quantitative model, as proposed by the Ministry of the Environment, Conservation and Parks, was needed and that the greater analytical power of a more sensitive model would likely not be sufficient to undermine the general conclusion of the analysis provided by the Proponent.

13.4.4 Injury and Mortality

Views of the Proponent

To decrease the potential for injury or mortality of caribou, the Proponent agreed to implement various onsite mitigation measures, such as suspending construction/operations activities if caribou are observed in the area, prohibiting hunting, implementing speed limits and driver training to avoid collisions, and safely stockpiling rock and filling pits and trenches to avoid injury.

The Proponent indicated that development of the mitigation measures would be informed by Environment and Climate Change Canada's *Environmental Code of Practice for Metal Mines*,

Ontario's Range Management Policy in Support of Woodland Caribou Conservations and Recovery, and the federal Recovery Strategy for Woodland Caribou.

With appropriate mitigation, the Proponent predicted that no adverse effects on caribou survival are anticipated from the Project given the lack of documented historical or current use of the Site Study Area by caribou and the very low numbers of caribou estimated to remain in the mainland Lake Superior Coastal Range.

13.5 MITIGATION AND OFFSETTING

13.5.1 Progressive Reclamation and Closure

Views of the Proponent

The Proponent would be required to prepare a regulatory Closure Plan in accordance with the requirements set out in Ontario's *Mining Act*, Ontario Regulation 240/00, as a means to mitigate the effects of the Project. The Proponent is developing a conceptual plan for the post-closure landscape and corresponding vegetation communities, as outlined in Section 11 (Terrain, Soils, and Vegetation).

The Proponent described how the anticipated closure landscape would affect caribou habitat and movement. The Proponent indicated that approximately 40% of the Site Study Area would be reforested where topography and soil conditions allow. As shown in Figure 11-1 in Section 11 (Terrain, Soils and Vegetation), the closure concept includes the creation of an approximately even-aged, treed conifer corridor 1 km wide across the site between the reclaimed process solids management facility and mine rock storage area. The Proponent reported that it would take approximately 40 years before it is considered suitable caribou habitat. In the interim, caribou would be able to pass through the regenerating forest in the absence of physical barriers, although it would not provide as much cover as closed-canopy forest. The Proponent stated that, because these conifer species are less palatable than deciduous browse typical of the Site Study Area and Local Study Area, this cover type is less likely to attract moose and black bears, potentially reducing the risk of predation for caribou. At 50 years, the Proponent considered the re-forested area to be caribou winter/refuge habitat for the purposes of its connectivity modelling.

The process solids management facility and proposed wetlands and ponds would likely increase predation risk somewhat by attracting moose, and in turn wolves, due to the vegetation types predicted for these locations, although these features would likely pose little if any physical barrier to caribou.

The two open pits would represent a barrier to connectivity, and the Proponent assumed caribou would divert around the pit lakes.

The Proponent stated that the degree to which the managed rock stockpile along the eastern edge of the Site Study Area may impair connectivity is unknown but is believed to be relatively minor. While the rock pile is steep, terrain in the Local Study Area is similarly rugged, with cliffs and associated talus, as well as steep, poorly vegetated bedrock slopes. The Proponent noted that the rock pile was not treated as either disturbance or refuge habitat in the post-closure model and that, if this area does impede connectivity, its north-south orientation may affect some potential east-west caribou movement.

The degree to which barren rock forming the embankments around the process solids management facility may impair connectivity is unknown but it is believed to be relatively minor, as in the case of the rock stockpile.

As noted in Section 11 (Terrain, Soils and Vegetation), the Proponent has committed to obtaining Biigtigong Nishnaabeg's consent with respect to their final Closure Plan.

Views of the Participants

Both Environment and Climate Change Canada and the Ministry of the Environment, Conservation and Parks noted the conceptual nature of the Proponent's proposed Closure Plan and that, the stated plan to reforest approximately 487 ha (or 40% of the Site Study Area) is not a firm commitment. They also cited concerns with the 1 km forested corridor as a means to mitigate effects on connectivity. Environment and Climate Change Canada stated that, as the Proponent has recognized themselves, corridors used by caribou are usually 10–20 km wide, and a 1-km-wide forested corridor is unlikely to mitigate the effects on range connectivity over the long term.

Environment and Climate Change Canada concluded that, according to the Proponent's plan, approximately 594 ha of forests would be permanently removed and there would be permanent effects on critical habitat, even 50 years after closure. Environment and Climate Change Canada recommended that as much of the mine site as possible should be reforested — not just revegetated — and that more information about onsite rehabilitation is required to evaluate residual effects.

The Ministry of the Environment, Conservation and Parks is of the opinion that the Proponent's proposed onsite, post-closure landscape does not contain enough detail about mitigating the effects on caribou and their habitat or provide sufficient information to support a conclusion that the post-closure landscape may provide a benefit to caribou. The Ministry recommended that restoration be guided by Ontario's *Best Management Practices for Mineral Exploration and Development Activities and Woodland Caribou in Ontario*, including: (a) site preparation and planting of jack pine or spruce at a minimum density of 1,000 stems per hectare; (b) site

preparation and aerial seeding of jack pine at 20,000 viable seeds per hectare; or (c) implement alternative site renewal treatments to return it to a forested condition that reflects the original stand.

The Crown Consultation Team recommended that the Proponent consult Michipicoten First Nation and Biigtigong Nishnaabeg in the development of onsite restoration and monitoring activities related to caribou and in the development of monitoring and follow-up programs related to Project effects to caribou.

13.5.2 Offsite Mitigation

Views of the Proponent

The Proponent stated that, although there has been no documented historic or current use of the Site Study Area by caribou, the area would be unsuitable for caribou use during operations. At closure, even with rehabilitation, the Site Study Area would likely be less suitable as habitat for caribou than it is currently. To compensate for this potential reduction in caribou habitat and connectivity in the Site Study Area, the Proponent has proposed offsite mitigation measures to improve connectivity within the Regional Study Area. Offsite mitigation has been developed to avoid significant residual effects on caribou or their habitat. The Proponent agrees with the Ministry of the Environment, Conservation and Parks that an overall benefit permit would be required under the *Endangered Species Act*. The Proponent is considering a suite of seven caribou-mitigation actions.

Road Decommissioning and Enhanced Silviculture

The Proponent stated that the area of Discontinuous Distribution is fragmented by infrastructure, resource extraction activities, as well as natural disturbance, all of which impair the function of this area for caribou occupancy or movement between the Coastal Range and ranges in the Continuous Distribution to the north.

The Proponent identified offsite road decommissioning and enhanced silviculture opportunities in the Coastal and the area of Discontinuous Distribution areas to enhance connectivity.

The Proponent stated that the proposed mitigation of fully decommissioning roads would not only reduce fragmentation by restoring conifer forests along the length of the treated road, but it also has the potential to reduce the likelihood of predator encounters with caribou passing through and within the area of Discontinuous Distribution and Coastal Range by breaking up predator lines of sight and potentially impeding their travel, therefore reducing foraging efficiency. This should improve the connectivity between the Coastal Range and ranges farther north.

The Proponent concluded that the proposed road decommissioning and enhanced silviculture would result in the addition of approximately 115 ha of future conifer forest on the rehabilitated roadbeds and associated landings. Over the longer term, the mitigation would also result in the removal of more than 4,000 ha of disturbance (when considering the 500 m buffer) associated with the roads and enhance potential connectivity within and among ranges. The Proponent has committed to conducting effectiveness monitoring that would focus on the success of the silviculture treatments and an aerial survey of the Regional Study Area west of Pukaskwa National Park.

The Proponent noted that, if ongoing discussions with Indigenous communities and government agencies indicate that these areas are no longer suitable, comparable areas in the Lake Superior Coastal Range and/or the area of Discontinuous Distribution would be identified for similar actions.

Translocations

The Proponent is considering translocations of caribou to augment struggling caribou populations and take the place of immigration, which take place in fully functional populations. Translocations have been identified as potential recovery actions in both the federal recovery strategy and Ontario's *Woodland Caribou Conservation Plan*. The Proponent described several potential opportunities, which Michipicoten First Nation put forward, including, the transfer of caribou from Caribou Island and/or the Slate Islands to Michipicoten Island to re-establish the population and provide a safeguard against extirpation. Further relocation efforts from island populations to the mainland and potentially to Pukaskwa National Park, the area between Pukaskwa National Park and Michipicoten First Nation, the east shore including Lake Superior Provincial Park and/or nearshore islands could also be considered.

Maternal Penning

The Proponent stated that maternal penning has been used in other Canadian jurisdictions and is identified in the federal recovery strategy as a recovery action to reduce caribou calf mortality, by protecting neonate calves until they are old enough to better escape predators. This initiative typically involves fenced areas within a population's existing range. The Proponent stated that maternal penning on Caribou Island could provide a continuing source of caribou to bolster herds on Slate Island and/or Michipicoten Island, or to translocate to other islands or mainland.

Enhanced Monitoring

The Proponent proposed several options to enhance monitoring of boreal caribou, alternative prey, and wolves that could improve understanding of the effectiveness of existing and planned initiatives and contribute to the overall understanding of wildlife use in the local area. The Proponent noted that the importance of population monitoring to caribou recovery has been

emphasized in both the federal recovery strategy and the provincial caribou protection plan. The Proponent stated that the monitoring efforts would be carried out in collaboration with Indigenous communities, Parks Canada, Ontario Parks, MNDMNR, and the Ministry of the Environment, Conservation and Parks.

Research

The Proponent stated that targeted research would help fill information gaps and inform recovery actions for the caribou population in the coastal range, which is poorly known. Potential collaborators include Biigtigong Nishnaabeg, Michipicoten First Nation, Lakehead University and other academic institutions, Ontario Parks, and the Centre for Northern Forest Ecosystem Research. The Proponent noted that research studies have been identified as a priority in Ontario's *Woodland Caribou Conservation Plan* and the importance of research to guide recovery actions is affirmed in the federal recovery strategy.

Community-Based Projects

The Proponent described several community-based projects to increase awareness and build capacity to protect caribou. Potential initiatives could include: community awareness program to increase positive attitudes towards caribou; scholarship for youth for college or university training in wildlife management; seed funding of a Biigtigong Wildlife Department coordinator, or First Nations Cooperative; and assistance to the Town of Marathon in fencing the municipal landfill. The Proponent noted that Ontario's caribou conservation plan identified outreach and stewardship to support caribou recovery, and the federal recovery strategy also supports the development of cooperative stewardship agreements and activities to support the engagement of Indigenous organizations and stakeholders.

Alternative Prey-Predator Control

The Proponent indicated predator-prey control could be implemented to support caribou recovery and is identified as a potential action in the federal recovery strategy and has been undertaken in other Canadian jurisdictions. This strategy can be done by directly harvesting wolves, directly reducing the prey base of wolves by hunting moose and deer, or by indirectly reducing prey by improving habitat conditions for caribou (reforestation).

The Proponent stated that all potential offsite measures would be developed in consultation with MNDMNR, the Ministry of the Environment, Conservation and Parks and Indigenous communities and ultimately would need approval by the Ministry through an Overall Benefit Agreement. The Proponent stated that the development of these measures would be informed by the *Range Management Policy in Support of Woodland Caribou Conservations and Recovery*, and the *Recovery Strategy for Woodland Caribou*. The Proponent also committed to consult with Biigtigong Nishnaabeg to revise current offsite caribou mitigations and consider the current landscape and cultural proposals from Biigtigong Nishnaabeg.

The Proponent stated that the suite of overall benefit actions would more than compensate for any residual effects. This would result in a net benefit to boreal caribou in the Lake Superior Coastal Range. The Project would therefore represent an opportunity to improve the conditions for caribou and/or their habitat in the Lake Superior Coastal Range.

Views of the Participants

Environment and Climate Change Canada stated that the Proponent did not provide sufficient detail about how offsite measures would improve connectivity within and between ranges. Environment and Climate Change Canada recommended the use of biodiversity offsets to achieve “no net loss” of caribou habitat as a result of the Project’s effects within the Site Study Area from the beginning of the construction phase through to the post-closure phase. Environment and Climate Change Canada explained that biodiversity offsets are designed to balance the residual adverse effects of a project after implementation of all feasible avoidance, minimization, and onsite restoration measures as described in their *Operational Framework for Use of Conservation Allowances*.

Environment and Climate Change Canada’s general approach is to recommend a minimum 4:1 ratio for low-risk projects to account for time-lags to restoration, uncertainty in outcomes, and to be precautionary in light of impacts to sensitive species. Environment and Climate Change Canada stated that offset ratios may be higher than 4:1 based on Project-specific circumstances.

In terms of offsetting, Environment and Climate Change Canada explained that not every hectare of restored habitat or action should be considered equal. That is, when more problematic areas are dealt with that provide significant improvements to habitat connectivity those actions are worth more in terms of an offsetting ratio.

In the absence of an updated onsite rehabilitation and post-closure restoration plan that demonstrates how the effects on critical habitat connectivity can be addressed, Environment and Climate Change Canada recommended that an offset ratio well above the minimum standard of 4:1 would be required to ensure that the effects of the Project are consistent with the *Species at Risk Act* recovery strategy.

The specific details of the offset ratio would need to be developed in collaboration with various parties based on the details of the final Closure Plan and other measures implemented by the Proponent. If the Proponent’s measures can effectively address connectivity and reduce adverse effects to recovery, the offset ratio necessary to address effects could be lowered.

The Ministry of the Environment, Conservation and Parks indicated that the proposed offsite road decommissioning and enhanced silviculture would be insufficient to avoid significant adverse effects on caribou and their habitat in the Lake Superior Coastal Range. This is because offsite habitat restoration actions are proposed for only 115 ha, which represents about 10% of

the habitat lost to the Project footprint (approximately 1,116 ha). Furthermore, the Ministry is of the opinion that the proposed offsite mitigation locations would not be meaningful in the context of connectivity and population persistence.

Overall, the Ministry of the Environment, Conservation and Parks noted that the mitigative and beneficial options presented by the Proponent lack sufficient supporting material to demonstrate that they are meaningful actions for caribou in the Lake Superior Coastal Range and that they are feasible or implementable.

Natural Resources Canada advised that there was insufficient information to properly evaluate the effectiveness of the offsite mitigation measures proposed by the Proponent or to determine the degree to which offsite mitigation measures may improve inter-range connectivity.

Biigtigong Nishnaabeg have developed a caribou stewardship strategy for the Lake Superior Coastal Range. They cited the lack of progress made by Ontario in planning and executing the sustainable management of Lake Superior caribou, and the uncertain utility of the Section 11 Conservation Agreement as considerations in developing the strategy. Biigtigong Nishnaabeg stated that the goal of the strategy is to establish and secure a self-sustaining population of caribou centered on the northeast portion of Lake Superior. Biigtigong Nishnaabeg noted that the strategy is still a work in progress, but the key goals are to re-establish and protect caribou populations on the islands, use the island populations as sources to reintroduce caribou to the mainland, and protect and monitor the caribou wherever they occur. Biigtigong Nishnaabeg also stated that the strategy would include extensive Indigenous involvement, including a leadership or co-management role for Indigenous communities in managing caribou, integration of traditional and community ecological knowledge, and increasing levels of Indigenous capacity.

Biigtigong Nishnaabeg stated that they have engaged with the Proponent regarding the development of improved offsite mitigation options, including the possible sponsorship of community-based projects, and are encouraged by the communication. They stated that they agree with the Ministry of the Environment, Conservation and Parks that the proposed measures lack specificity. But they were encouraged by the open communication and that measures would be developed by the Proponent in consultation with Biigtigong Nishnaabeg.

Biigtigong Nishnaabeg requested that the Crown:

- recognize and facilitate Biigtigong Nishnaabeg's aspirations related to caribou oversight and management;
- support the peer-reviewed detailed mapping of caribou habitat in Biigtigong Nishnaabeg's Exclusive Title Area and evaluate existing recovery zones and options for new

configurations to link caribou within and between the Lake Superior Caribou Range and the area of Discontinuous Distribution;

- work in partnership with Biigtigong in overseeing and administering wildlife management programs within Biigtigong's Exclusive Title Area (e.g., setting of moose tags and quotas for Wildlife Management Area 21A) to facilitate eventual full control by Biigtigong Nishnaabeg; and
- provide an endowment for training and hiring of a Biigtigong Nishnaabeg Conservation and wildlife staff including wildlife biologist and conservation officer.

Michipicoten First Nation expressed a deep concern for the dwindling caribou population in the Lake Superior Coastal Range. The Crown Consultation Team reported that Michipicoten First Nation has a committee of biologists with expertise in caribou management to help the community promote and preserve the caribou population through translocation strategies that offset the recent loss of a significant herd of caribou on Michipicoten Island. According to Michipicoten First Nation, their efforts to translocate caribou back to Michipicoten Island through mitigation efforts with another company have been frustrated by a lack of support from the province of Ontario to endorse any translocation activities. Michipicoten First Nation have stated that they want mining and other companies to take responsibility for the circumstances that resulted in the caribou mainland population decline. If any caribou are found in the Project area, Michipicoten First Nation would like to relocate them to Caribou and Michipicoten Islands.

The Jackfish Metis Association stated that restrictions and rules imposed by government to achieve the unlikely goal of restoring the caribou population in the region impair industrial development. They stated that caribou are a unique and important part of the Canadian landscape, but, unfortunately, not in this region. They believe that the environmental assessment process in their region should not include caribou restoration.

The Crown Consultation Team reported that the Ministry of the Environment, Conservation and Parks and Environment and Climate Change Canada would continue to engage in dialogue with Biigtigong Nishnaabeg and explore collaborative partnerships for caribou recovery within the Lake Superior Coastal Range. The Crown Consultation Team also stated they would continue discussions with Environment and Climate Change Canada regarding potential programs that may align with the concerns expressed by Biigtigong Nishnaabeg. The Crown Consultation Team recommended that the Proponent consult with Michipicoten First Nation in the development of offsite restoration and monitoring activities related to caribou.

13.6 RESIDUAL EFFECTS AND CONCLUSIONS

Views of the Proponent

Based on the evidence presented, the Proponent concluded that there would be no significant adverse effects on caribou habitat connectivity or critical habitat as a result of the Project during operations and post-closure. Nonetheless, due to the precarious state of caribou populations in the Lake Superior Coastal Range, the Proponent is committed to conducting offsite mitigation and other actions as part of an Overall Benefit Plan to ensure the Project has a net benefit to caribou and their habitat in the Lake Superior Coastal Range.

Views of the Participants

The Ministry of the Environment, Conservation and Parks stated that they remain of the opinion that the Proponent has not provided sufficient information to the Panel to demonstrate that the Project would have no significant adverse effects on caribou.

Environment and Climate Change Canada advised that the Project effects on caribou and its critical habitat have been underestimated by the Proponent. They stated that their expert advice is that the current onsite rehabilitation and post-closure restoration plan and offsite mitigation (offsetting) plan are not sufficient to address the magnitude and severity of impacts that are likely to occur in the critical habitat. They stated that the high vulnerability of the population combined with the high severity of the residual effects to critical habitat connectivity pose a high risk to the recovery of the Lake Superior Coastal Range boreal caribou.

Parks Canada supported Environment and Climate Change Canada's conclusions and recommendations and added that ultimately the recovery of boreal caribou in Pukaskwa National Park will depend on larger scale landscape planning and restoration initiatives, to ensure habitat beyond the park boundaries will facilitate a self-sustaining caribou population within the Lake Superior Coastal Range.

Biigtigong Nishnaabeg stated that, if the commitments of the Proponent to address effects to caribou are implemented, they would not share Ministry of the Environment, Conservation and Parks' view that the Project would result in significant adverse effects.

13.7 PANEL CONCLUSIONS AND RECOMMENDATIONS

In reaching their conclusions on the effects of the Project on caribou the Panel considered the following factors to be particularly relevant:

- Woodland caribou is a threatened species under the *Species At Risk Act* and also considered threatened under the Ontario *Endangered Species Act*.

- Environment and Climate Change Canada stated that current evidence supports the conclusion that the recovery of all local populations of caribou is biologically and technically feasible.
- Biigtigong Nishnaabeg and Michipicoten First Nation support the recovery of the Lake Superior Coastal Range caribou.
- Biigtigong Nishnaabeg stated that both Ontario and Canada have done an inadequate job of managing caribou and that Ontario has not met its policy commitments outlined in its recovery strategy and conservation plan.
- Biigtigong Nishnaabeg and Michipicoten First Nation have both proposed recovery strategies in the absence of government action.
- Approximately 106 ha of potential caribou winter habitat and 732 ha of caribou refuge habitat would be lost due to the development of the Project.
- According to Environment and Climate Change Canada, the Project is located in critical habitat for the species, as identified in the Recovery Strategy. Both Environment and Climate Change Canada and the Ministry of the Environment, Conservation and Parks consider the loss of the entire Site Study Area as loss of caribou habitat.
- The Project is situated within 500 m of Category 1 habitat according to the characterization of caribou habitat by the Ministry of the Environment, Conservation and Parks.
- Sensory disturbance could affect caribou behaviour at distances of between 500 m and 15 km from a disturbance.
- Environment and Climate Change Canada and the Ministry of the Environment, Conservation and Parks agree that the Proponent's view that the caribou in this range are tolerant to disturbance is not supported by evidence.
- Both Environment and Climate Change Canada and the Ministry of the Environment, Conservation and Parks recommended the Proponent avoid activities that emit loud noises within the sensitive caribou timing windows for calving (May 1 to Sept 15) and winter use (December 1 to March 31).
- At closure, even with rehabilitation, the Site Study Area would be less suitable as caribou habitat than it is currently and could result in reduced connectivity even 50 years after closure.
- The federal recovery strategy states that maintaining a long-term self-sustaining status for boreal caribou ranges depends on connectivity within and between ranges, and

indicates that irreversible range retraction or permanent breaks in range connectivity should be avoided.

- The Ministry of the Environment, Conservation and Parks is of the opinion that there is a significant likelihood that the Project footprint would be a physical barrier to caribou movement and connectivity.
- Parks Canada advised that connectivity within the Coastal Range and between ranges is expected to affect the success of future recovery measures in Pukaskwa National Park. They state that recovery and survival of caribou would likely be hampered by habitat conditions outside of park boundaries, as well as a lack of connectivity with more northern populations.
- Environment and Climate Change Canada stated that the proposed 1-km-wide forested corridor is unlikely to mitigate the effects on range connectivity over the long-term. Environment and Climate Change Canada also stated that the Proponent did not provide sufficient detail on how offsite measures would improve connectivity within and between ranges.
- The Ministry of the Environment, Conservation and Parks stated the Proponent has not provided suitable actions to mitigate the impacts to caribou connectivity.
- The Proponent has proposed several offsite mitigation measures and has committed to developing an Overall Benefit Plan as required by the Ministry of the Environment, Conservation and Parks.
- Environment and Climate Change Canada supports biodiversity offsets to compensate for the effects of the Project on caribou. They recommend an offsetting ratio of greater than 4:1.
- Environment and Climate Change Canada stated that, overall, the Proponent's current mitigation and offsetting measures are not sufficient to address the magnitude and severity of impacts that are likely to occur in the critical habitat, and that the high vulnerability of the population combined with the high severity of the residual effects on critical habitat connectivity pose a high risk to the recovery of the Lake Superior Coastal Range boreal caribou.
- The Ministry of the Environment, Conservation and Parks stated that the Proponent has not provided sufficient information to demonstrate that the Project would have no significant adverse effects on caribou.

The Panel notes that the Lake Superior Coastal Range population has diminished severely but understands from the evidence provided that the population is recoverable and could be self-sustaining in the future. The Panel notes that, while there are several potential effects of the

Project on caribou, the effect on connectivity through the removal of habitat is the central issue. All participants and the Proponent agree that the Project would reduce connectivity in the long-term to some degree. The Panel recognizes that the Proponent has proposed site rehabilitation and offsite measures to mitigate and offset these effects; however, the Panel finds these to be conceptual in nature and the details of the measures and their potential success rates will not be confirmed until after the environmental assessment is complete. Additionally, the Panel notes that, even if the measures are successful, the time lags associated with implementing these measures would mean that caribou could be affected by the Project without the benefit of site rehabilitation and offsite measures being in place. Due to this time delay, the Panel finds that the direct Project effects cannot be discounted when determining the significance of effects. Nevertheless, the Panel is of the opinion that, should the Project proceed, these offsite measures should be implemented, subject to confirmation by appropriate regulatory agencies and, in particular, Biigtigong Nishnaabeg.

Further, the Panel notes that the timing restrictions recommended by government to avoid sensory disturbance to caribou during sensitive life stages are not likely feasible in the context of the operation of a mine. According to the recommendation by the Ministry of the Environment, Conservation and Parks, and supported by Environment and Climate Change Canada, the Proponent should avoid activities that emit loud noises, within the timing windows of May 1 to September 15 and December 1 to March 31. Because blasting would be a daily occurrence during construction and operations, this would leave only approximately 3.5 months per year where the Proponent could operate the mine.

The Panel recognizes that GenPGM and Biigtigong Nishnaabeg made significant efforts in the weeks before the close of the record to address the issues related to potential effects on caribou; however, the effects of the Project remain.

The Panel notes that multiple parties have put forward tangible strategies and actions that have the potential to improve the population and habitat of caribou in the Lake Superior Coastal Range. The Panel expects the provincial and federal governments to respond and act on these proposals in a meaningful way.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 43: Undertake closure reclamation once operations have ceased in order to return the Site Study Area to a self-sustaining ecosystem that includes caribou habitat and connectivity for the purposes of caribou movement through the Site Study Area and in accordance with the *Mining Act* requirements for mine closure. Specifically, caribou habitat reclamation should be guided by Ontario's *Best Management Practices for Mineral Exploration and Development Activities and Woodland Caribou in Ontario* and should include:

- site preparation and planting of jack pine or spruce at a minimum density of 1,000 stems per hectare; or,

- site preparation and aerial seeding of jack pine at 20,000 viable seeds per hectare; or
- alternative site renewal treatments to return it to a forested condition that reflects the original stand.

Recommendation 44: Finalize and implement offsetting measures to mitigate residual effects of the Project on caribou after the implementation of all feasible avoidance, minimization, and closure reclamation measures have been taken into account. Develop and implement the measures in consultation with Indigenous groups; the Ministry of the Environment, Conservation and Parks; and Environment and Climate Change Canada and begin implementing the measures prior to or at the start of construction. The measures should be aligned with the Overall Benefit Plan required by the Ministry of the Environment, Conservation and Parks and should consider the principles outlined in Environment and Climate Change Canada's *Operational Framework for Conservation Allowances*. The determination of the measures and the offset ratio should demonstrate how the level of risk, severity of effects, vulnerability of species and/or habitat, time lags, probability of success, and the quality of the proposed offsetting measures were considered. Non-habitat measures such as research, monitoring, and community-based projects/programs should also be considered as part of the offsetting measures and developed and implemented in consultation with Indigenous groups; the Ministry of the Environment, Conservation and Parks; and Environment and Climate Change Canada.

Recommendation 45: Consider and incorporate Biigtigong Nishnaabeg's caribou strategy when developing offsetting measures and the Overall Benefit Plan.

Recommendation 46: Suspend construction and operations activities if individual caribou are observed or if the Proponent is informed of the presence of caribou within a 500 m radius of the Site Study Area. Resume activities when it is confirmed caribou have left the area. Report any observations to MNDMNRF.

In addition to the above key mitigation measures, the Panel recommends the Proponent implement follow-up programs:

Recommendation 47: The Proponent should develop and implement a follow-up program to verify the effectiveness of closure reclamation with regard to the objectives of the final approved Closure Plan and the recommendations of the Panel. The Proponent should develop the follow-up program, prior to end of operations, including methods, timing, duration, thresholds, and adaptive management measures in consultation with MNDMNRF, other relevant government agencies, Biigtigong Nishnaabeg, and other interested Indigenous

groups. The Proponent should implement the follow-up program during closure until objectives have been met and the ecosystem is self-sustaining.

Recommendation 48: The Proponent should develop and implement a follow-up program to verify the effectiveness of the offsetting measures. The follow-up program should include performance indicators to be used to evaluate the effectiveness of habitat- and non-habitat-based offsetting measures as well as adaptive management measures should the results indicate that the offsetting measures are not performing as predicted. The follow-up program should be developed and implemented in consultation with Indigenous groups, the Ministry of the Environment, Conservation and Parks and Environment and Climate Change Canada.

The Panel believes that the status of the species and its vulnerability to extirpation mean any additional effects have the potential to be severely detrimental. Despite implementation of the recommended mitigation measures outlined above, much uncertainty remains about the effects of the Project on caribou.

The Panel concludes, through application of the precautionary principle, that the Project is likely to cause a significant adverse environmental effect on critical habitat for caribou, as well as on connectivity of habitat within the Lake Superior Coastal Range.

In addition to their recommendations to the Proponent, the Panel recommends that the federal and/or provincial government implement the following two measures, whether or not the Project is approved.

Recommendation 49: Develop and implement a coordinated plan to advance the recovery of the Lake Superior Coastal Range caribou as soon as possible. The plan should include tangible actions and timelines for each component of the plan.

Recommendation 50: Consider and incorporate caribou recovery measures and strategies put forward by Biigtigong Nishnaabeg and Michipicoten First Nation in the plan developed. Interested Indigenous groups should be included in the development and implementation of the plan, including exploring a collaborative partnership with Biigtigong Nishnaabeg for caribou recovery in the Lake Superior Coastal Range.

13.8 CUMULATIVE EFFECTS

Views of the Proponent

The Proponent assessed the cumulative effects on caribou in terms of changes to habitat and mobility within the Regional Study Area (Lake Superior Coastal Range + 10 km buffer). Regarding future projects or activities that would overlap with the Project, the Proponent

stated that Magino Mine is outside the Regional Study Area and that infrastructure-related projects planned in Biigtigong Nishnaabeg are associated with previously built-up areas. Both were excluded from their assessment of cumulative effects for caribou. The Proponent stated that proposed wind and hydro-power developments and mineral exploration activities would be reasonably foreseeable activities in the caribou Regional Study Area that would be associated with land disturbance.

With regards to timber harvesting, the Proponent stated that, overall, the effect from forestry is orders of magnitude larger than any other anthropogenic disturbance on the landscape, and considerably larger than wildfires (which are actively suppressed); however, harvesting in much of the caribou Regional Study Area portion of the Pic Forest Management Unit has been deferred through 2039. The Proponent stated that harvesting is still planned for elsewhere in the coastal and discontinuous ranges between 2021 and 2031. For context, the Proponent reported that the total area of the Pic River Forest Management Unit covers approximately 1.1 million ha; approximately 17,514 ha of forest is scheduled to be harvested in 2020-2021 and the planned harvest from 2021 to 2031 is on the order of 100,000 ha (although mostly not within the Regional Study Area for caribou). In response to Information Request 3-1, the Proponent provided maps of future timber harvesting in the region between 2021 and 2031.

The Proponent explained that the maintenance of sustainable caribou habitats (winter and refuge) over time is a stated objective of each of the recently approved Forest Management Plans that encompass at least a portion of the Coastal Range and the area of Discontinuous Distribution. The Proponent stated that MNDMNR has expended considerable effort establishing the recent Forest Management Plans to ensure the sustainability of caribou habitat through time.

The Proponent reported that the objectives of Ontario's *Caribou Conservation Plan* (2009) for the Lake Superior Coastal Range are to protect and manage habitat for caribou population security and persistence, and to encourage connectivity with caribou populations to the north. To be consistent, the current Pic Forest Management Plan states that management of the portion of the coastal range within the Pic Forest will focus on preserving and creating refuge habitat for caribou to manage population security and persistence.

Additionally, the Proponent reported that the focus of Ontario's *Caribou Conservation Plan* (2009) with respect to the area of Discontinuous Distribution is on specific landscapes that may support temporary caribou occupancy or movement between the continuous ranges to the north and the Lake Superior Coastal Range. To be consistent with this direction, the *Pic Forest Management Plan* and other recent plans within the area of Discontinuous Distribution adopted zones of connectivity that maintain linkages between the northern Continuous Distribution and the Coastal Range.

The Proponent stated that levels of disturbance associated with future projects and activities within the Regional Study Area would be expected to be smaller than those associated with the

Project. Any cumulative increase in the level of disturbance in the Regional Study Area would remain well below the 35% maximum disturbance threshold above which caribou populations are less likely to be self-sustaining over the long-term. Some of these activities, particularly commercial forestry, could affect broad-scale movements of woodland caribou in the Regional Study Area.

Given offsite mitigation and the characterization of the cumulative residual effect on woodland caribou as it concerns changes in habitat in the Regional Study Area, the Proponent concluded that the cumulative residual effect is predicted to be not significant.

Panel Conclusions and Recommendations

The federal recovery strategy states that habitat alteration (i.e., habitat loss, degradation, and fragmentation) from both anthropogenic and natural sources and increased predation as a result of habitat alteration have led to local population declines of caribou throughout their distribution. The strategy also states that the proliferation of linear landscape features such as roads and seismic lines facilitates predation by wolves and the conversion of mature conifer stands to younger seral stages promotes increases in alternative prey, increasing the wolf population. Specifically, the recovery strategy states that many of the threats to boreal caribou and their habitat are related and may interact, in which case they can have cumulative impacts that may not be evident when threats are examined individually.

The Panel considers that past activities, and linear features such as the highway, rail line and transmission lines in particular, have likely played a major role in the decline of caribou in the Lake Superior Coastal Range. The Panel notes that the Proponent determined that the East-West Tie Transmission Line was a current project and included it in their assessment of baseline. Due to the fact that this project is relatively recent, the Panel believes it is unlikely that the effects of this project on caribou have been fully realized. Due to its linear nature, it has the potential to increase predation and decrease connectivity and act cumulatively with the effects of the Project.

The Panel understands that harvesting in much, but not all, of the caribou Regional Study Area portion of the Pic Forest Management Unit has been deferred through to 2039. However, it is unclear what amount hasn't been deferred. Based on the maps provided by the Proponent, the location of some of the timber harvesting in the Regional Study Area appears to be located directly north of the Site Study Area. In their Project effects analysis, the Proponent stated frequently that caribou could use the area north of the Project to travel around the site and this area would provide connectivity, given that the Project itself would reduce east-west connectivity. In this regard, the location of the timber harvesting noted on the maps may act cumulatively with the effects of the Project on connectivity.

The Panel considers that all identified species at risk have already experienced significant adverse effects due to past projects and activities. The Panel considers that any incremental effect on an already-at-risk species, such as caribou, would be significant.

The Panel concludes that the Project, in combination with other projects and activities, that have been or will be carried out, is likely to cause a significant adverse cumulative effect on caribou habitat and connectivity.

Recommendation 51: The Panel recommends that the federal and provincial governments should afford particular attention to the Panel's finding with respect to cumulative effects on caribou when considering development within the Lake Superior Coastal Range and/or the area of Discontinuous Distribution.

SECTION 14: TERRESTRIAL SPECIES AT RISK

14.1 REQUIREMENTS FOR THE CONSIDERATION OF SPECIES AT RISK

This section addresses the environmental effects of the Project on provincial and federal species at risk. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and under paragraph 5(1)(a) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required the Proponent to:

- provide baseline information on species at risk and their critical habitat within the site, Local and Regional Study Areas; and
- assess potential effects of the Project on species at risk for the areas that would be affected including the mine site, the transmission line corridor and access roads.

The Panel's Terms of Reference required that the Panel's assessment include a consideration of the extent to which biological diversity (e.g., ecosystems and/or species diversity) is affected by the Project, including any listed wildlife species, its critical habitat or the residences of individuals of that species as those terms are defined in subsection 2(1) of the federal *Species at Risk Act*, as well as any effect it may have on a provincially threatened or endangered species and/or its protected habitat.

14.2 BASELINE

Views of the Proponent

The Proponent reported that there are at least 32 federal or provincial species at risk that have ranges broadly overlapping the Regional Study Area. Of these, potentially suitable habitat occurs for about 15 species, and 10 species were confirmed in the Site Study Area and/or Local Study Area (see Appendix 6).

The following species at risk and their habitats within the Site Study Area and Local Study Area were identified by the Proponent: Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), Canada Warbler (*Cardellina canadensis*), Rusty Blackbird (*Euphagus carolinus*), Olive-sided Flycatcher (*Contopus cooperi*), Evening Grosbeak (*Coccothraustes vespertinus*), Eastern Wood-Pewee (*Contopus virens*), Bald Eagle (*Haliaeetus leucocephalus*), Peregrine Falcon (*Falco peregrinus anatum*), Common Nighthawk (*Chordeiles minor*), Eastern Whip-poor-will (*Antrostomus vociferus*), Yellow-banded Bumble Bee (*Bombus terricola*), and

Monarch Butterfly (*Danaus plexippus*). Northern Brook Lamprey and Lake Sturgeon, also listed as species at risk, are addressed in Section 10 (Fish and Fish Habitat). The boreal population of Woodland Caribou is a listed species at risk addressed under Section 13 (Caribou).

14.3 ENVIRONMENTAL EFFECTS

The Project presents potential effects on species at risk and their habitat due to changes on the landscape associated with activities during the preparation, construction, operations, and decommissioning and closure of the Project. Consideration of these effects focused on habitat loss, sensory disturbance and effects from dustfall, increased risk of direct mortality, and potential for collisions with Project vehicles and infrastructure.

The Proponent proposed general mitigation measures intended to avoid, reduce and/or offset potential effects of the Project on species at risk. These include timing of clearing activities, noise mitigation, dust suppression, and enforcing speed limits to reduce vehicular collisions.

14.3.1 Effects to Little Brown Myotis and Northern Myotis

Regulatory and Policy Setting

The Little Brown Myotis and Northern Myotis are listed as endangered under the federal *Species at Risk Act* (Schedule 1) and Ontario's *Endangered Species Act*. Both species also receive protection under Ontario's *Fish and Wildlife Conservation Act, 1997* as specially protected mammals.

The Little Brown Myotis and the Northern Myotis are found across Canada and their ranges overlap with the Project site, with distribution that includes the boreal forest south of the treeline through to the United States border.

The federal Recovery Strategy created under the *Species at Risk Act* identifies the single greatest threat to Little Brown Myotis and Northern Myotis as being white-nose syndrome. The Strategy notes that for areas already affected by white-nose syndrome, the significance of other threats to these bat species is heightened because the mortality of a small number of the remaining individuals (particularly adults) can affect the survival of local populations, population recovery, and, possibly, the development of resistance to the fungus that causes white-nose syndrome.

The Strategy states that, within areas affected by white-nose syndrome, the short-term (12-18 years) population objective for both Little Brown Myotis and Northern Myotis is to maintain (and where feasible increase) the population compared to its current (2015) level. The long-term (many generations) population objective is a self-sustaining, resilient, and redundant population.

Under the Ontario *Endangered Species Act*, a recovery strategy may incorporate all or part of an existing plan that relates to the species. The federal Recovery Strategy for Little Brown Myotis and Northern Myotis has been adopted for these species under the *Endangered Species Act*. The following habitat types are regulated under the *Endangered Species Act*:

- Hibernacula, swarming sites and maternity sites are to be prescribed as regulated habitat for Little Brown Myotis and Northern Myotis.
- Regulated habitat for all hibernacula and swarming sites include areas of associated foraging and roosting resources within 2,600 m of a hibernaculum and/or swarming site. It is noted that the area should extend 2,600 m from all known or suspected entrances of a hibernaculum, or total underground extent of a hibernaculum, if known, and/or the concentrated area of swarming activity.
- Regulated maternity habitat for each species include the maternity roost site as well as areas of associated foraging resources.

Views of the Proponent

Habitat requirements for these species vary seasonally and are broadly categorized as:

- overwintering habitat for hibernation and overwinter survival (i.e., hibernacula, abandoned mines, and wells);
- summering habitat which includes maternity roosting habitat and other roosts;
- foraging habitat within commuting range of the roosts; and
- swarming habitat used in the late summer and early fall for mating and socializing.

In 2020, the Proponent identified the presence of Little Brown Myotis and possibly Northern Myotis in the Local Study Area. Regulatory agencies have noted the possibility of Tri-colored Bat onsite due to mobility of these species and potential use of the site for foraging, although the Proponent did not find evidence of this species. The Proponent did not consider the Tri-colored Bat as potentially occupying the Local Study Area.

The Proponent identified no suitable bat roost trees, but did note that the Local Study Area likely provides habitat for non-breeding individuals during the summer months. They stated no hibernacula are present.

The Proponent stated that for the purposes of this Project, potential maternity roost habitat was modelled conservatively and all forested ecosites, with a minimum of 80 years of age and at least 10% cover of Trembling Aspen, were considered potentially suitable maternity roost habitat. In response to participant comments, the Proponent also updated their modelling include all birch hardwood and other ecosites, and to remove the percentage

requirement for trembling aspen. The original modelling predicted 39 ha of maternity roost habitat in the Site Study Area, 577 ha in the Local Study Area and 378,468 ha in the Regional Study Area. The updated modelling predicted 1,075 ha of maternity roost habitat in the Site Study Area, 3,828 ha in the Local Study Area and 1,032,549 ha in the Regional Study Area.

The Proponent noted that direction from the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) and the Ministry of Environment, Conservation and Parks regarding which ecosites and stand characteristics provide suitable habitat for bat maternity roosting habitat is based on untested assumptions. The Proponent stated that no bat maternity roosts have been found in Ontario's boreal forest and thus the assignment of ecosites is based on professional opinion from the synthesis of studies conducted in other jurisdictions or in Ontario outside of the boreal forest.

At the hearing, when asked about their approach to defining suitable bat maternity habitat, the Proponent explained that they used direction from the province, and suitable wildlife habitat criterion schedules for their initial characterization. They noted that in landscapes where human-made dwellings are not present, breeding bats aggregate for maternity roosts in tree cavities. Non-breeding individuals that do not need a large cavity can roost under flaking bark found in large, older decaying trees. Although no maternity roosts have been found onsite, the Proponent stated that large diameter trembling aspens found onsite would be the most likely to have tree cavities suitable for maternity roosts.

The Proponent reported that the main Project effects to Little Brown Myotis and Northern Myotis are related to direct habitat loss, indirect effects to habitat including sensory disturbance and fragmentation, and mortality risk.

Habitat disturbance from noise and artificial light may affect foraging and foraging strategies, general movement, and/or roosting behaviours depending on the timing, magnitude, and frequency of the noise. Noise effects are likely to be most strongly felt during foraging, or late in the day when bats are coming out of daily torpor (periods of physical inactivity). Artificial lighting can have an effect on a range of bat behaviour such as foraging and commuting, emergence, roosting, breeding and hibernation. The Proponent stated that depending on the types of lighting bats may be repelled, or may benefit from increased insect densities near artificial lighting.

The Proponent's proposed mitigation measures to reduce potential habitat loss for bats include:

- avoidance of vegetation clearing in the Site Study Area during the bat maternity period (May 15–August 31) to reduce the risk of destruction of bat occupied maternity trees or, if clearing must occur, undertaking bat maternity surveys using the MNDMNR *Significant Wildlife Habitat* and *Wind Project Protocol* to confirm bat presence/absence in any suitable trees and application of appropriate protection measures;

- installation of five bat boxes/rocket boxes as an alternative to maternity roosts in the Local Study Area prior to clearing activities in the Site Study Area; and
- suspension of construction/operations activities if a bat hibernaculum is discovered until a plan can be put in place with a qualified biologist in consultation with the Ministry of Environment, Conservation and Parks and informed by the *Best Management Practices for Bats in British Columbia*.

The Proponent also proposed general mitigation measures for disturbance due to sound, light, dust, and other edge effects, as well as collisions with Project infrastructure and vehicles.

At the hearing, the Proponent stated that clearing during the timing window would be under extremely limited circumstances such as health and safety reasons or minor logistical reasons and would be for extremely limited areas and circumstances.

At the hearing, the Proponent noted that details for the installation of bat boxes would be developed during the permitting phase; however, they confirmed a minimum of five bat boxes and/or rocket boxes would be installed in suitable habitats such as along forested waterbodies, in recognition that Little Brown Bats often forage in open areas and waterbodies. The Proponent noted that they would welcome guidance from agencies regarding the number of boxes. The Proponent also confirmed that the installed boxes would be monitored on an annual basis for occupancy to confirm usage and to determine effectiveness.

With respect to the potential discovery of hibernaculum, the Proponent stated that all operations near the hibernaculum would cease, and the location reported to the Ministry of Environment, Conservation and Parks, who would be consulted on how best to address the hibernaculum. Details of this approach would be developed in the wildlife management plan prior to operations. However, the Proponent maintained that no hibernaculum, roosting sites, and/or maternity roosts are known to be present onsite or in the Local Study Area.

The Proponent predicted that with remediation at closure, the loss of bat habitat would be partially mitigated by forest regeneration.

In the Proponent's opinion the actual timber harvest in the Pic Forest Management Unit typically achieves much less than the planned harvest. The Proponent concluded that this justified the loss of potential roosting habitat from the Project since the additional clearing of approximately 1,000 ha of forest in the Site Study Area is well within levels considered sustainable by MNDMNR. The Proponent also noted that most forest harvesting is not restricted to any specific season or timing window. Therefore, substantial clearing occurs during the May 15–August 31 bat maternity period when non-mobile pups would be killed by the felling of any maternity roost trees. According to the Proponent, provincial agencies apparently assume that this level of effect on both direct pup mortality and loss of maternity roosts is sustainable.

The Proponent noted that it was not feasible to develop a follow-up program to verify baseline assumptions as there is no indication that bat maternity roosts are present in the Site Study Area. Similarly, it is a challenge to predict Project effects with certainty in the absence of any confirmation of bat maternity roost presence in the Site Study Area.

The Proponent indicated that the overall monitoring program is primarily focused on maternity roosts, and bat/rocket boxes consistent with species recovery plans and reporting incidents or additional observations of bats onsite.

Views of the Participants

Environment and Climate Change Canada stated that, in areas already affected by white-nose syndrome, the significance of threats that result in additive mortality to the species of bats is heightened, as noted in the Recovery Strategy for Little Brown Myotis and Northern Myotis. Threats other than white-nose syndrome include residential and commercial development, energy production and mining, biological resource use, human intrusions and disturbance, natural system modifications and pollution. Potential threats with unknown effects include climate change and severe weather.

Environment and Climate Change Canada stated that the Proponent's proposed mitigation measures to address the loss of bat foraging, day roost habitat and maternity roost habitat in the Site Study Area have not been well-defined. They also noted that regenerating forested landscape would not provide suitable habitat for bats, specifically Little Brown Myotis and Northern Myotis.

Environment and Climate Change Canada was of the view that the possibility of finding hibernaculum at the Project site does exist and that the Proponent should provide details on the mitigation measures and a management plan in the event that hibernaculum are discovered. Furthermore, as Little Brown Myotis and Northern Myotis are both federally listed endangered species, Environment and Climate Change Canada recommended that an avoidance and mitigation plan be put in place. The Department requested that clearing of trees should be limited during a period that includes when females are establishing roost areas, which is between April 15 and August 31. The Proponent acknowledged this request at the hearing.

In addition to implementation of a timing window for clearing, Environment and Climate Change Canada recommended the following:

- details on the avoidance and/or mitigation measures that would be in place if a hibernaculum were discovered within the Site Study Area;

- implementation of a monitoring program to identify which bat/rocket boxes are successfully occupied, focusing on Little Brown Myotis and Northern Myotis, and a commitment to implement adaptive mitigation, if necessary; and
- consideration of *Best Management Practices for Bats in British Columbia* to inform mitigation and enhancement measures.

With respect to the number of bat/rocket boxes proposed by the Proponent as a precautionary measure, Environment and Climate Change Canada noted that they do not have specific guidance regarding numbers of boxes. They indicated they would rely on the Proponent to demonstrate that mitigation measures taken would be sufficient in terms of bat/rocket boxes according to the amount of habitat loss. In terms of monitoring, Environment and Climate Change Canada noted that multiple visits during the maternity roost period are typical in terms of visual inspection and exit surveys.

Environment and Climate Change Canada also noted that disturbance to bats and their habitats would not be acceptable in the 100-metre core area around the blasting site at any time, and only potentially acceptable in a one-kilometre special management zone around the blasting at any time with review by an experienced bat biologist. They stated that disturbance to bats in Ontario is not acceptable within specific timing windows (for maternity sites between April 15th and August 31st; and for hibernation sites, between October and April). Environment and Climate Change Canada recommended that the Proponent consult the *Best Management Practices for Bats in British Columbia: Mine Developments and Inactive Mine Habitats* to inform the mitigation and enhancement measures implemented to reduce effects of blasting activities for bats.

Environment and Climate Change Canada noted that if the Proponent were to implement their commitments and the recommendations their department provided, the effects of the Project on bat populations could be effectively mitigated.

With regards to the Proponent's mitigation plans to perform bat maternity surveys when vegetation clearing is required within the bat maternity season, the Ministry of Environment, Conservation and Parks advised against this approach as detectability of roosting bats is very low and could adversely affect individuals. They recommended that all tree removals occur outside the active window (April 15–August 31) to reduce effects to all roosting species at risk bats. Should there be a need to remove trees within this timing window, they expressed concerns about effects on bat species at risk, requiring further discussion in the context of any application for authorization under the *Endangered Species Act*.

With respect to the number of bat/rocket boxes proposed by the Proponent as a precautionary measure, the Ministry of Environment, Conservation and Parks noted that when it has been determined that there are no effects on habitat, typically proponents are not required to utilize bat boxes. If a proponent does decide to install bat boxes, the Ministry agreed with

Environment and Climate Change Canada, stating that they would also rely on the Proponent to demonstrate that they have put in a sufficient number and would monitor the boxes sufficiently to acquire positive results.

At the hearing, the Ministry of Environment, Conservation and Parks noted that they were supportive of the Proponent's conclusions that it is unlikely that hibernaculum features exist in the Site Study Area and that similar habitat for bat species at risk is abundant and widespread within the Regional Study Area.

The Ministry of Environment, Conservation and Parks recommended that the Tri-colored Bat also be considered as potentially occupying the Site Study Area.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on Little Brown Myotis and Northern Myotis, the Panel considered the following factors to be particularly relevant:

- Little Brown Myotis and Northern Myotis are classified as endangered under the *Species at Risk Act* and the *Ontario Endangered Species Act*, meaning these species are facing imminent extinction or extirpation.
- Threats other than white-nose syndrome include habitat loss and degradation (e.g., destruction or degradation of hibernacula, maternity roosts, and foraging areas).
- Local populations of these species are already affected by white-nose syndrome and the species Recovery Strategy notes that, in areas already affected by white-nose syndrome, the significance of other threats is heightened.
- The Site Study Area contains suitable day roost and maternity roost habitat according to modelling and both species have been documented using the Local Study Area.
- The Proponent maintained that no hibernaculum, roosting sites, and/or maternity roosts are known to be present onsite or in the Local Study Area.
- Field observation of bat maternity roosts in the boreal forest of Northern Ontario has not occurred to date.
- Hibernacula, swarming sites and maternity sites are considered as regulated habitat for Little Brown Myotis and Northern Myotis under the *Endangered Species Act*.
- Concerns regarding the Proponent's modelling of habitat were raised by the Ministry of Environment, Conservation and Parks and the Environment and Climate Change Canada.

- Although the Proponent noted that direct effects on individual species at risk bats can be avoided using timing windows that avoid tree removals from April 15–August 31, they indicated that (limited) tree clearing may still occur during this period.
- Blasting activities from ongoing construction and operations could induce Little Brown Myotis and Northern Myotis to leave the area as well as potentially influence reproductive success. Environment and Climate Change Canada recommended spatial and temporal restrictions that would limit blasting onsite.
- Regenerating forests in the post-closure landscape would likely not provide suitable habitat for bats, specifically Little Brown Myotis and Northern Myotis.

In consideration of the objectives of the Recovery Strategy for these bat species at risk, the Panel notes that within white-nose syndrome-affected areas, the federal Strategy aims for both short-term (12–18 years) and long-term (many generations) population objectives for both Little Brown Myotis and Northern Myotis. This would require maintaining, and where feasible, increasing, the population compared to 2015 levels. The long-term (many generations) population objective is a self-sustaining, resilient, and redundant population.

The Panel considers that the Proponent’s plan to conduct limited clearing between April 15 and August 31 may result in mortality of some bats. The Panel acknowledges the advice of the Ministry of Environment, Conservation and Parks that bat maternity surveys within the bat maternity season are not advisable as detectability of roosting bats is very low and could adversely affect individuals.

The Panel considers that recommends that mitigation measures should be informed by the *Best Management Practices for Bats in British Columbia* and the MNDMNRF guidance document *Bats and Bat Habitats: Guidelines for Wind Power Projects*. The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 52: The Proponent should develop and implement measures to avoid disturbance to hibernaculum if they are discovered during site clearing or other Project activities. These measures should be developed in consultation with Environment and Climate Change Canada and the Ministry of Environment, Conservation and Parks.

Recommendation 53: The Proponent should develop and implement, in consultation with Environment and Climate Change Canada and the Ministry of Environment, Conservation and Parks, effective mitigation for the loss of bat habitat, in addition to the installation of five bat boxes/rocket boxes. This approach could include additional offsite mitigation and offsetting. The Proponent should incorporate additional baseline information, including monitoring for Tri-colored Bats, into the development of the mitigation and offsetting measures to demonstrate that the measures would be sufficient to address the amount and type of habitat loss.

Recommendation 54: Clearing of trees should not occur between April 15 and August 31. If limited clearing must be completed between April 15 and August 31, the Proponent should conduct bat maternity surveys in consultation with the Ministry of Environment, Conservation and Parks to confirm bat presence/absence in suitable trees, including large diameter cavity trees, and appropriate protection measures should be applied.

Recommendation 55: The Proponent should implement measures to mitigate sensory disturbance from blasting on bats and bat habitat with review by an experienced bat biologist and in consideration of *Best Management Practices for Bats in British Columbia: Mine Developments and Inactive Mine Habitats*.

Recommendation 56: The Proponent should implement as part of closure reclamation an eventual forest stand structure that provides habitat for Little Brown Myotis and Northern Myotis, in consultation with Environment and Climate Change Canada, the Ministry of Environment, Conservation and Parks, and MNDMNR.

In addition to the recommended mitigation measures, the Panel recommends the Proponent implement a follow-up program:

Recommendation 57: The Proponent should implement a follow-up program to verify the effectiveness of offsite mitigation measures, including bat/rocket boxes. The Proponent should develop and implement the program, in consultation with Environment and Climate Change Canada and the Ministry of Environment, Conservation and Parks, to identify if bat/rocket boxes are successfully occupied, focusing on Little Brown Myotis and Northern Myotis. The Proponent should commit to implementing adaptive management, if necessary. Monitoring should include multiple visits during the maternity roost period in terms of visual inspection and exit surveys.

The Panel understands from the Recovery Strategy that the mortality of a small number of remaining individual species of Little Brown Myotis and North Myotis can affect the survival of local populations, their recovery, and perhaps the development of resistance to the fungus causing white-nose syndrome.

The Panel also understands that the Recovery Strategy states that any type of development activity that results in the removal of trees or forested landscapes has the potential to destroy or degrade roosts for Little Brown Myotis and North Myotis. For example, forestry and timber harvesting operations may remove tracts of mature forests, as well as individual snags that may be used by male and female bats for roosting. Removal of roosts may lower reproductive success, alter home range size, change mean colony size, and decrease site fidelity. Destruction

of roosts, as an additional threat to bats in addition to white-nose syndrome, is listed as high concern and high severity in the Recovery Strategy.

The Panel concludes, in applying the precautionary principle, that the Project is likely to cause a significant adverse environmental effect on Little Brown Myotis and Northern Myotis and on bat habitat.

Cumulative Effects

Views of the Proponent

The main residual effects of the Project arise from the loss of possible bat foraging, day roost habitat, and bat maternity roost habitat in the Site Study Area during the development and operation of the mine.

The Proponent noted that other activities in the region, including development of infrastructure (i.e., for wind and hydro power developments, and mineral exploration) and/or forest clearing approved under a Forest Management Plan, were considered to not adversely affect the sustainability of species at risk bat populations in the Regional Study Area. There are three forest management units in the Regional Study Area. In the Pic Forest Management Unit, where the Project is located, the planned harvest from 2021 to 2031 is on the order of 100,000 ha. The Proponent offered the opinion that given actual harvesting on the Pic Forest Management Unit typically achieves much less than the planned (sustainable) harvest, the additional clearing of approximately 1,000 ha of forest in the Project's Site Study Area plus other clearing that is contemplated by other projects/activities is likely well within levels considered sustainable by MNDMNR. North-west of the Project, the planned harvest for the Kenogami Forest Management Unit from 2011 to 2021 was approximately 150,000 ha, with about 75,000 ha of regeneration planned. South-east of the Project, the White River Forest Management Unit planned harvest from 2018 to 2028 is approximately 62,000 ha, with about 18,500 ha of regeneration planned.

The Proponent also noted that offsite mitigation, consisting of the installation of five bat boxes to replace potential loss of maternity roosts in the Local Study Area, is being proposed as an overall benefit to species at risk bats as a result of the Project.

The Proponent concluded that given offsite mitigation and the above characterization of the cumulative residual effect on Little Brown Myotis and Northern Myotis in the Regional Study Area, the cumulative residual effect is predicted to be not significant. Any incremental contribution of the Project to the cumulative effects on Little Brown Myotis and Northern Myotis is predicted to be negligible.

The Proponent did not consider sensory disturbance or collisions with Project infrastructure or vehicles in the cumulative effects assessment.

Views of the Participants

Environment and Climate Change Canada identified multiple threats in their *Recovery Strategy for the Little Brown Myotis (Myotis lucifugus), the Northern Myotis (Myotis septentrionalis), and the Tri-colored Bat (Perimyotis subflavus) in Canada*. Logging and mining are listed among the threats. Logging has the potential to destroy or degrade natural roosts for all three bat species, which can in turn alter home range size, change mean colony size, and increase travel distances. Mining rehabilitation activities at old mines can affect the suitability of hibernacula and disturb the bats that use them during hibernation. For Little Brown Myotis and Northern Myotis, logging activities are classified as having a low effect on the species (0.1% to 3% and 0.1% to 9% reduction of a species population respectively). The decommissioning of mines can result in flooding of hibernacula. Environment and Climate Change Canada stated that new mining activities could affect over 10% of the population of bat species in the next 10 to 15 years. They stated, however, that with appropriate legislation and regulations to protect bats, most effects could be mitigated. For Little Brown Myotis and Northern Myotis, mining activities are classified as having a low effect on the species (0.1% to 9% reduction of a species population).

Panel Conclusions and Recommendations

The federal recovery strategy states that feasibility of recovery for Little Brown Myotis and Northern Myotis in Canada is unknown. Furthermore, key aspects to the population recovery and persistence are also unknown. These include: sufficient suitable habitat available to support the species; avoidance or mitigation of the primary threats to the species or its habitat; and development of successful recovery techniques to achieve the population and distribution objectives within a reasonable timeframe. The Panel understands that logging and mining activities in the Regional Study Area could already have effects on Little Brown Myotis and Northern Myotis populations.

Due to these unknowns, the uncertainty of the success of mitigation (i.e., bat/rocket boxes), the lack of adequate information on the habitat types present in the Local Study Area and Site Study Area, and the status of the species, the Panel is of the view that a precautionary approach is warranted. Further, the Panel considers that all species at risk have already experienced adverse effects due to past projects and activities, including cumulative effects, leading to a designation as a species at risk and that this cannot be discounted.

For the reason stated above, the Panel considers that any incremental effect to a species already at risk, listed as endangered such as Little Brown Myotis and Northern Myotis, would be significant.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is likely to cause a significant adverse cumulative effect on Little Brown Myotis and Northern Myotis, and bat habitat.

14.3.2 Effects to Canada Warbler

Regulatory and Policy Setting

Canada Warbler was designated as threatened by the Committee for the Status of Endangered Wildlife in Canada in 2008, and as special concern since 2020. Since 2010, it has been listed as threatened under Schedule 1 of the *Species at Risk Act*. Under the Ontario *Endangered Species Act*, Canada Warbler is listed as special concern (Schedule 4) whose decline is linked to deforestation of over wintering habitats in South America.

The breeding range of Canada Warbler overlaps with the Site Study Area and includes southern boreal forest and mixed-wood regions, as well as the Great Lakes-St. Lawrence forest, and northern portion of the mixed-wood plains to the southern Hudson Plains.

The federal Recovery Strategy for Canada Warbler identifies the primary threats as land conversion of breeding and non-breeding habitat, forest harvesting and silviculture, removal of shrubs, energy and mining exploration and extraction, over-browsing, reduced availability of insect prey, and collisions with windows. Recovery is considered feasible; however, there are several unknown factors associated with the potential for recovery of this species including whether sufficient suitable habitat is available to support the species or could be made available through habitat management or restoration, and if recovery techniques that can achieve the population and distribution objectives exist or can be developed within the timeframes of the objectives. The Strategy does note, however, that most significant threats to habitat on the breeding grounds in Canada (e.g., forest harvesting and silviculture, land conversion, shrub removal, and over-browsing) can be mitigated or avoided.

The Recovery Strategy identifies short-term and long-term population objectives. The short-term population objective is to halt the national decline by 2025 while ensuring the population does not decrease more than 10 % over this time. The long-term (after 2025) population objective is to ensure a positive 10-year population trend. The distribution objective is to maintain the current extent of occurrence (the area that encompasses the geographic distribution of all known populations) in Canada. The strategy also notes available information is not adequate to identify the habitat necessary for the survival or recovery of Canada Warbler in Canada.

Views of the Proponent

GenPGM detected Canada Warblers during species at risk surveys over multiple years in the Local Study Area for the Project and found suitable habitat within the Site Study Area. This species was observed at 16 locations in the Local Study Area in the 2020 surveys.

The main Project effects are related to direct loss of habitat (from vegetation clearing activities and mine operations), sensory disturbance, and change in mortality risk.

The Proponent predicted, using habitat modelling, that the Project would result in habitat loss of approximately 1,071 hectares of particularly shrub-rich mixed woods with abundant coarse woody debris – approximately 771 ha (72%) are preferred ecosites. The Proponent also predicted that there was approximately 3,600 ha of potentially suitable habitat in the Local Study Area and over 700,000 ha in the Regional Study Area. The Proponent stated that preferred Canada Warbler habitat in the Site Study Area represents only about 0.17% of the available habitat in the Regional Study Area.

As a result of the habitat loss in the Site Study Area, the Project is estimated to displace approximately 92 breeding Canada Warblers. The Proponent also predicted that an additional 444 ha of the Local Study Area could potentially be affected by noise during operations of greater than 50 dB, including 326 ha of ecosites modelled as preferred Canada Warbler habitat. Based on observed densities, approximately 36 additional Canada Warblers in the Local Study Area could be disturbed by noise greater than 50 dB.

The Proponent proposed to stockpile non-merchantable coarse woody debris during site clearing in slash piles for use during future rehabilitation efforts in the Site Study Area, as per the conceptual Closure Plan. Since Canada Warblers are ground-nesters, often using downed logs and other coarse woody debris as cover for their nests, the Proponent proposed to redistribute these habitat features during rehabilitation, combined with shrub growth and tree planting in order to enhance eventual suitability of the site for this species. However, the Proponent noted that the regeneration of Canada Warbler habitat (mature deciduous or mixed forest) onsite would probably require several decades following decommissioning.

The Proponent would also implement timing restrictions for vegetation/forest removal so that activities do not occur during the breeding bird season (outside of the May 1–August 31 window to avoid nesting and courtship/nest building activities) and to reduce incidental take. As well, the Proponent would use directional lighting to reduce the potential “beacon effect” for nocturnal migrants and mitigate the risk of collisions with windows. Other mitigation and enhancement measures the Proponent proposed are similar for other non-species at risk songbirds (see Section 12 (Wildlife Species)).

With the proposed mitigation of clearing outside the bird breeding season, the Proponent predicted there would be no destruction of nests with eggs or chicks which represents a substantial reduction in mortality compared to forest harvesting practices and wildfire, both of which frequently occur during the breeding season.

The Proponent stated that the decline in Canada Warblers has been mainly linked to deforestation in the over-wintering habitats in South America leading to it federal listing as threatened in 2010. The Proponent reported that Canada Warbler numbers have increased steadily, with an overall growth of 46% over the past decade, resulting in this species having been reassessed federally as a species of special concern by the Committee on the Status of Endangered Wildlife in Canada in 2020. This increase in population is reflective of several

conservation efforts, especially in the Northern Andes. The Proponent suggested that overwintering habitat, rather than breeding habitat in Canada, may limit populations. They noted there is likely unoccupied suitable habitat within the Regional Study Area that could accommodate displaced Canada Warbler from the Site Study Area.

The Proponent also pointed to the observation that Canada Warbler are at least somewhat adapted to, or at least tolerant of, large-scale natural disturbance in their breeding habitat. This is evidenced by their widespread occurrence across the boreal forest in Canada where they must adapt to, or at least be tolerant of, the dynamic disturbance regime, where large wildfires naturally destroy forested breeding habitat.

The Proponent stated that Canada Warbler populations are apparently not significantly affected by sustainable forest harvesting of their breeding habitat, which is designed to emulate natural disturbance. The Proponent reported that Forest Management Units are exempt from Ontario's *Endangered Species Act* since the Province of Ontario considers that the forest policy framework of the *Crown Forest Sustainability Act* sufficiently protects species at risk.

The Proponent concluded that the change in Canada Warbler habitat quantity and quality is not expected to threaten the long-term viability of populations of this species in the Regional Study Area. Potential forest habitat for this species is stated as being abundant and widespread in the Regional Study Area and that Project-associated loss is well within the range of annual disturbance considered sustainable in boreal ecosystems.

Views of the Participants

MNDMNRF noted that the Proponent based their conclusions on the assumption that sufficient habitat exists in the surrounding area, or that suitable habitat would become available following mine closure. MNDMNRF noted it cannot be assumed that birds would be able to find alternate territories, or that the habitat carrying capacity in surrounding areas would allow for settling of displaced wildlife. However, as a precautionary measure, MNDMNRF acknowledged the proposed timing window (May 1–August 31) where no forest clearing would occur, and supports the use of this timing window as a measure to mitigate the potential effect of displacement.

Environment and Climate Change Canada noted that noise from ongoing construction and operations would be constant, but temporary, and may influence the use of suitable habitat by Canada Warblers in the immediate vicinity and potentially influence reproductive success if the songs broadcast by the males to attract females cannot be heard.

At the hearing, Environment and Climate Change Canada recommended a continued characterization of Canada Warbler habitat in the Site Study Area and to use that information, with baseline survey results, to determine appropriate mitigation as part of the overall

reclamation plan and to ensure that vegetation clearing in the Local Study Area and surrounding habitat occur outside of the Canada Warbler or migratory bird breeding season.

Environment and Climate Change Canada noted that virtually all of the Site Study Area is potential Canada Warbler habitat, of which 771 ha (72%) are preferred ecosites. They advised that the Project would cause a permanent loss of Canada Warbler breeding habitat, directly affecting the local Canada Warbler population; however, displaced birds would likely relocate to adjacent similar habitats. Environment and Climate Change Canada stated that if the Proponent meets the commitments stated, the effects of the Project on the regional Canada Warbler population can be effectively mitigated.

The Ministry of Environment, Conservation and Parks believed that the displacement of all breeding pairs of Canada Warbler from land clearing activities in the Site Study Area could be interpreted as a significant loss.

Pays Plat First Nation stated that the EIS Addendum did not include an evaluation of the adequacy of the surveys and that the Proponent underestimated the relative magnitude of the potential loss of habitat due to the Project. Pays Plat First Nation noted that the model may represent a simplistic approximation of Canada Warbler habitat and that major methodological flaws affect the validity of the results. Pays Plat First Nation claimed that habitat suitability models used by the Proponent predicted that wildlife habitat is abundant in the Regional Study Area but considered only vegetation as the factor influencing the habitat of choice and disregarded multiple other factors that all play a role in determining habitat suitability for a species (e.g., competition, predation, cooperation, species dispersal capabilities). Pays Plat First Nation requested that the Proponent provide a measure of the predictive capacity of the habitat suitability model for Canada Warbler and discuss how large or small the overestimation of habitat available may be. They indicated that understanding this overestimation would require field testing or the use of model validation and statistics.

Pays Plat First Nation also noted that the Proponent assumed breeding bird habitat is generally sufficient and that this uncertainty suggests that both the Project-specific and cumulative effects assessments could have larger effects than predicted. This possibility means that preventative actions should be adopted along with a range of alternative actions.

Biigtigong Nishnaabeg stated that the Proponent did not provide spatial boundaries for the assessment of potential effects of Project sensory disturbance (i.e., changes in habitat quality) for birds and recommended that the Proponent present additional research on the potential effects of Project-related increases in ambient light levels on migratory bird species. If additional evidence supporting the Proponent's assessment is not available, this should then be reflected in the significance prediction confidence.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on Canada Warbler, the Panel considered the following factors to be particularly relevant:

- Canada Warbler is listed as threatened under the *Species at Risk Act*; however, the Committee on the Status of Endangered Wildlife in Canada recommended in 2020 that its status be changed to special concern due to increases in population size. Canada Warbler is listed as special concern under the Ontario *Endangered Species Act*.
- The federal Recovery Strategy notes that there is insufficient information to identify the habitat necessary for the survival or recovery of Canada Warbler in Canada.
- The Proponent plans to mitigate effects to Canada Warbler by placing coarse woody debris in slash piles during site clearing and using this material in reclamation efforts among other mitigations measures for migratory birds.
- Environment and Climate Change Canada stated that permanent loss of 771 ha breeding habitat directly affects the local population; however, birds would likely relocate to adjacent similar habitat.
- Environment and Climate Change Canada recommended a continued characterization of Canada Warbler habitat in the Site Study Area and to use that information, with baseline survey results, to determine appropriate mitigation as part of the overall reclamation plan.
- Pays Plat First Nation stated that the habitat model is flawed as vegetation was the only factor considered in habitat of choice and recommended field testing or use of model validation and statistics to understand how much the model may have overestimated suitable habitat.
- Biigtigong Nishnaabeg is of the opinion that effects of ambient light levels on migratory birds needs further research.

The Panel is of the view that the Project would be unlikely to affect the local population of Canada Warbler. The Panel notes that that the main threat to the species is overwintering habitat loss in South America and the population seems to be increasing more recently due to conservation efforts in the Northern Andes. This does not discount, however, the status of the species or that the Project itself would cause effects to warbler habitat.

The Panel notes the concerns expressed by Pays Plat First Nation that habitat characterization may not have been as accurate as it could have been; however, the information before the Panel indicates it is likely that there is adequate habitat in the Regional Study Area to accommodate displaced warblers.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 58: The Proponent should continue to characterize Canada Warbler habitat in the Site Study Area prior to construction and use this information, along with baseline survey results, to develop mitigation measures to be incorporated into progressive reclamation and closure reclamation. As part of this characterization, the Proponent should consider conducting additional modelling for habitat suitability, as suggested by Pays Plat First Nation, in order to determine if effects predictions were underestimated. Habitat characterization should be done in consultation with Environment and Climate Change Canada, Pays Plat First Nation, and other interested Indigenous groups.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on Canada Warbler.

Cumulative Effects

Views of the Proponent

The main residual effects of the Project arise from habitat loss at the Project site, change in habitat quality in the Local Study Area resulting from sensory disturbance, and mortality at the Project site due to collisions with Project infrastructure or vehicles.

The Proponent noted that cumulative habitat loss in the Regional Study Area would largely be associated with land clearing for timber harvesting activities, as they are the most spatially extensive activity related to direct habitat loss. However, the Proponent predicted, using habitat modelling, that there was over 700,000 ha of potentially suitable habitat in the Regional Study Area.

In terms of sensory disturbance, residual effects from the Project could interact cumulatively with other noise-generating activities in the Regional Study Area such as: hydro power developments, wind power developments, mineral exploration activities, and timber harvesting activities. The Proponent expected a relatively small cumulative effects as effects of these aforementioned activities would likely be confined locally in the vicinity of the activities, as opposed to regionally.

As for cumulative effects on mortality risk, the Proponent considered that effects of the Project could interact with other activities requiring the development of infrastructure, and where operation of vehicles and equipment would occur (e.g., wind and hydro power developments, mineral exploration, timber harvesting). Effects on mortality risk would act in an additive manner and would differ somewhat for the different projects and activities. The Proponent expected that, however, when viewed cumulatively in a larger context, the risks of mortality associated with the Project would be low in magnitude.

Views of the Participants

Pays Plat First Nation stated that the Proponent's habitat suitability models predicted that wildlife habitat was abundant in the Regional Study Area but only considered vegetation as the factor influencing the habitat of choice and disregarded multiple other factors that all play a role in determining habitat suitability for a species (e.g., competition, predation, cooperation, species dispersal capabilities etc.). As a result, stated Pays Plat First Nation, the Proponent overestimated the availability of Canada Warbler habitat and therefore presented an incorrect claim in the cumulative effects assessment.

Panel Conclusions and Recommendations

The Panel observes that Canada Warbler is listed as special concern provincially and recommended to be designated as special concern by the Committee on the Status of Endangered Wildlife in Canada. The Panel understands that the population of Canada Warbler has been increasing over the last decade and that the degradation of its overwintering grounds in South America is likely the primary cause of its previous decline. As such, the Panel agrees with the Proponent that the breeding habitat in the Regional Study Area is not likely fully occupied and could accommodate displaced birds from the Project itself and other projects and activities. The Panel finds that while there are existing threats to the species, the pre-existing cumulative effect is declining and populations seem to be recovering.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Canada Warbler.

14.3.3 Effects to Rusty Blackbird

Regulatory and Policy Setting

The Rusty Blackbird is listed as a species of special concern on Schedule 1 of the federal *Species at Risk Act* and as special concern (Schedule 4) under the Ontario *Endangered Species Act*. It is not listed under the *Migratory Birds Convention Act*, since no prohibitions under that Act or its regulations apply to this species.

The Rusty Blackbird occurs exclusively in North America and breeds in boreal wetland habitats. The species is most abundant in northern portions of the boreal forest, breeding throughout the boreal forest region, inclusive of the area where the Project is located, and southward to the beginning of the deciduous forest and/or grasslands. The population of the species has been declining over the last century. The prominent threats to the Rusty Blackbird are thought to be on the wintering grounds in the southeastern U.S, including the conversion of wetlands for agricultural and residential purposes, damming activities, large-scale blackbird control

programs in agricultural areas, and mortality due to agricultural pesticides. On the breeding grounds, threats include contamination of wetlands by mercury, wetland acidification, and wetland degradation due to climate change. Analyses of short-term trends in Canada indicate that the population has been fairly stable between 2004 and 2014.

Views of the Proponent

A Rusty Blackbird family group (adults with fledged young) was observed in 2009 along the shoreline of Lake 16 in the Site Study Area. Rusty Blackbirds were also observed in 2017 at five locations along lakeshores and streams in the Regional Study Area to the north and west of the Local Study Area.

The Proponent stated that there are no indications that this species is currently breeding in the Site Study Area. This species tends to select breeding sites with a combination of freshwater bodies with shallow water and emergent vegetation for foraging that are adjacent to wetlands with conifers or tall shrubs with cover for nesting.

The Project is anticipated to cause a permanent habitat loss of 17.7 ha of Rusty Blackbird breeding habitat, specifically small waterbodies with adjacent conifer forest. Some waterbodies would eventually be re-established during closure reclamation. However, the Proponent predicted that re-established waterbodies would likely not have the same productivity and characteristics as those lost during site development. As a result, they may not be as suitable for Rusty Blackbird habitat. The Proponent stated that availability of breeding habitat is likely not limiting for this species. Similar habitat is widespread in the Regional Study Area, with over 11,000 remaining small waterbodies (i.e., <10 ha) that collectively cover 11,409 ha.

The Proponent reported that approximately 401 ha of habitat in the Local Study Area is predicted to have a groundwater drawdown of at least 0.5 m; however, less than 5 ha are currently wetland that might be suitable foraging habitat for Rusty Blackbird. This change may be balanced by the 442 ha in the Local Study Area that is predicted to have a groundwater increase of at least 0.5 ha, including 6 ha of wetland. The Proponent stated that potential changes in surface water hydrology are not expected to adversely affect Rusty Blackbird. Additionally, the Proponent stated that potential effects from collisions with Project infrastructure or vehicles, sensory disturbance, or indirect effects from the Project are expected to be minimal for Rusty Blackbird given their infrequent use of the Local Study Area and habitat preference for riparian conifer forests.

General mitigation and enhancement measures are similar for Rusty Blackbird as for other non-species at risk birds, particularly for marsh birds and waterfowl. Specific mitigation is noted as the implementation of timing restrictions for vegetation removal to occur outside the breeding bird season (outside of the May 1st – August 31st window) and site restoration activities including wetland areas.

The Proponent stated that if new pairs of Rusty Blackbird are detected using the Local Study Area, any birds displaced by clearing are expected to find other breeding habitat, particularly given that this species is adapted to large-scale disturbance (e.g., wildfire) in the boreal forest and there appears to be a substantial amount of unoccupied but suitable habitat in the Regional Study Area.

Overall, the Proponent concluded that suitable forest habitat adjacent to small waterbodies is abundant and widespread in the Regional Study Area, and the limited loss of such habitat within the Site Study Area is not expected to threaten the long-term viability of Rusty Blackbird populations in the Regional Study Area.

Views of the Participants

MNDMNRF noted that the Proponent based their conclusions on the assumption that sufficient habitat exists in the surrounding area, or that suitable habitat would become available following mine closure. MNDMNRF stated it cannot be assumed that birds would be able to find alternate territories and that habitat carrying capacity in surrounding areas would allow for settling of displaced wildlife. However, as a precautionary measure, MNDMNRF acknowledged the proposed timing window (May 1 - August 31) where no forest clearing would occur and supports the use of this timing window as a measure to mitigate the potential displacement.

Environment and Climate Change Canada recommended a continued characterization of Rusty Blackbird habitat in the Site Study Area. They indicated the Proponent should use the results to identify areas to target for forest bird monitoring program surveys, as well as appropriate mitigation as part of the overall reclamation plan. Environment and Climate Change Canada acknowledged that the Project would cause a permanent loss of habitat for Rusty Blackbird, but that this species is tolerant of human activity and constant but temporary noise from ongoing operations and use of adjacent suitable habitat may therefore not be limited. Environment and Climate Change Canada stated that provided that the Proponent meets the stated commitments, the effects of the Project on regional Rusty Blackbird population could be effectively mitigated.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on Rusty Blackbird, the Panel considered the following factors to be particularly relevant:

- Rusty Blackbird is designated as a species of special concern under the federal *Species at Risk Act* and the Ontario *Endangered Species Act*. The population has been relatively stable recently.
- A Rusty Blackbird family group (adults with fledged young) was observed onsite in 2009. There are no indications that this species is currently breeding on the Project site.

- The Project would result in a loss of 17.7 ha of Rusty Blackbird breeding habitat.
- Habitat restored onsite as part of closure reclamation would be unlikely to have the same productivity and characteristics as the original waterbodies and may not be as suitable for Rusty Blackbird habitat.
- There is suitable breeding habitat for Rusty Blackbird in the Local Study Area and Regional Study Area.
- The Proponent has committed to implementing a timing window for vegetation removal to avoid the breeding bird season.
- Environment and Climate Change Canada noted that the species is tolerant of human activity.

The Panel understands that 17.7 ha of habitat would be permanently lost with site development; however, the Proponent has identified available habitat in the Local Study Area. The species is noted as being tolerant of human activity and to perturbances in the boreal forests. The Panel is cognizant of the gradual decline of the population in the last century, which is attributed to the removal of wetlands for development purposes.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 59: The Proponent should continue to characterize Rusty Blackbird habitat in the Site Study Area, prior to construction in consultation with Environment and Climate Change Canada. The Proponent should use this information, along with baseline survey results, to:

- identify areas to be targeted for surveys as part of the follow-up program for birds (Recommendation 42); and
- develop and implement mitigation measures to be incorporated into progressive reclamation and closure reclamation.

The Panel concludes that if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on Rusty Blackbird.

Cumulative Effects

Views of the Proponent

The Proponent stated that the main residual effects of the Project arise from potential breeding habitat loss, particularly small waterbodies with adjacent conifer forest. In the Regional Study Area, cumulative effects could be expected where some land clearing activities and/or

development of infrastructure is needed (e.g., wind and hydro power developments, mineral exploration). The Proponent noted that timber harvesting activities are the most spatially extensive activity, and thus largely associated cumulative effects with timber harvesting. The Proponent noted that Rusty Blackbird breeding habitat is likely not limiting in the Regional Study Area, and that this habitat type collectively covers an area of 11,409 ha in the Regional Study Area. The Proponent noted that the Project is at the southern edge of the Rusty Blackbird breeding range with the main breeding abundance much farther north in Ontario. Additionally, they stated that population densities are generally low, even in the core breeding range and therefore suitable replacement habitat in the Regional Study Area is not expected to be fully occupied by this species.

Panel Conclusions and Recommendations

The Panel observes that Rusty Blackbird is a species of special concern both federally and provincially, and is not threatened nor endangered. The Panel understands the most serious threats to the Rusty Blackbird are thought to be on the wintering grounds in the southeastern U.S. and that short-term trends in Canada indicate that the population has been fairly stable between 2004 and 2014. The Project itself, and the other projects and activities within the Regional Study Area, are not within the core of the Rusty Blackbird breeding grounds and as such sufficient suitable habitat is likely available. The Panel finds, in this instance, that while there are existing threats to the species, the population is relatively stable and the pre-existing effect is not significant.

The Panel concludes that the Project, in combination with other projects and activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Rusty Blackbird.

14.3.4 Effects to Eastern Wood-Pewee, Evening Grosbeak and Olive-sided Fly Catcher

Regulatory and Policy Setting

Eastern Wood-Pewee is listed as a species of special concern under the federal *Species at Risk Act*. Under the Ontario *Endangered Species Act*, Eastern Wood-Pewee is listed as special concern (Schedule 4).

Eastern Wood-Pewee is a small forest bird with a breeding range that covers much of south-central and eastern North America and an overwintering population primarily in northern South America. In Canada, the Eastern Wood-Pewee is mostly associated with the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in forest stands of intermediate age and in mature stands with little understory vegetation.

Data for Eastern Wood-Pewee for Canada indicate a significant population decline up to 2011. Threats and limiting factors affecting Eastern Wood-Pewees have not been clearly identified and are poorly known, largely because of a lack of research, and possibly include loss and degradation of habitat quality on breeding and wintering grounds, changes in prey availability, mortality rates during migration and/or on the wintering grounds, and nest predation and changes in forest structure (from over-browsing of deer). Outright loss of suitable forested habitat does not appear to be a significant issue across most of the species Canadian breeding range and does not appear to be very sensitive to forest fragmentation effects.

Evening Grosbeak (*Coccothraustes vespertinus*) is listed as a species of special concern under the federal *Species at Risk Act* and under the Ontario *Endangered Species Act*. Evening Grosbeak was not considered a species at risk during the initial baseline study and only in 2016 assessed as a species of special concern by the Committee on the Status of Endangered Wildlife in Canada, and thereafter by Ontario.

Evening Grosbeak is a large finch that is widely distributed across Canada's forests, but since 1970, has exhibited significant long-term declines (77-90%) over most of its range. Optimal breeding habitat for this species includes open, mature mixed-wood forests, where fir species and/or White Spruce are dominant, and Spruce Budworm is abundant.

Fluctuations of Spruce Budworm populations, which naturally occur every 25-40 years in eastern Canada and every 26 years in western Canada, are likely a key factor in the decline of the Evening Grosbeak population since 1970. Over the past decades, some data suggest a further decline while other data indicate stabilization at a lower level. Other threats to this species include reduced availability of mature and old-growth mixed-wood and conifer forests, collisions with windows, and mortality associated with feeding on grit and salt along roads in winter. Over the long term, there may be a contraction of breeding habitat due to climate change.

Olive-sided Flycatcher is listed as threatened under the federal *Species at Risk Act*. Under the Ontario *Endangered Species Act*, Olive-sided Flycatcher is listed as special concern (Schedule 4). In 2018 the Committee on the Status of Endangered Wildlife in Canada recommended a status change to special concern as declines in the population have slowed.

The species is a medium-sized forest songbird that breeds in open coniferous or mixed-wood forests, often located near water or wetlands with the presence of tall snags. The species has a relatively wide, yet sparse, distribution across coniferous and coniferous-dominated forests but population trends follow widespread and unabated declines with data indicating an annual rate of population decline equal to 3.4%.

The federal Recovery Strategy notes that causes of population decreases are not well understood. Loss of wintering habitat in northern South America is likely the greatest threat facing this species. Other probable significant threats include reduced availability of insect prey,

fire suppression, forest harvesting and silviculture, energy and mining exploration and extraction, and residential and commercial development. It is currently unknown whether the availability of breeding habitat is a limiting factor in Canada and the significance of each threat varies across the Olive-sided Flycatcher's geographical range.

Views of the Proponent

A single Eastern Wood-Pewee was heard during a survey in the Local Study Area in 2010; however, no Eastern Wood-Pewees were detected in the Local Study Area 2020. There would be approximately 1.2 hectares of habitat loss for Eastern Wood-Pewee in the Site Study Area; however, survey efforts reveal that there is potentially suitable breeding habitat in the Local Study Area. The Proponent stated that the species prefers gaps and edges of deciduous and mixed-wood forests which are abundant in the Local Study Area and stated that the species is relatively uncommon along the north shore of Lake Superior.

There were no Evening Grosbeak observed during 2020 fieldwork, but single individuals were observed in the Local Study Area during surveys in both 2008 and 2009. There would be approximately 1.2 hectares of habitat loss for Evening Grosbeak in the Site Study Area; however, survey efforts reveal that there is potentially suitable breeding habitat in the Local Study Area. The Proponent stated that no recent spruce budworm outbreaks are known in the Local Study Area and although it may provide potentially suitable breeding habitat for evening grosbeaks, it may not be occupied

Only one individual Olive-sided Flycatcher was encountered on one occasion in the Site Study Area during the 2009 baseline studies. The species was reported in several locations near open areas in the Regional Study Area in 2017. There is likely suitable breeding habitat in the Local Study Area although it may not be occupied, as there was no observation in the years of surveys. Approximately 1.4 hectares of habitat would be lost for Olive-sided Flycatcher.

The primary Project effect for these bird species is habitat loss due to the clearing of approximately 1,116 ha of the Site Study Area. Indirect loss of habitat is expected to occur as a result of sensory disturbance.

The loss of forest habitat in the Site Study Area is not expected to have an adverse effect on population sustainability for these three species, given the low level of observed use in the Local Study Area and the widespread and abundant suitable mixed-wood habitat in the surrounding landscape.

The general mitigation measure at the Site Study Area level for all species would be to limit site clearing in accordance with the timing window for migratory birds from May 1 to August 31 and mitigation measures to reduce noise from equipment.

Views of the Participants

As a precautionary measure, MNDMNR acknowledged the proposed timing window (May 1 - August 31) where no forest clearing shall occur and supported the use of this timing window as a measure to mitigate the potential displacement.

Environment and Climate Change Canada noted that despite not observing any individuals for both Olive-sided Flycatcher and Evening Grosbeak within the Site Study Area during 2020 fieldwork, it is unclear whether potential breeding habitat may be present within the Site Study Area for these species at risk.

At the hearing, Environment and Climate Change Canada recommended a continued characterization of habitat for all three species in the Site Study Area and to use that information, with baseline survey results, to determine appropriate mitigation as part of the overall reclamation plan. Environment and Climate Change Canada recommended the Proponent continue to characterize Olive-sided Flycatcher, Eastern Wood-Pewee, and Evening Grosbeak habitat in the Site Study Area and use the results to identify areas to be targeted for Forest Bird Monitoring Program surveys as well as appropriate mitigation as part of the overall reclamation plan.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on the Eastern Wood-Pewee, Olive-sided Flycatcher and Evening Grosbeak, the Panel considered the following factors to be particularly relevant:

- Eastern Wood-Pewee and Evening Grosbeak are listed as a species of special concern under the federal *Species at Risk Act*. Olive-sided Flycatcher is listed as threatened under the *Species at Risk Act* but was recently recommended to be designated as special concern.
- Very few of these species were observed in the Site Study Area and Local Study Area.
- The primary Project effect for these bird species is habitat loss due to the clearing of the Site Study Area. At most, the Proponent predicated that 1.4 ha of habitat would be lost for these species.
- The loss of forest habitat in the Site Study Area is not expected to have an adverse effect on population sustainability for these three species, given the low level of observed use in the Local Study Area and the widespread and abundant suitable mixed-wood habitat in the surrounding landscape.
- The Proponent would adhere to a timing window for vegetation removal during site development.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 60: The Proponent should continue to characterize Eastern Wood-Pewee, Olive-sided Flycatcher and Evening Grosbeak habitat in the Site Study Area, prior to construction in consultation with Environment and Climate Change Canada. The Proponent should use this information, along with baseline survey results, to:

- identify areas to be targeted for surveys as part of the follow-up program for birds (Recommendation 42); and
- develop and implement mitigation measures to be incorporated into progressive reclamation and closure reclamation.

The Panel concludes that if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on Eastern Wood Pewee, Olive-sided Flycatcher or Evening Grosbeak.

Cumulative Effects

Views of the Proponent

The Proponent identified the potential loss of forest habitat in the Site Study Area as the primary effect pathway on these songbird species. The Proponent stated that cumulative effects on these species at risk birds within the Regional Study Area could be expected where some land clearing activities and/or development of infrastructure is needed (e.g., wind and hydro power developments, mineral exploration). The Proponent considered timber harvesting activities as the most spatially extensive activity in the Regional Study Area as it concerns direct habitat loss. The Proponent noted that potential suitable mixedwood forest habitat for these species was abundant and widespread in the Regional Study Area. The Proponent expected a low magnitude cumulative residual effect due to the potential additive nature of the effects.

Panel Conclusions and Recommendations

The Panel observes that Eastern Wood-Pewee and Evening Grosbeak are species of special concern both federally and provincially, and Olive-sided Flycatcher has recently been recommended for a status change to special concern recently by the Committee on the Status of Endangered Wildlife in Canada. The primary threats that have led to the population declines of these species (i.e., changes to overwintering grounds and availability of Spruce Budworm) are independent from the effects that the projects and activities in the Regional Study Area may have on the species. The Panel finds, in this instance, that while there are existing threats to the species, the Project, in combination with other projects and activities, is not likely to influence the stability of the populations of these species.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Eastern Wood-Pewee, Evening Grosbeak and Olive-sided Flycatcher.

14.3.5 Effects to Bald Eagle and Peregrine Falcon

Regulatory and Policy Setting

Bald Eagle is listed as a species of special concern under the Ontario *Endangered Species Act* and not listed as a species at risk under the federal *Species at Risk Act*.

The species is a large diurnal bird of prey, the only representative of the sea eagle group in North America, with a wide North American distribution, occurring in all continental states of the USA and all provinces and territories of Canada.

While the Bald Eagle population in Ontario is recovering from historical population lows due to effects of DDT (dichlorodiphenyltrichloroethane), the species is vulnerable as a top predator that feeds primarily upon fish, and is therefore sensitive to persistent chemical contaminants in aquatic systems that biomagnify through the food chain and concentrate in top predators. The management program for the Bald Eagle in Ontario includes policy and planning guidance for forest management planning, municipal planning and renewable energy. However, ongoing threats include chemical contaminants, heavy metal poisoning, incidental mortality, disease, localized habitat loss and climate change.

Management goals aim to ensure population recovery to achieve a stable or increasing population state through monitoring, identification and protection of nesting habitat and important overwintering and stopover habitat, and continued high adult survival.

Peregrine Falcon is listed as special concern under the Ontario *Endangered Species Act* and special concern under the federal *Species at Risk Act*. The species was listed as endangered in 1978 under Ontario's original *Endangered Species Act*, as a result of a population collapse of the species in the 1950s and 1960s from exposure to DDT. Following successful re-establishment and recovery of the population in Ontario, the Committee on the Status of Endangered Wildlife in Canada re-examined the status of Peregrine Falcon in 2017 and designated it Not at Risk. Threats continue to persist, however, for Peregrine Falcons including the potential effects of contaminants and a sensitivity of this species to human threats and disturbances.

Views of the Proponent

The Proponent indicated that no Bald Eagles were observed during 2020 fieldwork and the species is not known to nest in the Site Study Area. No nests or birds were observed in 2009-2010 fieldwork although a single adult was observed near the Marathon Airport in 2008.

No Bald Eagles were reported in 23 years of Breeding Bird Surveys along Highway 17 at the south edge of the Site Study Area and MNDMNR data show the nearest nest bald eagle nest at about 11 km north of the Site Study Area. A single flying eagle was observed over Bamoo's Lake, as well as a smaller unnamed lake to the west, during 2017 fieldwork. Based on limited data, modest but increasing numbers of Bald Eagles are present in the Marathon area and on the lower Biigtig Zibi in the fall and early winter. Bald Eagle has been identified as a species of cultural importance by Indigenous groups.

Peregrine Falcons were not observed in the Site Study Area in 2020 or previously and MNDMNR data show the nearest nest location about 8 km west of the Site Study Area. An aerial survey in March 2009 found four potential nesting cliffs just outside the Site Study Area but a follow-up aerial survey in June found no evidence of nesting. Cliff habitat within the Site Study Area is classified as "marginal" habitat value.

The Proponent stated that habitat loss due to clearing would be the main Project effect particularly for Peregrine Falcon; however, the proposed Project is expected to have no effects on Bald Eagle.

Additional effects to these species are mortality due to collisions with Project infrastructure or vehicles and increased risk for collision with Project infrastructure and/or accidental poisoning due to improper waste disposal at the Project. Mortality from collision with Project infrastructure (e.g., transmission line) or vehicles, is possible particularly if scavenging roadkill (*i.e.*, bald eagle).

To mitigate effects to these species, the Proponent would conduct clearing outside of the bird nesting season to the extent feasible and, if clearing were to occur during this period, the Proponent would conduct nest surveys and put in place appropriate protections for nests identified. The Proponent has also committed to implementing measures to reduce mortality of wildlife from collisions.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on the Bald Eagle and Peregrine Falcon, the Panel considered the following factors to be particularly relevant:

- Both species suffered population declines largely due to contamination and are recovering.
- Bald Eagles may be at risk from contamination from bioaccumulation of contaminants in fish.
- Neither species is known to nest on the Site Study Area.
- The Project is not expected to have an effect on Bald Eagles. Some marginal cliff nesting habitat for peregrine falcons would be removed in the Site Study Area.

The Panel concludes that the Project is not likely to cause a residual adverse environmental effect on Bald Eagle or Peregrine Falcon.

14.3.6 Effects to Common Nighthawk and Eastern Whip-poor-will

Regulatory and Policy Setting

Common Nighthawk and Eastern Whip-poor-will are part of a group often referred to collectively as “nightjars” which actively feed during dawn and dusk, and throughout the night. They require extensive open areas, including open forest or rocky areas (outcrops, barrens, gravel roads, mines, and quarries).

Common Nighthawk is listed as threatened under the *Species at Risk Act* and as special concern under the Ontario *Endangered Species Act* because of significant long- and short-term declines across the portion of its range covered by bird population monitoring programs. In 2018, the Committee on the Status of Endangered Wildlife in Canada recommended that the species be designated as special concern. They indicated the rate of decline has slowed appreciably over the past decade, and the species appears to be quite abundant in suitable boreal habitats.

The Recovery Strategy for Common Nighthawk notes that there are many threats but that data are still lacking to directly link a single threat to observed population declines. The Recovery Strategy notes that sufficient suitable breeding habitat (e.g., nesting and roosting substrate) is probably available, and that although more could be made available through management, restoration, or creation, there is much still unknown about the distribution and abundance of this species and habitat preferences, as well as recovery techniques.

Eastern Whip-poor-will is listed as threatened under the *Species at Risk Act* and under the Ontario *Endangered Species Act*.

Eastern Whip-poor-will is a nocturnal insectivorous bird that breeds in sparse forests or at the edge of forests adjacent to open habitats required for foraging. The species breeds locally throughout its range which in Canada, extends from Saskatchewan to the Maritimes and includes the Project area.

The main threats to this species include reduced availability of insect prey, habitat loss and degradation (wintering and breeding grounds), urban expansion, as well as energy development and mineral extraction. Data reliability for the Eastern Whip-poor-will is considered sparse; however, Environment and Climate Change Canada analyses indicate a high probability that the population trend for this species is declining. Indices of abundance indicate that populations have been reduced by more than 30% over the last 10 years. There are numerous unknowns to recovery feasibility including knowledge of available and sufficient

suitable breeding habitat to support the species at its current level, primary threats, and recovery techniques.

Views of the Proponent

The Project is potentially within the provincial range of the Common Nighthawk, though no sightings or use of the Local Study Area have been recorded. This may be an uncommon nesting species in the Local Study Area, as the species prefers open bedrock ridges, burns, and cutovers as nesting habitat.

No Eastern Whip-poor-will were observed during the 2020 surveys and none were detected on acoustic recorders in 2020. No individuals of this species were identified in previous surveys undertaken for the Project and there has been no documented use of the Local Study Area.

Within the Site Study Area, there are only about 6 ha of non-treed upland eco-site and 42 ha of treed conifer eco-site that is potentially suitable habitat for these species, where there is sufficient unmapped rock barren area intermixed with jack pine and black spruce forest. This represents less than 0.1% of the potentially suitable habitat for these species within the Regional Study Area, not including cutovers, burns, and anthropogenic features such as transmission line rights-of-way.

The main Project effects are mostly related to vegetation clearing activities and mine operations and may affect activities and/or distribution.

The Proponent stated they would conduct clearing outside of the bird nesting season to the extent feasible and, if clearing were to occur during this period, the Proponent would conduct nest surveys and put in place appropriate protections for nests identified. At the hearing, the Proponent noted that habitat for Common Nighthawk and Eastern Whip-poor-will would probably be improved post-closure from what is currently available onsite due to the availability of open areas for nesting and foraging for those two species.

The Proponent committed to conducting surveys for these two species onsite in the event that they colonize the site during operations. This would be completed as part of the onsite wildlife management program and could potentially involve community members as well.

Views of the Participants

MNDMNR noted that creation of fragmented forest could potentially benefit bird species currently less common to the area, such as the Common Nighthawk.

Environment and Climate Change Canada and the Ministry of Environment, Conservation and Parks recommended a continuation of the Forest Bird monitoring Program and Nightjar surveys during the construction, operations and closure phases of the Project and that information from those surveys, along with baseline survey results, be used to verify effects predictions and

corresponding reclamation prescriptions. In addition, Environment and Climate Change Canada and the Ministry of Environment, Conservation and Parks recommended mapping of Eastern Whip-poor-will habitat through an aerial imagery review to inform the evaluation of the Project for suitable habitat. Environment and Climate Change Canada recommended continued characterization of Common Nighthawk and Eastern Whip-poor-will habitat in the Site Study Area to inform the identification of areas to be targeted for Nightjar surveys as well as appropriate mitigation as part of the overall reclamation plan. They recommended continuation of Nightjar surveys to ensure occupied nesting areas are protected during the core breeding period until young have naturally and permanently left the vicinity of the nest.

Environment and Climate Change Canada indicated the Project would likely not disturb the regional stability of migratory bird populations, if the Proponent met their stated commitments.

The Ministry of Environment, Conservation and Parks noted that based on their review of Project documentation and information that has been provided by the Proponent, the conclusions that there would be no significant effects on Eastern Whip-poor-will appear reasonable and valid.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on the Eastern Whip-poor-will and Common Nighthawk, the Panel considered the following factors to be particularly relevant:

- Common Nighthawk is listed as threatened under the federal *Species at Risk Act* and as special concern under the Ontario *Endangered Species Act*. In 2018, the species has been recommended to be designated as special concern federally as the rate of decline has slowed appreciably over the past decade, and the species appears to be quite abundant in suitable boreal habitats.
- Eastern Whip-poor-will is listed as threatened under the federal *Species at Risk Act* and under the Ontario *Endangered Species Act*. The population is continuing to decline.
- There has been no documented use of the Local Study Area by either Common Nighthawk or Eastern Whip-poor-will.
- There are several unknowns related to the feasibility of recovery for both species, although habitat restoration is a recovery objective for both species.
- Habitat for Common Nighthawk and Eastern Whip-poor-will would probably be better post-closure than what is currently available onsite.
- The Proponent has committed to surveying for these species should they be found to be onsite.

In consideration of the objectives of the recovery strategies for these species and the high number of unknowns related to available breeding habitat, the Panel recommends that the Proponent implement mitigation measures:

Recommendation 61: The Proponent should continue to characterize Common Nighthawk and Eastern Whip-poor-will habitat in the Site Study Area, prior to construction in consultation with Environment and Climate Change Canada. The Proponent should use this information, along with baseline survey results, to:

- identify areas to be targeted for surveys as part of the follow-up program for birds (Recommendation 42); and
- develop and implement mitigation measures to be incorporated into progressive reclamation and closure reclamation.

The Panel acknowledges that there may be some benefit to Common Nighthawk and Eastern Whip-poor-will, as noted by the Proponent, in a post-closure environment in terms of potential nesting and foraging sites; however, the timeline to achieve this (i.e., closure) is beyond even the long-term objectives of the recovery strategies for both species. As noted above, long-term objectives in those strategies consider a 10-year outlook. The Panel finds that although the potential for habitat restoration is beyond the timeframe of the recovery strategies, the Proponent has committed to ongoing monitoring and, where necessary, mitigation. This commitment is considered reasonable in meeting the objectives of the recovery strategies.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on Eastern Whip-poor-will or Common Nighthawk.

Cumulative Effects

Views of the Proponent

GenPGM stated that potential Project effects were related to the loss of suitable habitat at the Site Study Area. They noted that, although there was no current use of the Local Study Area by Common Nighthawk and Eastern Whip-poor-will, they could potentially use it in the future and could be susceptible to increased mortality via vehicle collisions.

In the Regional Study Area, the Proponent stated that cumulative effects related to habitat loss could be expected where some land clearing activities and/or development of infrastructure is needed (e.g., wind and hydro power developments, mineral exploration). The Proponent noted that timber harvesting activities are the most spatially extensive activity, and thus largely associated cumulative effects with timber harvesting. The Proponent noted, however, that potentially suitable Common Nighthawk habitat was abundant and widespread in the Regional

Study Area with more than 52,000 ha available. The Proponent expected, due to the potential additive nature of the loss of habitat effects, a low magnitude cumulative residual effect.

In terms of cumulative effects on mortality risk, the Proponent considered that effects of the Project could interact with other activities requiring operation of vehicles and equipment (e.g., wind and hydro power developments, mineral exploration, timber harvesting). The Proponent noted that mortality risk was perceived to be low based on the relative low numbers of Common Nighthawk and Eastern Whip-poor-will in the Regional Study Area and thus interactions of this sort would likely be rare regardless of the project or activity. Nevertheless, in consideration of the potential additive incremental change in mortality risk, the Proponent stated that a cumulative residual effect could be identified.

Panel Conclusions and Recommendations

The Panel observes that Common Nighthawk is listed as special concern provincially and recommended to be designated as special concern by the Committee on the Status of Endangered Wildlife in Canada. The Panel finds that while there are existing threats to the species, the pre-existing cumulative effect is declining and populations seems to be abundant in suitable boreal habitats.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Common Nighthawk.

Regarding Eastern Whip-poor-will, the Panel notes that habitat loss, energy development and mineral extraction are listed as potential threats to the species and therefore the Panel finds that projects and activities within the Regional Study Area would likely contribute to the existing cumulative effects. In consideration of the continued population decline of this species and its status as threatened, the Panel has used the precautionary principle in making its conclusions.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is likely to cause a significant adverse cumulative effect on Eastern Whip-poor-will.

14.3.7 Effects to Monarch Butterfly and Yellow-banded Bumble Bee

Regulatory and Policy Setting

The Monarch was listed as a species of special concern in the federal *Species at Risk Act* in 2003 and is also considered a species of special concern under the Ontario *Endangered Species Act*. This designation was based on the premise that, although this species has a population of millions to over one billion individuals, it is vulnerable in the most sensitive stage of its annual

cycle, during its overwintering in Mexico and California. The overwintering areas occupied by the Monarch are very restricted and threats to these sites, combined with threats to breeding habitat and along migratory routes, are sufficient to suggest that the species could become threatened in the near future.

The species is native to the Americas, with two mostly disjunct migratory populations in Canada: the Eastern population and the Western population. Southern Ontario and southern Quebec represent the most extensive breeding area in Canada, where abandoned farmland and other open areas, such as ditches, meadows and hedgerows serve as prime habitat for the widespread Common Milkweed, which is the larval host for the Monarch during breeding.

The primary threats facing the Monarch include the degradation and loss of overwintering habitat, widespread use of pesticides and herbicides throughout the breeding grounds, climate change, severe weather events, succession and conversion of breeding and nectaring habitat, and the effects of bark beetles on overwintering habitat.

Nectaring habitat occurs throughout the breeding range in various environments ranging from native grasslands to home gardens and road medians. These nectar sources are vital to adult Monarch survival, and are particularly important during the fall migration and include goldenrods, asters and related genera, as well as milkweeds.

The long-term goal is to ensure the conservation of the Monarch butterfly migratory phenomenon and, in the near-term, substantially lower the risk of extinction of the Eastern Monarch population by increasing overwintering habitat.

The Yellow-banded Bumble Bee is listed as a species of special concern in the federal *Species at Risk Act* and is also considered special concern under the Ontario *Endangered Species Act* due to a large observed decline in abundance in southern Canada.

This bee ranges across most of Canada south of the treeline, from the southeastern Yukon and eastern British Columbia east to Newfoundland.

The main threats impacting the Yellow-banded Bumble Bee include pathogen transmission and spillover from managed Bumble Bee populations in greenhouses; pollution (use of insecticides, herbicides and fungicides in agriculture and silviculture); intensification of agriculture; and climate change (habitat shifting and alteration, and temperature extremes). In addition, the species also faces limiting factors including the need for constant pollen and nectar to be available throughout the growing season to support colony growth and susceptibility to extinction when population sizes are small.

Management objectives for this species aim to increase abundance in parts of its Canadian range where it has declined, and maintain abundance in the remainder of its Canadian range and distribution throughout its known Canadian range.

Views of the Proponent

The Proponent reported that both Monarchs and Yellow-banded Bumble Bees were observed within the Site Study Area during the 2020 field surveys.

The Proponent reported that there were no milkweed plants observed in the Site Study Area and that the observed adult Monarchs were likely outside their normal range.

The main Project effects for both species are mostly related to vegetation, such as wildflowers, and clearing activities, particularly along the roadside. The introduction of invasive plant species could potentially affect nectar sources. Mine operations pose a risk of mortality from collisions with vehicles. These species are habitat generalists and the Proponent considered the entire Site Study Area as potential habitat.

The Proponent stated that due to the broad habitat requirements for both species and abundant potential habitat in the Regional Study Area, habitat loss is not expected to affect regional populations of Monarch butterfly and Yellow-banded Bumble Bee.

Mitigation measures for these species include taking reasonable steps to reclaim some disturbed areas of the Site Study Area in a progressive manner, including re-establishment of vegetation conditions supportive of Monarch and Yellow-banded Bumble Bee where possible.

The Proponent also committed to incorporate wildflower seed mix and Common Milkweed into the re-vegetation plan to provide potential habitat for Monarch butterfly and Yellow-banded Bumble Bee. The seed mixes would be used during post-closure rehabilitation of the Site Study Area to provide nectar and pollen sources for both species and would be a net benefit to Monarchs as a result of the Project.

Views of the Participants

Environment and Climate Change Canada recommended that additional breeding habitat be created for both species where forest reclamation is not possible as part of the overall reclamation plan.

Environment and Climate Change Canada noted that these displaced species should be able to relocate to adjacent similar habitats and, if the Proponent meets their commitments for these species, the effects of the Project on regional Monarch and Yellow-banded Bumble Bee populations would be effectively mitigated.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on the Monarch and the Yellow-banded Bumble Bee, the Panel considered the following factors to be particularly relevant:

- The Monarch and Yellow-banded Bumble Bee are listed as species of special concern under the federal *Species at Risk Act* and the Ontario *Endangered Species Act*.
- Both species were observed onsite and the clearing of the Site Study Area would remove potential habitat for both species.
- The Proponent has committed to use wildflower seed mix and Common Milkweed in the re-vegetation plan to provide potential habitat for Monarchs and Yellow-banded Bumble Bee.
- There is abundant habitat in the Regional Study Area for both species.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 62: As part of progressive reclamation and closure reclamation, the Proponent should incorporate breeding habitat for Monarchs and Yellow-banded Bumble Bee in areas where forest reclamation is not possible in the Site Study Area.

The Panel concludes that if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on Monarch butterfly and Yellow-banded Bumble Bee.

Cumulative Effects

Views of the Proponent

The Proponent identified potential residual Project effects related to the loss of foraging habitat at the Site Study Area and change in mortality due to collisions with Project infrastructure or vehicles.

In the Regional Study Area, cumulative effects could be expected where some land clearing activities and/or development of infrastructure is needed (e.g., wind and hydro power developments, mineral exploration). For the Monarch butterfly, the Proponent stated that these activities could reduce the amount of roadside nectar sources for adult Monarchs, at least in the short term. No effects were expected on the larval host plant, milkweed, which does not occur in the Local Study Area. Occurrence of milkweed in the Regional Study Area are of anthropogenic origin, therefore, the Proponent did not expect cumulative effects on larval habitat.

For the Yellow-banded Bumble Bee, the Proponent noted that potential suitable habitat was abundant and widespread in the Regional Study Area. The Proponent expected, due to the potential additive nature of the loss of habitat effects, a low magnitude cumulative residual effect.

For cumulative effects related to mortality risk, the Proponent considered that effects of the Project could interact with other activities requiring operation of vehicles and equipment (e.g., wind and hydro power developments, mineral exploration, timber harvesting). The Proponent expected, due to the potential additive nature of the loss of habitat effects, a low magnitude cumulative residual effect.

Panel Conclusions and Recommendations

The Panel observes that Monarchs and Yellow-banded Bumble Bees are species of special concern both federally and provincially, and is not threatened nor endangered. The Panel finds, in this instance, that while there are existing threats to the species, the pre-existing effect is not yet significant.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Monarchs and Yellow-banded Bumble Bees.

PART 4: ATMOSPHERIC AND ACOUSTIC ENVIRONMENT

SECTION 15: ATMOSPHERIC ENVIRONMENT

This section addresses the environmental effects of the Project on the atmospheric environment. For the purposes of their environmental assessment, GenPGM considered the following aspects of the atmospheric environment: air quality, greenhouse gases, and ambient light.

15.1 AIR QUALITY

15.1.1 Requirements for the Consideration of Air Quality

This section addresses environmental effects of the Project on air quality. The Panel considered these to be environmental effects under the Ontario *Environmental Assessment Act* and that inform the assessment of effects under paragraphs 5(1)(b) and (c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- describe climate and meteorological conditions at the site, local and regional study areas; and
- use climate and meteorological data to inform the air quality dispersion modelling and identify potential effects on air quality from all Project phases and sources, including criteria air contaminants and dustfall from point and mobile ones.

The effects of changes to air quality on human health are covered in Section 17 (Human Health).

15.1.2 Air Quality Baseline

Views of the Proponent

The Local Study Area for air quality was defined as a buffer zone 10 km wide around the property boundary of the Proponent's surface mining claims. The size of the surface mining claim is slightly larger than the planned Project footprint. The Regional Study Area extended 50 km from the property boundary.

The Proponent stated that baseline ambient air quality is expected to be good and adequately representative of rural air quality because of the relatively remote location of the Project. Sources of air contaminants in the Local Study Area include the Marathon municipal landfill, the airport, and traffic on Highway 17.

The Proponent used climate data from the Thunder Bay Airport station for the climate baseline. The data set used was for the years 1971 through 2000. The Proponent used data from the Canadian National Air Pollution Surveillance program to establish an ambient air quality baseline. The data were from National Air Pollution Surveillance stations in Sault Ste. Marie, Thunder Bay, and North Bay, Ontario, and Winnipeg, Manitoba. The Proponent considered the use of this data to be appropriate as these are the surveillance stations closest to the Project area. The Proponent noted that using this data would lead to conservative predictions of air quality effects, as data from more industrialized locations would provide overestimates of background concentrations of contaminants.

Contaminants of potential concern can be released to the atmosphere during the mining and associated processing activities. Eighty-three such contaminants were identified by the Proponent based on experience at similar projects and knowledge of the regulatory requirements. The background levels of all contaminants of potential concern, where data was available, were below applicable Ministry of the Environment, Conservation and Parks air quality criteria, except for annual average benzene (a volatile organic compound) and 24-hour and annual average benzo(a)pyrene, which is a polycyclic aromatic hydrocarbon. In addition to using National Air Pollution Surveillance program data, GenPGM measured levels of particulate matter with a diameter of 10 micrograms (μg) or smaller (PM_{10}), dustfall, and metals at up to five locations per contaminant on or near the Project site in 2011, and the resulting data were reported in the EIS Addendum. The 90th percentile results (i.e., concentrations were below this value 90% of the time) ranged from $12.8 \mu\text{g}/\text{m}^3$ at May's Gifts to $14.6 \mu\text{g}/\text{m}^3$ at the Pic River station. All results were below the Ontario averages and the Ministry of the Environment, Conservation and Parks Ambient Air Quality Criteria criterion of $50 \mu\text{g}/\text{m}^3$. The National Air Pollution Surveillance program data were generally higher than the onsite measurements due to the remote nature of the Marathon site and its significantly smaller population when compared with the data from Thunder Bay. Measured total dustfall concentrations were well below the ambient air quality criterion of $7 \text{ g}/\text{m}^3$ over a 30-day averaging period. For metals in dustfall with measurable concentrations, levels of copper, nickel and zinc were higher than regional background concentrations, while concentrations of lead were similar to or lower than the background concentrations.

The ambient air quality baseline for short-term averaging periods (≤ 24 hours) was determined by taking the highest 90th percentile concentration for each contaminant from the aforementioned data sources. The Proponent stated that this would conservatively account for existing concentrations.

Views of the Participants

The Ministry of the Environment, Conservation and Parks generally approved of the Proponent's method of estimating background ambient concentrations of contaminants. They agreed that these would likely be conservative and may overestimate actual ambient concentrations in the Project area. The Ministry of the Environment, Conservation and Parks, Health Canada, and Environment and Climate Change Canada noted that background data were not provided for crystalline silica.

15.1.3 Project-Related Changes to Air Quality

Views of the Proponent

The Proponent reported that Project activities would produce a change in air quality and dustfall, which could have effects on human health from exposure and inhalation. Sources of contaminants of potential concern and dust include fuel combustion from vehicles and heavy equipment, travel on unpaved haul routes, and material movement and processing.

The Project construction phase is anticipated to be completed within 18 to 24 months. Site preparation and construction activities that would affect air quality include:

- land clearing, drilling, blasting, excavation, and other earthworks to clear the site and construct mine infrastructure such as open pits and containments dams;
- construction of facilities such as the process plant, explosives factory, water management facilities and systems, storage buildings, the administrative building;
- construction of the electrical transmission line;
- construction of mine access roads and haul roads;
- construction of infrastructure associated with the rail load-out facility; and
- use of vehicles and equipment, including the four diesel generators that would power the site during the construction phase.

Project operations are estimated to last 12.7 years. Operations activities that would affect air quality include:

- drilling and blasting of mine rock;
- loading and hauling of crushed material, filtered concentrate and other equipment;
- process plant and other ancillary infrastructure, such as the assay lab; and
- use of gas or diesel-powered vehicles and equipment on both mine site and public roads.

The Proponent indicated the closure phases are expected to generate negligible emissions of contaminants to air.

Emissions from loading concentrate at the rail load-out facility and vehicle traffic were included in the air quality dispersion modelling but those from locomotive engines were not. The Proponent stated that these would be operated by a third party and were not included in the scope of the environmental assessment of effects on the atmospheric environment.

The principal air quality parameters that could be affected by Project activity are particulate matter (PM₁₀, PM_{2.5}, and total suspended particulates); metals in particulate matter (e.g., crystalline silica); products of combustion such as nitrogen dioxide (NO₂), nitrogen oxides (NO_x), sulphur dioxide, ozone, carbon monoxide, volatile organic compounds, and polycyclic aromatic hydrocarbons.

For the air quality effects assessment, the Proponent conducted dispersion modelling to predict the concentrations of air contaminants of potential concern migrating from the Project site to the surrounding airshed. These predictions were compared to regulatory standards, objectives, and guidelines such as those from Ontario Regulation 419/05 Schedule 3, jurisdictional screening levels, upper risk thresholds, *Ontario Ambient Air Quality Criteria*, or *Canadian Ambient Air Quality Standards*. Where there were multiple provincial or federal criteria for a given contaminant, the standard used to assess the results was typically the more conservative option.

The US Environmental Protection Agency's AERMOD model was used to model the construction and operation scenarios. The Proponent stated that regulatory models, such as AERMOD, are biased towards overestimates of contaminant concentrations. Maximum ground-level concentration estimates of Project emissions were determined for 11,421 receptor grid points, including those along the length of the property boundary, to capture maximum concentrations. Ninety-seven special receptors were included in locations where human activity more regularly takes place, including nearby residences, hospitals, schools, watersheds and waterbodies, and locations of recreational or Indigenous traditional land use.

The Proponent stated that the model conservatively did not account for the additional natural mitigation of dustfall from rain, or during winter months. The Proponent used year 2 to represent the entire operations phase as a worst-case scenario, stating this would be conservative because of its maximum mining and production levels combined with shallower pit depths. The Proponent modelled air quality emissions from the Project alone, as well those in a cumulative scenario, which combined Project emissions with background concentrations.

The Proponent reported that, of the 83 contaminants of potential concern assessed, 78 were predicted to be below the applicable criteria for the cumulative scenario in each of the construction and operations phases. Exceedances were predicted during construction and operations for benzo(a)pyrene, benzene, crystalline silica, and dustfall. Exceedances for NO₂

were also predicted during construction, and nickel exceedances were predicted during operations.

The Proponent proposed mitigation measures for air quality effects from contaminants of potential concern in the EIS Addendum and updated the Table of Commitments in response to Undertaking 31 (Appendix 2) including:

- equipping the concentrate facility with fugitive-emissions control technology;
- enclosing the mill feed crushed-ore storage area and equipping the crushed-ore reclaim tunnel with a baghouse;
- controlling emissions from the concentrate load-out area, lime delivery area, lime slacking mill and carboxymethyl cellulose feed bin with baghouses;
- using baghouses on the lead assay and cupel furnaces;
- using scrubbers on the base metals fume hood and the assay lab AA unit and
- controlling emissions from the precious metals and base metals furnaces in the assay lab with wet scrubbers;
- controlling emissions by enclosing the rail load-out facility and equipping it with baghouses;
- preferential use of low-sulphur diesel for heavy equipment operation;
- using equipment and vehicles that meet Transport Canada off-road (Tier 4) emission requirements , as well as US Environmental Protection Agency Tier 4 or better emissions standards, and effective equipment maintenance.

Benzene and Benzo(a)pyrene

For both the construction and operations phases, maximum cumulative benzo(a)pyrene concentrations were predicted to exceed the applicable 24-hour and annual criteria at several special receptor locations, particularly along Peninsula Road. The Proponent emphasized that the background level of benzo(a)pyrene was above applicable air quality criteria across the Local Study Area, with the Project only providing a small (< 1%) contribution to the cumulative concentrations.

Cumulative benzene concentrations were also predicted to exceed the annual average benzene criterion during the Project construction and operations phases at special receptors. Receptors with the maximum predicted concentrations were on Highway 17 during construction and at residences near the rail load-out facility during operations. Background benzene concentrations were above applicable air quality criteria, with the Project only providing a small (< 7%) contribution to the maximum cumulative concentration during operations. The Proponent noted that background benzene and benzo(a)pyrene concentrations were derived from

National Air Pollution Surveillance monitoring data for Winnipeg. Because the Proponent expected background levels from this station to be conservative for the Marathon area, they stated the cumulative assessment methodology was also conservative.

Nitrogen Dioxide

The Proponent initially compared predicted NO₂ concentrations to criteria from Ontario Regulation 419/05 Schedule 3, which showed modest exceedances in the construction phase at the property boundary. In the response to Information Request 6-2 Air Quality Criteria, the Proponent provided updated comparisons of predicted NO₂ concentrations against the 2020 and 2025 *Canadian Ambient Air Quality Standards*. For the construction phase, the maximum hourly and annual average cumulative NO₂ concentrations were predicted to exceed the 2025 NO₂ criterion at the modelled property boundary and at special receptors, with the maximum special receptor on the airport property. The maximum hourly average and annual average cumulative NO₂ ground-level concentrations were predicted to be 317% and 176% of the criteria, at the maximum special receptor. For the operations phase, the maximum hourly average and annual average cumulative NO₂ concentrations were predicted to exceed the criteria at the property boundary and at special receptors, with the maximum special receptor being at Bamooos Lake. However, the Proponent stated these were conservative estimates because the background NO₂ concentration used in the assessment was expected to provide a conservative estimate of ambient levels in the Marathon area and it was based on measurements in large urban residential, commercial, and industrial areas. These were expected to have higher background concentrations relative to the Local Study Area. The Proponent highlighted other conservative assumptions used in the air quality modelling that affected NO₂ predictions:

- Diesel generators and propane heaters were assumed to be running 24/7 for the entirety of the Project lifecycle.
- NO_x emissions from on-road sources used an emission factor calculated for the worst-case month, which was then applied year-round.
- Non-road equipment such as dozers, excavators, and loaders were modelled to be operating 24 hours a day, when they would typically run for about 15 hours per day.
- All mining equipment was modelled to be running simultaneously.

Nickel

Predicted cumulative nickel concentrations were above the 24-hour and annual average nickel criteria in the operations phase, 25 m from the property boundary at the rail load-out facility. The Proponent stated that the nickel exceedances were due to the loading of concentrate to rail cars, which they committed to addressing during detailed design of the rail load-out facility by enclosing the facility and baghouse installations.

Fugitive Dustfall and Crystalline Silica

For the operations phase, the cumulative monthly dustfall level at the modelled property boundary (close to the entrance of the mine site) was predicted to exceed the criterion by 46%. Predicted cumulative dustfall levels exceeded the criterion at special receptors by up to 73%. The area in which cumulative dustfall levels were above the criterion is expected to be limited near the modelled property boundary, and the mine entrance in particular. The major contributor to the dustfall exceedance is road dust emissions from the haul road into the site.

Modelled particulate matter approached air quality criteria in the cumulative scenario at the property boundary and at some special receptors, even when emissions from haul roads and stockpiles were excluded. These emissions were excluded because the Proponent plans to employ a best management plan for dust that they stated could achieve a high mitigation efficiency.

For the construction phase, the maximum predicted cumulative crystalline silica concentration was the same as for the Project alone, as no background data were obtained by the Proponent. Maximum crystalline silica concentrations were predicted to exceed the 24-hour criterion by approximately 603% at the modelled property boundary and up to 121% at a special receptor on Bamooos Lake, where human presence is expected to be infrequent. The Proponent found that exceedances of the crystalline silica criterion were predicted to be limited in extent, with the area of exceedance outside the modelled property boundary encompassing approximately 13 km².

For the operations phase, maximum crystalline silica concentrations were predicted to exceed the 24-hour criterion by up to 704% at both the modelled property boundary and up to 388% at a special receptor located on the airport property. The Proponent predicted that exceedances of the crystalline silica criterion would be limited in extent, with the area of exceedance outside the modelled property boundary encompassing an area approximately 5.5 km². Further analysis by the Proponent of the crystalline silica emissions found the exceedances where people may be present for significant periods of time (e.g., at the Travelodge hotel) were infrequent.

The Proponent stated the air quality dispersion model method used to model dustfall and particulate matter did not account for deposition and depletion from plumes as they travel from source to receptor. The Proponent indicated that the modelling method conservatively

did not account for the additional natural mitigation of road dust and/or crystalline silica that occurs during winter months. The frequency assessment also did not account for days with precipitation, when no road dust emissions would occur. Overall, the Proponent expected the assessment for crystalline silica to overestimate the magnitude, frequency, and duration. They stated they expected to be required to demonstrate compliance with the crystalline silica criteria during the permitting stage, should the Project be approved.

The Proponent outlined proposed mitigation measures for air quality effects from fugitive dust in the updated Table of Commitments in the response to Undertaking 31 (Appendix 2) including:

- maintaining all site roadways, including regular inspections and timely repairs to reduce silt loading and posting and monitoring speed limits;
- dust suppression activities and initiatives such as using water sprays or calcium and magnesium chloride as needed;
- building mine design features such as windbreaks to limit fugitive dust;
- adding water sprays to mobile aggregate crushing systems;
- equipping concentrate haul trucks with soft covers;
- loading concentrate trucks or railcars in a covered environment;
- reducing the amount of beach exposed in Cell 2 of the process solids management facility and mitigating airborne dust by wetting or chemically stabilizing exposed beach areas with polymers and/or “crusting” agents, as safe and practicable;
- maintaining a water cover on Cell 1 in the process solids management facility during operations;
- housing the primary crusher in an enclosed structure with a dust collection system;
- enclosing the mill feed crushed-ore storage area and equipping the crushed-ore reclaim tunnel with a baghouse;
- controlling emissions from the concentrate load-out area, lime delivery area, lime slacking mill and carboxymethyl cellulose feed bin using baghouses;
- controlling emissions from the precious metals and base metals furnaces in the assay lab using wet scrubbers;
- controlling emissions with baghouses at the rail load-out facility;

- progressively reclaiming and revegetating overburden, mine rock, and tailings stockpiles, whenever practicable and during active closure and post-closure; and
- developing a monitoring plan for fugitive dust.

At the hearing, the Ministry of the Environment, Conservation and Parks highlighted an issue with the vehicle-kilometres travelled in the air quality dispersion model for certain paved and unpaved road segments in the Project operations phase. In response, the Proponent revised emissions estimates for dustfall (total suspended particulates) but stated that, ultimately, the conclusions from the EIS Addendum were unaffected.

The Proponent found:

- The maximum particulate matter and metals concentration at the special receptor where the highest contaminant levels had initially been predicted remained unchanged, although increases ranged from 0% to 21% at the other 96 receptors.
- Changes in crystalline silica concentrations ranged from 1% to 17% and changes in the frequency of exceedance were no greater than 1 day per year.

Views of the Participants

The Ministry of the Environment, Conservation and Parks was of the view that the description of the air emission sources and the estimates of emissions of contaminants from these sources were carried out largely in accordance with established industry norms and published guidance documents. The primary exception was the low silt-loading content used for unpaved roads in the air quality dispersion modelling. A silt content of 5.8% was used for the calculation of fugitive particulate matter emissions from unpaved roads. Typically, when site-specific data are not available, a mean silt content of 9.14% (from a range of 0.10% to 36.80% for mine sites in Ontario) is recommended. Particulate matter emissions from the Project therefore may have been underestimated. This issue was discussed at the hearing where the Proponent indicated referencing silt values from guidance from the US Environmental Protection Agency for industrial unpaved roads at taconite mining operations, based on the mineralogy of rock at the mine site. The Ministry also noted that concentrations of particulate matter were predicted to be well above certain provincial criteria when emissions from haul roads and stockpiles were included (i.e., they were not assumed to be fully mitigated), for both the construction and operations phases. The Ministry noted that the Proponent's best management plan for dust would be assessed as a requirement of a provincial Environmental Compliance Approval process, should the Project be approved.

Environment and Climate Change Canada also considered that, overall, the Proponent's modelling approach and methodology were acceptable and reasonable, and the air quality predictions were credible and suitably conservative. Environment and Climate Change Canada

noted that for all but two of the air contaminants with predicted exceedances, the ambient concentrations were predicted to drop off shortly beyond the property boundary. These two contaminants of potential concern were benzene and benzo(a)pyrene. Health Canada's concerns related to air quality are reflected in Section 17 (Human Health).

The Métis Nation of Ontario expressed concern regarding potential effects on air quality from NO_x, particulate matter, crystalline silica, and chemical dust suppressants or surfactants. The Métis Nation of Ontario was concerned that ultrafine particulate matter (PM₁) was not considered in the air quality modelling, particularly as it relates to palladium. The Métis Nation of Ontario suggested that even the perception of effects on air quality could lead to avoidance behaviours, compromising the potential activities of harvesters.

15.1.4 Air Quality Monitoring and Follow-Up

Views of the Proponent

The Proponent committed to implementing an Atmospheric Environment Monitoring Program to verify the accuracy of the predicted effects, determine the effectiveness of mitigation measures, and inform adaptive management. For air contaminants, the program would include measurement of particulates, criteria air contaminants, and fugitive dust.

Views of the Participants

The Ministry of the Environment, Conservation and Parks noted a lack of detail for the air quality monitoring and follow-up program. The Ministry made recommendations for a specific monitoring plan that included pre-construction sampling to establish site-specific background concentrations, as well as for contaminants throughout the Project lifecycle. The Ministry stated that pre-construction sampling should target contaminants where background concentrations were already elevated or simply unknown. These include benzo(a)pyrene, crystalline silica, and silt content for unpaved roads. Contaminants to be monitored in all active Project phases include total suspended particulates, including metals, PM₁₀ and PM_{2.5}, crystalline silica, dustfall, NO₂, and, potentially, benzo(a)pyrene.

Environment and Climate Change Canada and Health Canada also noted the absence of specific information related to the air quality monitoring and follow-up program. Environment and Climate Change Canada recommended monitoring the following contaminants during all Project phases:

- dustfall (non-continuously),
- total suspended particulates and metals (non-continuously),
- PM₁₀ (continuously),

- PM_{2.5} (continuously),
- NO₂ (continuously),
- benzene and benzo(a)pyrene (non-continuously).

Environment and Climate Change Canada also recommended implementing a best management plan for dust.

Health Canada recommended that monitoring should take place where exceedances or near-exceedances of air quality criteria were predicted, adding that the locations should also reflect where populations and/or individuals are likely to be exposed. Health Canada stated that action or trigger levels should be based on applicable criteria for the protection of human health or when contaminant levels are substantially higher than predicted. Health Canada recommended that, for non-threshold contaminants, where health effects may occur at any exposure level, additional mitigation measures should not be restricted to meeting the *Canadian Ambient Air Quality Standards*.

The Crown Consultation Team recommended, based on input from Indigenous groups, that Biigtigong Nishnaabeg, the Métis Nation of Ontario, and the Red Sky Métis Independent Nation be consulted in the development of the detailed monitoring plan for air quality. Particular attention should be paid to how the plan applies to effects on vegetation harvested as country foods.

15.1.5 Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on air quality, the Panel considered the following factors to be particularly relevant:

- Local air quality is expected to be good and representative of rural air quality.
- The air quality baseline was established from National Air Pollution Surveillance program data from more developed/urban locations, and supplemented by limited local sampling.
- As no baseline data were gathered for crystalline silica, the true level of exceedance is not known.
- The appropriate silt content used in modelling is uncertain.
- Conservative assumptions were used for several elements of the air quality dispersion model such that some of the elevated levels of air contaminants may not be as high as predicted.
- Expert reviewers from government agencies were generally satisfied with the approach to the air quality dispersion modelling and agreed that it was likely conservative.

- Concentrations of air contaminants of potential concern were predicted to exceed standards criteria during both the construction and operations phases. Air emissions were expected to be negligible during active closure and post-closure.
- For most contaminants, infrequent criteria exceedances were predicted at special receptors where the Proponent anticipated people could be present for significant amounts of time.
- The Proponent committed to implementing a monitoring and follow-up program to establish a more accurate baseline, verify air quality predictions, and implement adaptive management as required.

The Panel finds the Proponent's assertion that the air quality dispersion modelling is likely to be conservative (effectively overestimating environmental effects) to be reasonable, with the exception of crystalline silica.

The Panel notes that, although large air quality criteria exceedances were predicted for benzo(a)pyrene and benzene during the operations phase, these were caused by elevated levels used in the baseline. The Panel finds that the Project would only have an incremental contribution, however, the magnitude of predicted exceedances remains uncertain because the real local background concentrations are not known.

The Panel heard predictions that monthly dustfall during Project operations would exceed standards criteria, while several other modelled particulate matter would nearly exceed their criteria. The Panel notes that emissions of particulate matter from haul roads and storage piles were excluded from consideration in the results analysis as the Proponent assumed these sources would be fully mitigated. The Panel questions the validity of this assumption and concludes that the modelled predictions for dustfall and particulate matter are uncertain. Furthermore, no background concentrations were available for crystalline silica, and a site-specific measure of silt-loading content was not used. The Proponent emphasized that precipitation and winter snow cover were not factored into the air quality dispersion modelling, which would reduce predicted dustfall levels. The Proponent committed to implementing a best management plan for dust as part of the provincial permitting process that, the Panel understands, could reduce dust emissions to almost negligible amounts.

The Panel heard that the purpose of the federal and provincial government's air quality criteria is to help contextualize the magnitude of contaminant emissions and promote the preservation of clean airsheds. *Ontario's Ambient Air Quality Criteria* and the *Canadian Ambient Air Quality Standards* are not enforceable regulatory criteria. These guiding criteria are established iteratively from a review of scientific literature to protect against adverse effects on human health and/or the environment. These criteria should inform the development of a provincial Environmental Compliance Approval related to air quality, should the Project be given approval to proceed.

The Panel is of the view that, in addition to the mitigation proposed by GenPGM and Panel recommendations noted below, that the Proponent could further mitigate air emissions by electrifying the vehicle fleet, as it becomes technically and economically feasible.

For further Panel analysis on potential human health effects related to air quality, see Section 17 (Human Health).

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 63: Mitigate emissions of fugitive dust (total suspended particulates, PM₁₀, and PM_{2.5}), associated metals, and products of combustion during construction and operations by:

- implementing standard dust suppression activities such as water sprays or chemical suppressants, ongoing road maintenance, and posting and monitoring of speed limits;
- equipping all concentrate-handling or storage facilities with fugitive emission control technology;
- loading trucks and rail cars with concentrate, during operations, in a covered environment;
- locating the primary crusher within an enclosed structure with an appropriate dust collection system;
- using water sprays on aggregate crushing systems to maintain moisture levels to effectively suppress dust;
- covering the crushed-ore stockpile to prevent wind erosion;
- incorporating design features such as wind breaks in areas where modelling has indicated they would be most effective to limit fugitive dust emissions; and
- using mining vehicles and mining equipment that meet US Environmental Protection Agency Tier 4 emission standards.

In addition to the above key mitigation measures, the Panel recommends the Proponent:

Recommendation 64: Implement an air quality follow-up program to determine the accuracy of the modelling predictions and verify the effectiveness of mitigation measures. The Proponent should consult with Environment and Climate Change Canada, Ministry of Environment, Conservation and Park, Biigtigong Nishnaabeg, Pays Plat First Nation, and other interested Indigenous groups in the development, implementation, and associated monitoring of the follow-up program. The air quality monitoring and follow-up program should include the following:

- Updating baseline conditions to inform the follow-up program by conducting:
 - preconstruction sampling of benzo(a)pyrene, benzene, dustfall, and crystalline silica in the Local Study Area, and updating the air quality model where parameters are higher than original assumptions; and
 - preconstruction analysis of the silt content of unpaved roads and updating of the air quality model should the value be higher than 5.8%.
- Monitoring the following during construction, operations, and active closure phase of the Project:
 - dustfall;
 - total suspended particulates and metals;
 - PM₁₀ and PM_{2.5}, monitored continuously to facilitate adaptive management for dust;
 - crystalline silica;
 - benzene and benzo(a)pyrene; and
 - NO₂, monitored continuously.
- Monitoring at locations where special receptors were predicted to experience the greatest air quality criteria exceedances for each contaminant and at locations used for traditional land resource use purposes.
- Comparing monitoring results to both air quality predictions from the environmental assessment and the most stringent federal or provincial air quality criteria available for a given contaminant. At a minimum, surpassing either of these should be considered a threshold for the Proponent to implement adaptive management. The Proponent should use the *Canadian Ambient Air Quality Standards* for NO₂.
- Implementing additional mitigation measures, in consultation with Ministry of the Environment, Conservation and Parks, Environment and Climate Change Canada, Biigtigong Nishnaabeg First Nation, and others as appropriate, should monitoring show exceedances of identified thresholds.

- Sharing results of the follow-up program annually with the Impact Assessment Agency of Canada, the Ministry of the Environment, Conservation and Parks, and Environment and Climate Change Canada, as well as Biigtigong Nishnaabeg First Nation and other interested Indigenous communities.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on air quality.

15.1.6 Cumulative Effects

Views of the Proponent

GenPGM stated incremental increases of contaminant levels in air as a result of the Project were predicted, but exceedances of air quality criteria were not expected beyond the Local Study Area. The Proponent stated that future activities, such as traditional and general land and resource uses would have negligible effects on air quality. The Proponent noted that the Hemlo Gold Mine and proposed hydroelectric developments would be well outside the zone of influence of the Project. The Proponent did not anticipate any cumulative effects on air quality as a result of the Project.

Views of the Participants

The Panel did not receive any views from participants with respect to the cumulative effects of air quality.

Panel Conclusions and Recommendations

The Panel notes that exceedances of air quality criteria were not predicted beyond the boundary of the Local Study Area. The Panel is satisfied there would be little spatial overlap between the Project's effects on air quality and other large scale projects or activities within the Regional Study Area.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on air quality.

15.2 GREENHOUSE GAS EMISSIONS

15.2.1 Requirements for the Consideration of Greenhouse Gas Emissions

This section of the report addresses Project greenhouse gas (GHG) emissions and effects on climate change. The Panel considered these to be environmental effects under the Ontario *Environmental Assessment Act* and that inform the assessment of effects under paragraphs 5(1)(b) and (c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to discuss several aspects related to Project GHG emissions. This included a discussion of analytical techniques and relevant policies considered, an estimate of emissions for all sources and comparisons to the provincial and national totals, possible changes to the climate.

GHGs are the primary contributor to global climate change. Common GHGs include carbon dioxide (CO₂), methane, and nitrous oxide. Emissions are expressed here and in GenPGM's material as conversions to CO₂-equivalent (CO₂e) values using the 100-year global warming potential for each parameter from the 2019 Canada Greenhouse Gas Quantification Requirements. These emissions would directly result from the combustion of fuels (gasoline, diesel, and propane) in vehicle engines and other equipment used in various Project activities, from the detonation of explosives during blasting, and from facilities such as the process plant. Greenhouse gas emissions would also occur from land clearing activities that release CO₂ stored in trees and other vegetation types.

15.2.2 Project-Related Changes to Greenhouse Gas Emissions

Views of the Proponent

GenPGM provided GHG estimates for the construction and operations phases of the Project in the EIS Addendum. Following comments received from Environment and Climate Change Canada, the emissions calculations were revised to more closely follow the guidance set out in the *Strategic Assessment of Climate Change*. This updated assessment was provided in the response to an information request. The simplified equation for net GHG emissions is: *Net GHG emissions = direct GHG emissions + acquired GHG emissions – CO₂ captured and stored – avoided domestic emissions – offset credits*.

The direct emissions variable comprises emissions from fuel use in vehicles and mining equipment, blasting, and land use change (deforestation and wetland removal). Acquired emissions were those associated with electricity obtained from the Ontario power grid. No CO₂ storage or capture, avoided domestic emissions, or offset credits were reported for the Project. At the hearing, the Proponent emphasized that the minerals mined would aid in the transition

to a low-carbon economy, from copper used in electrification to platinum group metals used in catalytic converters and potential future battery technology.

The Proponent also shared a suite of mitigation measures that it anticipated would reduce GHG emissions from the Project. These measures included, among others:

- using energy-efficient equipment in the process plant and other buildings;
- clearing vegetation in such a manner to maximize the recovery of marketable wood products (vegetative material would not be burned);
- management of fuel use during operations including minimizing vehicle idling and optimizing vehicle movements;
- properly maintaining vehicles, mining equipment and diesel generators to optimize performance;
- potential use of biodiesel in all mine equipment;
- potential use of trolley assist technology (electrical assistance for haul trucks) for key haul segments; and
- exploring the possibility of employing CO₂ capture in construction concrete and the processed solids stream.

Total CO₂e emissions during construction are predicted to range from 212.5 to 240.3 kilotonnes (kt) annually. Total annual CO₂e emissions during operations are predicted to average 88.3 kt and range from 59.6 kt to 105.3 kt. The Proponent emphasized the minor incremental contribution of Project construction and operations to the total annual GHG emissions of Ontario (0.01% and 0.05%) and Canada (0.003% and 0.01%), based on 2018 data in the EIS Addendum, but did not revise this analysis assuming the higher annual Project emissions rates shown in response to Information Request 6-4. The total CO₂e emissions predicted for the Project lifecycle amount to 1,677.5 kt. The Proponent noted that facilities that emit more than 10 kt of CO₂e annually must report these emissions to Environment and Climate Change Canada, while those that emit more than 50 kt of CO₂e annually must provide compensation or obtain credits.

Views of the Participants

Environment and Climate Change Canada stated that, overall, the approach to GHG emissions quantification was acceptable and reasonable. Environment and Climate Change Canada noted that the Proponent did not provide a discussion of how the Project may affect Canada's ability to reduce GHG emissions or how it could affect global efforts. Environment and Climate Change Canada also pointed out that comparing Project GHG emissions to provincial or national totals

is not a meaningful comparison. The Proponent should have instead compared the Project's predicted emissions intensity with similar, high-performing, energy-efficient projects or mines.

Environment and Climate Change Canada described the mitigation measures proposed by the Proponent to reduce GHG emissions as minimal. The measures proposed to optimize mine design and management of fuel use are standard practices that are not typically considered mitigation measures. Environment and Climate Change Canada suggested the Proponent refer to the *Strategic Assessment of Climate Change* technical guidance to determine best available technologies and best environmental practices that could be applied to the Project.

The Proponent has promoted the Project by emphasizing that palladium is a critical mineral for manufacturing batteries and would be used in electric cars. Environment and Climate Change Canada agreed that palladium is a critical mineral, and a member of a group of minerals that could prove indispensable to global efforts to reaching net-zero carbon economies by 2050. However, Environment and Climate Change Canada stated that it is unclear how Canada would benefit from the potential GHG emissions reductions associated with the palladium produced by the Project.

Northwatch and Environment North criticized the Proponent's approach to assessing environmental effects on GHG emissions and climate change. Environment North stated that GenPGM should develop a greenhouse gas emissions management plan to identify viable pathways to net zero emissions and set emissions reductions goals for the Project.

15.2.3 Emissions Intensity

Views of the Proponent

As part of the GHG calculations, GenPGM also presented the Project's predicted emissions intensity. This is a measure of how much GHG emissions are released per unit of ore produced. The simplified equation for emissions intensity is: *Emissions intensity = net GHG emissions / units produced (tonnes of ore)*.

The predicted emissions intensity for the Project ranged from 0.582 CO₂/t of ore in the construction phase to 0.008 CO₂/t of ore in the peak operations years. At the hearing, the Proponent reported that they commissioned an independent benchmark study on the Project's carbon intensity. This report showed that the Project's emissions of CO₂ per tonne of copper-equivalent-produced (1.0) was near the Canadian average (1.0) and below the global average (2.9). The spread was larger when GHG emissions from transportation and processing of concentrate to the finished metal were included (1.5 for the Project, 2.8 for the Canadian average, and 4.7 for the global average). The Proponent also noted that the Project would be subject to a price on carbon based on its emissions intensity, under the Ontario Emissions Performance Standards program.

15.2.4 Panel's Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on GHGs and climate change, the Panel considered the following factors to be particularly relevant:

- The Project would be a net contributor to global GHGs.
- Expert reviewers from Environment and Climate Change Canada confirmed the approach to calculate GHG emission estimates was reasonable.
- The Project performed well in emissions-intensity benchmarking compared with similar mines in Canada and internationally.
- The minerals mined have been identified by Environment and Climate Change Canada as important for the transition to a low-carbon economy.
- Climate change is a global phenomenon with a wide variety of potential impacts.

The Panel recognizes the Project would be a net contributor to global GHG emissions, which would exacerbate climate change, albeit performing better than similar mines in terms of emissions intensity.

The Panel notes that the Proponent has marketed the Project as one that would provide critical minerals to aid in the transition to cleaner energies and a green economy. The Panel acknowledges the minerals mined may find themselves in products designed to reduce GHG emissions. However, little definitive information was submitted regarding the quantity or extent to which minerals mined from the Project could offset GHG emissions in Canada or internationally. Therefore, while the Panel broadly agrees with the Proponent's premise, the magnitude of this benefit is uncertain.

The Panel acknowledges the current and ongoing global climate crisis and is generally aware of federal and international policy initiatives to limit temperature rise to 1.5 to 2 °C above pre-industrial levels. The Panel believes it is incumbent upon industries to be leaders in reducing GHG emissions. The Panel recommends that the Proponent endeavour to reduce GHG emissions through mitigation, while continually seeking improvement, should the Project be given approval.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 65: The Proponent should implement mitigation measures to reduce Project-related GHG emissions including implement anti-idling and fuel-tracking policies.

Recommendation 66: The Proponent should develop and implement a management plan for greenhouse gas emissions. The management plan should be developed in consultation with Environment and Climate Change Canada and refer to the guidance in the *Strategic Assessment of Climate Change* and should:

- take into account provincial and federal emissions reduction strategies and build on mitigation measures already identified by the Proponent;
- identify sources of greenhouse gas emissions from each phase of the Project;
- identify greenhouse gas emissions reductions and energy efficient technologies or practices that could apply to each source;
- provide detailed information on the feasibility and emissions reduction potential of these technologies;
- be continuous and iterative through the life of the mine as new technologies become available;
- undergo review, including the identified technologies, emissions reductions achieved, and challenges encountered, at predetermined intervals.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on greenhouse gases or climate change. However, the Project would make a minimal contribution to increased greenhouse gas emissions.

15.2.5 Cumulative Effects

Views of the Proponent

GenPGM acknowledged that GHG emissions from the Project would be a net contributor to national and global GHGs. The Proponent considered the Project's emissions would be a small fraction of total national emissions, but would nonetheless represent an incremental increase with respect to Canada's ability to meet its climate change commitments.

Views of the Participants

Environment and Climate Change Canada indicated the Project's GHG emissions need to align with Canada's targets and international commitments, as greenhouse gas emissions are of concern due to their cumulative nature.

Panel Conclusions and Recommendations

The Project would add 1,677.5 kt CO₂e to global GHG emissions over its lifecycle. The Panel recognizes that this is an adverse cumulative effect that would contribute to climate change and hinder Canada's objective of achieving net-zero emissions by 2050. However, the Panel notes this is a relatively small amount when compared with provincial and national emissions. The Panel notes that no frame of reference or information on a national regulatory system for the management of GHG emissions that could aid in determining the magnitude of this effect was submitted. As noted above, the Panel agrees that some of these greenhouse gas emissions could be offset if the minerals mined are used in low- and/or zero-emissions technologies.

The Panel concludes that the Project, in combination with other projects and activities that have been or are likely to be carried out, is not likely to cause a significant adverse cumulative effect on greenhouse gases or climate change.

15.3 AMBIENT LIGHT

15.3.1 Requirements for the Consideration of Ambient Light

This section addresses effects of the Project on ambient light. The Panel considered these to be environmental effects under the Ontario *Environmental Assessment Act* and that inform the assessment of effects under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to identify potential effects on the environment resulting from artificial light pollution at the mine site.

15.3.2 Project-Related Changes to Ambient Light

Views of the Proponent

GenPGM reported the Project is located in a mostly undeveloped forested area with almost no artificial lighting. The nearest nighttime light sources are the Marathon airport and Highway 17. Artificial lighting would be required for all Project-related activities that occur outdoors at night

for safety reasons. The proposed Project schedule involves 24-hour activity, 7 days a week, for the site preparation, construction, and operations phases.

The Proponent performed a qualitative assessment of ambient light effects by analyzing sightlines from the Site Study Area to nearby receptors. The three types of light effects evaluated were light trespass, glare, and sky glow. Light trespass is emitted light that spills into receiving properties where it may disturb sleep, cause harsh illumination, or compromise safety by reducing visibility. Glare is an excess of light caused by exposed or poorly directed lights, such as from the high-beams of a vehicle. Glare poses a risk to safety and security and a degradation of aesthetics. Sky glow is a result of upwards illumination that leads to a brightening of the night sky. Sky glow can make it impossible to observe stars or other celestial features and affect the navigational ability of birds.

Portable lighting units may be used during site preparation and construction to ensure a safe work site. Mobile construction and mining equipment operating at night would have headlights, marker lights and work lights. Light from this equipment has the potential to shine toward receptors or into the night sky. Lighting would be required during operations to ensure safe work areas at the open pits, haul routes, and at the process plant. Operations would proceed on a 24-hour basis. Perimeter lighting may also be required on mine buildings (e.g., the process plant, fuel farm, and administration and services building). During active closure Project light levels would be similar to those during site preparation and construction.

The Proponent's proposed mitigation measures for ambient light included:

- general compliance with the *Occupational Health and Safety Act* and its regulations in order to maintain safe working spaces;
- optimization of lighting design to reduce the total amount needed;
- shielded fixtures to reduce glare and light levels;
- use of directional lighting outfitted with shields to minimize light leakage; and
- mounting light fixtures at the lowest possible height.

The Proponent concluded that ambient light would not be visible from Marathon as there is no direct line of sight, but it could be visible from Highway 17. Overall, light effects would be expected to be subdued. The effects of Project-related light on the cottages on Hare Lake and properties along Highway 17 were deemed to be negligible as these would be screened from the Site Study Area by existing vegetation and uneven terrain. The Proponent stated that the effects of light on wildlife were not considered to be of concern as lighting would be restricted to developed areas of the Project, where wildlife activity is expected to be minimal.

View of the Participants

Pays Plat First Nation noted the potential stigmatization and avoidance of the Project site as a result of light from the Project. The Métis Nation of Ontario also noted that light disturbance could result in increased avoidance and displacement of harvesters who use the Local Study Area.

15.3.3 Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project to ambient light the Panel considered the following factors to be particularly relevant:

- The Project is in an undeveloped area with almost no artificial lighting.
- Ambient light from the Project would not be visible from the town of Marathon.
- Ambient light from the Project would be negligible from the closest receptors along Highway 17 and the cottages on Hare Lake.
- Pays Plat First Nation and the Métis Nation of Ontario indicated that the increase in artificial light could lead to community members avoiding the Local Study Area.

The Panel appreciates concerns from Indigenous groups that increases in ambient light could lead to avoidance behaviours of land and resource users in the Local Study Area. For specific Panel analysis on potential perception effects and sensory disturbance on Indigenous groups see Section 21 (Effects on Indigenous Peoples).

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 67: The Proponent should implement the following mitigation measures to reduce ambient light:

- optimize lighting design to reduce total amount of lighting needed;
- use directional lighting;
- use shielded fixtures to reduce glare, reduce sideways and upward light leakage, and light pollution; and
- place fixtures on poles or buildings at the lowest possible height.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project's ambient light is not likely to cause a significant adverse environmental effect.

15.3.4 Cumulative Effects

Views of the Proponent

GenPGM stated that low to no light trespass is expected beyond the Site Study Area due to the lack of line of sight between the Project and offsite receptors. The Proponent stated that future activities within the Local Study Area, such as traditional and general land and resource uses would have negligible contributions to ambient light. Other projects or activities, such as the active Magino Gold Project or proposed hydroelectric developments would be well outside the zone of influence of the Project. The Proponent did not anticipate any cumulative effects from ambient light as a result of the Project.

Views of the Participants

The Panel did not receive any views from participants with respect to the cumulative effects of ambient light.

Panel Conclusions and Recommendations

The Panel notes that ambient light from the Project would not be visible from the town of Marathon and barely noticeable from nearby receptors. The Panel is satisfied there would be little spatial overlap between the Project's effects on ambient light and other large scale projects or activities within the Regional Study Area.

The Panel concludes that the Project's ambient light, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect.

SECTION 16: ACOUSTIC ENVIRONMENT

16.1 REQUIREMENTS FOR THE CONSIDERATION OF NOISE AND VIBRATION

This section addresses the environmental effects of the Project (noise and vibration) on the human acoustic environment. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- describe current ambient noise levels at the site, in the Local Study Area and for other areas that could be affected by the Project;
- assess the potential for noise effects resulting from the Project, including identifying and quantifying noise sources from construction and operations phases as well as noise associated with loading concentrate into rail cars and increased road traffic; and
- identify and evaluate effects on potential human receptors.

In this section, different units are used to describe noise levels. Decibels (dB) are the unit used to measure sound pressure levels. A-weighted decibels (dBA) are decibels that are modified to account for human hearing sensitivity as humans do not hear all frequencies equally. Peak linear decibels (dBLin) are used when describing blast air overpressure and are not directly comparable with dBA levels.

The effects of noise and vibration on wildlife are discussed in Section 12 (Wildlife Species).

16.2 METHODOLOGY AND BASELINE

Views of the Proponent

GenPGM collected baseline noise data at five locations around the Project property in August 2009. Further to the Ministry of the Environment, Conservation and Parks comments, the Proponent collected updated baseline noise data in September 2013 for four of the five locations previously surveilled. The Proponent used a combination of field measurements obtained in 2009 and 2013 and traffic noise modelling based on 2008 Ministry of Transportation traffic data to predict baseline noise associated with the Project. The Proponent did not update the baseline measurements for the Environmental Impact Assessment Addendum; they considered the baseline measurements of 2013 representative of the 2021

conditions as there had been no significant changes within the Local Study Area or Regional Study Area that would affect the ambient noise in the area.

The Proponent used provincial and federal noise standards to evaluate the significance of the predicted noise levels. If the predicted Project noise level met or was below the criteria identified by the Ministry of the Environment, Conservation and Parks or Health Canada, the Proponent considered the Project noise levels to be in compliance with the criteria, and therefore acceptable. Although the provincial and federal methodologies and criteria to identify adverse effects from noise differ, both aim to determine adverse effects on humans. The provincial methodology and criteria were developed by the Ministry of the Environment, Conservation and Parks to identify an adverse effect on noise sensitive receptors where an adverse effect may include a health effect and/or loss of enjoyment of normal property use. The federal assessment methodology and criteria were developed by Health Canada to identify an adverse effect on human health. The Proponent followed Health Canada's *Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (2017)*, which identifies criteria and provides objectives for noise levels to determine health effects caused by community annoyance (measured in percent highly annoyed (% HA)) and by sleep disturbance.

The Proponent reviewed their community annoyance predictions in response to Health Canada's concern that the combined noise effects from all Project-related noise sources needed to be considered. The Proponent indicated that overlap would occur between Project-site noise and Project-related traffic noise and between rail load-out noise and Project-related traffic noise. Combined noise would remain well below the Health Canada criteria for community annoyance. The Proponent indicated that, due to the distance between the Project site from the rail load-out facility, no overlap between those noise sources would occur.

The Proponent indicated that the acoustic environments at the two Hare Lake cottages to the west, the Biigtig Zibi to the east, and Bamoo's Lake to the north are characterized by a lower noise level limit, with natural sounds and little to no road traffic, corresponding to a provincially identified Class 3 area. The acoustic environment to the south of the site, adjacent to Highway 17 and within the Town of Marathon, is representative of an urban area and of a rural area with a higher sound level limit, corresponding to a Class 2 area. The Ministry of the Environment, Conservation and Parks methodology specifies sound level limits based on the baseline noise levels experienced in the noise-sensitive receptors' locations. In many cases, baseline sound levels are already higher than the Ministry of the Environment, Conservation and Parks noise limits.

Using baseline noise modelling data and Project construction and operations assumptions, the Proponent modelled Project noise that considered sensitive receptors in close proximity to the four main sources of Project-related noise.

Table 16-1: Noise-Sensitive Receptors in Proximity to Project's Sources of Noise

	Project site	Highway 17 transportation corridor	Town of Marathon transportation corridor	Rail load-out facility
Noise-sensitive receptors	Two cottages at Hare Lake, Bamooos Lake, Biigtig Zibi, May's Gifts, Wayfare Inn, Peninsula Inn, Travelodge Hotel, Laughing Moose Restaurant and Residence, and a residence.	May's Gifts, Laughing Moose Restaurant and Residence, Travelodge Hotel, Peninsula Inn, Wayfare Inn, and four residences	13 residences, a senior's center, a hospital, a library, churches, I Sew Studio and Residence, police station, Pic Motel, Harbour Inn, Zero-100 Motor Inn	Two residences, Harbour Inn, Kingdom Hall Church

Note: Adapted from Section 6.2.2 of the EIS (CIAR 224); Section 6.2.2 and Appendix D2 of the EIS Addendum (CIAR 727); and Information Request 6-10 (CIAR 950).

The Proponent indicated these receptors are representative of the worst-case Project effects because they are typically the closest to the Project activities and therefore the most likely to be affected by noise.

View of the Participants

As noted above, Health Canada expressed concern that the Proponent had not considered combined noise impacts from all Project-related noise sources. Health Canada stated that the total noise effects may have been underestimated when calculating the change in community annoyance. They also stated that this calculation by the Proponent may not be representative of Project-related future noise as it did not include all sources, such as backup alarms, and coupling noise, and their applicable adjustments for sound characteristics. Health Canada also recommended that the Proponent provide a detailed complaint-response process and a proactive engagement plan for noisy activities to regulatory authorities prior to implementation.

16.3 PROJECT SITE NOISE

16.3.1 Construction and Operations Noise

Views of the Proponent

To predict the effects of noise from facility construction and operations on noise sensitive receptors during the daytime, GenPGM assumed that Project equipment within the Site Study Area would operate 24 hours per day and 7 days per week. However, the Proponent assumed restricted activities at the process solids management facility to predict nighttime noise. Specifically, in the southern portion of the process solids management facility between 11 p.m. and 7 a.m., compactors and bulldozers were assumed to not operate. It was also assumed that equipment would idle while trucks are dumping, and that the frequency of haul trucks would fall to an average of four per hour, if heavy equipment activities were to congregate in this area.

Construction and Operations Noise Levels

The Proponent found that for all noise sensitive receptors, sound levels would be predicted to be in compliance with the Ministry of the Environment, Conservation and Parks criteria for hourly continuous sound during construction and operations of the Project, according to *Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300)*. For construction noise, the highest level was predicted at the Peninsula Inn within the Highway 17 corridor and was lower than the criteria during the day and equal to the sound limit at night. For facility operations (other than blasting activities), the highest noise level was predicted to be at the Biigtig Zibi receptor. The Proponent described how the predicted noise levels would be experienced by an individual on the Biigtig Zibi during construction and operations. They likened the worst-case hourly case of 40 dBA to a whisper-type noise, or quiet consistent droning. Daytime and nighttime noise levels at this receptor were predicted to be lower than the MECP criteria.

Community Annoyance and Sleep Disturbance

For community annoyance, Health Canada guidance specifies that noise must not exceed a 6.5% change in the proportion of those highly annoyed in order to avoid a health impact. For construction and operations, the Proponent found that the highest predicted change is in the Biigtig Zibi corridor with 4.1% HA, which is in compliance with the Health Canada criteria.

The Health Canada guidance specifies the nighttime noise threshold that should not be exceeded to avoid a health impact related to sleep disturbance. For the construction and operations of the Project, the Proponent found that the Project's nighttime noise would not exceed the Health Canada threshold. The highest predicted maximum nighttime noise level

during construction would be at the Peninsula Inn, within the Highway 17 corridor. In response to Health Canada's comment on not using a lower noise threshold recommended by the World Health Organization, the Proponent responded that they did not consider these criteria applicable to noise-sensitive receptors adjacent to a provincial highway, where the criteria is already exceeded. They added that the Health Canada guidelines do not specify that the World Health Organization's sleep disturbance guidelines should be adopted.

Mitigation

The Proponent committed to implementing measures to limit noise during construction and operations of the Project site. Commitments included limiting sources of noise between the hours of 11 p.m. and 7 a.m.

The Proponent noted that, at the Project site, they would consider alternative backup alarm technologies (e.g., ambient noise-adjusted volumes and broadband) and the need for backup alarms through operational considerations. The Proponent would also install warning signs at the site entrance during construction prohibiting tailgate slams, which should reduce the occurrence and disruption of regular impulsive noise.

Views of the Participants

The Ministry of the Environment, Conservation and Parks determined that the Proponent had sufficiently characterized adverse noise effects associated with the construction and operations of the facility. The Ministry stated that the predicted noise impact would be compliant with Ministry noise guideline NPC-300 for steady-state noise from facility construction and mining operations.

Health Canada stated that the Proponent had not assessed sleep disturbance using all recommended standards. In particular, they stated that the Proponent should have used a lower noise threshold recommended by the World Health Organization to avoid long-term adverse health effects. Health Canada reviewed GenPGM's response to the Panel regarding nighttime noise levels and did not provide additional comments on this topic.

16.3.2 Air Blasting Noise and Vibration

Views of the Proponent

GenPGM used Ministry of the Environment, Conservation and Parks guidance (NPC-119: Blasting) to assess the effects of Project air blasts for both infrastructure and pit development blasting. In response to Health Canada's concern that this guidance is intended to assess structural damage and is not appropriate for assessing human health effects from blasting, the Proponent compared predicted air blast overpressure levels at noise-sensitive receptors to data in a peer-reviewed article that described human responses to air blasting.

Infrastructure Blasting

The Proponent indicated that infrastructure blasting would occur during construction and operations at various locations, including roads, the process solids management facility, and the process plant. The blasting would last less than a year at each location and typically would be less than 3 blasts per day or 93 blasts per month.

To assess the noise effects of infrastructure blasting, the Proponent used the Health Canada-recommended formula to calculate the peak value for short-term blasting and compared the result with the Ministry of the Environment, Conservation and Parks criteria that identify the peak air blast level with and without monitoring.

For infrastructure blasting, the Proponent noted that the predicted peak air blast level was aligned with the Ministry of the Environment, Conservation and Parks blasting criteria, for which monitoring is not required. The Proponent noted that, if any areas require blasting within the recommended setback distance, mitigation may be applied to reduce annoyance.

Pit Development

The Proponent indicated that blasting in open pits for pit development would occur during construction and operations. The blasting would last about 13 years and would typically be one blast per day or 30 blasts per month.

To assess the noise effects of pit development blasting at noise-sensitive receptors, GenPGM used Ministry of the Environment, Conservation and Parks guidance to determine the air blast overpressure according to the distance of noise-sensitive receptors from the blast.

The blast overpressure level predicted by the Proponent at noise-sensitive receptors varied from 110 to 112 dBLin, which was in compliance with the Ministry of the Environment, Conservation and Parks criteria. The Proponent referred to a peer-reviewed article¹² to describe an air blast overpressure of between 90 and 120 dBLin as having the following human response: “strongly perceptible to mildly unpleasant.” The Proponent also described what would be experienced by people at the Biigtig Zibi receptor, at about a 1,000- to 1,500 m distance during blasting, as feeling like a “mild breeze” or a 10 to 20 km/h wind.

Vibration

To assess the effects of vibration from air blasting, GenPGM used the Ministry of the Environment, Conservation and Parks guidance to determine the setback distance that would or would not require monitoring. Vibration levels at the noise-sensitive receptors for

¹² P.K Singh, M. Klemen, and C. Niemann-Delius, *Air Overpressure Airblast generation, propagation and prediction*, QM February 2005

construction and operations were predicted to be in compliance with the Ministry of the Environment, Conservation and Parks criteria for which monitoring is not required.

Mitigation

The Proponent stated that they may proactively consider measures to mitigate the effects of blasting. One would be to decrease the blasting-powder factor through a combination of increased hole spacing, decreased column height of explosives, increased depth of stemming material in the blasthole, and variable-diameter blastholes. Another measure described by the Proponent was the use of modified blasting techniques such as:

- electronic detonation instead of explosive detonation cord;
- air decking, which involves the use of an inverted cone in the blasthole to constrain energy within the rock mass;
- timing sequence to develop an echelon effect; and
- coordinating blast patterns toward a partially open face.

The Proponent noted that additional mitigation measures could include the use of blast mats and altering charge size and blasting frequencies.

During operations, the Proponent indicated they would design a blast plan to manage air blast overpressure effects, including avoidance behavior and startle responses.

Views of the Participants

The Ministry of the Environment, Conservation and Parks determined that the Proponent had sufficiently characterized adverse sound and vibration effects associated with blasting sound concussion and vibration events from facility construction and mining operations.

The Métis Nation of Ontario noted that blasting is intermittent, unpredictable, and can result in a startle response and increased avoidance behaviour that can alter patterns related to the exercise of rights.

Health Canada expressed concern about the Proponent's use of NPC-119, stating that the guidance is primarily designed to prevent structural damage and is not appropriate for an assessment of human health effects. Their recommendation was for the Proponent to provide a noise assessment of blasting-related health impacts following Health Canada's Noise Guidance. Health Canada reviewed the Proponent's response to the Panel regarding blasting and did not provide additional comments on this topic.

16.4 TRAFFIC NOISE

Views of the Proponent

GenPGM modelled the noise from all vehicles going to and coming from the Project site using Highway 17 and Town of Marathon roads to access the rail load-out facility. The Proponent estimated that 90 passenger vehicles would enter the mine site for the day shift, 60 would enter for the night shift, and 6 trucks carrying supplies would access the site throughout the day during operations. They confirmed that the model presented for worst-case scenario daytime noise accounted for 30 truckloads of concentrate per day. They acknowledged that this would be an underestimate if they produced vanadium-magnetite concentrate, and that they should have accounted for a total of 40 truckloads of concentrate. As a point of clarification, the Panel understands that the number of trucks refers to actual trucks, and not to the number of truck trips. The Proponent stated that, although they expected an adjustment in noise for the additional trucks, traffic noise would likely remain below the 65 dBA criteria and below the 5 dB change criteria, meaning that no mitigation would need to be considered.

The Proponent also indicated that the truck noise modelling included two peak hours — from 7 a.m. to 8 a.m. and from 7 p.m. to 8 p.m. — during which 10 trucks would circulate each hour. The other truck traffic was evenly distributed throughout the day.

The Proponent indicated that Project traffic noise would affect a smaller number of noise-sensitive receptors during construction compared with operations. Construction traffic would use the Highway 17 transportation corridor exclusively. However, during operations, Project-related traffic would use the Highway 17 transportation corridor and pass through the town of Marathon to access the rail load-out facility.

For traffic noise, the Proponent's predicted Project sound levels were added to the baseline traffic sound levels. The Proponent compared predicted Project sound levels to the Ministry of the Environment, Conservation and Parks's NPC-300 road traffic daytime noise limit of 55 dBA. Using the Ontario Ministry of Transportation's *Environmental Guide for Noise* (2006), the Proponent determined that, if the 55 dBA criteria was surpassed, a difference of more than 5 dB above the baseline would require mitigation measures.

The Proponent stated that the baseline noise levels for receptors potentially affected by Project-related traffic within the Highway 17 transportation corridor already exceeded the 55 dBA Ministry of the Environment, Conservation and Parks criteria. The Proponent determined that the Project's contribution would be less than the Ministry of Transportation's threshold for all noise-sensitive receptors. Consequently, the Proponent indicated that no additional mitigation would be required.

Similarly, the noise-sensitive receptors (residences, seniors' center, churches, hospital, library, and commercial developments) within the town of Marathon along the route to the rail load-

out facility had baseline noise levels that exceeded the Ministry of the Environment, Conservation and Parks criteria of 55 dBA. Because the largest predicted contribution of the Project to those noise levels is less than 5 dB, the Proponent indicated that no mitigation would be required.

As traffic noise would only occur during the day, the applicable Health Canada criteria to determine the effects on health are based on community annoyance. The Proponent found that during construction, the highest change would be 0.3% HA at a residence situated at the intersection of Peninsula Road and Industrial Park Road. During operations, the highest predicted change was 0.7% HA at a sewing studio near the rail load-out facility. Both were in compliance with the Health Canada criteria.

Mitigation

As a mitigation measure for traffic noise, the Proponent stated that they would purchase vehicles and equipment that meet the applicable noise-suppression regulations. GenPGM was not able to confirm the noise reduction this measure would achieve. They also stated that they would schedule concentrate delivery at times of the day to reduce complaints, whenever possible. The Proponent added that deliveries would likely occur during the rail load-out facility operating hours, from 7 a.m. to 5 p.m., and that trucks would be spread out throughout that window.

Views of the Participants

The Ministry of the Environment, Conservation and Parks determined that the Proponent had sufficiently characterized adverse noise effects associated with road traffic noise from the facility construction and mining operations. The Ministry of the Environment, Conservation and Parks stated that the predicted noise impact would be compliant with their noise protocols for road traffic and those of the Ministry of Transportation when the facility is fully operational. At the hearing, when asked to comment on the 55 dBA traffic-noise exceedance, which is the Ministry of the Environment, Conservation and Parks criteria, the Ministry commented that the Proponent's analysis was consistent with Ministry of Transportation's policy, which is that traffic noise should not exceed 65 dBA and/or that the Project's traffic noise impact should not exceed 5 dBA. They added that the Ministry of the Environment, Conservation and Parks does not generally consider traffic noise as part of a large mining environmental assessment and that the Proponent had gone above and beyond their expectation in that regard.

Health Canada did not provide comments on the Proponent's traffic noise assessment.

16.5 RAIL LOAD-OUT FACILITY OPERATIONS NOISE

Views of the Proponent

GenPGM explained that the rail load-out facility would be contained in an enclosed building and that transport trucks would pull into the building, which would limit noise. This was further clarified at the hearing, at which they stated that the building would be sealed and that most of the activity at the rail load-out would occur inside, except for two to three times a week, when the Canadian Pacific train would collect the loaded cars. Rail-car coupling was the only noise source considered in the impulsive noise assessment for the rail load-out facility. The Proponent stated that there would be no noise impacts overnight.

In the modelling for the rail load-out facility, the Proponent assumed that the rail load-out facility would operate between the hours of 7 a.m. and 11 p.m. Another assumption was that an average of three rail car couples would occur in a given hour. The Proponent described coupling as low-impact noises produced by the connections when the train begins to move. They confirmed that there would be no shunting noises, which they described as a higher-impact noise.

The Proponent stated that if they were to produce vanadium-magnetite concentrate, there could be up to 40 trucks of concentrate per day going to the rail load-out facility, meaning that additional rail cars would be required. They confirmed that the maximum of three coupling events per hour would still not be exceeded as the rail load-out facility could accommodate storage and operation such that rail-car traffic could be spread out.

Steady-State and Impulsive Noise

The Proponent indicated the noise-sensitive receptors (a church, the Harbour Inn and two residences) within the town, would potentially be affected by noise from the rail load-out facility. They indicated that the predicted steady-state noise from the rail load-out facility at these receptors was in compliance with the Ministry of the Environment, Conservation and Parks standard for hourly continuous sound (NPC-300). The highest noise levels were found to be equal to the sound limit for daytime and evening at the Harbour Inn.

The Proponent reported that the highest predicted impulsive sound levels were 1 dBA lower than the daytime and evening sound limit at the Harbour Inn. They indicated that the impulsive sounds levels were in compliance with the Ministry of the Environment, Conservation and Parks standard for impulsive sound (NPC-300).

Community Annoyance

For steady-state noise at the rail load-out facility, the Proponent found that the Project's change in % HA is in compliance with the Health Canada criteria. The highest predicted change

is 1.5 % HA at the Harbour Inn. The Proponent therefore determined that there was no expected noise impact on community annoyance related to rail load-out activities.

Mitigation

To reduce potential impulsive noise and vibrations, the Proponent stated that coupling of concentrate rail cars at the rail load-out facility would occur only during the daytime hours of 7 a.m. to 7 p.m. The Proponent would limit the coupling of concentrate rail cars to allow the rail carrier to complete a pickup. Last, they would only couple concentrate rail cars in zones where compliance with applicable NPC-300 impulsive noise criteria can be met.

Views of the Participants

The Ministry of the Environment, Conservation and Parks expressed concern that the additional rail cars needed, if vanadium-magnetite concentrate was produced, would result in more coupling impulses. The Ministry noted that, with this addition, the sound level limit for the worst-case hourly modelling could be close to being reached. They confirmed that the Proponent would have to comply with noise criteria caps.

Health Canada expressed concern that there could be noise complaints related to rail load-out facility activities outside the typical sleep hours used by the Proponent, and if locomotive idling occurred overnight. Health Canada recommended that concerns related to sleep hours should be emphasized in a community consultation plan. Health Canada also disagreed with the Proponent's view that coupling of rail cars was a less-impulsive noise source than shunting.

16.6 GENERAL MITIGATION MEASURES AND MONITORING

Views of the Proponent

As a mitigation measure, GenPGM stated that a formal complaints procedure for nuisance noise would be established for stakeholders and Indigenous peoples during the construction, operations, and active closure phases of the Project. A response protocol would also be established so that appropriate follow-up occurs.

The Proponent indicated that monitoring could be required should the public raise a concern and this would be implemented if ambient noise levels exceed applicable regulatory criteria. Additional mitigation measures would be determined based on the specific scenario and be developed by the Proponent in collaboration with pertinent agencies and stakeholders. The Proponent indicated additional mitigation may include a review of nighttime activities; improvement and/or procurement of vehicles and equipment for increased noise suppression; and review of blasting plans in response to monitoring recordings at sensitive report locations that exceed applicable criteria. The Proponent would implement the follow-up program,

reporting the results to the Ministry of the Environment, Conservation and Parks and others as appropriate, and implementing adaptive management measures where required.

The Proponent also committed to conducting additional ambient monitoring. The scope of this program would be developed through community, Indigenous, and regulatory consultation. The Proponent indicated that they would consider additional monitoring at Bamooos Lake and the Biigtig Zibi.

Views of the Participants

The Participants did not provide additional views on the general mitigation measures and monitoring proposed by the Proponent.

16.7 PANEL CONCLUSIONS AND RECOMMENDATIONS

The Panel agrees with the Proponent's assessment regarding changes to the acoustic environment.

In reaching their conclusions on the acoustic environment, the Panel found the following factors to be particularly relevant:

- Many of the baseline noise levels at noise-sensitive receptors south of the Project site already appear to be at or above Ministry of the Environment, Conservation and Parks criteria for Class 2 areas.
- During construction and operations, the greatest increase in community annoyance would be at the Biigtig Zibi noise-sensitive receptor. People at this receptor would experience Project-related noise as constant droning equivalent to a whisper.
- The Proponent committed to implementing a number of mitigation measures, such as prohibiting tailgate slams when dumping materials and reducing the number of haul trucks per hours or requiring them to idle if heavy-equipment activities are congregating in areas close to noise-sensitive receptors at nighttime. The Proponent would monitor noise levels and consider other adaptive management measures to reduce noise further, if necessary.
- Air blast noise and vibration levels would be compliant with Ministry of the Environment, Conservation and Parks criteria. The human response to pit development blasting would be mildly unpleasant. At the Biigtig Zibi receptor, blasting would feel like a "mild breeze" or a 10 to 20 km/h wind.

- There was no expected noise impact on community annoyance related to construction and operations traffic noise. The highest predicted changes were 0.3 % and 0.7 % HA, respectively.
- The Ministry of the Environment, Conservation and Parks was satisfied with the Proponent's methodology for assessing noise impacts and added that they do not usually consider traffic noise as part of a large mining environmental assessment.
- The Proponent committed to purchasing vehicles and equipment to reduce traffic noise, but could not confirm the exact amount of noise reduction they would achieve.
- Activities at the rail load-out facility, such as the loading of train cars and storage of concentrate, would occur within an enclosed building between the hours of 7 a.m. to 11 p.m.

The Panel understands that the connecting of rail cars to locomotives may take place outside the enclosed building, but that it would only be done through coupling and between 7 a.m. and 7 p.m. Additionally, the Proponent would have to comply with Ministry of the Environment, Conservation and Parks noise criteria caps. Last, there was no expected noise impact on community annoyance.

The Panel is satisfied with the Proponent's methodology for assessing noise impacts. The Panel accepts that different activities (Project activities, blasting, traffic, and rail load-out activities) can be assessed separately, and does not require a combined assessment to appropriately characterize the resulting community annoyance. The Panel agrees that effects on the acoustic environment would largely occur within the Local Study Area, and would end by completion of the active closure phase. The Panel also finds the magnitude of these impacts to be relatively low, considering that baseline noise levels are, in many cases, already at or above provincial limits. The Panel acknowledges that the effects of noise are perceived differently and generally influenced by other factors. The Panel is understanding of these perceived effects, and does not wish to imply that they should be discounted by the determination that Project-related noise is below the regulatory thresholds. The Panel accepts that the Proponent has committed to implementing appropriate mitigation measures, monitoring, and follow-up programs.

The Panel finds that impacts on human health from Project effects on the acoustic environment would not be significant.

The Panel recommends that the Proponent implement the following mitigation measures.

Recommendation 68: Reduce noise-generating activities between the nighttime hours of 11 p.m. and 7 a.m. by:

- not operating compactors during construction and operations;

- not operating bulldozers working on the southern portion of the process solids management facility berm during operations;
- prohibiting Project-related truck traffic from utilizing Highway 17 and town of Marathon transportation corridors; and
- if heavy equipment activities are occurring at the southern portion of the process solids management facility during operations:
 - requiring all other equipment to idle while haul trucks are dumping; and/or
 - reducing haul trucks to an average of four per hour.

Recommendation 69: Install warning signs at the Project site entrance prohibiting haul truck tailgate slams to reduce impulsive noise occurrences.

Recommendation 70: Restrict the coupling of cars at the rail load-out facility to the daytime hours of 7 a.m. to 7 p.m. and do not exceed three coupling events per hour. Restrict other noise-generating activities at the rail load-out facility to the hours of 7 a.m. to 11 p.m.

In addition to the recommended mitigation measures, the Panel recommends the Proponent implement the following follow-up and monitoring measures:

Recommendation 71: Develop and implement a notification plan, in consultation with Indigenous groups and the Town of Marathon, to provide advance notice to residents regarding Project-related noise generating activities, including blasting. The notification plan should include the establishment of the methods and the timing of notification.

Recommendation 72: Monitor ambient noise levels, overpressure, and vibrations at identified sensitive-receptor locations during various mining activities including, but not limited to, near-surface blasting activities during site preparation and early operations, to verify the predictions of the environmental assessment and determine the effectiveness of mitigation measures. The location of monitoring stations should be determined based on several factors, including the locations of maximum predicted noise levels, proximity to residential or sensitive land use areas, Ministry of the Environment, Conservation and Parks siting criteria for noise monitors, and should be reviewed and approved by the Ministry.

Should overpressure or vibration monitoring indicate that levels are exceeding those predicted in the environmental assessment, the Proponent should implement additional mitigation measures and consider modified blasting techniques, including:

- decreasing the powder factor through a combination of increased hole spacing, decreased explosive column height, increased depth of stemming material in the blasthole, and variable diameter blastholes;

- electronic detonation instead of explosive detonation cord;
- air decking, which involves the use of an inverted cone in the blast hole to constrain energy within the rock mass;
- timing sequence to develop an echelon effect;
- coordinating blast patterns towards a partially open face;
- using blast mats; and
- pursuing smaller, more frequent blast patterns.

Recommendation 73: Develop and implement a formal noise complaint and response protocol for all phases of the Project. As part of the protocol, the Proponent should acknowledge the complaint within 48 hours and implement corrective actions, if required, in a timely manner.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause a significant adverse environmental effect on the acoustic environment.

16.8 CUMULATIVE EFFECTS

Views of the Proponent

GenPGM identified Project residual effects on the acoustic environment that were carried forward into a cumulative effects assessment. No cumulative residual effects on noise levels and vibration were identified.

In their cumulative effects assessment for noise and vibration, the Proponent identified potential interactions between the Project and the Town of Marathon Landfill and Waste Transfer Station. The Proponent completed a separate cumulative noise impact assessment that combined these two activities with the Project's operational noise. The cumulative sound levels for the Project's facility operations and rail load-out operations were predicted to be below the Ministry of the Environment, Conservation and Parks criteria. The cumulative noise assessment predicted a lower Project traffic sound level increase over the baseline. The Proponent did not predict potential noise interactions that would contribute to cumulative effects with reasonably foreseeable activities.

Views of the Participants

Participants did not provide views on the cumulative effects on the acoustic environment.

Panel's Conclusions and Recommendations

The Panel finds that there would be residual effects with respect to Project site noise, traffic noise, and rail load-out noise. Although the residual effects may act additively with the Town of Marathon Landfill and Waste Transfer Station, sounds levels would still be expected to remain below applicable provincial noise criteria. The Panel finds that the Proponent would not be required to implement additional mitigation measures to address cumulative effects on the acoustic environment.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on the acoustic environment.

PART 5: HUMAN ENVIRONMENT

SECTION 17: HUMAN HEALTH

17.1 REQUIREMENTS FOR THE CONSIDERATION OF HUMAN HEALTH

This section addresses the environmental effects of the Project on human health. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- describe current health profiles, including public health services, of the communities likely to be affected by the Project; and
- assess effects on human health related to potential chemical releases in the environment using quantitative and qualitative risk assessment methods.

17.2 CURRENT HUMAN HEALTH CONDITIONS

Views of the Proponent

GenPGM undertook a human health risk assessment (HHRA) to look at multimedia sources of exposure. The methodology used by the Proponent in their HHRA focused solely on a number of air quality contaminants. Therefore, in addition to considering the approach and results of the HHRA, the Panel in this section addresses other human health considerations, specifically contaminants in country foods and water. There are also important human health considerations associated with the Project related to well-being and the provision of social services, and these have been addressed under Sections 18 (Socio-economic Environment) and 21 (Effects on Indigenous Peoples).

For the purposes of the environmental assessment, GenPGM considered human health risks related to releases of chemicals to the environment and environmental stressors from Project activities. In the Environmental Impact Statement Addendum (EIS Addendum), human health was considered as a standalone valued ecosystem component to provide a more targeted discussion on potential health risks.

Baseline information related to water quality, fish, air quality and noise, as presented by the Proponent for each valued ecosystem component in separate topic reports, is described in Sections 9 (Surface Water Quality), 10 (Fish and Fish Habitat), 15 (Atmospheric Environment), and 16 (Acoustic Environment) of this report, respectively. This section speaks to other valued ecosystem components for which baseline information is not discussed in other sections.

Country Foods

The Proponent stated that information concerning the relationship between Indigenous health and the harvesting of country foods and traditional activities were considered in the HHRA. Traditional uses that were identified as occurring in the area include hunting, trapping, fishing, and plant harvesting, with activities generally focused on the larger waterways, such as the Biigtig Zibi, Bamoos Lake, Hare Lake, and Angler Creek. The harvesting of country foods is understood to play an important role in the economic, social, cultural, and spiritual lives of Indigenous communities.

According to the Proponent, all Indigenous groups reported some current or historical land and resource uses in the Regional Study Area, but only Biigtigong Nishnaabeg reported extensive use of the Site Study Area and the Local Study Area for traditional land- and resource-related pursuits (see Appendix 6). Biigtigong Nishnaabeg reported that traditional dietary habits are relatively widespread in the community.

The Proponent presented information obtained from Biigtigong Nishnaabeg describing extensive traditional land and resource uses in the general vicinity of the Project. These included hunting, trapping, fishing, plant harvesting, and timber harvesting. Speckled and rainbow trout, moose, partridge, rabbit, beaver, and blueberries were identified by Biigtigong Nishnaabeg as preferred country foods. The Proponent stated that Biigtigong Nishnaabeg did not provide specific consumption rates for country foods but estimated that most of the community consumes at least some country foods each week. In particular, moose is estimated to be consumed three times per week on average. Large animals, such as moose and other seasonally-available animals, are frozen for consumption year-round.

During the hearing, the Proponent stated that they engaged with Biigtigong Nishnaabeg and other Indigenous communities in 2021 to determine which species should be included in the country foods monitoring program and inform locations for sampling. The Proponent also noted that they worked directly with Biigtigong Nishnaabeg to develop and distribute a dietary survey. The Proponent acknowledged that information from the survey on country foods consumption specific to the community was not available at the time of preparation of the HHRA.

Mercury in Fish

There is no recreational or Indigenous fishery in the Site Study Area but there are some in the Regional Study Area centred on the Biigtig Zibi, Bamooos Lake, Lake Superior, Hare Lake, Hare Creek, and Angler Creek. The Proponent provided a summary of background concentrations of metals in fish and sport fish consumption advisories in the Project area. Data on fish chemistry were obtained from local fish tissue samples collected from 2009 to 2013 in Hare Lake, Bamooos Lake, and the Biigtig Zibi. Historical mean mercury levels in fish for waterbodies near the Project were also presented for Lake Superior, Bamooos Lake, and Gowan Lake. Mean mercury concentrations in northern pike muscle tissue from Hare Lake exceeded the total consumption restriction value of 1.84 mg/kg for the general population. Mean mercury concentrations in northern pike liver tissue from Hare Lake were above the values at which complete restriction is advised for a sensitive population (0.52 mg/kg) and consumption restrictions begin for the general population (0.15 mg/kg). Mean mercury concentrations in lake trout muscle and liver tissue from Bamooos Lake marginally exceeded the value at which a complete restriction is advised for a sensitive population (0.52 mg/kg) but were below 0.15 mg/kg, the value at which consumption restrictions for the general population begin.

The Proponent indicated that additional fish tissue samples were collected from Hare Lake and the Biigtig Zibi in 2021 in support of the country foods monitoring program. Additional collections are expected to include other species and locations during the open-water period of 2022. The Proponent confirmed at the hearing that their analysis was not available at that time but would be incorporated into the environmental effects monitoring and baseline information, as well as the country foods monitoring program, which is being developed with Indigenous communities.

Views of the Participants

Environment and Climate Change Canada noted that mercury is a toxic substance listed on Schedule 1 of the *Canadian Environmental Protection Act, 1999*. Methylmercury is a contaminant of particular concern given its neurotoxicity and its ability to bioaccumulate and biomagnify in freshwater food webs.

Environment and Climate Change Canada noted that background mercury concentrations collected in Hare Lake were above human health consumption guidelines, indicating that Hare Lake currently has elevated methylmercury production.

Health Canada noted that there is an existing mercury-related fish consumption advisory for northern pike and walleye in the Biigtig Zibi, which are traditional foods of Indigenous interest.

Biigtigong Nishnaabeg reported that their members consume a large amount and variety of country foods. The inclusion of country foods in their diet helps promote holistic health and improve diet through the intake of important nutrients. Fish species of concern identified by

the community included lake trout, cisco, splake, walleye, yellow perch, northern pike, and lake sturgeon. Biigtigong Nishnaabeg indicated that the average mercury intake through diet among First Nations in Ontario was 1.6 times higher than that of the general Canadian population, and that among traditional food consumers the average total dietary mercury exposure was nine times higher than the Canadian average. Biigtigong Nishnaabeg identified a critical need to establish rigorous baselines for metal concentrations in foods and medicines of importance to the community, given the high concentrations of natural contaminants (e.g., copper) in environmental media and the potential risks associated with seepage and discharge from the Project.

Pays Plat First Nation reported hunting and other harvesting activities along the north shore of Lake Superior, including at Angler Creek and in the vicinity of Hare Lake. Pays Plat First Nation did not provide specific hunting locations within the Site Study Area but reported general use of the area for wildlife harvesting.

Michipicoten First Nation indicated that watersheds near the Project currently exhibit fish tissue methylmercury levels that are sufficiently elevated to be subject to Ontario human fish consumption restrictions. These levels are also above consumption levels set by the Canadian Council of Ministers of the Environment for the protection of fish-eating wildlife.

The Métis Nation of Ontario stated that the *First Nations Food, Nutrition and Environmental Study*, which was referenced by the Proponent, is not representative of country foods consumed by their community members, as dietary patterns, lifestyle, and general health status vary. In addition, the current framework used incorrect portion sizes and misunderstands how fish species are used by Métis citizens. As a result, contamination levels are underrepresented based on a store-type portion of fish rather than those who rely on fish multiple times per week. The Métis Nation of Ontario stated that no community-specific baseline information was collected for country foods.

Ginoogaming First Nation reported that community members forage for plants and harvest materials of cultural importance within the Site and Local Study Areas, adding that these activities could be impacted due to reduced access and dust accumulation.

17.3 HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Views of the Proponent

Baseline information that served as input into the HHRA was presented in separate topic reports of the EIS and EIS Addendum. A review of these findings is found in Sections 7 (Groundwater), 9 (Surface Water Quality), 10 (Fish and Fish Habitat), 15 (Atmospheric Environment) and 16 (Acoustic Environment).

The HHRA considered the following human health effects pathways:

- air quality including atmospheric emissions and dust deposition;
- surface and groundwater quality (for drinking and recreational use);
 - releases of mine effluent to Hare Lake during operations;
 - drainage from the reclaimed process solids management facility to Stream 105 and 106 subwatersheds after closure;
 - drainage from the reclaimed mine rock storage area, open pits and water management pond to the Biigtig Zibi;
- country foods;
- noise and vibrations; and
- electro-magnetic fields.

The conclusions associated with water quality, fish and air quality are captured in this section of the Panel Report to the extent that they pertain to the HHRA.

The HHRA examined predicted levels of contaminants in the environment and assessed health risks through a four-step process:

1. screening of contaminant exceedances against relevant criteria or guidelines;
2. exposure assessment to estimate exposure of receptors to contaminants;
3. hazard assessment for the contaminants and exposure pathways carried forward to quantitative assessment; and
4. risk characterization to estimate the potential for cancer and non-cancer human health effects from exposure to the contaminants.

Step 1: Screening

In the screening step, residual environmental effects that were predicted to exceed relevant regulatory criteria or deviate notably from background levels were carried forward for further assessment. The Proponent considered these benchmarks to be generally protective of human health. This was emphasized in their response to Information Request 6-33 that stated the various air and water quality criteria are based on the most sensitive effects for each contaminant, and are therefore also protective of human health with respect to uptake into country foods.

Of the several valued ecosystem components intersecting with human health, only air quality effects were screened by the HHRA based on exceedances of relevant air quality criteria that considered the maximum predicted concentrations from the Project plus background. Air contaminants of potential concern that were modelled to exceed relevant air criteria were benzene, benzo(a)pyrene, crystalline silica, nickel, nitrogen dioxide, and dustfall and particulate matter.

The Proponent further screened these elevated criteria by locations where human receptors may be present for prolonged periods of time. These were Bamoo Lake, Hare Lake, the Biigtig Zibi, residences near the potential rail loadout facility, and the modelled property boundary (the border of the Proponent's surface mining claims).

The Proponent screened water quality effects out of the HHRA. Their rationale was that while discharge of mine effluent to Hare Lake was predicted to increase the concentrations of contaminants in water and sediment relative to background levels, water quality benchmarks protective of human health were not predicted to be exceeded in the Project operations phase. Similarly, the Proponent stated that contaminant concentrations in the Angler Creek and the Biigtig Zibi were not predicted to exceed water quality benchmarks protective of human health in the post-closure phase.

The Proponent stated there is no hydraulic connectivity between Marathon's Groundwater Protection Zone and groundwater in the Site Study Area, and therefore groundwater was screened from the HHRA.

The Proponent indicated that seepage from Project components such as the process solids management facility, mine rock storage area, and water management pond would not be expected to be discharged to surface water, via groundwater, for more than 100 years. At the hearing, the Proponent acknowledged that some groundwater users along Highway 17 have wells down-gradient of the process solids management facility, but indicated that the seepage pathways in this area are toward surface water receivers. The Proponent committed to a monitoring program for these groundwater wells, including a communication plan for residents and businesses.

The Proponent screened the effects of country foods out of the HHRA because they expected no changes in the concentrations of contaminants in country foods where they are likely to be harvested.

Step 2: Exposure Assessment

The Proponent carried out an exposure assessment that used the estimated maximum concentrations of contaminants of potential concern, exposure characteristics of the receptors, and exposure pathways. This was performed only for air quality contaminants since water and

country foods had been screened out in Step 1. For potential interactions with different human receptor profiles, the following receptors were considered:

- a seasonal resident (cottager living on Hare Lake);
- a subsistence harvester (a member of Biigtigong Nishnaabeg);
- a country foods consumer (recreational hunters, fishers, gatherers, or trappers); and
- a permanent resident of the town of Marathon.

Step 3: Hazard Assessment

The Proponent conducted a hazards assessment to classify the potential toxicological effects of a contaminant of potential concern as carcinogenic, non-carcinogenic, or both, and to determine toxicological reference values relevant to the exposure pathways and durations identified for the receptors. These toxicological reference values provide a basis to interpret exposure rates; they are thresholds at which, if reached or surpassed, unacceptable health risks could occur.

The hazards assessment was conducted for air quality contaminants of potential concern that were screened into the assessment and considered possible modes of toxicity for different routes and durations of exposure. Benzene and benzo(a)pyrene were identified for quantitative assessment from long-term exposures through inhalation as chronic exposures. The Proponent concluded that both benzene and benzo(a)pyrene may present non-cancer and cancer hazards due to inhalation.

Step 4: Risk Characterization

The Proponent's risk characterization combined the results of the exposure assessment and hazards assessment to estimate the potential for cancer and non-cancer human health effects from exposure to the contaminants of potential concern. A quantitative assessment was performed for benzene and benzo(a)pyrene,¹³ while a qualitative assessment was done for benzene, benzo(a)pyrene, crystalline silica, nickel, nitrogen dioxide (NO₂), and dustfall. Chemical mixtures were also qualitatively evaluated in the HHRA, specifically polycyclic aromatic hydrocarbons and diesel exhaust. The Proponent stated that many of the assumptions used to assess potential health risks were conservative.

¹³ Benzo(a)pyrene was also used as a surrogate for airborne carcinogenic polycyclic aromatic hydrocarbons that did not have an O. Reg 419/05 annual air criterion.

Views of the Participants

Health Canada criticized the screening process undertaken by the Proponent for the HHRA. Health Canada's position was that it was inappropriate to screen out contaminants of potential concern for the country foods consumption pathway based on non-exceedance of air quality criteria, drinking water quality guidelines, or other surface water quality guidelines for the protection of aquatic life and agricultural water uses. Health Canada stated that these criteria and guidelines are developed for a specific pathway of exposure and are not necessarily considered appropriate health-based criteria or guidelines for the consumption of traditional foods. For contaminant cases where guidelines or criteria do not exist, it was Health Canada's view that these should have been carried forward to a quantitative risk assessment.

Health Canada stated the overall HHRA did not fully address the potential health risks from multiple sources (i.e., simultaneous exposure to substances being released into the environment from the mining activities and deposited to air, food, and water). Health Canada stated that a multi-media HHRA should have been conducted, regardless of contaminant levels in each environmental media.

17.4 RESULTS OF HUMAN HEALTH RISK ASSESSMENT

Views of the Proponent

GenPGM assessed the non-cancer and cancer risks from benzo(a)pyrene and benzene quantitatively. Their predictions showed that, for the non-cancer risk, the maximum exposure ratio was well below the target ratio for both contaminants. For cancer risks, the predictions showed that the incremental lifetime cancer risks were well below the target value at special receptors for both contaminants. These receptors included residents near the rail load-out facility; seasonal residents at Hare Lake and Bamooos Lake; and subsistence harvesters at Hare Lake, Bamooos Lake, and the Biigtig Zibi. The Proponent stated that the modelling for cancer risks was conservative because they were evaluated over an 80-year lifetime of exposure, whereas the Project operations phase is estimated to last 12.7 years.

The Proponent assessed human health risks from short-term exposure to NO₂. In assessing potential health risks, the Proponent compared predicted NO₂ concentrations to criteria from Ontario Regulation 419/05 Schedule 3, rather than the more conservative Canadian Ambient Air Quality Standards. The predicted maximum concentration of NO₂ during construction exceeded its one-hour screening criterion near the fence line by up to 15%, but was below the criterion at the HHRA receptor locations. These criteria exceedances for NO₂ were associated with drilling and blasting in the construction phase. Levels of NO₂ were not exceeded for the 24-hour criterion at any location, during any Project phase. The Proponent stated that the potential for adverse health effects from short-term exposure to elevated concentrations of

NO₂ was considered low. This is because there would be little potential for the maximum exposure scenario to occur given the limited spatial and temporal extent of peak concentrations, and the low magnitude of the predicted maximum exceedance of the screening criterion.

The Proponent assessed human health risks from short-term exposure to crystalline silica. Where people may be present for significant periods of time over the life of the Project, the Proponent reported that the crystalline silica 24-hour criterion was exceeded infrequently (less than 2% of the time) and by no more than 64% of the criterion, specifically at the Travelodge Hotel located on Highway 17. No background concentrations were included in the modelling for this contaminant. There were predictions of exceedances of the 24-hour crystalline silica criterion at other locations, such as a 704% exceedance at the property boundary and a 388% exceedance at a special receptor on the airport property. The Proponent considered the potential for adverse health effects from inhalation of crystalline silica to be low because of the relatively short duration of the Project, the short duration and intermittent nature of peak concentrations, the low potential for a maximum-exposure scenario to occur given the limited spatial and temporal extents of peak concentrations, and the 70-year exposure period assumed in the development of the air quality criterion.

Nickel exceedances for both 24-hour and annual average criteria were predicted at the property boundary near the rail load-out facility, but not at the nearest special receptors, which were residences. The Proponent therefore concluded that nickel exceedances would not occur where people spend substantial amounts of time and are unlikely to present a health risk. The Proponent committed to developing mitigation measures for nickel exceedances during the detailed design stage for the Project.

The Proponent evaluated the potential for adverse health effects from diesel exhaust, noting that the general consensus in the scientific community is that occupational exposure is associated with an increased incidence of lung cancer. Diesel exhaust is a complex chemical mixture and its individual components, including particulate matter, benzo(a)pyrene, benzene, nitrogen oxides, carbon monoxide and sulphur dioxide, were assessed separately. Diesel exhaust would be released by vehicles, off-road equipment such as excavators and haul trucks, and generators used to power the site during the construction phase or as backup power for the operations phase. The Proponent used two methods to evaluate potential cancer risks from diesel emissions: a toxic-equivalency-factor approach using a mixture of polycyclic aromatic hydrocarbons and a relative-risk approach using particulate matter smaller than 2.5 µm in diameter (PM_{2.5}) as a proxy for elemental carbon. In both cases, the Proponent concluded that incremental cancer risk from diesel exhaust was negligible. There was a 1% additional risk at the most-affected receptor, a residence near the rail load-out facility, for the Project operations phase.

The Proponent assessed human health risks from long-term exposure to contaminants of potential concern in air for all contaminants screened into the HHRA. It was the Proponent's conclusion that the predicted exposure was below levels associated with health risks from long-term exposures, including target benchmarks set by Health Canada. The Proponent stated that the assumptions used to assess potential health risks were highly conservative, especially for cancer risks, and actual risks would be expected to be even lower than those presented in the assessment.

Views of the Participants

Health Canada concluded that uncertainties remain concerning the potential human health risks due to Project contributions to air pollution. A general critique was that predicted contaminant concentrations were not modelled for areas within the property boundary where land users could be present. This issue was discussed at the hearing, with the Proponent pointing to specific special-receptor locations along Highway 17 that were considered conservative representations of all other areas within the property boundary because of the direction of prevailing winds at the site.

Health Canada noted that for NO₂, the Proponent compared the predicted concentrations to the 2025 *Canadian Ambient Air Quality Standards* in response to Information Request 6-2, and found that there would be exceedances. However, neither the air quality effects assessment nor the HHRA were updated. Health Canada noted that fugitive dust should have been considered in the HHRA, as the Proponent's supporting information to justify 100% mitigation efficiency was lacking.

Health Canada stated the Project's contributions to health risks associated with benzene and benzo(a)pyrene were likely underestimated. This was because infiltration of these contaminants to indoor environments was not considered and the elevated background concentrations used may have masked the incremental carcinogenic risks. The Proponent's position was that the risk assessment using an 80-year lifetime of exposure, as a conservative measure, offset any uncertainty in the predictions. The Proponent also stated that other indoor exposures pathways, such as those associated with household products, gas stoves, and smoking, were much greater sources of benzene and benzo(a)pyrene.

Health Canada commented that the approaches used to characterize the carcinogenic risks of diesel exhaust mixture were insufficient. In addition, they stated that the results of these flawed approaches were not presented in a meaningful manner, suggesting that Health Canada's benchmarks for acceptable risk values of 1 in 100,000 should have been used. Health Canada stated that the Proponent should have performed a quantitative assessment using inhalation-unit risks, as outlined in guidance from the California Environmental Protection Agency, as the best available option.

17.4.1 Water Quality

While the Proponent screened water quality out of the HHRA, the Panel has considered the views of the Proponent and participants, as well as the Panel's conclusions on water quality as part of their assessment of human health.

Views of the Proponent

The Proponent stated that discharges to surface water during all Project phases were not expected to increase constituent concentrations in surface water above water quality benchmarks. In addition, no existing or foreseeable groundwater users are located in areas where groundwater quality was predicted to exceed provincial and/or federal drinking water standards. The Proponent predicted no adverse effects on human health from either surface water or groundwater during any phase of the Project.

View of the Participants

The Métis Nation of Ontario stated that it was inappropriate to rule out human health risks from platinum group metals in air, water, and soils, as these were not sufficiently studied.

The Métis Nation of Ontario expressed concern regarding the lack of federal and provincial environmental and health regulations for platinum group metals at mines. They noted that, while both the Canadian and Ontario governments have critical mineral strategies that include platinum group metals, no regulations are in place. They indicated that guidance, oversight, and legislation based on current scientific knowledge are required. The importance of this issue was emphasized in their closing remarks as a key concern.

Several other participants, including Health Canada, Natural Resources Canada, and the Ministry of the Environment, Conservation and Parks discussed the emerging science of the toxicity of platinum group metals in water. Health Canada agreed that it was incorrect to screen chemicals out of a quantitative HHRA in the absence of water quality objectives or guidelines. Health Canada noted that agencies in Europe, including the European Medicines Agency, have set permitted daily exposure limits for platinum group metals. Health Canada, along with the Ministry of the Environment, Conservation and Parks and Natural Resources Canada, suggested monitoring contaminants in important waterbodies near the Project during the operations and closure phases. The Ministry of the Environment, Conservation and Parks also noted that toxicity thresholds from the latest scientific literature would likely be considered in the provincial Environmental Compliance Approval review and permitting process, should the Project be approved.

For more information on the concerns of Indigenous groups with respect to the potential environmental effects of the Project on water, see Section 21 (Effects on Indigenous Peoples).

17.4.2 Country Foods

While GenPGM screened country foods out of the HHRA, the Panel considered the views of the Proponent and participants on the effects of the Project on country foods as part of an assessment of human health.

Views of the Proponent

The Proponent stated that changes to air, water, and sediment quality are not expected to have an adverse effect on human health through the consumption of country foods. This is because contaminant concentrations in these environmental media during construction and operations are predicted to meet relevant environmental benchmarks and/or do not differ substantially from background conditions at locations where subsistence harvesters may harvest country foods. A similar conclusion was reached for the Project closure phase.

Methylmercury and Arsenic in Fish

The Proponent stated the Project is not expected to add mercury to any of the receiving waterbodies during any Project phase and therefore would not be a contributor to methylmercury in fish. They stated that predicted surface water concentrations of mercury in the Biigtig Zibi, Stream 106 (Angler Creek), and Hare Lake are not expected to differ substantially from background concentrations or surpass Provincial Water Quality Objectives. As such, the Project is not expected to lead to increased methylmercury levels in fish tissue or affect current advice on fish consumption. Nevertheless, the Proponent recognized the sensitivity of the issue of uptake of mercury and methylmercury into country foods, particularly fish, from information provided by Indigenous groups and other stakeholders. Mercury was considered a contaminant of potential concern because of its potential to biomagnify through the food chain as methylmercury. The Proponent addressed various environmental effects pathways for mercury mobilization or methylation in waterbodies throughout the environmental assessment process; these are summarized here and described in more detail in Section 9 (Surface Water Quality).

The Proponent recognized the risk presented by mercury mobilization to local surface waters during land clearing and proposed a set of mitigation measures to address the potential effects, including:

- keeping vegetated buffer zones between cleared areas and waterbodies;
- implementing sediment and erosion control; and
- using stormwater management pond to collect run-off.

The Proponent recognized that phosphorous in effluent released to Hare Lake could cause nutrient enrichment, encourage eutrophication, and increase methylmercury production.

They stated that this issue would be mitigated via source control and, if necessary, through treatment in a water treatment plant prior to final discharge to Hare Lake.

The Proponent predicted an increase in sulphates from a baseline of 3.5 mg/L to an average of 7.2 mg/L in Angler Creek post-closure. They indicated that it takes more than a small amount of sulphates in water to produce mercury methylation as anoxic sediment conditions are required.

The Proponent indicated that water quality would be monitored in the open pits prior to discharge to the Biigtig Zibi during the post-closure phase. During the hearing the Proponent made the commitment that, if the water quality was not acceptable for discharge, they could pump water from the pits to prevent its rise to the release level and treat it before discharge.

The Proponent stated that arsenic is not known to biomagnify in freshwater food chains. They noted that the predicted maximum water concentrations for arsenic are not expected to differ substantially from background concentrations; fish tissue concentrations are therefore not expected to differ substantially from background concentrations. The Proponent stated the average and maximum baseline concentrations for arsenic for northern pike from Hare Lake were within the normal ranges typically found in Canada with no health concerns associated with consumption. The Proponent indicated that arsenic concentrations in country foods, such as fish, would be monitored to verify their conclusions.

Views of the Participants

The Ministry of the Environment, Conservation and Parks and the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) agreed that the risk of mercury mobilization associated with land clearing at the Site Study Area is relatively low. Both agencies also agreed that the Proponent's proposed mitigation measures to reduce mercury mobilization are appropriate. The Ministry of the Environment, Conservation and Parks stated that an effluent limit for phosphorous of 0.01 mg/L would be required for the Environmental Compliance Approval permitting process. This would be stricter than the 0.02 mg/L objective that is typically applied. The Ministry noted that an objective for sulfate would also be considered for inclusion in the environmental compliance approval.

Biigtigong Nishnaabeg emphasized the need to establish rigorous baselines for metal concentrations in foods and medicines of importance to the community to understand the effects on country foods and human health. The community expressed concern about the decline in availability and quality of country foods that could be contaminated by Project releases to environmental media.

Biigtigong Nishnaabeg was of the view that the Proponent's health assessment was not inclusive of specific data gathered regarding community health and impacts on harvesting, country foods, and use of the area. Biigtigong Nishnaabeg noted that additional data-gathering efforts was required to determine the impacts on human health for Biigtigong Nishnaabeg that

were not considered in the HHRA, but added that the Proponent would monitor these issues moving forward.

Biigtigong Nishnaabeg communicated they were particularly concerned about the potential for the Project to increase mercury concentrations in waterbodies from which community members harvest fish for consumption. The community noted that Indigenous populations are often more susceptible to methylmercury contamination when compared with the general population due to a higher rate of consumption of fish. Biigtigong Nishnaabeg stated that the average total dietary mercury exposure among country foods consumers was nine times the Canadian average.

Biigtigong Nishnaabeg described waterbodies near the Project as being of high value for the harvesting of country foods. These include the Biigtig Zibi, Hare Lake, Bamooos Lake, Angler Creek, and Lake Superior. They stated that they have zero tolerance for the Project to increase the rate of mercury methylation in any Project-affected waterbodies beyond the already high concentrations observed in baseline studies. Biigtigong Nishnaabeg stated that the discharge of nutrients (phosphorous, ammonia, and nitrates) and release of sulphate can lead to elevated levels of mercury and methylmercury in the environment.

In addition, Biigtigong Nishnaabeg stated that psychological and social impacts could occur if fear of consuming contaminated fish or other foods lead to avoidance behaviour. This in turn could lead to economic and health impacts as community members replace traditional foods with highly processed and unhealthy alternatives purchased at grocery stores. Cultural, mental, and emotional impacts would also result from community members avoiding traditional fishing practices due to perceived health risks.

Pays Plat First Nation were concerned about a decrease in the water quality in Hare Lake due to mine effluent and migration of contaminants into Lake Superior, which could result in cumulative effects on mercury and consumption restrictions for fish.

Michipicoten First Nation expressed concern about the bioaccumulation of mercury in fish and possible health risks for both human and wildlife consumers. They raised the issue of eutrophication and bioaccumulation of methylmercury in regional waterbodies and were particularly concerned about this phenomenon occurring due to phosphorus in mine effluent discharged into Hare Lake. Michipicoten First Nation indicated that, due to the lack of site-specific phosphorus Provincial Water Quality Objectives for Hare Lake and the Biigtig Zibi, it is not possible to conclude that mine effluent or pit lakes discharge would not substantially contribute to increased eutrophication and, consequently, increased methylmercury levels in fish tissue. Michipicoten First Nation indicated that a loading-based phosphorus analysis is needed to be able to demonstrate this.

The Métis Nation of Ontario stated that minute changes to turbidity, water chemistry, and sediment quality can have negative effects throughout a food chain.

For more information on the concerns of Indigenous groups with respect to the potential environmental effects of the Project on country foods, see Section 21 (Effects on Indigenous Peoples).

17.4.3 Noise

Views of the Proponent

GenPGM evaluated Project noise effects using Health Canada's metrics for sleep disturbance and community annoyance or percent highly annoyed (% HA). The maximum nighttime noise level predicted for the Project activities did not exceed 60 A-weighted decibels (dBA) at the noise sensitive receptors. The Proponent therefore concluded there is no expected sleep disturbance on the community from noise effects. For community annoyance the highest % HA from all Project phases on a noise-sensitive receptor in Marathon was 2.4% at the Peninsula Inn, which is below the Health Canada threshold of 6.5%, at which mitigation is required. Two new noise-sensitive receptors were added to the assessment to cover noise effects on traditional land and resource users near the Site Study Area; these were at Bamooos Lake and on the Biigtig Zibi. The % HA values for these receptors were 1.5% and 4.7% respectively. For further information on potential noise effects, see Section 16 (Acoustic Environment).

17.4.4 Electromagnetic Fields

Views of the Proponent

Electrical power to the Project would be provided by a new 2.2-kilometre-long 115 kV overhead transmission line running from north of the process plant to the existing Terrace Bay-Manitouowadge transmission line. GenPGM stated that both Health Canada and the Federal-Provincial-Territorial Radiation Protection Committee believe there is insufficient scientific evidence to conclude that exposures to electromagnetic fields from power lines cause health problems. The nearest receptor to the proposed power line is a cottage on Hare Lake, approximately 2 to 3 km away. The Proponent stated that exposure to electromagnetic fields did not warrant further assessment with respect to human health risks.

17.5 MITIGATION OF HUMAN HEALTH EFFECTS

Mitigation measures for human health designed to minimize the Project's effects on specific biophysical values ecosystem components are described in Sections 9 (Surface Water Quality), 7 (Groundwater), 10 (Fish and Fish Habitat), 15 (Atmospheric Environment) and 16 (Acoustic Environment).

17.6 MONITORING AND FOLLOW-UP PROGRAMS

Views of the Proponent

GenPGM committed to monitoring contaminants of potential concern in air and water, as well as noise, as part of their monitoring programs. These are described in Sections 7 (Groundwater), 9 (Surface Water Quality), 10 (Fish and Fish Habitat), 15 (Atmospheric Environment) and 16 (Acoustic Environment).

The Proponent plans to monitor country foods for contaminants and exposure pathways prior to the site preparation and during the construction and operations phases of the Project. The purpose of these programs is to verify the accuracy of the HHRA conclusions and the effectiveness of the mitigation measures implemented to target any potential adverse environmental effects of the Project. The country foods monitoring and follow-up program would support the management of environmental effects and the implementation of adaptive management responses, as required, to address any previously unanticipated environmental effects. A conceptual plan was prepared and presented in response to Information Request 16, which would serve as the framework for the monitoring and follow-up program. A conceptual country foods monitoring and follow-up program, proposed in 2013, envisions collecting blueberries, moose meat, and fish tissue.

The Proponent made a joint commitment with Biigtigong Nishnaabeg to collaborate on the development and implementation of the country foods monitoring program, which would inform future health assessments. This commitment would include monitoring terrain and soils, vegetation, wildlife and fish, and fish habitat for any potential impacts of the Project on human health and establishing rigorous baselines for metal concentrations in foods and medicines of importance to Biigtigong Nishnaabeg. The country foods monitoring and follow-up program would also be developed in consultation with relevant authorities. The Proponent stated that sampling is currently underway to establish a baseline of contaminants in country foods. They committed to reassessing human health risks if the results of the country foods monitoring program indicated anything contradicting the original assessment, or if any new information suggests a health concern. The Proponent stated their environmental monitoring programs would include specific components related to mercury and phosphorus. They also committed to work with Biigtigong Nishnaabeg in the design and implementation of the mercury monitoring plan and other site-wide water management plans and programs, and to obtain Biigtigong Nishnaabeg's approval of mercury monitoring plans. These monitoring programs would focus on waterbodies of significance to Indigenous communities, such as the Biigtig Zibi extending downstream of the Project to the mouth of Lake Superior, the outlet of Hare Creek at Port Munro, Stream 6 (Angler Creek), and the outlet at Sturdee Cove. The Proponent indicated that these programs would include collection of surface water, sediment, benthic invertebrates, and fish tissue samples; monitoring for mercury, phosphorus, and other indicators of

eutrophication; as well as toxicity testing for mill reagents prior to effluent discharge to receiving water bodies.

The Proponent indicated that toxicological monitoring would be completed through fish tissue sampling. They noted that predatory fish (e.g., walleye and northern pike) have been identified as the top contributors to elevated exposure to mercury in the traditional diet of Indigenous communities in Ontario. The Proponent committed to monitoring mercury concentrations in country foods, such as fish, to verify the conclusions of the HHRA.

The Proponent noted that the advisory concentrations, as listed in the *Guide to Eating Ontario Fish*, used to assess the risk to sensitive and general populations as part of monitoring of potential changes to mercury concentrations through the life of the Project are as follows (parts per million [ppm] is equal to $\mu\text{g/g}$ and/or mg/kg):

- Sensitive population (i.e., women of child-bearing age and children under 15 years old) – the advisory changes from 32 to 16 meals per month at a mercury concentration of 0.06 ppm, from 16 to 12 meals per month at 0.12 ppm, from 12 to 8 meals per month at 0.16 ppm, from 8 to 4 meals per month at 0.25 ppm, while complete restriction (i.e., do not eat) is advised for levels above 0.5 ppm.
- General population – the advisory changes from 32 to 16 meals per month at mercury concentration of 0.15 ppm, from 16 to 12 meals per month at 0.3 ppm, from 12 to 8 meals per month at 0.4 ppm, from 8 to 4 meals per month at 0.6 ppm, from 4 to 2 meals per month at 1.2 ppm, while complete restriction is advised for levels above 1.8 ppm.

The Proponent committed to developing a program to monitor metal levels in fish tissues in response to concerns that these levels would be affected by discharge from mine releases. They indicated the program would focus on recreational, food fish and/or fish collected as part of Indigenous fisheries. They also stated that interested stakeholders, including the public, Indigenous Peoples, and the government, would be consulted when the program was designed.

At the hearing, the Proponent discussed three current standing environmental committees with membership from several Indigenous groups, among whom the country foods monitoring program has been a topic of interest.

Views of the Participants

Health Canada noted a lack of detail in the conceptual country foods monitoring and follow-up program and consequently made recommendations to offset the degree of uncertainty concerning the health risks of consuming country foods that could be affected by the Project. These recommendations called for a broadening of the scope of representative species sampled, based on input from Indigenous communities, including dietary consumption patterns. Sampling locations should also be representative of Project effects and areas of

concern for harvesting, fishing, hunting, and trapping identified through engagement. Health Canada recommended that sample analyses include the complete list of contaminants of potential concern listed in the EIS Addendum, including polycyclic aromatic hydrocarbons for plants, and metals for all food types. Health Canada recommended that results of the monitoring program be assessed for potential human health risks, and be communicated to potentially affected Indigenous communities.

The Métis Nation of Ontario required that ongoing monitoring of country foods be conducted, and that all consumptive country foods be included to ensure a holistic view of subsistence harvester health.

The First Nations and Inuit Health Branch of Indigenous Services Canada recommended that if there was “any potential for mercury release, then, mercury must be included in the modelling and effects predictions, and an action plan should be developed before the implementation of the Project.”

17.7 PANEL CONCLUSIONS AND RECOMMENDATIONS

Air

In reaching their conclusions about the HHRA and findings related to air quality, the Panel found the following factors related to air to be particularly relevant:

- Health Canada raised at the hearing that they had concerns with the Proponent’s approach to the HHRA.
- Air quality effects predictions were generally conservative.
- Criteria exceedances of air contaminants of potential concern were predicted for both the construction and operations phases.
- Maximum predicted exposure concentrations of air contaminants were found to be for residents of Marathon near the potential rail load-out facility.
- Quantitative assessment for cancers risks and qualitative assessments for non-cancer risks were below levels associated with health risks.
- The Proponent committed to implementing mitigation measures as well as monitoring and follow-up programs to reduce and manage Project effects on air quality.

The Panel finds that the Proponent’s adoption of air quality criteria, in addition to the mitigation measures proposed, was appropriate for screening air quality contaminants for the human health risk assessment. The Panel notes that the air quality dispersion modelling was generally conservative, while the HHRA also used conservative assumptions. For example, an

80-year lifetime of exposure was assumed in the evaluation of cancer risks. Overall, the Panel agrees with the Proponent's conclusions that non-cancer and cancer risks from air contaminants would be low if the recommended mitigation measures for air quality were implemented.

The Panel notes that the HHRA was not updated for NO₂, as shown by the exceedances of the Canadian Ambient Air Quality Standards depicted in the Proponent's response to Information Request 6-2. The Panel believes the modelling was highly conservative for NO₂, and the thresholds set for adaptive management as part of the monitoring and follow-up program should reflect those from the Canadian Ambient Air Quality Standards. This should also be a consideration for the Ministry of the Environment, Conservation and Parks in setting requirements for Environmental Compliance Approval during the permitting process, should the Project be approved.

The Panel notes that fugitive dust from haul roads and stockpiles was not considered in the HHRA. The Panel recommended that the Proponent implement mitigation measures and a follow-up program for dust from mining operations that achieves a very high level of mitigation, particularly where people are expected to spend significant amounts of time – see Section 15 (Atmospheric Environment).

The Panel notes the disagreement between the Proponent and Health Canada concerning the method used to characterize health risks from diesel exhaust. The Panel agrees that a quantitative method to evaluating health risks would have been preferable, but the two qualitative methods of assessing the chemical mixture appeared reasonable and both resulted in similar conclusions.

Water

In reaching their conclusions on the effects of the Project on human health from changes to water quality, the Panel considered the following factors to be particularly relevant:

- Provincial and federal water quality objectives for surface water and ground/drinking water were used as benchmarks to screen water quality for the HHRA.
- Contaminant concentrations in surface waters were not predicted to exceed benchmarks protective of human health for all Project phases.
- No existing or foreseeable groundwater wells are located where groundwater quality was predicted to exceed provincial or federal drinking water standards.
- The Proponent committed to implementing mitigation measures as well as a monitoring and follow-up program to reduce and manage Project effects on water quality.

The Panel finds that the Proponent's adoption of water quality objectives, in addition to the mitigation measures proposed, was appropriate for screening water quality out of the human health risk assessment.

The Panel heard Indigenous groups and government agencies comment on the toxicity of platinum group metals in water. Participants referenced a growing body of scientific literature that suggests these metals present greater health risks than previously known. The Panel notes that platinum group metals may fall within the scope of Canada and Ontario's critical mineral strategies, yet no associated water quality objectives or standards appear to exist.

Country Foods

In reaching their conclusions on the effects of the Project on human health from changes to country foods, the Panel considered the following factors to be particularly relevant:

- Indigenous groups reported that community members consume a large amount of country foods.
- Methylmercury contamination of fish tissue is a major concern for Indigenous groups.
 - Methylmercury can bioaccumulate in fish tissue and biomagnify throughout the food chain.
 - Methylmercury can cause adverse health effects on humans.
 - There are current fish consumption advisories in nearby waterbodies due to elevated levels of methylmercury in fish tissue.
- No increases in mercury concentrations in local waterbodies are predicted from direct or indirect Project sources if mitigation measures committed to by the Proponent are fully implemented.
- The Proponent committed to implementing mitigation measures as well as a monitoring and follow-up program to mitigate Project sources of mercury in water.

The Panel appreciates the serious concern shared by Indigenous groups related to mercury increases in Project-affected waterbodies. The Panel notes that the Proponent has made several commitments with respect to mitigating potential increases of mercury in local waterbodies and methylmercury in fish tissue. In addition, the Proponent has made important commitments concerning a monitoring and follow-up program to verify predictions and manage unintended effects on water. The Panel notes that several of these commitments have been made jointly with Biigtigong Nishnaabeg.

The Panel heard that contaminant concentrations in the environment during all Project phases were predicted to meet relevant environmental benchmarks and/or would not differ

substantially from background conditions at locations where subsistence harvesters may harvest country foods. The Proponent did not consider country foods as an operable pathway for human health effects based on the predictions for environmental effects on air, groundwater, and surface water quality. The Panel recognizes the importance of country foods to Indigenous livelihood. The Panel heard that contamination of country foods could lead to severe health, social, and cultural effects to Indigenous communities. The Panel notes that the Proponent, in collaboration with Biigtigong Nishnaabeg and in consultation with relevant authorities, has committed to develop and implement a country foods monitoring program. The Panel agrees with the Proponent's conclusion that country foods are not likely to be affected by the Project if the mitigation measures from air and water quality effects are implemented.

Noise

In reaching their conclusions on the effects of Project noise on human health, the Panel considered the following factors to be particularly relevant:

- Health-based benchmarks for sleep disturbance and community annoyance were not predicted to be reached at any noise-sensitive receptors.

The Panel agrees with the Proponent's conclusion that health risks related to noise from the Project are low.

Electromagnetic Fields

In reaching their conclusions on the effects of the electromagnetic fields from the transmission line on human health, the Panel found the following factors to be particularly relevant:

- Government agencies believe there is insufficient scientific evidence to conclude that exposure to electromagnetic fields from power lines causes health problems.
- The nearest receptor to the proposed transmission line is a cottage on Hare Lake, approximately 2 to 3 km away.

The Panel agrees with the Proponent's conclusion that health risks related to the electromagnetic fields from the transmission line are low.

Recommendations

The Panel set out recommendations for mitigation and follow-up programs for air quality, water quality, fish, and noise in the respective sections on these valued ecosystem components. Those recommendations also apply to human health.

The Panel recommends that the Proponent implement a follow-up program:

Recommendation 74: The Proponent should develop and implement, in consultation with Indigenous groups, a country foods follow-up program to verify whether contaminant levels in country foods have risen due to the Project by:

- monitoring methylmercury and other contaminant levels in fish tissue prior to construction, during construction, and during operations at locations of Indigenous interest. Sampling size of large-bodied fish should be 10 to 20 fish, with sizes ranging between 25 and ≥ 75 cm, and using fish species representative of fish present and also of interest to Indigenous groups such as walleye and northern pike;
- monitoring contaminants, including polycyclic aromatic hydrocarbons, in plant species of interest to Indigenous groups, including blueberries, during construction and operations;
- monitoring contaminants of potential concern, including mercury, in food types representative of Indigenous diets; and,
- communicating the results of the country foods follow-up program regularly to Indigenous groups.

The Panel supports the Proponent's commitment to obtaining approval from Biigtigong Nishnaabeg for the development and implementation of the mercury monitoring program. The opportunity for collaboration should be extended to other Indigenous communities. When developing the program, the Proponent should consult with relevant government agencies to determine the frequency, duration, and methods of sampling.

Recommendation 75: The Proponent should update the human health risk assessment to assess the potential risk to human health and inform adaptive management strategies if measured concentrations of contaminants of potential concern in environmental media (i.e., air, water, and country foods) show an increasing trend that was not originally predicted as determined through the follow-up programs for air quality, water quality, and country foods.

The Panel concludes that, if the recommended mitigation measures and follow-up program are implemented, as they are described throughout this report for the various biophysical valued ecosystem components that intersect with human health, the Project is not likely to cause a significant adverse environmental effect on human health.

In addition to their recommendations to the Proponent, the Panel recommends that government agencies implement the following measures:

Recommendation 76: Government agencies, including Environment and Climate Change Canada and the Ministry of the Environment, Conservation and Parks, should develop water quality objectives or guidelines for platinum group metals.

Recommendation 77: Health Canada should develop their own, or formally endorse an existing, quantitative method for evaluating health risks from diesel exhaust. This would guide proponents in the development of future environmental impact statements.

17.8 CUMULATIVE EFFECTS

Views of the Proponent

GenPGM predicted that the Project would increase contaminant concentrations beyond background levels in the Site Study Area and Local Study Area, however, no increased risk to human health was predicted. The Proponent did not predict increases of methylmercury, or other contaminants in the environment, that would result in changes to human health as a result of country food consumption. The Proponent predicted there would not be cumulative effects on human health as a result of the Project.

Views of Participants

Biigtigong Nishnaabeg stated they continue to experience the cumulative impact of past and present development and pressure from ongoing mineral exploration in their Exclusive Title Area. They expressed concern that existing mining activity combined with the Project's effects could result in cumulative effects to human health. Biigtigong Nishnaabeg indicated that the Proponent had not included the Geco Mine or the Hemlo Gold Mine in their assessment, noting that both mines are within the Black River watershed, which meets the Biigtig Zibi. They indicated that cyanide spills from the Hemlo Gold Mine had occurred in the past. Biigtigong Nishnaabeg observed that uncontrolled discharge of contaminants from either mine would result in cumulative effects in the Biigtig Zibi.

The Crown Consultation Team stated that, based on information from the community, there is a high potential for the Project to contribute to cumulative human health effects on Biigtigong Nishnaabeg.

Panel Conclusions and Recommendations

The Panel heard concerns from many participants regarding the elevated levels of methylmercury in fish tissue, and in fish in waterbodies near the Project. The Panel notes that that fish consumption advisories are currently in place in the Project area. Fish are an important country food for Indigenous communities in the region. The Panel understands that some Indigenous community members may be avoiding consumption of fish, while others may be consuming fish to levels that exceed what is recommended by fish consumption advisories. The Panel considers that both avoidance of fish consumption and consumption above the

advisory concentrations or amounts would have an effect on human health. The Panel finds that even minor increases of methylmercury in fish tissue could compound an already existing adverse effect.

As a result, the Panel considers that consumers of country foods, in particular Indigenous communities, are already experiencing substantial adverse effect on human health from the existing mercury levels in fish tissues, and the consumption of more fish than recommended.

The Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, as they are described throughout this report for the various biophysical valued ecosystem components that intersect with human health, the Project is not likely to cause a significant cumulative effect on human health.

However, the Panel is of the view that *any* incremental increase in mercury levels in local waterbodies could contribute to existing adverse cumulative effects on human health. Although it is unlikely, if, despite mitigation, mercury levels in fish were to increase due to the Project, the Panel concludes that the Project, in combination with other Projects and activities, would cause a significant adverse cumulative effect on human health.

SECTION 18: SOCIO-ECONOMIC ENVIRONMENT

This section addresses the Project's environmental effects on socio-economic conditions considerations. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act* and that inform the assessment of effects under subsection 5(1)(c) of the *Canadian Environmental Assessment Act, 2012*.

For the purposes of the environmental assessment, GenPGM considered the following aspects of the socio-economic environment: economic issues, social issues including services and infrastructure, land and resource use, navigable waters, and physical and cultural heritage resources.

This section of the report includes an analysis of the socio-economic effects on Indigenous and non-Indigenous communities. Further analysis of the effects of this Project on Indigenous communities is presented in Section 21 (Effects on Indigenous Peoples).

18.1 ECONOMY AND EMPLOYMENT

18.1.1 Requirements for the Economy and Employment

This section addresses the Project effects on the economy and employment. The *Guidelines for the Preparation of an Environmental Impact Statement* (EIS Guidelines) required GenPGM to:

- provide information on the existing status of the socio-economic components, recognizing interrelationships, system functions and vulnerabilities;
- assess potential economic effects, including:
 - positive effects or benefits, resulting directly from the Project including estimates of direct, indirect and induced income for all Project phases;
 - estimates of government expenditures that may be required if the Project is developed;
 - a description of future economic activity without the Project;
 - training or education programs to be provided; and
 - a labour market analysis.

18.1.2 Economy and Employment Baseline

Views of the Proponent

The Proponent reviewed and updated much of the baseline report as a precursor to the EIS Addendum, due to the fact nearly 10 years had elapsed and the dynamic nature of socio-economic data. To update the status of current conditions, data sources were revisited, and the Proponent held conversations with the Town of Marathon administrative staff, other local authorities, and Biigtigong Nishnaabeg.

A single study area (the Regional Study Area) was identified for the purposes of the economic and employment assessment. The census subdivisions within 100 km of the Project included:

- the Town of Marathon;
- Pays Plat Indian Reserve 51;
- Pic Moberg North (part of the Netmizaaggamig Nishnaabeg land base);
- Pic Moberg South (part of the Netmizaaggamig Nishnaabeg land base);
- Pic River 50 Reserve Lands (now known as the Biigtigong Nishnaabeg First Nation Reserve);
- Schreiber Township;
- Terrace Bay Township;
- Manitouwadge Township; and
- White River.

According to the *Socio-economic and Current Use Updated Baseline Report*, the total population of the Regional Study Area in 2016 was 9,380, including 1,855 persons of Indigenous identity. The population of the Town of Marathon, also included in the Regional Study Area population, is 3,275. While the EIS described the socio-economic environment of specific municipalities and Indigenous communities, the Proponent acknowledged that members of other Indigenous groups, including Superior Northshore Métis (the Métis Nation of Ontario), the Red Sky Métis Independent Nation, and the Ontario Coalition of Indigenous Peoples reside in the Local and Regional Study Areas. The 2011 socio-economic baseline report indicated that the populations of all municipalities in the Regional Study Area, except for Schreiber, were decreasing. The Proponent did not clarify, in their updated analysis, whether this trend was still occurring. Among the Indigenous communities, Biigtigong Nishnaabeg and Pays Plat First Nation experienced population increases, while Pic Moberg First Nation's population decreased.

The Proponent cited Statistics Canada data (2017 and 2018) indicating that there were 4,705 people (49.2% female) in the labour force in the Regional Study Area, for a workforce participation rate of 59.6%. The average unemployment rate for the Regional Study Area reported in the 2016 census was 9.5%. Indigenous persons account for 18.1% of the labour force, and there is a 14.1% unemployment rate amongst this group.

Permanent or temporary closures of pulp mills and other forest-sector operations in Marathon, Manitouwadge, White River, and Terrace Bay have contributed to job losses and population declines. Employment is greatest in the mining and quarrying sector, accounting for 14.8% of the labour force (690 persons), followed by retail trade (12.4% or 580 persons) and health care and social assistance (11.1% or 515 persons).

Using Statistics Canada 2017 and 2018 data, the Proponent's *Socio-economic and Current Use Updated Baseline Report* presented income in the Regional Study Area as \$39,112 (median) and \$63,919 (mean); these numbers are \$31,960 and \$44,621 for Indigenous groups. The Proponent noted regional labour market trends in the mining industry, which included:

- Mining companies are having difficulty attracting and retaining qualified staff.
- A mobile workforce results in workers seeking employment outside of Northwestern Ontario.
- An aging workforce means an estimated 25% of the industry's current workforce is set to retire by 2027.
- Women are underrepresented in the industry, accounting for 17% of the workforce, mostly in clerical and corporate services roles.

Views of the Participants

The Town of Marathon stated that it is a resource-based community with a socio-economic history of serving as a host community for the mining and forestry industries. The town has been home to the Hemlo Gold Mine for more than 35 years as well as the Marathon Pulp Mill for more than 70 years, up until it closed in 2009.

18.1.3 Economic and Employment Contributions

Views of the Proponent

GenPGM stated the Project would result in employment opportunities and income, government revenue, and economic and business development, particularly in the construction and operations phases of the Project.

During the hearing, the Proponent clarified employment for the construction phase, estimating a need for an average of 430 to 550 workers, with a peak of between 800 and 1,000 workers. Operations would require an average of 430 employees split in a one-week on/off rotation, meaning 215 workers in a given week. The Proponent estimated that 80%–90% of the Project’s operational labour force would comprise workers from Regional Study Area communities, with the remaining 10%–20% being transient workers.

The Proponent stated that, because labour force participation in the regional mining and mining-related sectors is skewed toward non-Indigenous and male workers, it is likely that a greater number of men than women and non-Indigenous persons than Indigenous persons could be eligible for employment with the Project. However, the Proponent stated that they would provide opportunities for skills training to ensure that women and Indigenous persons can acquire the skills to participate in the Project. The Proponent indicated they have been exploring a number of opportunities and partnerships for training, including Northwest Employment Works, Anishinabek Employment and Training Services, and Confederation College. They also noted they have begun developing a skills survey that would be placed on their recruitment website to better understand the level of skills that are available in the regional population.

The Proponent noted that the labour benefits are not limited to the Marathon area. Project spending would create employment and labour income in Ontario and elsewhere in Canada. A summary of estimated direct, indirect, and induced full-time equivalents and labour income is presented below.

Table 18-1: Estimated Direct, Indirect, and Induced Full-time Equivalents and Labour Income

Project phase	Full-time equivalents	Income (millions CDN\$)
Site preparation/construction	5,075	433
Operations (annually)	1,165	104
Active closure/post-closure	333	31
Sustaining capital	4,491	267

Note: Adapted from Table 6.2.9-4 in the EIS Addendum (CIAR #727)

The Proponent presented a cost-benefit analysis to weigh the potential economic benefits to all levels of government against estimates of municipal, provincial, and federal expenditures that may be required if the Project were to be developed. The Proponent estimated they would pay \$24 million in local school and property taxes over the life of the Project, or approximately \$1.5 million annually. Payments to the town by the Proponent for fee-based services such as potable water or waste disposal would also be incurred. The Proponent estimated that the total amount of tax collected would offset the incremental annual costs to the Town of Marathon for hosting the Project, which were presented as \$912,000 for the construction phase and \$399,500 for the operations phase.

The Proponent stated that, if the Project were to proceed, capital spending during Project construction is estimated to generate approximately \$81 million in federal tax revenue, and \$54 million in provincial tax revenue. Sustaining capital investment would generate a further \$26 million in federal tax revenue and \$19.5 million in provincial tax revenue. Project expenditures associated with operations would, on average, generate an estimated \$20 million in federal tax revenue and \$13 million in provincial tax revenue annually. In addition, the Proponent estimated that they would pay a total of \$245 million in Ontario mining duties, \$279 million in provincial income taxes, and \$419 million in federal income taxes. The Project would also generate an estimated \$4 million in other property royalties to be payable over the life of the Project.

The Proponent submitted a summary of estimated gross domestic product contributions, the potential value added to the economy from the Project.

Table 18-2: Estimated Total Gross Domestic Product Contributions (Millions CDN\$)

Project phase	Ontario	Rest of Canada	Total
Site preparation/construction	606	173	779
Operations (annually)	190	-	190
Active closure/post-closure	57	-	57
Sustaining capital	307	91	398

Note: Adapted from Table 6.2.9-5 of the EIS Addendum (CIAR #727). Figures include direct, indirect, and induced contributions.

The Proponent predicted that adverse economic effects would be triggered as the Project transitions from the operations to closure phases. The Proponent stated these effects would occur within the boundaries of normal variation of conditions, given the cyclical nature of the mining industry in the region. They stated they intended to implement strategies to help transition the workforce after mine closure.

Views of the Participants

The Town of Marathon strongly supported the Project throughout the environmental assessment process. Representatives emphasized the importance of the mining industry to the community and the potential for job creation, from the Project itself and from peripheral fields such as transportation, environmental management, or food services. The Town stated that these new employment opportunities would require training and education. Implemented locally, these would directly enhance community education levels that would have far-reaching benefits for all of Marathon and the region.

The Panel heard from municipal representatives that these employment opportunities would incentivize people, especially youth, to stay or return to Marathon. The Town of Marathon noted that the average weekly mining wage is 70% higher than the average industrial wage in the province. Local training and education opportunities were noted by the Town as a benefit of the Project. The Town also emphasized the data shared by the Proponent regarding added employment and revenue (Table 18-1). The Town offered that increased municipal revenue would be reinvested in quality-of-life initiatives such as sports and recreation programs in Marathon.

The Thunder Bay Community Economic Development Commission indicated that more than 400 businesses within the Thunder Bay region currently support the mining industry. The organization stated that these companies rely heavily on future contract opportunities from resource development such as with this Project. The Commission added that Thunder Bay is prepared to support the Project and local communities in bridging gaps, as required, in the workforce and skilled labour, infrastructure capacities, or other challenges that may arise. The Commission noted that with activities tapering down at the Hemlo Gold Mine near Marathon, the Project would offer continuity to the local and regional mining workforce.

The Thunder Bay Chamber of Commerce voiced support for the Project on similar grounds, emphasizing the potential for community growth and strengthened social ties, job creation, training and skills development, Indigenous and community partnerships, and entrepreneurial activities. The Chamber stated that approximately 850 Thunder Bay residents work at mines in Northwestern Ontario, while thousands more are employed by the 400-plus service and supply companies that support mining exploration and operations sites.

The Thunder Bay Metal Fabricators Association, and some of their member companies, submitted documentation of support for the Project, and referenced experience servicing mining and forestry facilities in Northwestern Ontario. The association stated that their 25 member companies, with 1,200 skilled workers, rely on industrial projects similar to the Project.

Many members of the general public wrote to the Panel throughout the environmental assessment process to express support for the Project. The general theme of these submissions was that it would be a boon to the local economy and offer welcome employment prospects.

MiningWatch Canada questioned the economic viability of the Project as described in Section 5 (Need, Purpose, and Assessment of Alternatives). The organization stated the Project is particularly susceptible to price fluctuations for metals. MiningWatch Canada submitted that the Proponent is attempting to capitalize on current trends in palladium markets, which saw prices per ounce rise to greater than \$2,000 US for much of 2020 — significantly higher than the long-term average. Northwatch also questioned the long-term demand for copper, and cited conflicting market reports published by Reuters and Bloomberg news agencies. MiningWatch Canada and Northwatch warned that if the Project was rendered unprofitable

due to fluctuations in the price of either metal, the costs for remediation of the site would be borne by Ontario taxpayers.

18.1.4 Economy and Employment Monitoring and Follow-Up

GenPGM committed to implementing a Socio-economic Monitoring Program to verify the accuracy of the predicted effects, determine the effectiveness of mitigation measures, and inform adaptive management. A conceptual program was first tabled by the Proponent in 2013 and was reviewed by the Town of Marathon and Biigtigong Nishnaabeg. The program envisioned relying on information collected from the Proponent, Indigenous groups, government agencies, community organizations, relevant businesses, and Crown corporations. The study area for the monitoring program would include Marathon, Terrace Bay, Manitouwadge, Biigtigong Nishnaabeg, and other Indigenous communities as appropriate. The primary economic indicators would include population and employment data disaggregated by age and gender, unemployment and workforce participation rate, employment income, and business development.

18.1.5 Panel Conclusions and Recommendations

In reaching their conclusions on the economic and employment contributions of the Project, the Panel found the following to be factors to be particularly relevant:

- The Project would create hundreds of jobs over its lifecycle.
- There are commitments from GenPGM in partnership with other organizations to provide training and education opportunities.
- Support from local and regional business groups and residents based on employment opportunities.
- The contribution to the gross domestic product would be on the order of hundreds of millions of dollars.
- Ontario and Canada would each receive hundreds of millions of dollars in tax revenue.
- Non-governmental organizations expressed concern about the vulnerability of the Project due to metal-price fluctuations, the quality of the deposit, and the potential for a premature shutdown of the mine, resulting in costs to taxpayers.
- Job losses would be experienced after the mine shuts down.

The Panel finds that the Project would have positive economic and employment benefits for the Town, the region, and the province. The Proponent estimated the construction and operations phases would span approximately 14 years. In a community with limited employment

opportunities, this would provide jobs, although these would be lost after the mine shuts down. On balance, this Project would provide positive economic and employment opportunities. Measures to monitor and encourage underemployed segments of the population through training and education opportunities would enhance the beneficial effects of this Project.

The Panel recommends that the Proponent implement the following measures to help ensure the benefits on employment and the economy are equitably experienced:

Recommendation 78: As part of Project planning, GenPGM should develop recruitment and training programs focused on attracting and retaining underrepresented populations (e.g., Indigenous Peoples and women) within the mining sector. The focus of these programs would be on populations within the Local Study Area and Regional Study Area and would continue into the operations phase of the Project to address employee attrition.

Recommendation 79: GenPGM should undertake a socio-economic monitoring program during construction and operations to verify the accuracy of the predicted effects, determine the effectiveness of recruitment and training programs, and inform adaptive management. The primary economic indicators would include population and employment data disaggregated by age and gender, unemployment, and workforce participation rate. The aggregated findings of this program would be posted to their website on an annual basis.

The Panel notes that recommendations 78 and 79 would only need to be considered under the Ontario *Environmental Assessment Act*.

The Panel concludes that there are no significant adverse effects on employment and the economy and that, if the recommended mitigation measures and follow-up programs are implemented, the Project is likely to have a positive effect on the economy and employment.

18.2 ACCOMMODATIONS, INFRASTRUCTURE AND SERVICES

18.2.1 Requirements for Accommodations, Infrastructure and Services

This section addresses the Project effects on accommodations, infrastructure and services. The EIS Guidelines required GenPGM to:

- provide information on the existing status of housing availability in the town of Marathon; and
- assess the potential effects from the Project on housing availability, community and social and health services, and traffic and transportation.

18.2.2 Accommodations, Infrastructure and Services Baseline

Views of the Proponent

The Local Study Area encompassed the area immediately surrounding the Project, including the town of Marathon and the reserve lands of the Biigtigong Nishnaabeg. The Regional Study Area included communities within a 100-km driving distance of the Project as listed in Section 18.1.2.

GenPGM reported that housing vacancy rates for owned homes and rented accommodations in the Regional Study Area are currently low as a result of other resource projects in the area. In addition, there are 364 temporary accommodation (hotel and motel) rooms in the Regional Study Area.

The Regional Study Area includes 20 schools, five of which are in Marathon. The Proponent noted that educational services are also offered by Biigtigong Nishnaabeg and Netmizaaggamig Nishnaabeg.

Three hospitals and five medical clinics provide community health care in the Regional Study Area. Marathon hosts the 22-bed Wilson Memorial General Hospital. Health services in the Indigenous communities are provided via federally funded, community-based programs, and local health centres.

For community safety, police services in the Regional Study Area are provided by the Ontario Provincial Police and the Anishinabek Police Service. There are seven fire departments in the Regional Study Area with 108 members.

Drinking water treatment and distribution, and wastewater treatment, are provided by the municipalities. Marathon has five groundwater wells designed for a capacity of 5,500 people. The Town's water distribution and treatment services do not serve Biigtigong Nishnaabeg.

A new landfill opened in Marathon in 2015 and it is not expected to reach capacity until 2140.

Views of the Participants

At the hearing, the Town stated that they are fortunate to have great health services in the community provided by Wilson Memorial General Hospital, which, as of the date of the hearing, employed eight full-time physicians. There is also a hospital in nearby Terrace Bay, meaning the region is well serviced. An additional 14 long-term care beds have also been approved by the Government of Ontario for the town of Marathon.

The Biigtigong Nishnaabeg stated that there is inadequate infrastructure and service on their reserve including but not limited to:

- a water treatment facility,
- related utilities including sewage treatment,
- school facilities (including related land-based education),
- health and social services,
- emergency response (police, fire, medical),
- transportation services, other road supports, and related equipment.

Biigtigong Nishnaabeg noted, via the Crown Consultation Team, that housing availability is non-existent in their community; all of the 168 houses on the reserve being at or beyond capacity. There are currently more than 40 people or families on various wait lists for homes, including single- or two-bedroom units for Elders, families requiring multiple bedroom homes, and families who have outgrown their existing homes and need more space.

Biigtigong Nishnaabeg identified several health issues of concern, including high rates of family violence; women's health; children's health; and alcohol, drug, and other substance abuse issues that rely on social services. The community indicated that all community health and social services are at capacity or under stress. This situation was exacerbated by the COVID-19 pandemic, which led to additional demands for physical and mental health services and programs.

18.2.3 Project-Related Housing and Accommodations

Views of the Proponent

GenPGM stated that demand for housing, rental units, and temporary accommodations in Marathon and surrounding communities could increase as transient workers move to the area for the Project construction and operations phases. This could lead to upward pressure on housing prices, residential rent rates, and ultimately reduced affordability, particularly in light of the existing low local housing vacancy rate. The Proponent presented a worst-case scenario that assumed 100% of construction workers and 50% of operations workers would be transient. A Valard work camp in the town of Marathon can accommodate 350 workers. The Proponent suggested this work camp could be repurposed to house transient workers during the construction phase of the Project, noting that, due to its modular design, it could be doubled in size. In addition, a proposed accommodations complex is designed to accommodate 100 people, could be expanded to accommodate 180 workers and built earlier to host overflow workers in the construction phase. Rotational work schedules could mean only half of the

transient workforce would be in the town/region at a given time. Further, rotational work schedules could mean only half of the transient workforce would be in the town/region at a given time.

As noted above, an accommodations complex that could accommodate up to 180 workers, if needed, would be built to house workers during operations. The Proponent emphasized that the more likely scenario, rather than having to house this many workers from outside the area, is for 80% to 90% of workers would live in local communities. The Proponent noted that more than 700 people work in the regional mining industry. The conversion of the Hemlo Gold Mine to an underground operation would lead to reduced labour requirements, meaning many of these local workers could be available to work for the Project and would not need transient workforce accommodation.

The Proponent stated that the implementation of a housing strategy is the primary mitigation measure proposed to alleviate pressures from out-of-region workers on housing and infrastructure and services more generally.

Views of the Participants

The Town of Marathon stated that when Hemlo Gold Mine was originally developed, the Town had anticipated growing to 10,000 people. As a result they have areas already serviced and ready for development. Several new developments were described including a subdivision expansion in the Penn Lake Heights area, a new 30-unit multi-residential facility under construction in the spring of 2022 and an additional 110 multi-residential units planned for construction in late fall of 2022.

Two additional hotels with construction started in April of 2022 and would add 80 units. The Town of Marathon also noted that a 36-unit supportive housing complex was built two years ago with construction started in April 2022 that would add 80 units.

Biigtigong Nishnaabeg reported to the Crown Consultation Team that approximately 14% surveyed respondents indicated they would move back to the community should employment be secured. Of these, approximately 18% intended to apply for housing on-reserve and would bring two or more family members with them. These would be in addition to the existing housing wait list in the community. Biigtigong Nishnaabeg identified barriers to building new housing in their community, including insufficient potable water infrastructure, scarcity of dry land to build foundations and septic fields, and lack of funding. Biigtigong Nishnaabeg asked that the Panel recommend a “whole of government” response to address these issues.

The Red Sky Métis Independent Nation expressed concern about increased housing insecurity for members living in Marathon, as a result of Project demand raising costs.

18.2.4 Infrastructure and Services

Views of the Proponent

GenPGM stated that local utilities would generally have the capacity to receive increased demand from the Project. The Marathon potable water system could accommodate nearly twice the maximum daily usage, while the municipal landfill (which opened in 2015) would not reach capacity for 100 years. The Proponent recognized that water treatment and sewage facilities in Biigtigong Nishnaabeg would not be adequate to support an increase in demand, should members choose to return to the community after gaining employment with the Project. The Proponent committed to implementing a Waste Management Plan for the Project.

The expected influx of workers could increase demand for various community, safety/police, emergency, health, and educational services, particularly in cases where families relocate to the area. The Proponent stated that transient workers would be well served at the accommodations complex, consuming fewer services on a per-person basis than the general population. The Proponent also stated that, because of population declines in the region, many services are now in position to absorb greater demand. They acknowledged the opposite is true for Biigtigong Nishnaabeg, where many services are currently operating beyond capacity.

A commitment was made by the Proponent to engage with municipal authorities in coordinating the planning of infrastructure development or upgrades that may be needed. Other mitigation identified by the Proponent included supporting key community services or organizations; providing fitness and recreational programs for workers within existing facilities; and providing Project employees with physical, mental, and social health services, including an employee assistance program and onsite emergency services.

Local roadways would also see increased use as up to 150 passenger vehicles, up to 40 haul trucks of concentrate, and 6 haul trucks of supplies could travel to/from the Project site each day. The Proponent indicated they would mitigate traffic effects by implementing a Traffic Management Plan. This plan would include scheduling shift changes and truck movements to avoid peak traffic hours and school-bus times, encourage carpooling, and providing bus transport to the Project site, as well as to widen the entrance to Camp 19 Road from Highway 17.

The Proponent concluded that the Project's adverse effect on infrastructure and services was not significant and could in fact be positive as increased demand may lead to investment and improvements in housing and recreation.

However, the Proponent determined that, with respect to infrastructure and services, the Project and additional members returning to the community could result in capacity constraints on most Biigtigong Nishnaabeg infrastructure and services. The Proponent stated that addressing these challenges with investments in areas such as a new elementary school, a

community master plan, a housing program, new water infrastructure, and police funding, would require discussions between Biigtigong Nishnaabeg and Indigenous Services Canada.

Views of the Participants

Indigenous communities, particularly Biigtigong Nishnaabeg and Pays Plat First Nation, provided extensive information on the status of and potential effects on infrastructure and services in their communities. Biigtigong Nishnaabeg indicated that almost all community services, including housing, health care, education, and child/elder care, among others, are currently stressed or at capacity. Representatives from Biigtigong Nishnaabeg said members would want to return to their community to live and work at the proposed mine and that this would result in added pressures on housing, schooling, and infrastructure. Biigtigong Nishnaabeg concluded that additive pressures from the Project could therefore result in high impacts on socio-economic values and conditions.

Northwatch acknowledged that there may be many benefits of the Project and acknowledge and appreciate the Town's supporting the Project for the economic benefits. However, they stated that there should have been a more thorough consideration of the impacts on housing availability and prices. Further, they stated that they would expect there to be a strategy in place and closure transition funding available for local communities and the Town.

Citizens for Responsible Industry in Northwestern Ontario, spoke to the value of a community benefits agreement with an oversight committee to engage the Marathon community in understanding and mitigating the Project's effects and advancing potential benefits as the Project moves forward. The group stated that such a community benefits agreement would be a legally enforceable document that endures even if ownership changes and would be in addition to community benefit agreements established with Indigenous communities. Citizens for Responsible Industry in Northwestern Ontario stated that it would detail in writing the benefits a community should expect from the Project, including hiring practices, funding for training and education, neighbourhood improvements and support for social enterprises, including the health sector.

Citizens for Responsible Industry in Northwestern Ontario indicated the oversight committee should comprise people who do not have an economic connection to the Project and include members who have technical and governance expertise, and reflect the local and regional citizenry. The oversight committee would have access to Project reporting and receive independent funding to allow them to carry out their mandate. The Town was supportive of this suggestion while the Proponent stated this role was addressed through the existing environmental committees. The Proponent indicated that the frequency of meetings with environmental committees would decrease throughout the life of the Project as it moved through the various phases.

The Town stated that the Project could play an important role in social well-being by partnering with and contributing to community organizations, charities, and programs. The Project could help secure the socio-economic sustainability of Marathon. The Town of Marathon warned that, without the Project proceeding, it could experience a population decline, with an exodus of skilled professionals, the loss of critical services and infrastructure, economic decline, and worsening social cohesion.

18.2.5 Violence and Crime Risks From an Influx of Transient Workers

Views of the Proponent

GenPGM acknowledged at the hearing that worker camps associated with resource projects can compromise the safety of women, particularly Indigenous women. GenPGM proposed, as a mitigation measure, to hold mandatory cultural sensitivity training for all employees.

Views of the Participants

Biigtigong Nishnaabeg stated that the literature provides clear evidence of how resource extraction projects that attract large groups of out-of-town men for employment can contribute to increases in violence, assaults, racism, unplanned pregnancies, drug use, and safety concerns for women and children in Indigenous communities. The community quoted from the *Final Report of the National Inquiry into Missing and Murdered Indigenous Women and Girls*, emphasizing these risks affect primarily Indigenous women, girls, and two-spirit, lesbian, gay, bisexual, transgender, queer, questioning, intersex, and asexual (2SLGBTQQIA) people. Biigtigong Nishnaabeg shared concerns about the possibility of resource-extraction projects in their asserted traditional territory causing spikes in violence against their community members.

The Crown Consultation Team noted the concerns expressed by Biigtigong Nishnaabeg and identified a need for the Proponent to develop policies and procedures in collaboration with Indigenous groups to address workplace and community risks associated with sexual harassment, violence, harassment, and discrimination. This included proper education of the workforce with a code of conduct that covers issues of discrimination and violence.

The Town of Marathon indicated that their experiences hosting 330 transient workers for the construction of the East-West Tie Transmission Line, in addition to other past resource/industrial projects, have been positive. The Town of Marathon stated they would not expect an increase in police service calls due to the presence of a worker accommodations complex, citing discussions with the local police commander.

Northwatch expressed concern about the effects out-of-town workers, predominantly those living in accommodations complexes, could have on women. The organization cited the *Final Report of the National Inquiry into Missing and Murdered Indigenous Women and Girls*, which

found that Indigenous women are particularly at risk. Northwatch criticized the absence of a gender-based analysis to reveal the potential adverse effects the Project could have on women.

18.2.6 Panel Conclusions and Recommendations

In reaching their conclusions on accommodation, infrastructure and services, including violence and crime, the Panel found the following to be factors to be particularly relevant:

- GenPGM has accounted for accommodation for up to 50% of the transient workforce at the proposed accommodations complex and construction camp and would operate it on a rotational schedule.
- The Town stated there is sufficient infrastructure and social services to support the development of the Project.
- Additional housing developments in Marathon are approved or at an advanced planning stage.
- GenPGM would provide services in support of transient workers.
- Biigtigong Nishnaabeg has constraints on almost all social services within their community.
- The potential negative effects of out-of-town workers can have on vulnerable groups such as Indigenous women is a documented concern raised by Indigenous groups and non-governmental organizations.

The Town of Marathon confirmed the Proponent's assessment that there is sufficient infrastructure and social services to accommodate growth in the community associated with the Project. The commitments made by the Proponent, if implemented, would provide sufficient accommodation and services for transient workers. The Panel heard from the Town that additional housing developments will be available in the near future should workers and families move into the community.

The Panel is of the view that a large influx of workers poses an increased risk of sexual harassment, violence, harassment and discrimination for Indigenous community members, particularly women. This risk also extends to marginalized community members such as 2SLGBTQQIA individuals. GenPGM has committed to cultural sensitivity training and the establishment of a code of conduct. The Panel believes this is best developed in collaboration with Indigenous groups and members of the 2SLGBTQQIA communities. It would be important to monitor the success of this training, augment and adjust the curriculum and articulate consequences in response to sexual harassment, violence, harassment, and discrimination events.

The Panel acknowledges a Marathon community benefits agreement as described by Citizens for Responsible Industry in Northwestern Ontario would help ensure that social services are appropriately supported and that the Marathon community experiences the full benefits of the Project.

The Federal government has the responsibility for reserve lands. CEAA 2012 does not provide for the assessment of direct social effects on Indigenous communities (i.e., the need for on-reserve infrastructure and housing). However, the Panel acknowledges that Biigtigong Nishnaabeg have requested, and the Proponent supports, a “whole of government” response to on-reserve infrastructure and housing challenges to help their members return to the reserve to live and benefit from employment opportunities at the Project.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 80: GenPGM should provide employees with physical, mental, and social health services, including an employee assistance program and onsite emergency services such that new and unsustainable demands from the Project are not placed on existing services in Marathon. These services would commence at the beginning of Project construction.

Recommendation 81: GenPGM should implement a worker housing strategy, which entails the use of an accommodations complex in or near Marathon during construction and operations, and a rotational work arrangement to minimize the number of transient workers in Marathon at any point in time.

Recommendation 82: GenPGM should provide sufficient financial support to fund key community services or organizations in support of fitness and recreational programs for workers. These programs should be carried out in existing facilities.

Recommendation 83: The Proponent should work with the Town of Marathon to establish an oversight committee comprising local and regional citizens that would have access to Project reporting and regular Project updates. GenPGM should work with the Town to identify an agreed level of funding to support the operation of the committee.

Recommendation 84: GenPGM should develop policies and procedures in collaboration with Indigenous groups that address workplace and community risks associated with violence, harassment and discrimination. The policies should include a code of conduct that covers issues of violence, harassment and discrimination. Information on these policies and procedures would be part of a cultural competency training program for all employees hired throughout the life of the Project that should also include content on the history of the residential school system, the Truth and Reconciliation Commission, missing and murdered Indigenous women and girls, and Indigenous rights. An incident reporting and monitoring program should be established. The program should assess the effectiveness of the training with augmentation and adjustment to training and conduct expectations. Explicit

consequences should be articulated and enforced in response to violence, harassment and discrimination events.

The Panel notes that Recommendations 80, 81, 82, 83, and 84 would only need to be considered under the Ontario *Environmental Assessment Act*.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause significant adverse effects on the socio-economic environment with regards to off reserve accommodation, infrastructure and non-Indigenous services.

18.2.7 Cumulative Effects

Views of the Proponent

The Proponent indicated that mineral exploration, and projects developed by Biigtigong Nishnaabeg such as hydroelectric facilities, wind energy projects, and water system upgrades were most likely to act cumulatively with the effects of the Project. The Proponent acknowledged that if future projects with large workforces overlapped temporally with the Project, additional demand would be placed on local services and infrastructure. The Proponent concluded the Project's incremental contribution to cumulative effects on infrastructure and community services is predicted to be negligible.

Views of the Participants

The Panel did not receive any views from participants with respect to the cumulative effects to infrastructure and services outside of Indigenous communities.

Panels Conclusions and Recommendations

The Panel notes the Town of Marathon has confirmed that they have sufficient infrastructure and social services to support the development of the Project. The Proponent has also committed to providing services to support transient workers, primarily through the accommodations complex.

The Panel understands that nearby projects or activities such as mineral exploration as well as Biigtigong Nishnaabeg-led developments could require large workforces that would conceivably be hosted in Marathon. However, the Panel heard little, specific information on the status of other projects including whether they were approved and/or likely to proceed and what the associated labour requirements would be. Further, the Panel is satisfied that the incremental cumulative effect of the Project on existing infrastructure and services would be minor. There Panel's views on cumulative effects to Indigenous communities are discussed in Section 21 (Effects on Indigenous Peoples).

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on infrastructure and services, outside of Indigenous communities.

18.3 LAND AND RESOURCES USE

18.3.1 Requirements for Land and Resources Use

This section addresses the Project effects on land and resources use. The EIS Guidelines required GenPGM to:

- provide information on past, current and planned land use that may be affected by the Project, including land tenures; commercial and recreational fisheries; recreation and tourism; hunting, trapping, fishing, and guiding; forestry activity; mining projects and mining leases; and agriculture; and
- assess potential effects from the Project on these aspects of land and resource use.

Views of the Proponent

The study areas for the land and resource use component differed from those used for the other socio-economic indicators. The Local Study Area added a buffer zone 1 km wide to the Project footprint to align with the wildlife valued ecosystem component. The Regional Study Area added a buffer zone 35 km wide, which GenPGM stated adequately captures the extent of potential land and resource users. The Site Study Area is located entirely on Crown land, which represents 96.5% (3,985 ha) of the Local Study Area and 96.2% (439,797 ha) of the Regional Study Area.

GenPGM reported that the Site Study Area was designated as rural by the Town of Marathon, and permits uses related to natural resources, such as mining and mineral exploration. The municipality's Official Plan includes mining operation policies within the rural designation to ensure that such facilities are compatible with surrounding land uses and do not adversely affect water resources and water-based activities.

The Project lies within the Pic Forest Management Unit. No potential harvest areas in their current management plan were identified within the Site Study Area and only 10 ha overlap the Local Study Area. Negligible agriculture exists in the area.

The Local Study Area is located within provincially defined Wildlife Management Units 21A and 21B, which also overlap portions of the Regional Study Area. Hunting is permitted in the area for moose, whitetail deer, black bears, small game, and fur-bearing animals. Two registered traplines intersect the Site Study Area, including the Biigtigong Nishnaabeg community trapline.

For more information on this trapline, see Section 21 (Effects on Indigenous Peoples). The Site Study Area is located within Ontario Fisheries Management Zone 7, which includes important fisheries for recreation and tourism.

In addition to recreational hunting, fishing, and trapping, informal summer recreational tourism in the Project and regional areas includes swimming, boating, canoeing, biking, picnicking, and birding. Winter recreation consists primarily of snowmobiling, cross-country skiing, and snowshoeing.

View of the Participants

Indigenous communities, particularly Biigtigong Nishnaabeg and Pays Plat First Nation, shared extensive information on historical and current land and resource use in the Project study areas. These views are included in Section 21 (Effects on Indigenous Peoples).

18.3.2 Land and Sensory Disturbance

Views of the Proponent

GenPGM reported the Project would result in the direct removal of 1,116 ha from current land and resource use. The Proponent committed to installing signage around the Site Study Area to alert land users to the presence of the Project. This landscape disturbance would affect the overall experience of various land and resource users, such as hunters, trappers, fishers, outfitters, and recreational users. Hunting, fishing, and harvesting activities would be prohibited at the Project site. Recreation and tourism in the area revolve around fishing, swimming, boating, canoeing, biking, picnicking, birding, snowmobiling, cross-country skiing, and snowshoeing. Sensory disturbances related to noise or dust could also affect human land users or wildlife. The Proponent acknowledged that this could lead to lesser enjoyment and alter behavioural patterns of land and resource users, as well as hinder the success of hunters. The local Steelhead trout fishery in the lower reaches of Angler Creek would be affected by flow reductions as a result of the construction of the process solids management facility. Public access to Bamoo Lake via a trail accessed off Camp 19 Road would be lost due to Project infrastructure, but guided access throughout the site would be provided to Indigenous groups when possible.

The Proponent noted that mitigation measures targeting effects on other valued ecosystem components (e.g., fish and fish habitat and air quality) would also reduce potential effects on land and resource use. The Proponent pledged to engage the Town of Marathon and provincial Crown lands permit holders to address potential disturbances or access restrictions.

A commitment was also made to communicate Project activities, locations, and timing to Indigenous groups, affected land and resource users, environmental non-governmental organizations, the provincial government, and local authorities.

The Proponent characterized the effects on land and resource use as being low in magnitude, as the 1,116 ha Project area is relatively small compared with alternative lands available for land and resource use activities. Sensory disturbances from noise and dust were predicted to be below relevant regulatory thresholds. Furthermore, the Project would not conflict with established federal, provincial, or municipal land use designations, policies, or by-laws. The Proponent anticipated that land and resource uses could continue to occur at or near current levels, and pointed out that other areas are available in the region for resource and recreational pursuits.

18.3.3 Land and Resource Use Monitoring and Follow-up

Views of the Proponent

The Proponent committed to implementing a socio-economic monitoring program (described in Section 18.1.3) to verify the accuracy of the predicted effects, determine the effectiveness of mitigation measures, and inform adaptive management. For land and resource use, the primary indicators would involve tracking the level of change of harvesting activity near the Project site, how harvesters relocate, and third-party use of the Local Study Area.

18.3.4 Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on land and resource use, the Panel considered the following factors to be particularly relevant:

- Loss of land and resource use of 1,116 hectares, but none of that area is identified under the *Pic Forest Management Plan* for forestry operations.
- The Project would not conflict with established federal, provincial, or municipal land use designations, policies, or by-laws.
- The Project area is relatively small compared to alternative local lands available for land and resource use activities.
- GenPGM assumed that land and resource uses could continue at or near current levels in other areas of the region for resource and recreational pursuits.
- The Panel heard that land and resource use effects would be primarily experienced by Indigenous groups, with Biigtigong Nishnaabeg in particular losing their community trapline. This has been reflected in Section 21 (Effects to Indigenous Peoples).

The Panel agrees with the Proponent that the Project does not conflict with designated land uses, including the applicable Forest Management Plan. Further, the Panel agrees that the Project area is relatively small compared with alternative lands in the area available for land

and resource use activities. The Panel also notes there does not appear to be broad use of the area of the Project by non-Indigenous users. Conclusions related to the effects of the Project on land and resource use by Indigenous Peoples are described in Section 21 (Effects on Indigenous Peoples).

The Panel recommends that the Proponent implement the following measures:

Recommendation 85: The Proponent should follow the requirements of the *Pic Forest Management Plan* for land clearing and wood utilization, to the extent possible, including the salvaging of merchantable wood for commerce or firewood.

Recommendation 86: The Proponent should, as part of a socio-economic monitoring program, monitor impacts on harvesters, including tracking the ability of harvesters to relocate and the level and change of harvesting near the Project site.

The Panel notes that Recommendations 85 and 86 would only need to be considered under the Ontario *Environmental Assessment Act*.

The Panel concludes that, if the recommended mitigation measures and follow-up program are implemented, the Project is not likely to cause a significant adverse effect on the land and resource use by non-Indigenous users.

18.3.5 Cumulative Effects

For information the cumulative effects of the Project on Indigenous land and resource users, see Section 21 (Effects on Indigenous Peoples).

Views of the Proponent

The Proponent stated that land clearing, such as mineral exploration and timber harvesting were the most likely to act cumulatively with the effects of the Project. The Proponent indicated the effects pathways of these activities would be similar to those of the Project, namely direct loss of area and sensory disturbances affecting land and resource uses such as hunting, trapping, outfitting, and recreational use. The Proponent reported that current and planned timber harvesting in the Regional Study Area, from the Forest Management Plans for the Pic Forest and White River Forest, represents 50,629 ha, or 14.6% of the land area. This land clearing would be in addition to the 1,116 ha cleared for the Project site. The Proponent concluded that land and resource use availability would not be degraded such that activity could not continue at or near current levels in the future.

Views of the Participants

The Panel did not receive any views from participants with respect to the cumulative effects to non-Indigenous land and resource uses.

Panel Conclusions and Recommendations

The Panel notes the Project would remove 1,116 ha from the land and resource use base, which represents 0.3% of the Regional Study Area. This would be in addition to current and planned timber harvesting, which represents 14.6% of the Regional Study Areas, as well as mineral exploration activity. The Panel believes there is sufficient land area within the Regional Study Area for continued land and resource use, even if the aforementioned projects and activities, and the Project were to occur simultaneously.

The Panel is generally aware that non-Indigenous land and resource users use the Regional Study Area for activities, including fishing, hunting, snowmobiling, and other recreational pursuits. However, the Panel was presented little information on the record concerning the nature of adverse cumulative effects that would occur from the Project in combination with those from other planned or foreseeable projects and activities.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on non-Indigenous land and resource use.

18.4 NAVIGABLE WATERS

18.4.1 Requirements for Navigable Waters

This section addresses the Project effects on navigable waters. The EIS Guidelines required GenPGM to:

- identify all waterways and waterbodies that would be directly affected by the Project, and include their width, depth, gradient, and flow;
- assess potential effects from the Project on navigable water, including the identification of Project components, activities or temporary works that could affect navigable waters; and
- provide information and describe potential effects on current and/or historical use of these waters, including by Indigenous groups.

Views of the Proponent

The Proponent reported that 13 numbered waterbodies and several other smaller ponds, across six subwatersheds would be directly affected by the Project, either through overprinting or loss of water. The Proponent conducted a screening exercise, based on their interpretation of the *Canadian Navigable Waters Act* (2019), to determine which of these, if any, could be considered navigable. The screening criteria were based on physical characteristics of the waterbody (size and depth), current travel use for recreational or commercial purposes, current travel use by Indigenous Peoples, potential future use, past use, and public access.

The Proponent's preliminary assessment was that none of the aforementioned waterbodies likely meet the definition of navigable waters. No specific authorizations would therefore be required under the *Canadian Navigable Waters Act* (2019). The Proponent stated that the effluent discharge system at Hare Lake meets the *Minor Works Order*, which would exempt it from requiring a formal application for approval.

Views of Participants

Transport Canada noted that it is responsible for making the determination of navigability for each impacted waterbody. Transport Canada stated that it does not currently have sufficient information regarding use of each of the listed waterbodies for navigation purposes by the public or Indigenous groups to determine whether they are navigable waters as defined in the legislation. Transport Canada circulated a survey to local Indigenous communities to help fill these information gaps but no further information was submitted to the Panel prior to the close of record.

18.4.2 Panel Conclusions

In reaching their conclusions on the effects of the Project on navigation, the Panel considered the following factors to be particularly relevant:

- There was no evidence that any waterways affected by the Project are navigable. This is due to shallow depth or impediments such as beaver dams.
- Further assessment is being undertaken by Transport Canada.

While there was no evidence that any navigable waterways would be impeded or affected by the Project. Transport Canada will continue to assess them and will follow a regulatory process to address potential effects to navigation. The Panel did not hear from any Indigenous group or other stakeholders that effects on navigation are expected.

Based on the limited information provided by Transport Canada and other participants, the Panel does not expect there to be a residual effect on navigation from the Project.

18.5 PHYSICAL AND CULTURAL HERITAGE RESOURCES

18.5.1 Requirements for Physical and Cultural Heritage Resources

This section addresses the Project effects on physical and cultural heritage resources. The EIS Guidelines required GenPGM to:

- identify and describe any areas containing features of historical, archaeological, paleontological, architectural, or cultural importance; and
- assess potential effects from the Project on physical and cultural heritage resources.

18.5.2 Physical and Cultural Heritage Resources

Views of the Proponent

The study areas for the physical and cultural heritage resources component differed from those used for the other socio-economic indicators. The Local Study Area added a 50-m wide buffer zone to the Project footprint, based on the potential for vibration effects. The Regional Study Area used the municipal limits of the Town of Marathon, or a 1-km buffer where the Project site sat outside this boundary.

GenPGM conducted an archaeological study that identified Hare Lake as having high potential for archaeological resources. Further research included desktop reviews and information collected from Indigenous communities on sites of cultural, spiritual, or traditional importance. An archaeological site containing chert was identified on the north shore of Hare Lake. The Proponent indicated that they did not expect this site to be affected by the Project. One site near the effluent discharge pipeline was marked as having potential for archaeological resources. In addition, other areas of archaeological potential on Hare Lake were identified but not tested.

The Proponent stated that further archaeological assessments would be undertaken in September 2022 in the vicinity of the proposed location of the effluent discharge structure to assess the presence of archaeological resources. They noted that they had invited Indigenous communities to participate in this field work, stating that the assessment would inform the discharge pipe's final alignment. The Proponent indicated that, if archeological resources were identified, they would undertake Stage 3 studies, or adjust the location of the discharge pipeline outlet within 200–250 m of the shoreline within the proposed discharge corridor.

The Proponent recognized that archaeological resources could also be unearthed during land-clearing activities. To mitigate potential effects on physical and cultural resources discovered during land clearing, they committed to implementing protocols to protect the contents of any chance discovery. This included training staff for such an eventuality, inviting Indigenous groups to archaeological field programs, immediately suspending all work, and consulting with the Ministry of Heritage, Sport, Tourism and Culture Industries and Indigenous communities to determine appropriate mitigation measures.

The Proponent completed a Ministry of Heritage, Sport, Tourism and Culture Industries checklist to screen for potential physical or cultural heritage resources. They concluded there were no built heritage resources or cultural heritage landscapes within the Site Study Area.

Views of the Participants

The Ministry of Heritage, Sport, Tourism and Culture Industries confirmed there is low potential for built heritage resources or cultural heritage resources within the Site Study Area, and indicated that no further assessment was required. However, the Ministry also noted that some areas around Hare Lake had sites of archaeological potential. They indicated Indigenous groups have identified the area as having high cultural value and provided information regarding current use of the site for cultural purposes.

The Ministry of Heritage, Sport, Tourism and Culture Industries recommended that further archaeological assessments be carried out near the site prior to any ground-disturbing activities, particularly in the area of the effluent discharge pipe and associated infrastructure.

The Ministry of Heritage, Sport, Tourism and Culture Industries noted that, while there is no requirement under the *Ontario Heritage Act* to engage with Indigenous communities at these early stages of an archeological assessment, it recommended early engagement as a best practice.

18.5.3 Panel Conclusions and Recommendations

In reaching their conclusions on the effects of the Project on physical and cultural heritage resources, the Panel found the following factors to be particularly relevant:

- Provincial regulatory and procedural measures are in place to identify and recover archeological resources.
- No known built heritage resources or cultural landscapes were identified in the Site Study Area.
- The Proponent indicated it would complete further archaeological assessments of Hare Lake and undertake additional studies or adjust the location of the discharge structure if any additional archeological sites are found.

- The Proponent committed to implementing protocols to protect the contents of a chance discovery.
- The Proponent committed to informing Indigenous groups, including Biigtigong Nishnaabeg, of any further archaeological studies and their results.

The Panel is satisfied that completion of the additional archaeological assessment on Hare Lake near the location of the discharge structure would identify whether there are archaeological resources present that could be affected by the Project. If archaeological resources are discovered, they would be addressed through provincial protocols. The Panel accepts that the 200–250 m stretch of shoreline along Hare Lake should be sufficient to allow the Proponent to adjust the location of the discharge structure to avoid or minimize disturbance.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 87: The Proponent should complete an additional area of Stage 2 archaeological assessment, prior to construction, in the area of the discharge structure near the area of high archaeological potential on Hare Lake. This work should be completed in accordance with the Ministry of Heritage, Sport, Tourism and Culture Industries' *Standards and Guidelines for Consultant Archaeologists*. If any archaeological resources are documented, the protocols described in the *Standards and Guidelines for Consultant Archaeologists* would be followed to address follow-up Stage 3 archaeological assessment and, if required, Stage 4 archaeological mitigation. GenPGM should engage Biigtigong Nishnaabeg and other interested Indigenous groups in the archaeological assessment by allowing them to have representatives onsite during field work and/or be apprised of the findings as they are known. Should archaeological resources be found, appropriate mitigation measure would be determined in consultation with the Ministry of Heritage, Sport, Tourism and Culture Industries, Biigtigong Nishnaabeg, and other interested Indigenous groups. This may include the identification of alternative locations for the discharge structure to avoid disturbance of this site.

Recommendation 88: The Proponent should implement a “chance find” protocol that includes the following:

- Train all employees engaged in activities that have the potential to unearth heritage or cultural features.
- Immediately suspend all work in the vicinity of the discovery in the instance that archaeological resources are identified and notify the Ministry of Heritage, Sport, Tourism and Culture Industries and Indigenous representatives.
- Immediately suspend all work in the vicinity of the discovery in the instance that human remains are identified and notify the Ontario Provincial Police, or local police, Ministry of Heritage, Sport, Tourism and Culture Industries, and Indigenous representatives.

The Panel concludes that, if the recommended mitigation measures are implemented, the Project is not likely to cause a residual effect on physical or cultural heritage resources.

PART 6: NATURAL AND OPERATIONAL HAZARDS

SECTION 19: EFFECTS OF THE ENVIRONMENT ON THE PROJECT

19.1 REQUIREMENTS FOR THE CONSIDERATION OF THE EFFECT OF THE ENVIRONMENT ON THE PROJECT

This section addresses the potential effects of the environment on the Project, which is a factor to be considered as per paragraph 19(1)(h) of the *Canadian Environmental Assessment Act, 2012*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to:

- evaluate the effects of the environment on the Project including how local water conditions and natural hazards, such as severe weather conditions and external events, could adversely affect the Project, including:
 - climate change, including the potential long-term effects of changing groundwater and surface water levels;
 - extreme weather (severe rainstorms, snow storms, flood events, wind, drought);
 - forest fires; and
 - seismic activity;
- provide planning, design, and construction strategies to minimize the potential effects of the environment on the Project; and
- discuss longer-term effects of climate change, up to the end of the projected post-closure phase of the Project, and the sensitivity of the Project to long-term climate variability.

19.2 EFFECT OF CLIMATE CHANGE ON THE PROJECT

Views of the Proponent

Climate Change Projections

In the Environmental Impact Statement (EIS), GenPGM stated that they derived climate change projections for temperature, precipitation, and wind for the Project using a third-generation Coupled Global Climate Model from the Canadian Centre for Climate Modelling and Analysis.

The Proponent also indicated that they downloaded 30 years of daily climate data (mean, minimum, and maximum temperature, and total precipitation) from a climate station in Wawa, Ontario. The Proponent stated that they selected this station because of its proximity to the Project (160 km to the southeast), similar altitude (287 m at Wawa and 315.5 m at Marathon), and inclusion of 30 years of complete data records.

The Proponent estimated temperature and precipitation projections for two consecutive 30-year time periods, 2011–2040 and 2041–2070. They observed that the climate change predictions for the Marathon area suggest that the local climate would be warmer and drier. Over the 2011–2040 period, the Proponent predicted an increase in mean temperature of 0.380 to 1.337 °C and a decrease in precipitation (mean daily) of 1.0% to 9.5%. Over the 2041–2070 period, the Proponent also predicted a positive mean temperature change of 0.821 to 1.496 °C and a decrease in precipitation (mean daily) of 1.5% to 6%.

For the same period of 2011–2040, the Proponent provided projections of extreme precipitation for a number of precipitation durations. They concluded that, even under the best-case scenario (i.e., aggressive worldwide mitigation to curb global warming), climate change is expected to result in significant changes in precipitation events, with higher total rainfall and rainfalls of high intensity occurring more frequently. In response to comments made by Environment and Climate Change Canada during the hearing, the Proponent clarified that they used the Canadian Earth System model version 2 recommended by the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) to simulate climate change. The Proponent further clarified that, as the Project goes through detailed designs, updated models and approaches such as the multi-model ensemble in Environment and Climate Change Canada's *Strategic Assessment of Climate Change (2020)* would be used to improve the projections.

The Proponent stated that they assessed the Project's sensitivity to a changing climate for all phases of the Project. They identified no specific sensitivities except for the active and post-closure phases, and noted that the other phases would be completed over a relatively short timeframe. The Proponent identified three closure activities that could be affected by climate change:

- reclamation and restoration of the landscape (including water bodies) to productive capacity;
- management of flooded pits to submerge Type 2 material and to protect groundwater and surface water quality during flooding and pit overflow; and
- process solids management facility closure design for the long-term management of Type 2 materials and stability of the facility.

Reclamation and Restoration of the Landscape (Including Water Bodies)

The Proponent stated that the future climate of the Marathon area would be factored into the decision-making and detailed design processes for reclamation and restoration activities in both terrestrial and aquatic habitats at closure.

The Proponent indicated that, for terrestrial habitats that would be reclaimed through re-vegetation, seeds or seedlings that are suited to drier conditions or are drought-adapted could be a suitable option.

The Proponent indicated that, the detailed design process for restoring aquatic habitats would consider the need to maintain fish passage under lower base-flow conditions than currently exist.

Management of Flooded Pits to Submerge Type 2 Material

The Proponent stated that a future warmer and drier climate in the Marathon area could result in the North Pit taking longer to fill due to less natural surface water run-off and groundwater inflow. This could expose the rock faces along the pit perimeter to the atmosphere for a longer period of time, potentially increasing concentrations of chemicals of potential concern in water within the pit. In this scenario, surface water quality in areas such as the Biigtig Zibi, into which the pit water would eventually overflow, could be negatively affected. The Proponent indicated that potential pit water quality issues would be managed through a strategy that would be developed if the pit water quality monitoring data during the closure phases show a trend of decreasing quality. They further indicated that in situ treatments, such as the addition of lime, have been used effectively in similar circumstances elsewhere.

Long-Term Management of Type 2 Materials

The Proponent noted that, under dry and extreme dry precipitation conditions, there is a potential for drying of the upper Type 1 (non-potentially acid-generating) process solids, resulting in stressed colonizing vegetation on the process solids management facility cover. However, they indicated that neither of these conditions should result in unsaturated storage conditions in the Type 2 (potentially acid-generating) process solids. The Proponent stated during the hearing that they would deposit a minimum of 5 m of Type 1 process solids over the Type 2 process solids within Cell 2A in the process solids management facility to maintain the Type 2 process solids in a saturated state over the long term.

Views of the Participants

Environment and Climate Change Canada noted in their hearing submission that the Proponent's projected changes in temperatures and precipitations over the two time periods encompassing 2011 to 2070 in the EIS were based on a single run from a single climate model.

Environment and Climate Change Canada then noted that the strongest warming in the temperature projections was 1.5 °C in the 2041–2070 period; however, updates to these projections were not provided in the EIS Addendum.

Environment and Climate Change Canada also noted that the Proponent derived their projections of extreme precipitation over the period 2010–2040 for a local station from a single climate model using a statistical tool. They stated that the use of a single model does not account for uncertainty related to climate model selections. As a result, the simulations described by the Proponent are unlikely to be robust because the changes in observed extreme precipitation at the local scale are small when compared with the natural variability of extreme precipitation.

Environment and Climate Change Canada recommended that the Proponent use a scientifically appropriate, best-available methodology to characterize potential future changes to inform the detailed design phase of the Project. They recommended those outlined in the Canadian Standards Association's *Technical Guide: Development, interpretation and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners* (CSA PLUS 4013-12, 2019).

Panel Conclusions and Recommendations

In reaching their conclusions on the effect of climate change on the Project, the Panel considered the following factors to be particularly relevant:

- The Proponent's proposal to deposit a minimum of 5 m of Type 1 material over the Type 2 material within Cell 2A in the process solids management facility to maintain the Type 2 material in a saturated state over the long term;
- The Proponent's proposal to use additions of lime should pit water quality monitoring data during the closure phases show a trend of decreasing quality; and
- The Proponent's commitments to use, during detailed design, updated models and approaches such as the multi-model ensemble in Environment and Climate Change Canada's *Strategic Assessment of Climate Change (2020)* to improve projected climate changes.

The Panel accepts Environment and Climate Change Canada's description of the Canadian Standards Association Guidance as best-available practice and finds that their recommendation has merit. The Panel is of the view that projected future climate change scenarios that are relevant for the design of the infrastructure of the Project should be based on scientifically appropriate, best-available methodology.

The Panel is of the view that the use of updated models and approaches to improve projected climate change scenarios during detailed design would reduce the Project's vulnerability to future climate change.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 89: The Proponent should, during the design stage and prior to construction, update the climate change projections for the Project using methods described in both Environment and Climate Change Canada's *Strategic Assessment of Climate Change (2020)* and the Canadian Standards Association's *Technical Guide: Development, interpretation, and use of rainfall intensity-duration-frequency (IDF) information: Guideline for Canadian water resources practitioners (CSA PLUS 4013-12, 2019)*. The Proponent should use the results of these revised climate change projections to inform the detailed design and construction of the Project.

19.3 EFFECT OF EXTREME WEATHER EVENTS ON THE PROJECT

Views of the Proponent

GenPGM indicated that the main concern with precipitation remains the potential for future increased frequency and magnitude of events. The Proponent noted the need to manage water quantity to minimize adverse effects from unplanned releases from the site. The Proponent stated that the process solids management facility and mine rock storage area catch basins have been designed to avoid unplanned releases from the site.

The Proponent noted that the process solids management facility would have sufficient capacity to store operational water needs in addition to the volumes from natural run-off and snowmelt resulting from an environmental design storm of 408 mm. The Proponent clarified that a predicted 1-in-100-year 24-hour precipitation event of 133 mm was added to the 30-day spring snowmelt to generate an estimated environmental design storm with 408 mm of precipitation.

The Proponent also reported that additional capacity has been included in the design of the process solids management facility, above the environmental design storm level, to handle the inflow design flood. The latter consists of the 24-hour probable maximum precipitation of an estimated 328 mm. A dry freeboard allowance is also included above the inflow design flood level to contain wave run-up resulting from a 1-in-1,000-year wind event. Above the freeboard, overflow spillways have been included in the design. Overall, the inflow design flood and the freeboard are additional capacities on top of the environmental design storm, before the overflow spillways would be required.

The Proponent noted that the mine rock storage area catch basins have been designed to handle a 1-in-100-year 24-hour event of 133 mm of precipitation. They also stated that the

mine rock storage area overflow spillway capacity was designed for a 1-in-200-year event, corresponding to 142 mm of precipitation.

The Proponent reported that the main concern with respect to wind is the potential effect on buildings, power lines, and the process solids management facility.

The Proponent stated that high-velocity winds could damage buildings and/or power lines. They indicated that this infrastructure would incorporate appropriate standards in the design and construction processes. The Proponent further indicated that the design would incorporate redundancy into the power supply infrastructure to ensure the site does not lose power.

The Proponent stated that, within the process solids management facility, large waves could develop in areas inundated with process water and fugitive dust emissions could emanate from beach areas. They indicated that the design of the process solids management facility would include the capacity to contain wave run-ups associated with the 1-in-1,000-year wind event. The Proponent identified additional measures that would be in place during operations and closure to address fugitive dust emissions resulting from strong winds. During operations, water sprays and/or additives to the process solids slurry would be utilized to minimize fugitive dust emissions. At closure, wind breaks would be installed, and the final process solids surface would be vegetated to reduce the likelihood of fugitive dust emissions.

Views of the Participants

Environment and Climate Change Canada indicated that they would expect the probability of overflow discharge from the mine rock storage area catch basins to the Biigtig Zibi to be less than 1% in any given year because of the 1-in-100-year design event used by the Proponent in the design.

Environment and Climate Change Canada indicated that climate change in the region is expected to increase the intensity and frequency of rainfall events, which could increase the risks of an emergency discharge from the water management systems. They found that the environmental design storm estimates used by the Proponent to size the water management systems may be inadequate. Environment and Climate Change Canada requested that the Proponent incorporate climate considerations into environmental design storm estimates and alter designs as needed to reduce the risk of an emergency discharge.

Environment and Climate Change Canada further indicated that, with climate change incorporated into the design, the expected probability of an overflow discharge event occurring would be near the end of the mine life.

Panel Conclusions and Recommendations

In reaching their conclusions on the effects of extreme weather events on the Project, the Panel found the following factors to be particularly relevant:

- GenPGM's proposed design features in the process solids management facility and mine rock storage area to address extreme precipitation;
- Environment and Climate Change Canada's opinion that the probability of the catch basins overflowing to the Biigtig Zibi is less than 1% in any given year;
- Environment and Climate Change Canada's finding that the environmental design storm estimates used by GenPGM to size the water management systems may be inadequate; and
- Environment and Climate Change Canada's recommendation that the Proponent incorporate climate considerations into the environmental design storm estimates and alter designs as needed to reduce the risk of an emergency discharge.

The Panel acknowledges Environment and Climate Change Canada's opinion on the probability of the catch basins overflowing to the Biigtig Zibi. While recognizing the cultural importance of the Biigtig Zibi, the Panel finds that the probability of the catch basins overflowing to the Biigtig Zibi is low.

In Section 9 (Surface Water Quality), the Panel recommends that GenPGM regularly monitor water quality in the mine rock storage area catch basins and mitigate as necessary. This is so that if a precipitation event above both the 1-in-100-year storm storage and pumping capacities were to result in overflow, there would be a reduced risk of effects to water quality in the Biigtig Zibi from the Project.

The Panel recommends that the Proponent implement the following mitigation measures:

Recommendation 90: Design the mine rock storage area catch basins and the associated pumps in a manner that prevents routine overflows to the Biigtig Zibi and reduces the risk of overflow to the Biigtig Zibi at the end of mine life.

19.4 EFFECT OF FOREST FIRES ON THE PROJECT

Views of the Proponent

GenPGM indicated there are no records of a fire in the Site Study Area (see Appendix 6) for the period of record available. They noted this is consistent with vegetation data that indicate the forested areas are more than 100 years old. Canadian Wildland Fire Information System data

indicate some frequency of fires regionally in the area of interest from 1980 to 2019, although forest fire activity in the immediate vicinity of the Project appears to be limited.

The Proponent stated that a major fire could cause property damage and interrupt operations. Given the planned clearing associated with the development of the mine infrastructure, the Proponent anticipated that the Project itself would act as a fire break and that this may limit the extent to which a large-scale fire would result in extensive onsite damage.

The Proponent confirmed there would be a very low probability that onsite water management structures or fuel facilities would be compromised by a fire. They identified a low likelihood that the transmission line that connects to the Terrace Bay-Manitouwadge Transmission Line and the effluent discharge pipe to Hare Lake would be compromised by fire. To mitigate this risk, the Proponent indicated they would undertake appropriate brush clearing to maintain rights-of-way.

The Proponent stated that they would develop a response procedure within the Emergency Preparedness and Response Plan that considers a large-scale forest fire in the vicinity of the Project.

Views of the Participants

MNDNMRF confirmed that the Wildland Fire – *Provincial Policy Statement* (2020) and the *Forest Fire Prevention Act* require that any mine within 300 m of a forested area must clear the surrounding area of flammable debris for a distance of at least 30 m. MNDNMRF indicated that the Proponent would be required to comply with this minimum requirement as a preventative measure.

MNDNMRF suggested the Project's Emergency Preparedness and Response Plan would need to address the training of employees in fire prevention and control. They noted the plan should be developed and implemented in collaboration with the community of Marathon, Biigtigong Nishnaabeg, and provincial emergency response crews to provide for rapid detection and response to fire.

Panel Conclusions and Recommendations

In reaching their conclusions on the effect of forest fires on the Project, the Panel considered the following factors to be particularly relevant:

- planned clearing associated with the development of the mine infrastructure would act as a fire-break;
- the Proponent's proposed brush clearing to maintain the Hare Lake water right-of-way, and transmission line right-of-way; and

- the Proponent's commitment to developing a response procedure within the Emergency Preparedness and Response Plan that considers a large-scale forest fire in the vicinity of the Project.

The Panel accepts that planned clearing undertaken by the Proponent to build and maintain the Project would also serve as an effective fire break. The Panel recommends implementation of the Emergency Preparedness and Response Plan as described in Section 20 (Accidents and Malfunctions). In consideration of the above measures, the Panel is satisfied that the risk of a forest fire that would affect Project infrastructure is low.

19.5 EFFECT OF SEISMIC ACTIVITY ON THE PROJECT

Views of the Proponent

GenPGM stated that the Geologic Survey of Canada identifies the Project area as being within a region of relatively low seismicity. They noted there have been no significant earthquakes in the vicinity of the Project and there are no significant geological faults in the area. The Proponent indicated that an environmental issue resulting from a seismic event is highly improbable.

The Proponent indicated that the primary concern from a seismic event would be a failure of a man-made structure such as a dam at the mine rock storage area or the process solids management facility. They indicated that the mine rock storage area and process solids management facility designs took into account a peak ground acceleration corresponding to the 1-in-2,475-year seismic event as required by the *Lakes and Rivers Improvement Act* and its associated regulations, and the Canadian Dam Association's *Canadian Dam Safety Guidelines (2013)*. In addition, the Proponent noted that pit slopes were designed with appropriate safety factors.

Views of the Participants

Natural Resources Canada agreed with the Proponent's characterization of the Project area as being within a region of relatively low seismicity. Natural Resources Canada confirmed that peak ground acceleration corresponding to a 1-in-2,475-year earthquake event was appropriate for the Proponent's design. This value corresponds with the guidance in the most recent *Canadian Dam Safety Guidelines (2013)* for a dam classified as of high consequence as it pertains to loss of life, property loss, cultural-built heritage loss, and environmental loss.

Panel Conclusions and Recommendations

In reaching their conclusions on the effect of seismic activity on the Project, the Panel considered the following factors to be particularly relevant:

- The Proponent and Natural Resources Canada agreed that the Project is within a region of low seismicity, there are no significant geological faults in the area, and there have been no significant earthquakes in the area.
- The Proponent designed the mine rock storage area and process solids management facility dams in consideration of a 1-in-2,475-year seismic event and Natural Resources Canada confirmed the appropriateness of this standard.

The Panel is satisfied that the risk of seismic activity that would affect Project infrastructure is low.

The Panel concludes that, with the implementation of the recommended mitigation, the Project could be designed to adequately account for possible adverse effects of the environment on the Project.

SECTION 20: ACCIDENTS AND MALFUNCTIONS

20.1 REQUIREMENTS FOR CONSIDERATION OF ACCIDENTS AND MALFUNCTIONS AND PANEL'S APPROACH

This section addresses the environmental effects of accidents and malfunctions, which is a factor to be considered as per paragraph 19(1)(a) of the *Canadian Environmental Assessment Act, 2012*. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act*.

The *Guidelines for the Preparation of an Environmental Impact Statement* required GenPGM to evaluate potential environmental effects that may result from Project accidents and malfunctions.

The Panel focused their assessment on accident and malfunction scenarios with potentially high environmental consequences, but remote likelihoods of occurring. The Panel also focused on concerns from participants expressed at the hearing about the following scenarios:

- process solids management facility slope failure (dam breach);
- unanticipated seepage from the process solids management facility;
- fuel release during transport to the site; and
- chemical release during transport to the site.

The Panel refers to dam breach interchangeably with slope failure, a term used by GenPGM in the EIS Addendum.

20.2 METHODOLOGY

Views of the Proponent

GenPGM stated that they considered accident-malfunction scenarios that had the potential to adversely affect the environment during any Project phase. In their assessment of accident-malfunction scenarios, they considered the nature, mechanism, and magnitude of the potential events.

The Proponent categorized the likelihood of those events as: high (likely to occur), medium (might occur), low (unlikely to occur but the probability cannot be entirely dismissed), and remote (very unlikely to occur but worthy of consideration nonetheless). They then

characterized the consequences of these events from an environmental perspective and proposed some mitigation measures.

In total, the Proponent assessed 20 accident-malfunction scenarios and determined the probability of each scenario. The scenarios are listed below along with their probabilities:

- process solids management facility slope failure (dam breach) (remote probability);
- mine rock storage area slope failure (low/remote probability);
- unanticipated seepage from the process solids management facility (low probability);
- fuel release during transport to the site (low probability);
- chemical release during transport to the site (low probability);
- concentrate haul incident (low probability);
- controlled release of water from the process solids management facility (remote probability);
- controlled release of untreated water from the mine rock storage area catch basins (low probability);
- process solids pipeline and reclaim water pipeline failure (low probability);
- water treatment plant incident (low probability);
- concentrate load-out release (medium/high probability);
- chemical release within the Site Study Area (medium/high probability);
- pit slope failure (low probability);
- unanticipated drainage from the mine rock storage area (low probability);
- premature closure of the mine (low/remote probability);
- propane handling incident (low probability);
- explosives accident (low probability);
- fuel release from onsite storage facilities (medium probability);
- fuel release during onsite dispensing (medium probability); and
- Project-related fires (medium/high probability).

The Proponent considered mitigation measures that are principally related to design, management, policies, practices, safeguards, capabilities of resources in the area, and equipment that is available to safely respond to these scenarios. They also considered contingency and emergency response procedures as these would form the backbone of responses to such events. The Proponent stated that key design and direct mitigation measures common across the accident-malfunction scenarios include:

- application of appropriate design standards and criteria;
- adherence to industry standards, regulations, guidelines, and best practices;
- preparation and implementation of operation, maintenance, and surveillance manuals;
- preparation and implementation of the Emergency Preparedness and Response Plan; and
- regular personnel task training (staff and personnel) and hazard assessments.

The Proponent indicated that the overall risk associated with a scenario is the function of both probability and consequence. Based on the analysis of potential Project-related accident and malfunction scenarios over the life of the Project, the Proponent concluded that there would be a low overall risk to the environment associated with the scenarios with high consequences but remote likelihoods of occurring.

20.3 PROCESS SOLIDS MANAGEMENT FACILITY DAM BREACH

Views of the Proponent

GenPGM identified a dam breach of the process solids management facility as one of two remote (very unlikely) scenarios.

The Proponent conducted a preliminary hazard potential classification for the design of the process solids management facility dams. Based on a hypothetical failure of the dams involving the release of all stored water and a portion of the process solids along one of four identified inundation routes (Figure 20-1), the Proponent analyzed potential incremental losses with respect to life, property, environment, and cultural/built heritage around the Project. Based on their assessment of each category, they determined that a dam breach of the process solids management facility would fall into the category of a High Hazard potential.

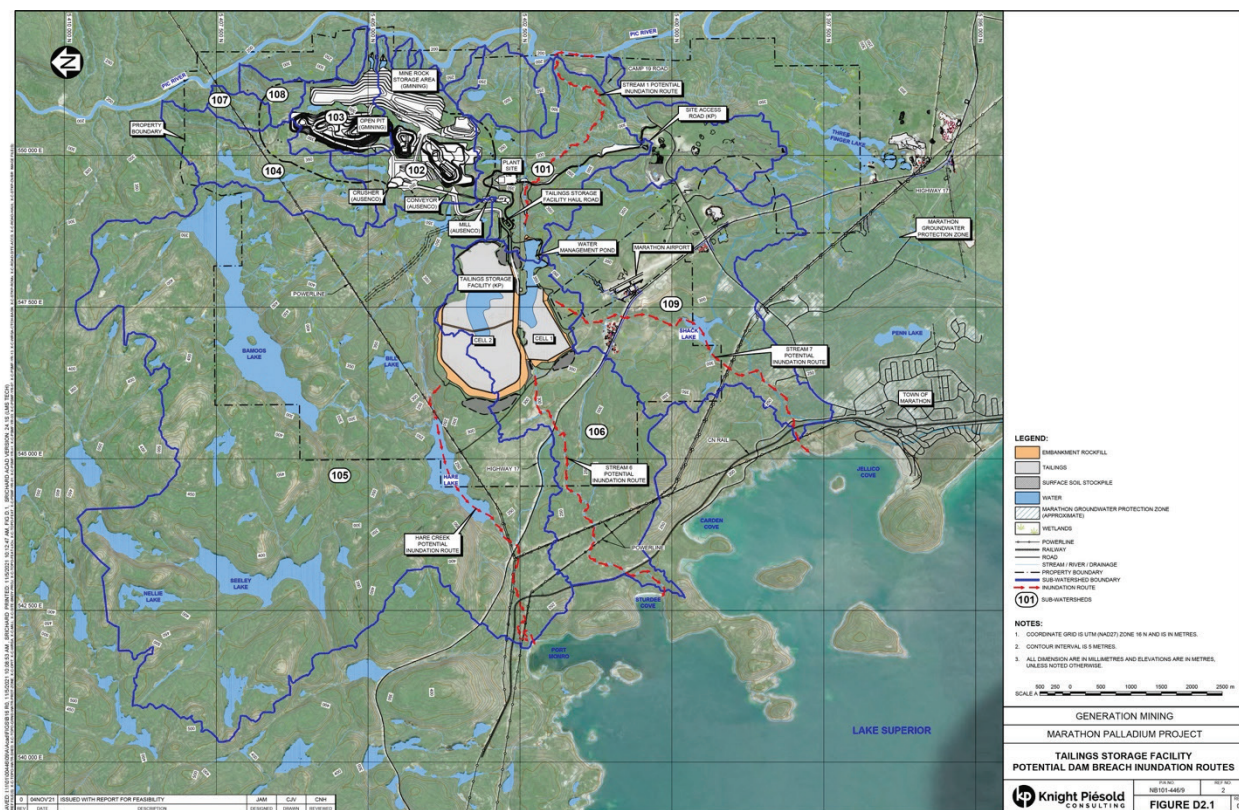


Figure 20-1: Process Solids Management Facility – Potential Inundations Routes – Hypothetical Dam Breach (Source: CIAR #1221)

The Proponent identified four waterbodies within the Regional Study Area (see Appendix 6) which would be potentially at risk from a dam breach: Stream 1, Stream 5 (Hare Creek), Stream 6 (Angler Creek), and Stream 7.

Stream 1 into the Biigtig Zibi

Stream 1 flows through a culvert below the existing Camp 19 Road and outlets into the Biigtig Zibi. The Proponent noted that the east side of the process solids management facility, the water management pond, and the stormwater management pond are located within the headwaters of Stream 1 (subwatershed 101) approximately 5 km upstream of the Biigtig Zibi. They further noted that the Site Access Road dam across Stream 1 would comprise the east dam of the stormwater management pond.

Hare Lake Into Stream 5 (Hare Creek)

Stream 5 (Hare Creek) flows through culverts below Highway 17 and the Canadian Pacific rail line downstream of Hare Lake. Hare Creek outlets into Port Munro on the north shore of Lake Superior. The Proponent indicated that the north side of the process solids management facility would be within the Stream 5 (Hare Creek) catchment (subwatershed 105) approximately 0.5 km upstream of Hare Lake. They further indicated there are no water bodies between the

process solids management facility and Hare Lake and identified just one dwelling along the south shore of Hare Lake toward the west end.

Stream 6 (Angler Creek) Toward Lake Superior

Stream 6 (Angler Creek) in subwatershed 106 flows through culverts below Highway 17 and the Canadian Pacific rail line before it reaches Sturdee Cove on the north shore of Lake Superior. The Proponent stated that the process solids management facility would be located at the headwaters of Stream 6 approximately 6 km upstream of Lake Superior. They also stated that there are no homes, cottages, or other permanent structures along Stream 6 (Angler Creek).

Stream 7 toward Shack Lake

Stream 7 crosses the north end of the Marathon Airport property, passes adjacent to the Highway Maintenance yard, and flows through a culvert under Highway 17 prior to flowing into Shack Lake. The Proponent noted that Stream 7 flows south from Shack Lake toward the Peninsula Golf Course and Marathon Cross Country Ski and Snowshoe Club, and across the northern margin of the Marathon Ground Water Protection Zone, where it flows through culverts below Carden Cove Road and the Canadian Pacific rail line before reaching Lake Superior. The Proponent indicated that the south side of the process solids management facility would be adjacent to the headwaters of Stream 7 (subwatershed 109) approximately 1.9 km upstream of Shack Lake.

Facility Design

The Proponent stated that the process solids management facility dams would be constructed with massive rock fill using the downstream construction method and would be built directly on bedrock. They indicated that, with this construction method, the rock fill would be placed directly over the bedrock foundation and fully supported by durable rock fill. The Proponent informed the Panel that other possible techniques for the construction of the dam were less robust because they did not rely on the rock fill as the full foundation and structural component of the dam.

In their assessment of a hypothetical process solids management facility dam breach scenario, the Proponent stated that the worst-case scenario would be a partial failure of the slope resulting in a partial release of the process solids, as opposed to a total failure. They explained that a full dam breach was not an applicable worst-case scenario based on the width and the nature of the rock fill that would be used to construct the dam, and in their view a dam breach was very unlikely to erode the entire embankment. The Proponent also noted the additional safety measures, including an emergency spillway and 1 m of dry freeboard above the allowance for an inflow design flood. The inflow design flood corresponds to the most severe inflow flood (peak, volume, shape, duration, and timing) for which a dam and its associated facilities are designed.

The Proponent explained that, during a rain event with a subsequent inflow design flood, the facility could be at the maximum operating level, corresponding to the maximum quantity of water or energy stored within the facility. They stated that, under this scenario, there would be the potential for a greater amount of erosion of the dam should an overtopping event occur and lead to water flowing over the dam. Nevertheless, they indicated that an overtopping of the dam was unlikely because of the inclusion of an emergency spillway and additional freeboard in the design. Instead of overtopping the dam, water would be conveyed through a controlled spillway to avoid a catastrophic event due to erosion of the entire dam.

The Proponent indicated that a dam breach assessment in support of permitting under the *Lakes and Rivers Improvement Act* was underway. The assessment, which the Proponent committed to share with Biigtigong Nishnaabeg, would include the potential dimensions of a breach and the volume of release associated with that hypothetical breach event, as well as a detailed inundation analysis. The Proponent noted that they conservatively selected an inflow design flood consisting of the probable management flood to size the process solids management facility (including the freeboard and emergency spillways) in case the hazard classification changed from High to Very High based on results of the ongoing dam breach assessment.

Environmental Effects

The Proponent stated that the environmental effects of a partial breach would include loss of containment of the solids fraction, resulting in swamping of previously undisturbed terrestrial habitats. As such, the liquid fraction could drain to natural surface water features, including Hare Lake, Stream 5 (Hare Creek), Stream 6 (Angler Creek), and Stream 7, negatively affecting water quality.

The Proponent further clarified during the hearing that, if a partial dam breach was to occur, the liquid portion of the process solids could report into a natural surface feature. The concentrations of constituents in the liquid portion of process solids within the process solids management facility would be below relevant thresholds. The Proponent was of the opinion that no significant effects on water quality would be associated with the release as it would be a short-term event, in the order of hours, and it would be significantly diluted by precipitation or snow melt.

The Proponent acknowledged that it is possible that water reaching local receivers during a partial dam breach could contain high concentrations of total suspended solids. However, as any such event would likely be associated with high flows, the solids would be carried downstream instead of settling.

The Proponent indicated that the areas affected by a partial dam failure would be surveyed to determine the extent of the spreading of solids on terrestrial habitat. This would be followed by a plan to clean up and restore those areas. In addition, there would be reclamation planning in

association with local Indigenous communities to restore the areas to a natural setting. In the event of dam failure, the Proponent committed to incorporate the specifics of a clean-up and restoration plan into the Emergency Preparedness and Response Plan for the site.

Mitigation Measures

To mitigate the potential of a process solids management facility slope failure, the Proponent indicated they adopted a suitably conservative approach, including:

- a design that exceeds dam safety guideline requirements;
- dam raises that would be completed under the supervision of qualified persons;
- a spillway design to allow for controlled release of the inflow design flood during all development stages;
- no free-standing water adjacent to dam structures at closure; and
- dam safety inspections over the long term.

Independent Tailings Review Board

The Proponent indicated they had no objection to oversight of the design, construction, and closure of the process solids management facility by a body consisting of third-party experts (i.e., an independent tailings review board). They acknowledged the effectiveness and usefulness of independent tailings reviews based on past experiences at other mines, and their own feasibility and design studies. The Proponent added that establishment of an independent tailings review board is outlined in the Mining Association of Canada's 2019 guidance: *A Guide to the Management of Tailings Facilities*. The Proponent also noted that a global industry standard for tailings management was recently developed by the International Council on Mining and Metals.

Views of the Participants

The Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNRF) indicated that the environmental assessment should address the inflow design flood in the context of dam hazard classification, and that the Proponent should confirm dam hazard classifications for all dams that would be constructed as part of the Project.

MNDMNRF reported that, under the *Lakes and Rivers Improvement Act*, the Ministry can appoint inspectors and engineers to inspect and confirm the conditions in the location that the dam is being operated in accordance with an approved operating plan and water management plan. Noting that closure planning is a separate process from the current environmental assessment, they reported that the Proponent's Closure Plan is required to contain "details of measures to breach or stabilize all tailings, water and other impoundment structures against

static or dynamic loadings to ensure the containment of materials and to maintain the specified land use.” They concluded that the Ministry would begin their assessment only when they receive the full closure plan submission from the Proponent.

Pays Plat First Nation stated that they have been assured that the dam would be constructed as a “downstream dam,” which has mitigated a number of their concerns. However, they stated that it was of paramount importance to consider mitigation and remediation techniques in the event of a failure, and to consider how increases in the magnitude and frequency of storm events due to climate change could affect the dam. They cited the 2014 tailings dam failure at the Mount Polley Mine in British Columbia as an example of a catastrophic environmental impact. They also mentioned that the Lac Des Iles Mine in Northwestern Ontario was forced to discharge its tailings pond water into the environment without treatment due to excess water from a rain event. They stated that if a similar event was to happen at the Project, there would be irreversible damage to Pays Plat First Nation traditional territory.

Biigtigong Nishnaabeg recognized that the dam breach event would likely be a low probability. However, referring to the Mount Polley Mine tailings dam breach, Biigtigong Nishnaabeg indicated that the impact of a dam failure at the Marathon site would be extremely severe and long-lasting. Biigtigong Nishnaabeg raised concerns regarding the potential effect on natural resources such as the Biigtig Zibi, Stream 6 (Angler Creek), and Lake Superior, all of which the community relies on for cultural and spiritual connectivity and harvesting of fish. Biigtigong Nishnaabeg noted that the Project would be immediately adjacent to the Biigtig Zibi, and the process solids management facility would be within 5 km of Lake Superior. Concern was also raised regarding the effects on Sturdee Cove, which is used by the community for a variety of purposes, and on community trapping activities in the vicinity of the Project.

Biigtigong Nishnaabeg required that an independent tailings review board be established to encourage transparency and open communication. They indicated that the board should consist of recognized senior experts in the areas of geotechnical engineering, hydrogeology, and geochemistry along with Biigtigong Nishnaabeg community members engaged in this process through existing mechanisms such as environmental monitoring committees or other mechanisms. The board should be responsible for reviewing and overseeing the design, construction, and closure of the process solids management facility. Moreover, Biigtigong Nishnaabeg stated that the independent tailings review board should be responsible for making recommendations to the Proponent on areas that the board feels warrant further investigation or attention as they relate to the design, construction, and closure of the process solids management facility. Biigtigong Nishnaabeg added that the board should be equipped with the mechanisms to ensure that proper implementation and follow-up are completed on the recommendations they provide to GenPGM.

Biigtigong Nishnaabeg noted that construction of the process solids management facility would require the Proponent to obtain permits under the *Lakes and Rivers Improvement Act*. As part

of this permitting process, the Proponent may be required to complete a dam safety review, which, according to the community, is a series of inspections, detailed background reviews, and technical assessments completed at a regular frequency by a third-party engineering firm to determine status of the containment structures. Biigtigong Nishnaabeg requested that the Proponent commit to conducting a third-party dam breach assessment and sharing the results with the community.

Environment and Climate Change Canada also recommended that the Proponent commit to mitigation strategies, contingency plans, and response capabilities commensurate with the environmental risks that this Project may pose, including but not limited to the worst-case scenarios, such as the process solids management facility dam failure scenario.

The Ministry of the Environment, Conservation and Parks noted that neither dam stability nor hazards are under their mandate. Nevertheless, the Ministry stated that they supported a review of the proposed dam by an independent tailings review board.

20.4 MINE ROCK STORAGE AREA SLOPE FAILURE

Views of the Proponent

GenPGM indicated that slumping of the mine rock storage area to the east or west could occur as the result of various factors, such as: not adhering to the proposed design; an event occurring outside the limits of the proposed design; the loss of structural integrity in the foundation; or the build-up of hydrostatic pressure. They further indicated that any minor slope failure (at the bench scale) would be contained within the mine rock storage area and there would be no environmental concerns. The Proponent noted that any major slope failure would likely be contained within the mine rock storage area drainage collection basins but could possibly result in some localized habitat disturbance in the Biigtig Zibi flood plain; no large-scale movement of material into the Biigtig Zibi is anticipated.

GenPGM indicated that appropriate safety factors and adequate setback from the Biigtig Zibi would be incorporated into the design of the mine rock storage area to mitigate potential slope failure.

20.5 UNANTICIPATED SEEPAGE FROM THE PROCESS SOLIDS MANAGEMENT FACILITY

Views of the Proponent

The Proponent acknowledged that seepage from the facilities to the downstream environment would need to be avoided as much as possible. They indicated that seepage from the process solids management facility was conservatively accounted for in their groundwater flow

modelling, which also showed seepage travel time to reach downstream waterbodies to be greater than 100 years. The Proponent stated that unintended seepage from the facility would go around the collection measures that have been included in the design. They noted that the design of the dams includes a geomembrane liner on the upstream face of the dams to minimize seepage through the dams. The Proponent noted that the predicted travel time of groundwater seepage to surface receivers is greater than 100 years. Further discussion on groundwater travel times to reach surface water bodies is provided in Section 7 (Groundwater).

In addition to the measures included in the design, the Proponent stated that their assessment of the effects of the seepage from the process solids management facility was also completed with a conservative assumption of no attenuation along the groundwater flow path.

The Proponent pointed out that their closure predictions for subwatersheds 105 and 106 were relatively conservative as the modelling assumed relatively high seepage rates with no attenuation. They assumed that the process water that is entrained in the process solids management facility essentially reports directly into those watersheds. Their model showed that water quality in subwatersheds 105 and 106 remains below appropriate water quality criteria for the protection of aquatic life. Based on that observation, and considering the fact that the design of the dams includes a geomembrane liner, the Proponent concluded that water quality in the subwatersheds would be protected.

Mitigation Measures

The Proponent stated that, if an unexpected increased rate of seepage was not compliant with the design, or if the threshold for investigation of water quality was reached, a pump-back system from downstream monitoring wells would be implemented to correct the situation. In the Proponent's opinion, the time it would take to implement a mitigation measure such as a pump-back system would be in the order of months, shorter than the estimated seepage travel time.

The Proponent also committed to conducting a groundwater monitoring program with an adaptive management component. That component would, through thresholds for groundwater quantity and quality, alert management to changing conditions prior to any significant effect on surface water receivers. In terms of water quality, the Proponent stated that they would set a threshold of investigation that is below the predicted water quality. To control both the quantity and quality of seepage, they committed to installing monitoring wells up-gradient of the surface receivers. Those wells would be immediately adjacent to the process solids management facility and nested in the overburden and the shallow bedrock, which is the predicted flow path of seepage.

Views of the Participants

Environment and Climate Change Canada stated that accounting for seepage is important to understanding the potential effects on the Biigtig Zibi and other watersheds affected by the Project. Environment and Climate Change Canada recommended a wastewater management plan and follow-up monitoring program that includes a groundwater monitoring network to verify predictions and identify the need for additional mitigation and monitoring measures to protect aquatic life if required.

The Ministry of the Environment, Conservation and Parks stated that they generally agreed with the measures proposed by the Proponent. They pointed out that, in general, when dealing with seepage at the permitting stage, the Proponent is asked to prepare a detailed monitoring program for the purpose of detecting seepage that is beyond what the Proponent had predicted. Moreover, the program should include a contingency plan with measures to address unexpected situations.

20.6 TRANSPORTATION INCIDENTS

Views of the Proponent

Fuel Release during Transportation

GenPGM stated that fuel tanker trucks would vary in size between 34,000 and 60,000 L, and they classified the likelihood of a fuel spill as low. They noted that the environmental effects associated with a potential fuel release during transportation would be contamination of terrestrial and aquatic habitat.

The Proponent noted that, if the entire volume of a tanker truck spilled when the ground is not frozen, the fuel would seep into the ground and affect the local area around the spill, triggering an emergency response. Any free spilled product would be vacuumed up while contaminated soils or vegetation would be excavated. The Proponent further indicated that the area would be tested and reclamation would be carried out when feasible. Based on these remediation actions, the Proponent concluded that long-term effects of a terrestrial fuel release would be unlikely.

The Proponent also noted that if the entire volume of a tanker truck was to spill into a water course some of it would volatilize. Diesel fuel in particular, being heavy, would likely bind with sediment particles. In that case, the remediation actions, including containing the spill and clean-up activities, would be more extensive.

Chemical Release during Transportation

The Proponent indicated that the largest volume of a chemical release event would be related to the transport of mill process chemicals. They noted that flotation chemicals would come to the site in powdered form in 1,000 kg totes and a full truck can carry as much as 40 tonnes of mill reagents.

During the hearing, the Proponent stated that, if there was a release of the entire content of a tote in the winter, the frozen ground would make clean-up relatively easy. If a release occurred in the summer, the product would remain within the immediate vicinity of the release. In either case, the emergency response plan would be implemented.

The Proponent stated that, if there was a release of the entire content of a tote into a waterbody, the powder would begin to dissolve as the chemicals are water soluble. Concentrations of those chemicals in that immediate vicinity could be quite high. As they are dissolving there could be some acute toxicity in the immediate vicinity; farther afield where dilution was provided, those concentrations would dissipate. The Proponent was of the opinion that there could certainly be some acute toxicity in a specific waterbody, but not at the species population level.

Concentrate Haul Incident

The Proponent indicated that, depending on market conditions, up to 40 trucks would be required per day for concentrate shipping. They stated that the most likely accident scenario involves a haul truck leaving the road and releasing concentrate to the ground. They anticipated that concentrate loss would smother the ground in the immediate vicinity of the release. Consequently, both the loss and its subsequent clean-up would disturb the release area.

Mitigation Measures

GenPGM committed during the hearing to conducting a quantitative risk assessment associated with chemical release during transport; identifying any potential environmental issues; and developing appropriate mitigation strategies, contingency plans, and response capabilities commensurate with the environmental risks under both worst-case and alternative accident scenarios.

GenPGM stated that, to mitigate the potential of a fuel or chemical release during transportation, the following measures would be implemented:

- only licensed companies would be permitted to deliver to the site;
- third-party contractors would be required to have active service agreements with licensed release response contractors;

- all drivers would be required to have appropriate training, including release-response training;
- all trucks would be required to have appropriate communications capabilities; and
- speed limits would be posted and monitored on site access roads and the Proponent would follow up on any reports of excess speed.

Views of the Participants

The Ministry of the Environment, Conservation and Parks agreed with the estimates provided by the Proponent with respect to effects from a transportation incident. The Ministry indicated that the Proponent's proposed mitigation for spill response is what is typically expected for such a scenario.

Environment and Climate Change Canada recommended that the Proponent prepare an emergency response plan prior to construction that reflects all plausible types of accidents and malfunctions and accounts for site-specific conditions and sensitivities associated with the Project. The emergency response plan should demonstrate the Proponent's ability to prevent, prepare for, respond to, and recover from accidents and malfunctions. Environment and Climate Change Canada recommended the Proponent use a risk matrix system to provide a quantitative risk assessment of the likelihood and severity of potential hazards, as opposed to a purely qualitative risk assessment. Environment and Climate Change Canada noted that a quantitative risk assessment approach would assign risk ratings and provide information on appropriate mitigation measures to avoid, eliminate, or reduce a significant adverse effect to the environment.

20.7 OTHER SCENARIOS DESCRIBED BY THE PROPONENT

20.7.1 Controlled Release of Untreated Water from the Process Solids Management Facility

GenPGM indicated that the process solids management facility would be sized to contain the environmental design storm and, above that, a containment for a portion of the inflow design flood has been considered. Discharge from the spillway would basically occur at the 1-in-10,000-year storm event over the mine's 12.7-year life. The Proponent classified the likelihood of a controlled release of untreated process water and run-off water from the process solids management facility as remote. Effects of storm events are further discussed in Section 19 (Effect of the Environment on the Project).

The Proponent estimated that a 1-in-10,000-year inflow design flood lasting 24 hours, which is the worst-case scenario for a controlled release of untreated process water and run-off water

from the process solids management facility over the spillway to Stream 6 (Angler Creek), would involve approximately 1 million m³ of water. That estimate is based on approximately 14,000 million m³ per hour over three days.

With regard to the potential effects of controlled releases from the process solids management facility, the Proponent recognized that certain metals could be above chronic threshold effect levels. They maintained that the time span of such overflow events in the receiver would be in the order of hours and days, which is relatively brief. The Proponent did not anticipate chronic effects due to controlled releases and concluded that there would be no significant adverse effects, based on the expected duration of exposure as a result of a controlled release to the environment.

The Proponent noted that suspended solids from the tailings could be mobilized during controlled release from the process solids management facility. However, the amount of water generated during this type of event would be high, as a result of a heavy storm, the release would be relatively diluted, and the effect would likely be masked by the natural erosion processes within the watershed.

20.7.2 Controlled Release of Untreated Water from the Mine Rock Storage Area Catch Basins

The Proponent stated that, because catch basins 2 and 3 are sized to contain the full 100-year storm event, the worst-case scenario for controlled release of untreated runoff water to the Biigtig Zibi was low and would be less than their initial estimates. Initial estimates were 540 m³ per hour for catch basin 2 and 350 m³ per hour for catch basin 3, based on a 1-in-25-year 24-hour storm event.

With regard to the potential effect of the controlled releases from the mine rock storage area catch basins, the Proponent recognized that certain metals could be above chronic threshold effect levels. However, they maintained that any overflow event in the receiver would last for only hours or days, which is a relatively short period of time. The Proponent therefore did not anticipate chronic effects due to the controlled releases.

20.7.3 Process Solids Pipeline and Reclaim Water Pipeline Failure

GenPGM noted that process solids would be transported as slurry from the process plant to the process solids management facility in two streams of Type 1 and Type 2 material using high-density polyethylene and/or carbon steel in pipelines of 1 to 3 km in length each. Similarly, reclaimed water would be returned to the process plant from the process solids management facility via the water management pond to support ore processing, using a pipeline 2 km long.

Because monitoring and inspection would occur on a regular basis, the Proponent classified the likelihood of pipeline failure as low. They described a pipeline failure as an event that could occur as the result of a mechanical failure or a rupture due to a severe impact.

The Proponent indicated that solid fractions within a pipeline could swamp the area in the vicinity of a pipeline failure, affecting terrestrial habitat. They stated that the liquid fraction could drain into existing surface water features. Metals would be below acute thresholds but above chronic thresholds and, given short duration of exposure, no negative effects would be predicted.

The Proponent stated that the following measures would be implemented to mitigate the potential of a pipeline failure:

- pipelines would be constructed using appropriate design factors;
- pipelines would be routed adjacent to the process solids management facility access road to facilitate access and inspection;
- pipelines would be positioned along the crest of the process solids management facility dams where possible to direct a release resulting from a failure into the facility;
- pipelines would be routed away from sensitive environmental features where practical;
- emergency catchment features (e.g., berms) would be installed to lessen the probability of a failure resulting in the release of material to a surface water feature; and
- pipelines would have a telemetric flow meters installed to monitor real-time flow rates and pipeline inspections would occur regularly.

20.7.4 Water Treatment Plant Failure

GenPGM emphasized that there would be no intent to discharge untreated water to Hare Lake through the water treatment plant. They indicated that, as a precaution, real-time monitoring of the water treatment plant would detect any operational issues. If monitoring indicated the plant was not treating water according to the requirements, water discharge to Hare Lake would stop. This would be followed by storage of the effluent within the process solids management facility, where there would be sufficient contingency storage capacity, until the water treatment plant was brought back on line. The Proponent indicated that, under the worst-case scenario with insufficient capacity in the process solids management facility, the site would stop operations for a period of time.

20.7.5 Concentrate Load-Out Release

GenPGM indicated that a release of concentrate during load-out at the Project or at the proposed rail load-out facility in Marathon could occur due to equipment malfunction or human error. They did not anticipate environmental issues as any loss would occur within an enclosed and contained area.

The Proponent stated that they would implement the following measures to mitigate the potential of a concentrate release during load-out:

- only licensed companies would be permitted to deliver to site;
- the load-out facility would be designed to make a release to the environment implausible;
- concentrate handling procedures would be defined;
- personnel would have appropriate training, including release response; and
- trucks and rail cars would be inspected to ensure no concentrate leaves the facility outside of containment.

20.7.6 Chemical Release within the Site Study Area

GenPGM stated that a chemical release could occur within or outside a confined facility (contained structure or building). They anticipated no substantial environmental issues as releases under these two circumstances would be either contained in the facility or within drainage areas of built-up parts of the site.

The Proponent stated that they would implement the following measures to mitigate the potential of a chemical release within the Site Study Area:

- building or structure designs would include sealed floors and sumps or drains to contain any material released to ground;
- local onsite transport routes would include appropriate setbacks from sensitive features;
- all chemicals would be stored and handled as appropriate according to the material safety data sheet; and
- all personnel handling chemicals would have appropriate training.

20.7.7 Pit Slope Failure

GenPGM indicated that a pit slope failure could result from improper design or operation of the pits, and that this could lead to an expansion of the pit perimeter and the loss of some terrestrial habitat. They stated that the following measures would be implemented to mitigate the potential of a pit slope failure:

- appropriate conservative safety factors would be used to design the pit and optimize its operations;
- pit wall stability would be monitored during excavation; and
- surface monitors would be installed to monitor ground movement.

20.7.8 Unanticipated Drainage from the Mine Rock Storage Area

GenPGM stated that unanticipated drainage from the mine rock storage area could result if substantially more Type 2 material than had been assumed was stored in the mine rock storage area. They indicated that any water quality issues that arose in this scenario would be managed through treatment for as long as necessary. The Proponent indicated that the following measures would be implemented to mitigate the potential of unanticipated drainage from the mine rock storage area:

- a grade control program in the pits to segregate mine rock streams;
- water quality modelling for the mine rock storage area; and
- collecting water draining to the mine rock storage area and treating it if necessary to protect water quality in the Biigtig Zibi over the long term.

20.7.9 Premature Closure of the Mine

GenPGM stated that premature closure of the mine could occur during any mine life phase. They indicated that environmental concerns would be related to the loss of control of material and/or equipment on the site or a loss of control of the management of the site as a whole. The Proponent indicated that the following factors were considered:

- a robust economic analysis of the Project to ensure the Project would remain economically feasible over its projected life;
- the risk of corporate insolvency is remote as Project risks are shared; and
- the Closure Plan (and the actions outlined therein) and the financial assurance associated with the Closure Plan.

20.7.10 Additional Accident and Malfunction Scenarios

GenPGM also described the following scenarios and provided mitigation measures for each, as described in Appendix 2:

- propane handling incident (low probability);
- explosives accident (low probability);
- fuel release from onsite storage facilities (medium probability);
- fuel release during onsite dispensing (medium probability); and
- Project-related fires (medium/high probability).

20.8 EMERGENCY RESPONSE PLANS AND PROCEDURES

Views of the Proponent

GenPGM indicated that they would develop emergency response plans and procedures that define the roles and responsibilities and provide direction to site personal and emergency responders. The Proponent indicated that these measures would allow them to reduce risks and manage incidents or malfunctions if they were to occur. The emergency response plans and procedures would define four key items:

- equipment, resources, and training requirements necessary to safely respond to accidents and malfunctions;
- contingency measures to contain, clean up, and restore affected areas;
- communication and warning protocols; and
- a response procedure specific to each identified accident and malfunction scenario.

The Proponent identified three categories of responders, in addition to site personnel, on which they would rely to respond to accident and malfunction events. The categories include third-party delivery contractors, third-party release-response contractors, and Town of Marathon emergency response services. The Proponent stated that third-party contractors providing delivery services for the Project would operate under their own emergency procedures and would be responsible for first-level release response and reporting. The Proponent reported that they would retain third-party release response contractors to help respond to chemical and fuel releases and slope failures. They also indicated that they would request assistance from local emergency response services to deal with Project-related fires.

Views of the Participants

The Ministry of the Environment, Conservation and Parks stated that they agreed with the Proponent's proposed plans for mitigating spills, given that the plans are representative of what the Ministry would expect for such a scenario.

Environment and Climate Change Canada recommended that, prior to construction, the Proponent prepare an emergency response plan that reflects all plausible accidents and malfunctions scenarios and takes into account site-specific conditions. The response plan should demonstrate the Proponent's ability to prevent, prepare for, respond to, and recover from an accident or malfunction.

20.9 PANEL CONCLUSIONS AND RECOMMENDATIONS

In reaching their conclusions on the effects of accidents and malfunction on the Project, the Panel considered several factors to be particularly relevant.

Process Solids Management Facility Dam Breach

- A process solids management dam breach would be remote but its environmental consequences would be high. GenPGM would use a robust downstream construction method to build the dam.
- Biigtigong Nishnaabeg was concerned that, notwithstanding the proposed construction method, dam failure could result in severe implications for community members.
- Biigtigong Nishnaabeg community asked for transparency and open communication regarding the design, construction, and closure of the process solids management facility.
- GenPGM committed to establishing an independent tailings review board and to engaging Biigtigong Nishnaabeg in this effort.
- MNMNR, under the authority of the *Lakes and Rivers Improvement Act*, can conduct periodic compliance monitoring (e.g., inspections) of dams and enforcement activities.
- The Proponent would be required to submit a closure plan to MNMNR that contains details of measures to breach or stabilize all tailings, water, and other impoundment structures against static or dynamic loadings to ensure the containment of materials and maintain the specified land use.

Other Accident and Malfunction Scenarios

- The Proponent assessed the likelihood of accident and malfunction scenarios and their environmental consequences.
- The Proponent proposed mitigation measures to prevent and/or respond to accidents and malfunctions.

Emergency Response Plans and Procedures

- Detailed emergency response plans and procedures have not yet been prepared by the Proponent.
- The Ministry of the Environment, Conservation and Parks agreed with the Proponent's proposed plans for mitigating spills. Environment and Climate Change Canada recommended an emergency response plan that reflects all plausible accidents and malfunctions scenarios be developed prior to construction.

The Panel notes that the Proponent's preliminary analysis concluded that the process solids management facility dam falls into the category of a High Hazard potential, which they stated could eventually be revised to Very High based on results of the ongoing dam breach assessment in support of permitting under the *Lakes and Rivers Improvement Act*. The analysis also assessed the consequences of the dam failure for life, economic, environmental, and cultural losses under a number of scenarios. The Panel observes that dam failure that leads to the inundation of the Stream 6 (Angler Creek) watershed could result in loss of life estimated at between 1 and 10 persons, economic losses of up to \$30 million, and significant deterioration of fish habitat and the shore area of Lake Superior.

The Panel finds that concerns raised by Biigtigong Nishnaabeg about the consequences of a process solids management facility dam breach are valid. The Panel is satisfied that the Proponent has committed to establishing an independent tailings review board and to engage Biigtigong Nishnaabeg in this effort. The Panel agrees with Environment and Climate Change Canada that the Proponent's emergency response plan should demonstrate an ability to prevent, prepare for, respond to, and recover from a catastrophic accident such as a dam failure. Despite design aspects that have been considered to minimize seepage from the process solids management facility, and because the potential for unanticipated seepage cannot be disregarded, the Proponent's assessment assumed both high seepage rates and no attenuation along the groundwater flow path. The Panel notes that, under this conservative approach, the Proponent's model suggests that water quality in subwatersheds 105 and 106 remains below appropriate objectives for the protection of aquatic life. The Panel acknowledges the Proponent's commitment to install groundwater monitoring wells downgradient of the process solids management facility. The Panel considers such monitoring

to be a good approach to the detection of potential issues when combined with an adaptive management plan to protect downstream receivers and groundwater users.

The Panel understands that the Proponent would require third-party contractors providing delivery services for the Project (i.e., fuel delivery companies, concentrate haul companies, chemical delivery companies) to operate under their own emergency procedures and to provide first-level spill release response and reporting. The Panel notes that the Proponent plans to prepare a detailed emergency response plan and procedure. The Panel finds that it is important that a detailed plan be prepared prior to starting construction activities and include all accidents and malfunctions scenarios. The Panel also finds that, once finalized, the plan should be made publicly available.

The Panel recommends the Proponent implement the following measures to prevent and/or respond to an accident or malfunction:

Recommendation 91: Organize and implement an independent expert review board to oversee the design, construction (including dam raises) and closure of the process solids management facility. The board should consist of senior experts in tailings facility design and operation from the fields of geotechnical engineering, hydrogeology, and geochemistry. The Proponent should request and review recommendations from the board regarding the design, construction, and closure of the process solids management facility and should include Indigenous groups in the board process and review of recommendations.

Recommendation 92: Prepare, prior to construction and in consultation with Biigtigong Nishnaabeg and the Town of Marathon, detailed emergency response plans and procedures that reflect all plausible accidents and malfunctions scenarios, taking into account site-specific conditions, and demonstrate the Proponent's ability to prevent, prepare for, respond to, and recover from an accident and malfunction. Implement the plans and procedures during all phases of the Project. The plan should include all accident and malfunction scenarios and define:

- reasonable measures to prevent accidents and malfunctions;
- response and mitigation measures;
- roles and responsibilities, including those of third party contractors or municipal services; and
- notification and reporting requirements.

Recommendation 93: Develop, in consultation with Indigenous groups, a communication plan that would be used in the case of an occurrence of an accident or malfunction. The plan should include the methods and timing of communication for each type of accident and malfunction for each community. Prior to operations, develop and share with all

communities that could potentially be affected by a process solids management facility dam breach, an evacuation plan and an updated map highlighting the areas that could be flooded during a dam breach. The evacuation plan should be developed in consultation with communities and periodically reviewed and updated.

Recommendation 94: Prior to construction, conduct a quantitative risk assessment using a risk matrix system of the likelihood and severity of potential hazards associated with a potential chemical release during transport, and assign risk ratings. Develop mitigation strategies, contingency plans, and response capabilities commensurate with the environmental risks that this Project may pose in relation to a potential chemical release during transport, including contingency plans based on a “worst-case” scenario.

With respect to the scenario of a potential dam breach, the Panel finds that such an event, or other event resulting in accidental discharge of process-affected water to the Biigtig Zibi and/or Angler Creek, would result in severe deterioration of the environment comprising a significant adverse environmental effect. The Panel is of the view however that the likelihood of such an occurrence is remote. The Panel is satisfied that the proposed design features, regulatory requirements, the Proponent’s commitment to establish an independent tailings review board, and the Panel’s own recommendations would minimize the risk to the extent possible.

With respect to all other accident and malfunction scenarios, the Panel concludes that, if the recommended mitigation measures and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect as a result of accidents and malfunctions.

PART 7: INDIGENOUS MATTERS

SECTION 21: EFFECTS ON INDIGENOUS PEOPLES

21.1 INTRODUCTION

21.1.1 Requirements of the Panel

This section addresses the Project's potential environmental effects on Indigenous Peoples.

The Panel is of the view that the assessment presented in previous sections is relevant to Indigenous interests and therefore helps to inform this section. While framed around legislative requirements under paragraph 5(1)(c) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012), the Panel considers the analysis and conclusions of the environmental effects within the definition of "environment" that must be assessed under Ontario's *Environmental Assessment Act*.

As noted earlier, the definition of "environment" in the Panel's Terms of Reference is identical to the definition of "environment" in the EAA and is very broad. The inclusion of this broad definition in the Terms of Reference was necessary to allow the Panel to fulfill their obligations under the EAA. However, when considering effects on Indigenous Peoples under CEAA 2012, the Panel understands that the federal mandate is limited to those effects set out under paragraph 5(1)(c). For this assessment, the Panel has applied the narrower definition of environment as set out in CEAA 2012.

Canadian Environmental Assessment Act, 2012

The Panel assessed effects on Indigenous Peoples as required under CEAA 2012, which states that the environmental effects that are to be taken into account in relation to a designated project with respect to Indigenous Peoples include an effect occurring in Canada of any change that may be caused to the environment on:

- health and socio-economic conditions;
- physical and cultural heritage;
- the current use of lands and resources for traditional purposes; or
- any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance.

The Panel notes that effects to “any structure, site or thing that is of historical, archaeological, paleontological, or architectural significance” are considered as part of the Panel’s assessment of physical and cultural heritage.

Terms of Reference

In accordance with their Terms of Reference, the Panel took into account Indigenous consultation undertaken by the Proponent, comments from Indigenous groups, Indigenous traditional and community knowledge, the current use of lands and resources for traditional purposes by Indigenous persons, and physical and cultural heritage. Hereafter the Panel refers to “the current use of land and resources for traditional purposes” simply as “current use.”

The Panel invited information from Indigenous groups related to the nature and scope of potential or established Aboriginal and Treaty rights in the area of the Project, as well as information on the potential adverse environmental effects that the Project may have on those rights. The *Constitution Act 1982*, CEEA 2012 and the Panel’s Terms of Reference all refer to Aboriginal rights instead of Indigenous rights. However, considering the widespread use of the term Indigenous rights, the Panel will hereafter use the term “Indigenous rights” to refer to “Aboriginal and Treaty rights”.

The Panel accepted information from Indigenous groups regarding the location, extent, and exercise of Indigenous rights that may be affected by the Project. The Panel also accepted information presented by participants on potential adverse environmental effects of the Project on Indigenous rights and related interests. Information relevant to the Panel’s assessment of environmental effects on the Project included, but was not limited to, information about the use of lands and resources, harvesting and other traditional uses of land, lifestyle, culture, health, socio-economic conditions, quality of life, access to areas used for traditional and cultural purposes, and the ability of future generations to pursue traditional activities or lifestyle. The Panel also received information concerning measures proposed to mitigate or avoid adverse impacts on Indigenous rights.

As stipulated in their Terms of Reference, the Panel did not make any determination related to the validity or the strength of Indigenous rights, the scope of the Crown’s duty to consult Indigenous groups, the Crown’s duty to consult and accommodate, the potential for the Project to infringe upon Indigenous rights, or matters of Treaty interpretation.

In this section of the report, the Panel provides their assessment of the Project’s effects on First Nations and Métis communities who participated in the review process. In Section 22 (Indigenous Rights), the Panel documents information it received on Indigenous rights and identifies those recommendations that relate to the manner in which the environmental effects of the Project could adversely impact Indigenous rights, as required by the Terms of Reference. In doing so, the Panel considered the adverse environmental effects of the Project on the exercise of Indigenous rights as described by the First Nations and Métis communities.

Guidelines and Guidance

To guide their assessment, the Panel considered the requirements issued to the Proponent in the *Guidelines for the Preparation of the Environmental Impact Statement*.

The Panel's assessment is also informed by the following guidance from the Agency:

- *Technical guidance for assessing the current use of lands and resources for traditional purposes under CEAA 2012.*
- *Technical guidance for assessing physical and cultural heritage or any structure, site or thing that is of historical, archeological, paleontological or architectural significance under CEAA 2012.*
- *Determining whether a designated project is likely to cause significant adverse environmental effects under CEAA 2012.*
- *Assessing cumulative environmental effects under CEAA 2012.*
- *Considering Aboriginal traditional knowledge in environmental assessments conducted under CEAA 2012.*

To conduct their assessment according to the requirements and guidance stated above, the Panel has, for each Indigenous community, reported below what they heard by key issue. How each issue contributes to changes to access, experience, and quantity and quality of resources was carried forward in the Panel's analysis and conclusions on 5(1)(c) factors. Other factors the Panel took into consideration include preferred locations and timing for current use and cultural practices, and the importance of those places for intergenerational transmission of knowledge.

In reaching their conclusions, the Panel implicitly took into account recommendations including, but not limited to those pertaining to water, vegetation, wildlife, caribou, air quality, noise, and human health.

The Panel discussed their approach to cumulative effects assessments in Section 3 (Mandate of the Panel and Scope of Review). In addition, the Panel took into account the following considerations from Agency guidance to guide the Panel's approach to assess cumulative effects on First Nations and Métis communities:

- The value of an environmental component not only as it relates to its role in the ecosystem, but also to the value people place on it.
- The level of concern expressed by Indigenous groups is taken into account in the approach to cumulative effects assessment.

- Setting the spatial boundaries for valued ecosystem components related to Indigenous Peoples takes into consideration the conditions in which Indigenous Peoples experience cumulative effects.
- Environmental effects within a selected spatial boundary, whether they come from physical activities within or outside of the spatial boundary, are considered for inclusion in the cumulative effects assessment.
- The timelines of projects and activities need not overlap for cumulative effects to occur.
- A past project or activity ceases to contribute to cumulative effects when the valued ecosystem component has recovered and is stable relative to environmental conditions and natural variability.
- Setting a past temporal boundary provides a meaningful picture of valued ecosystem components, to determine whether the baseline condition is representative.
- Studies about cultural history and identity before industrial development can be used to describe the past state of valued ecosystem components, and provide a narrative of their evolution.

21.1.2 Information Sources

As much as possible, the Panel relied on the information received directly from Indigenous groups for their assessment. Biigtigong Nishnaabeg, Pays Plat First Nation, the Métis Nation of Ontario, and the Jackfish Metis Association participated throughout the Panel review process. The Red Sky Métis Independent Nation and Netmizaaggamig Nishnaabeg provided information to the former panel at the onset of the review process. Both groups have since issued letters of support to the Proponent, and they did not participate in the public hearing. Ginoogaming First Nation and Michipicoten First Nation have participated in the process since 2021. Pays Plat First Nation and the Métis Nation of Ontario shared redacted versions of their traditional land use studies with the Panel.

The Panel reviewed all information from Indigenous groups on the public record which spans a wide range of topics, from comments on the Panel's mandate to technical expertise on environmental components and assessment methodology, information related to potential effects on current use, traditional practices, culture, and impacts on rights. Many participants raised concerns with the Panel's capacity to engage with community members during the COVID-19 pandemic, as well as during times harvesters were out on the land.

The Panel also took into account information on Indigenous matters received from the Proponent. The Proponent explained that their Indigenous engagement was structured in four phases. Phase 1 was completed during the preparation of the original Environmental Impact Statement (EIS) up to 2015. Phase 1 engagement consisted of presentations, site tours,

meetings, and capacity funding for traditional land use studies. Phase 2 was the interim exploration phase from 2015 to 2019. The Proponent provided regular updates to groups during Phase 2. Phase 3 was conducted during the preparation of the Environmental Impact Statement Addendum (EIS Addendum). Phase 3 engagement occurred primarily through the establishment of environmental committees, one with Biigtigong Nishnaabeg, one with Pays Plat First Nation, and another with other Indigenous groups and the Town of Marathon. Phase 3 also involved funding for participation in the environmental assessment, consultation with the Proponent's technical experts, and sharing drafts of the EIS Addendum. Phase 4 began in 2021 and, as of the close of the record, GenPGM had shared information with their environmental committees on the draft closure plan, the fish habitat offsetting and compensation plan, the caribou mitigation strategy, and country foods monitoring. The Proponent also collected proposals for community initiatives related to follow-up and monitoring. The Proponent noted that the frequency of meetings with environmental committees would decrease throughout the life of the Project as it moved to construction, operations, closure and post-closure phases. They committed to continue to participate in discussions regarding community arrangements and benefit agreements with Indigenous communities.

The Proponent noted that some of the information they received from Indigenous groups during their engagement was confidential in nature, including traditional land use studies and the nature of discussions related to the measures comprising community benefit agreements. The Proponent stated that they integrated the information submitted by Indigenous groups into their assessment.

The Panel also received information from Indigenous groups about Indigenous rights and interests from the Crown Consultation Team. The Crown Consultation Team noted it was comprised of representatives from the Impact Assessment Agency of Canada, the Ontario Ministry of Northern Development, Mines, and Natural Resources and Forestry (MNDMNR), and the Ontario Ministry of Environment, Conservation and Parks. The Crown Consultation Team provided several submissions throughout the Panel review process and made presentations to the Panel on matters pertaining to effects on Indigenous Peoples, their rights, and interests.

The Crown Consultation Team provided the Panel with a preliminary assessment of the potential impacts of the Project on established or asserted Aboriginal and treaty rights as recognized and affirmed under section 35 of the *Constitution Act, 1982*. They noted that this information could further inform the Panel's rationale, conclusions, and recommendations to decision-makers. The Crown Consultation Team's analysis was informed by Indigenous groups' submissions to the Panel and meetings between the Crown Consultation Team and the Indigenous groups. The Crown Consultation Team offered each Indigenous group the opportunity to draft their section of the submission, and provided a draft version of the submission for their review and input. The Panel understands that the submission contained the views of Biigtigong Nishnaabeg in their direct words. For Pays Plat First Nation, the Métis

Nation of Ontario, the Red Sky Métis Independent Nation, Michipicoten First Nation, and Ginoogaming First Nation, the Panel understands that the Crown consultation team integrated the comments of these communities, including several direct quotes. When views were not clearly attributed to the Indigenous groups, the Panel understands that it is the Crown Consultation Team reporting the views of the groups.

The Panel understands that the Crown Consultation Team will finalize the assessment of potential impacts of the Project on established or asserted Aboriginal or Treaty rights as part of the Crown Consultation and Accommodation Report.

The Panel thanks all First Nations and Métis communities who contributed information to the review process, either directly or through engagement conducted with the Proponent and the Crown. The Panel recognizes that a significant amount of work required by all parties to provide the depth and breadth of knowledge to support the Panel in meeting their mandate for the environmental assessment.

21.1.3 Regional and Historical Context

The traditional territories of several First Nations and Métis communities overlap the area for which the Project is proposed along the north shore of Lake Superior. The Project is wholly on land claimed by Biigtigong Nishnaabeg as their Exclusive Title Area.

Other First Nations in proximity to the Project are Netmizaaggamig Nishnaabeg, Pays Plat First Nation, Michipicoten First Nation, and Ginoogaming First Nation. The Jackfish Metis Association, the Red Sky Métis Independent Nation, and the Métis Nation of Ontario represent Métis communities who identified rights and interests in the region where the Project is proposed.

The Project is in a region of Ontario covered by the Robinson-Superior Treaty of 1850. The treaty confers hunting and fishing rights on its signatories. Several of the communities identified above asserted that they are not signatories to the Robinson-Superior Treaty, notably Biigtigong Nishnaabeg, Netmizaaggamig Nishnaabeg, Pays Plat First Nation, and the Jackfish Metis Association.

In relation to the proposed Project site, most Indigenous communities highlighted the importance of water, notably the Biigtig Zibi, Bamoos Lake, Hare Lake, Stream 6 (Angler Creek)¹⁴, and Lake Superior. Key concerns expressed to the Panel by Indigenous communities related to water included the potential for contamination and changes in flows, given that such changes have the potential to affect harvesting practices, connection with and experiences on the land, and cultural heritage and identity. Of utmost importance to Indigenous communities were the effects that the Project would have on their ability to access areas where they practise

¹⁴ Note: Stream 6 (Angler Creek) is referred to simply by its common name, Angler Creek in this section.

their rights. Overall, the Panel heard extensively about ways in which the Project might affect both tangible and intangible aspects of the environment, which could affect Indigenous groups and have an impact on their ability to exercise their rights.

In addition to the eight Indigenous groups identified above, eight others were identified as “potentially affected” by the Proponent and the Crown Consultation Team. Those groups are Animbiigoo Zaagi’igan Anishinaabek First Nation, Bingwi Neyaashi Anishinaabek First Nation, Biinjitiwaabik Zaaging Anishinaabek First Nation, Fort William First Nation, Kiashke Zaaging Anishinaabek First Nation, Long Lake No. 58 First Nation, Red Rock Indian Band, and Whitesand First Nation. None of these groups actively participated in the review process. The Crown Consultation Team noted they continue to update these groups on process milestones and opportunities to participate.

More detailed context for each Indigenous group who actively participated in the review process is provided below. For each First Nation and Métis community, the Panel summarizes what they have heard from them directly, as well as what was reported by the Crown Consultation Team. The Panel does not make assertions regarding the validity of Indigenous claims and rights. In summarizing the information they obtained from Indigenous groups, the Panel does not attempt to speak on behalf of any of the groups. The Panel encourages readers to review the public record for further details on each First Nation and Métis community.

21.2 VIEWS OF THE PROPONENT

GenPGM provided an assessment of potential effects on Indigenous Peoples organized in three topic areas:

- traditional land and resource use;
- Indigenous heritage and archaeology; and
- Indigenous health.

The Proponent assessed potential effects on socio-economic conditions for Indigenous communities as part of their assessment of the effects on the socio-economic environment as further discussed in Section 18 (Socio-economic Environment).

21.2.1 Traditional Land and Resource Use

GenPGM assessed the effects on traditional land and resource use based on five pathways: changes to hunting areas or opportunities for wildlife harvesting; changes to the Biigtigong Nishnaabeg Community Trapline; changes to fishing or fishing areas or opportunities; changes to plant harvesting areas or opportunities; and changes to trails, travel routes or their use.

GenPGM noted that Biigtigong Nishnaabeg, Pays Plat First Nation, the Métis Nation of Ontario, the Red Sky Métis Independent Nation, and the Jackfish Metis Association reported harvesting

wildlife in the Site Study Area and Local Study Area (see Appendix 6). Biigtigong Nishnaabeg provided specific harvesting locations, primarily along Camp 19 Road. Pays Plat First Nation identified locations around Hare Lake, Stream 5 (Hare Creek)¹⁵, and Angler Creek.

The Proponent indicated that changes to plants, wildlife and wildlife habitat had the potential to affect species of importance to Indigenous communities that occur in the Site Study Area and Local Study Area.

The Proponent stated that access to the Site Study Area would be restricted during construction and operations, and that sensory disturbances could deter traditional land users from travelling in some areas. The Project would directly affect roughly 6 km of a trail that provides a travel route north toward Bamoos Lake and into the northern end of the Biigtigong Nishnaabeg Community Trapline (TR-022).

The Proponent recognized that Camp 19 Road is one of the few north-south corridors that provides access to the interior of Biigtigong Nishnaabeg's Community Trapline, and is important to them. The Proponent stated that they recognize and respect the cultural, societal, and economic value of Biigtigong Nishnaabeg's Community Trapline and how it contributes to the health, spirituality, sense of community, traditional knowledge, and Biigtigong Nishnaabeg's ability to live off the land. The Proponent noted that alternative access to lands within the Local Study Area is available along the travel corridor between Hare Lake and Bamoos Lake. They indicated that other First Nations and Métis communities, such as the Métis Nation of Ontario, Pays Plat First Nation, the Red Sky Métis Independent Nation, and Jackfish Metis Association, also reported using the Hare Creek and Hare Lake route to travel north to access Bamoos Lake.

The Proponent recognized that site preparation, construction, and operation activities could result in loss or alteration of access to traplines and hunting areas, as well as a reduction in ability to forage locally for traditional plants and harvest other materials such as timber within the Site Study Area. They expected that Indigenous harvesters would avoid the Project site during construction and operations, due to the presence of workers and safety concerns.

The Proponent noted that fish harvesting activities occur primarily outside the Site Study Area, in Bamoos Lake, Hare Lake, the lower reaches of Hare Creek, the lower reaches of Angler Creek, the near shore of Lake Superior and the Biigtig Zibi. The Proponent determined the Project would have no direct effect on fish harvesting in the Site Study Area. The Proponent explained that access to Bamoos Lake would be temporarily disrupted but the lake would continue to be accessible through a trail from Hare Lake. They also reported that Biigtigong Nishnaabeg gather for an annual Fish Camp at the mouth of the Biigtig Zibi before the river breaks in early spring.

The Proponent recognized that traditional and cultural uses at Angler Creek could be impacted during construction and operations, as a result of a 33%–36% mean annual flow reduction from

¹⁵ Note: Stream 5 (Hare Creek) is referred to simply by its common name, Hare Creek in this section.

overprinting of the watercourse. They explained that they were contemplating returning flows to Angler Creek after water quality in the process solids management facility became acceptable to return to the environment, which would occur in Year 6 of the closure period. At that time, GenPGM predicted that the mean annual flow for Angler Creek post-closure would represent a 4% reduction from baseline flows.

After closure, and with the installation of safety structures to protect the public, the Proponent noted that access to and through the Site Study Area would be restored. However, public access to the open pits would be prohibited and limited by a perimeter berm, following the requirements of the Mine Rehabilitation Code.

The Proponent recognized that effects on country food gathering and use of the Biigtigong Nishnaabeg Community Trapline could extend into the closure phase as the reclamation process takes hold, and as plant and animal communities re-distribute themselves in the landscape.

To mitigate the Project's effects on traditional land and resource use, the Proponent proposed to:

- inform planning and design of the Project through consultation with local users and Indigenous communities;
- provide a harvester training fund, as an endowment in which interest supports annual harvests and trapline training programs;
- provide reasonable support to Biigtigong Nishnaabeg to secure a replacement trapline for the community;
- provide compensation for the loss of access, the economic benefits of trapping and a use of a portion of Biigtigong Nishnaabeg Community Trapline within the Site Study Area;
- strictly prohibit hunting, fishing, harvesting of wildlife on the site;
- engage with Indigenous communities and develop a limited-access protocol to provide escorted access through the Site Study Area during construction and operations when and where safety permits;
- incorporate traditional ecological knowledge and traditional land and resource use information into detailed designs and mitigation measures and the development of follow-up and monitoring programs, to the extent practical, such as Biigtigong Nishnaabeg's Travel Route Mapping Survey (2019) information;
- develop a protocol to address public safety concerns with mine-related traffic for safe use of the initial portion of the Camp 19 Road, which provides access to the Biigtig Zibi and other travel corridors used for traditional wildlife, fish, and plant harvesting;

- where practicable, design the site to place buildings in topographically low areas, blended with surrounding height-of-land and vegetative buffers with forested areas to break lines of sight to reduce the visibility of site infrastructure from viewpoints in the Local Study Area;
- implement follow-up monitoring and environmental management plans on sites of significance to Indigenous communities (including the Biigtig Zibi to the mouth of Lake Superior, the outlet of Hare Creek at Port Munro, Angler Creek, and the outlet at Sturdee Cove);
- assess technically and economically feasible options to supplement flows for Angler Creek;
- incorporate plant species of interest to Indigenous communities during rehabilitation;
- consult with Indigenous Peoples to discuss the concepts developed for closure and seek further information, opinion, and guidance; and
- consider desired land and resource end uses in preparation of the Closure Plan.

The Proponent described residual effects on traditional land and resource use of the Community Trapline as: the loss of 1,116 ha of harvesting area until the site is reclaimed and safe for public access; the displacement of furbearers and birds; and habitat fragmentation within the Local Study Area. They also recognized that noise, dust, light, odors, and other sensory disturbances could affect the overall experience of resource users within the Site Study Area and Local Study Area, as remoteness is a large part of the draw and appeal of the activities. Indirect loss through sensory disturbance was estimated to cover another 1,300 ha. The Proponent noted that the 2,416 ha lost to direct and indirect effects represent 15.5% of the total area of the Community Trapline and 0.2% of Biigtigong Nishnaabeg's Exclusive Title Area.

With respect to changes in wildlife harvesting as a pathway of effect to traditional land and resource use, the Proponent noted that continued access to the Local Study Area would not be affected by the Project, and that extensive areas outside the Site Study Area where traditional harvesting is currently practised would continue to be available to Indigenous communities, as loss of the Site Study Area is only a fraction of the available area for wildlife harvesting. With respect to changes in plant harvesting, the Proponent noted that the magnitude of residual effects on harvesting of plants and fungus would be low, given that they are relatively common in the Regional Study Area (see Appendix 6). With respect to changes in fishing, the Proponent noted their assessment of fish and fish habitat included changes in traditional fish harvesting.

The Proponent described the residual effects on access and travel routes from the restricted access to Camp 19 Road as negative, medium in magnitude due to the availability of an alternate access, local in extent, lasting throughout the life of the Project, and reversible upon closure. They stated that, due to mitigation measures undertaken during the life of the Project

and reclamation of disturbed areas following mining activities, adverse effects on the Biigtigong Nishnaabeg Community Trapline would be temporary and reversible.

The Proponent characterized alteration to the natural landscape as irreversible, even with reclamation. Indirect impacts on hunters would be temporary and intermittent. Other changes, such as access to trails, would be reversible at closure and at final reclamation.

21.2.2 Heritage and Archeological Resources

GenPGM identified four pathways of effects of the Project on Indigenous heritage and archeological resources: physical or cultural Indigenous heritage and archaeological resources, spiritual sites, habitation sites, and access and travel routes.

The Proponent's assessment of archaeological resources is summarized and discussed in Section 18 (Socio-economic Environment). With proposed additional archeological assessments and mitigation measures, no residual adverse effects on these resources would be anticipated.

With respect to spiritual sites, the Proponent reported that no specific locations within the Site Study Area were identified by Indigenous communities. Outside the Site Study Area, the Proponent acknowledged the spiritual and cultural importance of the Biigtig Zibi as well as access to land and waterways for hunting, fishing, and ceremonial use. They also stated they recognized and respected the cultural, societal, and economic value of the Biigtigong Nishnaabeg Community Trapline, as it contributes to Biigtigong Nishnaabeg health, spirituality, sense of community, traditional knowledge, and ability to live off the land.

The Proponent found no habitation sites or temporary camps in the Site Study Area. Those identified in the Local Study Area, including on the shores of Hare Lake, would not be physically disturbed, and access to them would not be restricted by the Project.

With regard to culturally important travel routes, the Proponent considered Camp 19 Road as an important travel route for Biigtigong Nishnaabeg to access the interior of their traditional lands. The Proponent noted that access to the segment of Camp 19 Road that crosses the Site Study Area would be restricted during construction and operations, although an alternative travel corridor from Hare Lake north to Bamooos Lake would remain open. The Proponent also recognized the cultural and spiritual importance of water and waterways, noting in particular that the Biigtig Zibi plays a critical role for travel, fishing, and supply of drinking water, and is culturally and spiritually significant to the community and its overall health. The Proponent noted that Pays Plat First Nation stated they have used Angler Creek, Hare Creek, and the Hare Lake corridor for travel routes of cultural importance, and that the Métis Nation of Ontario and the Jackfish Metis Association have indicated they use Hare Creek and Hare Lake to travel north to access Bamooos Lake.

The Proponent acknowledged that sensory disturbances could affect cultural and spiritual experiences on the waterways such as the Biigtig Zibi, Angler Creek, and other waterways

within the Local Study Area. They noted that impacts on Indigenous heritage and archeological resources would occur as a result of the loss of cultural and spiritual experiences associated with land and travel routes in the Site Study Area.

The Proponent proposed to mitigate Project-related effects on heritage and archeological resources through:

- avoidance where possible of waterways, waterbodies, navigation routes, and trails used by Indigenous communities that have been identified as culturally or spiritually important;
- adjustment of construction and operations activities to limit sensory disturbance and meet human health criteria at the Project boundary;
- ongoing engagement with communities to provide an opportunity to identify physical or culturally important sites that have the potential to be affected by the Project; and
- mitigating potential removal or alteration of archeological sites or resources at Hare Lake, which includes providing the results of further archeological assessments to Indigenous communities.

Although the Proponent predicted that the effects of flow reduction on Angler Creek would be offset through the Fisheries Offsetting and Compensation Plan, they recognized that traditional and cultural use of Angler Creek by Biigtigong Nishnaabeg could be impacted during all phases of the Project. They committed to implementing a monitoring program for Angler Creek, in collaboration with Biigtigong Nishnaabeg prior to the start of construction, to monitor the impact of changes in the watershed on traditional and cultural uses.

The Proponent acknowledged that Biigtigong Nishnaabeg were concerned with potential post-closure discharge from the mine site into the Biigtig Zibi. The Proponent's assessment did not consider alternative methods to restore the natural drainage patterns from the mine rock storage area and pit lakes post-closure. The Proponent noted that they consulted and agreed with Biigtigong Nishnaabeg that their consent must be obtained prior to submission of the Closure Plan.

21.2.3 Indigenous Health

GenPGM's assessment of the effects on human health is discussed in Section 17 (Human Health), including a summary of their views on the risk to human health related to mercury. The following section outlines considerations included by the Proponent specifically for Indigenous health.

The Human Health Risk Assessment screened out all effects pathways other than atmospheric exposure, based on predicted air quality criteria exceedances. The Proponent assessed cancer risks from benzene and benzo(a)pyrene quantitatively, and assessed non-cancer risks from

benzene, benzo(a)pyrene, crystalline silica, nickel, nitrogen dioxide, dustfall and particulate matter, and diesel exhaust mixtures qualitatively. The Proponent concluded that the results of the Human Health Risk Assessment were below levels associated with health risks from long-term exposures, including benchmarks set by Health Canada. The Proponent assumed these conclusions held true for effects on land users within the property boundary — where no air quality receptors were located — because of the direction of prevailing winds at the site. They stated that air quality monitoring locations for the follow-up program could be located within the property boundary based on input from Indigenous groups and regulatory agencies.

Outside the Human Health Risk Assessment, the Proponent assessed two pathways for effects on Indigenous health: changes to drinking water quality and changes to consumption and quality of plants, animals, and fish for food, cultural and medicinal purposes. The Proponent assumed that access to the Site Study Area during construction and operations would be restricted, while land and resource use within the Site Study Area during the post-closure period would be expected to be limited due to the rugged terrain, difficulty of access, and limited productivity in the vicinity of the Project. The Proponent was therefore of the view that plant, fish, and animal harvesting within the Site Study Area would be limited and unlikely.

For drinking water, the Proponent stated that no groundwater users were known within the area where groundwater quality would be influenced by Project components. Changes in groundwater quality were not expected to adversely affect human health via use of groundwater as drinking water. The Proponent examined potential changes in Hare Lake as a water supply, and found that human health benchmarks would not be exceeded during any phase of the Project. They concluded that changes in surface water quality were not expected to adversely affect human health via use of surface water as drinking or recreational water.

The Proponent noted that many of the Indigenous people in the communities they consulted would be considered average to heavy consumers of country foods, with Biigtigong Nishnaabeg relying heavily on a traditional diet and medicines. The Proponent recognized that the Site Study Area and Local Study Area contribute meaningfully to Biigtigong Nishnaabeg's traditional diet, such that restricted access to these areas would have the potential to negatively affect Biigtigong Nishnaabeg's physical and spiritual health, gathering of medicinal plants, and dietary health.

The Proponent acknowledged that Indigenous communities are concerned about background levels of contaminants of potential concern, particularly mercury, associated with consuming fish, notably from Hare Lake, Hare Creek, Bamooos Lake, Angler Creek, and the Biigtig Zibi. The Proponent committed to engage with Biigtigong Nishnaabeg in the design and implementation of the mercury monitoring plan and other site-wide water management plans and programs, and obtain Biigtigong Nishnaabeg's approval of mercury monitoring plans.

The Proponent commented that, even though the health criteria for various valued ecosystem components can often be achieved, past experiences can influence how Indigenous Peoples

interpret and trust the information presented and ultimately use their traditional lands and waterways throughout the life of the Project. The Proponent committed to work with Indigenous communities to understand these contaminant pathways and monitor country foods in the Site Study Area and Local Study Area.

The Proponent stated they would like to build trust with communities, noting for example the importance of commitments related to direct Indigenous participation in field work, direct access to data focused on parameters that are specifically of concern, as well as education, training, and information sharing.

To mitigate the potential effects on health, the Proponent would prohibit public access to the Site Study Area during the construction, operations, and active closure phases of the Project. They also committed to develop and implement, in coordination with Indigenous communities, a country foods monitoring program that would include soils and terrain, vegetation, wildlife and fish, and fish habitat to assess the potential impacts of the Project on human health.

The country foods monitoring program would also establish baselines for metal concentrations in foods and medicines of importance to Biigtigong Nishnaabeg. The Proponent stated that this sampling is currently underway. As part of this program, they made a commitment to re-evaluate health risks if results indicate anything unexpected or contrary to the assumptions used in the assessment or anything that represents a health concern. The Proponent noted that communication of monitoring results would help alleviate potential concerns that Indigenous resource users may have regarding Project impacts. The Proponent further confirmed plans to develop a dietary survey in collaboration with Biigtigong Nishnaabeg.

GenPGM noted that seed collection for plant species of Indigenous interest occurred in 2021 as part of the country foods sampling efforts. Collection occurred with participation of Indigenous communities, and seeds could contribute to seed banks for community gardens, planting, school curriculum, and progressive rehabilitation.

21.2.4 Socio-Economic Conditions

GenPGM's views on effects on socio-economic conditions for Indigenous groups are discussed in the Section 18 (Socio-economic Environment). The following views focus on information provided by the Proponent on socio-economic conditions that are applicable only to First Nations and Métis communities that may be affected by the Project.

The Proponent explained that the details of mitigation and enhancement measures for socio-economic effects on Indigenous communities would be contained in community benefit agreements. The Proponent indicated that such agreements would include opportunities for training and skills development, employment for Indigenous community members and under-represented groups in the mining sector, and business and contracting opportunities for local Indigenous-owned businesses. The agreements could also include financial participation to

address impacts on traditional land and resource use, loss of access, financial benefits, and the Biigtigong Nishnaabeg's Community Trapline. The Proponent stated these agreements were being negotiated and are considered proprietary and confidential. Further details were not disclosed to the Panel.

As part of the assessment of effects on traditional land and resource use, the Proponent acknowledged that restricting access would negatively affect the economic benefits Biigtigong Nishnaabeg would obtain from foraging, trapping, and harvesting. The Proponent noted that a 2012 academic study summarizes the cultural, societal, and economic values for Biigtigong Nishnaabeg members who hunt, trap, fish, and harvest foods on and in the vicinity of the Project. As outlined previously, the Proponent committed to implementing a harvester training fund to support annual harvests and trapline training programs, provide reasonable support to Biigtigong Nishnaabeg to secure a replacement trapline for the community, and compensate for the loss of access and economic benefits of trapping.

The Proponent committed to develop, in collaboration with Biigtigong Nishnaabeg, a socio-economic management and monitoring plan to measure and mitigate the socio-economic impacts of the Project on Biigtigong Nishnaabeg. In the Proponent's preliminary plan, impacts on Indigenous harvesters, country foods, and culture would be monitored. Indicators would include the ability of harvesters to relocate, the level and change of harvesting near the Project, third-party use of the Local Study Area, and cumulative impacts on harvesting and community cultural activities.

21.3 BIIGTIGONG NISHNAABEG

Biigtigong Nishnaabeg are located at the mouth of the Biigtig Zibi, where it flows into Lake Superior, approximately 9 km south from GenPGM's mine claim boundary, and 20 km from the Project area.

Biigtigong Nishnaabeg have shared that their name relates directly to being people of the Biigtig Zibi. Biigtigong Nishnaabeg have, since time immemorial, fished, travelled, and traded on the Biigtig Zibi, which holds great cultural and spiritual significance.

Biigtigong Nishnaabeg presented the Panel with information on the meaning of "Biigtigong" in the Nishnaabemwin dialect. Biigtigong Nishnaabeg explained what it means for the community to be from "Biigtigong Nishnaabeg." They explained that, in symbolic language, Biigtigong means "the place of the river which tills the communing of body and soul, and of body, and of soul." They also noted that the choice of this name by community elders indicated the importance of the river for the community, in contrast to Lake Superior.

Biigtigong Nishnaabeg stated that the health and economic prosperity of the community is also closely tied to the health of the river. It is a place where Biigtigong Nishnaabeg transmit cultural knowledge to younger generations, where canoe trips are often taken with high school

students, and on which they are taught about the community's history and other knowledge of the community.

Biigtigong Nishnaabeg rely on the river for traditional and current uses, and to maintain their cultural and spiritual connectivity to the lands and waters within their Exclusive Title Area. They stated that "Water is gold to us and significant to our way of life. An elder referred to Lake Superior as the heart of Turtle Island, the tributaries are the veins, and the land is the body of Mother Earth. Water is a source of powerful teachings, rings true to the heart of who we are...". Biigtigong Nishnaabeg also identified traditional use of Bamooos Lake and Hare Lake. They noted that these rivers and lakes act as important travel and access routes.

Biigtigong Nishnaabeg identified numerous fish species of importance to the community, such as salmonids, Lake Sturgeon, and Muskellunge. They identified many boreal plants and indicated that furbearers, timber wolves, and coyotes were also of cultural importance. Caribou and moose are important cultural resources for the community, with moose being an important food source as well.

Biigtigong Nishnaabeg shared their world view with the Panel, which guided how they chose to contribute to environmental assessment. A member of Biigtigong Nishnaabeg, stated that:

"[...] we wanted to provide a glimpse into our Nishnaabeg world view, specifically our Biigtigong world view. We sought to express our inherent connection with our lands, our relationship with the world and the cosmos, the essence of our beings. The fundamental purpose and meaning that we have derives from our interconnections and our interdependencies upon our traditional lands.

It is in this world view that guides our responses to this environmental assessment. In our written submissions we encourage the Crown and others to adopt a holistic interpretation of the term environment that considers our Nishnaabeg world view. This broader view that Biigtigong holds will allow the Crown and the Proponent to better understand and consequently meaningfully address the potential impacts of this Project on our unceded lands and Aboriginal title rights [...]

So for us, and hopefully for everyone else on this Project, it is really important that we do not see this Project as a dot. It is very much connected to a bigger network of things."

The Panel attempted, as much as possible, to connect the dots between those things that create a bigger network, as expressed by Biigtigong Nishnaabeg. Each issue below is a pathway that the Panel considered in their analysis of effects on current use, cultural heritage, health, and socio-economic conditions for Biigtigong Nishnaabeg. The Panel hopes to consider the complexities it heard from Biigtigong Nishnaabeg and factors this appropriately in their assessment of effects. The Panel takes this approach for all other Indigenous communities as well.

21.3.1 Discharge to the Biigtig Zibi

Biigtigong Nishnaabeg noted that being located just a short distance downstream of the Project, on the shores of the Biigtig Zibi, means that any water discharged from the mine would flow past and through their reserve lands. Biigtigong Nishnaabeg expressed great concern with the passive water management design for the post-closure period, which suggests a potential for contaminated waters to enter the river.

Biigtigong Nishnaabeg emphasized that protection of the Biigtig Zibi is of the highest importance. Biigtigong Nishnaabeg noted that the pit lakes and the mine rock storage area would be permanent features on the community's Exclusive Title Area after mine closure, and any potential long-term risk that may arise related to the geotechnical stability of the mine rock storage area or with the effluent quality of the pit lakes, would have profound and lasting impacts on their spiritual and cultural well-being.

Biigtigong Nishnaabeg stated that any discharge of pit lake water to the river would be unacceptable. Biigtigong Nishnaabeg noted this sentiment also applied to all other Project-related discharges.

Biigtigong Nishnaabeg, in their closing remarks, acknowledged that GenPGM had worked closely with Biigtigong Nishnaabeg to resolve, or identify continuing commitments to resolve, outstanding issues, including the potential discharge to the Biigtig Zibi during the closure phase. These commitments included obtaining Biigtigong Nishnaabeg's consent for the final closure plan, and allowing for an ongoing review of feasible closure plan alternatives.

The Proponent committed to obtain Biigtigong Nishnaabeg's full and informed consent with respect to the final Closure Plan. Biigtigong Nishnaabeg requested MNDMNRF acknowledge that this threshold of consent must be met prior to the issuance of any formal approval of the Proponent's final Closure Plan. The Crown Consultation Team noted MNDMNRF's commitment to fulfilling their duty to consult prior to the acknowledgment of the Proponent's filed Closure Plan.

21.3.2 Overprinting of Angler Creek

Biigtigong Nishnaabeg reported using Sturdee Cove as a place to appreciate the beauty of Lake Superior, swim in its waters, and enjoy time with their families. Biigtigong Nishnaabeg also reported fishing at the mouth of Angler Creek for Rainbow Trout and Chinook Salmon. Biigtigong Nishnaabeg stated that Angler Creek is an extremely important area to the past, present, and future of Biigtigong Nishnaabeg, their culture, rights, and interests.

Biigtigong Nishnaabeg were particularly concerned about the potential impacts of the Project on changes to flow reductions and fish species of importance to the community. They stated that any reduction in Angler Creek fish productivity, particularly with respect to salmonids,

would be unacceptable. Potential effects on fish and fish habitat are further discussed in Section 10 (Fish and Fish Habitat).

With respect to the use of Angler Creek by Biigtigong Nishnaabeg, the Proponent and Biigtigong Nishnaabeg jointly submitted that the Proponent would develop and implement a monitoring program prior to the start of construction. The purpose of this program would be to monitor the impact of changes to the watershed, if any, on traditional and cultural uses of Angler Creek by Biigtigong Nishnaabeg.

21.3.3 Restricted Access and Avoidance

Biigtigong Nishnaabeg commented that the Project would remove one of three existing roads that provide community members with access to northern portions of their traditional territory. Additionally, a trail used by the community would also be severed. This trail, which facilitates access to the north end of the territory, is accessible via Camp 19 Road and extends for approximately 26 km north of the Project.

Biigtigong Nishnaabeg noted that many of their harvesters would be unlikely to use Camp 19 Road while the mine is in operation, regardless of any mitigation measures that may be put in place. As a result, Biigtigong Nishnaabeg members would be required to go elsewhere and this would result in increased pressure on other areas used by Biigtigong Nishnaabeg harvesters, such as the Deadhorse Road area. Biigtigong Nishnaabeg noted that, although an alternative access to Bamooos Lake would remain via Hare Lake, the Project would affect the most convenient access route. Biigtigong Nishnaabeg speculated that community members may choose to use Hare Lake more frequently as an access route, and possibly harvest fish from its waters.

Biigtigong Nishnaabeg requested that, to mitigate these effects, the Proponent build a bypass road with access controlled by Biigtigong Nishnaabeg. Biigtigong Nishnaabeg identified the “Gaffhook Lake Access” as an option for the bypass road. MNDMNRF committed to working with Biigtigong Nishnaabeg and the Proponent to identify administrative solutions as appropriate, but did not commit funding for road construction, noting that any funds required to create a bypass road should come from the Proponent.

With respect to potential changes to background noise levels near the Biigtig Zibi, Biigtigong Nishnaabeg commented that people who live in northern Ontario appreciate the silence that comes from the land. Changes in noise would impact connections with the land when paddling down the river and when “hearing silence and birds and natural activities happening on the land.”

21.3.4 Loss of Biigtigong Nishnaabeg's Community Trapline

Biigtigong Nishnaabeg stated that five registered traplines associated with Biigtigong Nishnaabeg fall within a 10 km radius of the Project footprint. Registered Trapline Area TR022 encompasses the proposed Project and is the sole Biigtigong Nishnaabeg Community Trapline.

Biigtigong Nishnaabeg explained that the Community Trapline is connected through patrilineage, as recorded through genealogy, and dates directly back through the heads of the Moses family, a prominent Biigtigong family. Biigtigong Nishnaabeg explained that the Community Trapline is held as a Band-managed trapline and used for community education and outdoor classroom programs. Biigtigong Nishnaabeg were concerned that furbearer populations, which are important to the trapline, are likely to move away from an active mine site, negatively affecting commercial and cultural harvesting activities.

Biigtigong Nishnaabeg stated that, although substantial efforts have been made to design and plan the Project site with Biigtigong Nishnaabeg input and to minimize disturbance, ultimately the location of the geological deposit and mining infrastructure would have an immense impact on the Biigtigong Nishnaabeg Community Trapline.

Biigtigong Nishnaabeg and the Crown Consultation Team expected that the Project would all but eliminate the usability of the trapline and any commercial and non-commercial trapping and harvesting activities, as well as communal, cultural, and training activities, that Biigtigong Nishnaabeg members had been practising for generations. Biigtigong Nishnaabeg requested both the Proponent and the Crown fund and support a replacement for the Community Trapline.

The Crown Consultation Team reported that MNDMNRF had identified administrative options and pathways through which the allocation of an alternate community trapline might be pursued. MNDMNRF is working directly with Biigtigong Nishnaabeg to identify a suitable alternative.

Biigtigong Nishnaabeg noted that the 2012 harvest study identified 63 harvesters who use the area within 5 km of the Project footprint. The study estimated the average cash-equivalent income produced by Biigtigong Nishnaabeg foragers who hunt, trap, fish, and gather in the vicinity of the proposed Project. This study estimated that each harvester annually collected, on average, resources equivalent to \$7,645 in cash. The study also estimated a compensation amount, based on a conservative estimate of six years for harvesters to transition to new areas, which totalled \$1,445,037.30. This amount was based on cash equivalents for resources harvested by hunting, trapping, fishing, and gathering, and did not factor in the costs associated with relocation of harvesting practices.

Beyond commercial and economic gains, Biigtigong Nishnaabeg explained that trapping and harvesting provides for food security, high-quality food products, reduction in grocery bills and the transfer of knowledge between generations of harvesters contributing to cultural

connections, ceremony, and social customs, which together support the economic, physical, mental, and cultural well-being of the community. Biigtigong Nishnaabeg noted that trapping and harvesting represent significant social structures and systems that are vital to cultural connectivity and continuity.

Biigtigong Nishnaabeg has indicated that the Proponent did not discuss their proposed harvester training fund in any detail, and no specific commitments were made. Biigtigong Nishnaabeg has indicated that the fund would not fully compensate for the loss of the Community Trapline. The Crown Consultation Team further noted that, while the compensation proposed by the Proponent might be intended to address the economic losses resulting from the Project, it may not address or mitigate the associated cultural, social, and spiritual impacts that are inextricably linked to commercial and non-commercial trapping and harvesting activities in the Project area.

21.3.5 Long-Term Alteration of the Landscape

Biigtigong Nishnaabeg identified that the community's economic prosperity relies on the ancestral lands and water resources for traditional and current uses. For example, Biigtigong Nishnaabeg members noted the significance of moose as a country food, and stated the loss of access to moose would result in more members purchasing meats and other foodstuffs from grocery stores and therefore have an economic impact on the community. Biigtigong Nishnaabeg noted that they expect the Project would have direct and indirect effects on both caribou and moose habitat. Although they no longer hunt caribou, they noted that both species are of critical importance to the culture of the community.

Biigtigong Nishnaabeg noted that the significance of caribou in their daily lives had been strongly affected by industry. Biigtigong Nishnaabeg commented that caribou was important to their people, as documented in interviews conducted in the 1950s. Elders "sang the songs about caribou because the caribou was important to them as a food source and as a clothing source." Biigtigong Nishnaabeg's Chief recalled that, in his experience, caribou was important in the early 50s, but by 1965 he heard no more stories of hunting caribou. He stated that then, "it was all about moose." He commented he would be letting several people down if he didn't try to do something to ensure that the caribou did not disappear from the north shore.

Biigtigong Nishnaabeg presented their Caribou Stewardship Strategy during the hearing and it is discussed in Section 13 (Caribou) in more detail. The strategy includes the goal of increasing the cultural awareness of caribou and their role in the ecosystem and Indigenous culture.

Biigtigong Nishnaabeg requested that the Proponent and the Crown engage in extensive consultations with Biigtigong Nishnaabeg regarding revising current caribou offsite mitigation measures to consider the current landscape and cultural proposals from Biigtigong Nishnaabeg. The Proponent and Biigtigong Nishnaabeg confirmed that the Proponent had accepted this request.

As for moose, Biigtigong Nishnaabeg explained that hundreds of non-Indigenous hunters use a highly sensitive core cultural area for moose hunting by way of Deadhorse Road. As harvesters would no longer be using Camp 19 Road, pressure on the already stressed Deadhorse Road in Wildlife Management Unit 21A would be expected to increase. Biigtigong Nishnaabeg requested that Unit 21A be split in two to mitigate the effects of the Project and allow the area to be managed in a way that is sensitive to the realities of access and sensitive to Indigenous land use issues. They requested the Crown work in partnership with Biigtigong in overseeing and administering wildlife management programs within Biigtigong's Exclusive Title Area, such as setting moose tags and quotas for Wildlife Management Unit 21A to facilitate eventual full control by Biigtigong Nishnaabeg. The Crown Consultation Team acknowledged that access to areas where Biigtigong Nishnaabeg members hunt for moose would be negatively affected by the proposed Project. The Crown Consultation Team shared that MNDMNR would continue to discuss Biigtigong Nishnaabeg's request regarding moose management and look for ways to address Biigtigong Nishnaabeg's interests and concerns. MNDMNR committed to providing Biigtigong Nishnaabeg with additional information on moose management for follow-up discussions.

Biigtigong Nishnaabeg stated that the process solids management facility, the mine rock storage area, and pit lakes would be permanent features on their Exclusive Title Area after the mine is closed. Following closure, Biigtigong Nishnaabeg noted that habitats would be in early stages of succession, vegetation and wildlife communities and their locations on the landscape might differ, the abundance of species would change, new ecosites might be introduced or lost, and the patterns that wildlife follow when moving across the landscape could be different. This would fundamentally change Biigtigong Nishnaabeg's use of the area, contemporarily and for the long term.

Biigtigong Nishnaabeg emphasized that end land-use planning is a mechanism that would ensure the site is reclaimed in a way that would support their long-term use of the area for traditional activities, such as trapping, harvesting, gathering, fishing, and ceremonial purposes. Biigtigong Nishnaabeg noted that they are deeply connected to and have a long-term vision for their Exclusive Title Area, and this includes what the landscape near the Project would look like post-mining.

The Proponent agreed to:

- engage Biigtigong Nishnaabeg in end land-use planning for the Project site and ensure the site is designed to support habitats and species of interest to Biigtigong Nishnaabeg;
- obtain Biigtigong Nishnaabeg's consent to the closure plan; and
- review feasible closure plan alternatives with Biigtigong Nishnaabeg.

21.3.6 Alienations in the Exclusive Title Area

Biigtigong Nishnaabeg stated that there are few replacement areas that are not already occupied where they would be able to conduct traditional and cultural activities uninterrupted by others. Biigtigong Nishnaabeg expressed concern with routinely hearing throughout the environmental assessment process that the title area is large and the mining footprint is relatively small, therefore Biigtigong Nishnaabeg can go elsewhere.

In support of these views, Biigtigong Nishnaabeg provided maps showing current use and historical and current land alienations in the Exclusive Title Area, which covers approximately 800,000 ha. They explained that the Project is in the heart of this area. A density map of harvesting activities showed core areas in the area around the reserve, extending up the Manitouwadge highway to the east and in the Deadhorse area. Another map illustrated that within 5 km of the Project, 63 harvesters had documented more than a thousand use and occupancy features.

Biigtigong Nishnaabeg's documentation of alienations provided context for past and existing activities and projects in the title area that affect their use of the land. Biigtigong Nishnaabeg stated that sources of alienation included municipalities, provincial and federal protected areas, private lands, mines, mining claims and advanced exploration areas, forestry activities, aggregate pits, roads, and rights of way, among others. Biigtigong Nishnaabeg also pointed out that Crown policies, such as Ontario's wildlife management policies and fishing and hunting licenses, represent a form of impact. Biigtigong Nishnaabeg noted that for most of these activities, they were not consulted and resources were not protected for their use.

21.3.7 Perception of contamination

Although the views of Indigenous groups regarding potential contamination of country foods are reported in Section 17 (Human Health), the Panel also heard how the perception of contamination may lead to changes in harvesting practices. Biigtigong Nishnaabeg indicated that if food sources were to be perceived as inedible by community members, this would compromise an integral component of the contemporary Indigenous diet.

The Crown Consultation Team shared their views that the issues of mercury and methylmercury and contamination of fish and local country foods could result in psychosocial impacts on Biigtigong Nishnaabeg, as fear of consumption of contaminants could result in community members refraining from fishing or even consuming fish or other traditional food sources. This would result in economic impacts, as more community members turn instead to purchased foodstuffs from grocery stores.

The Crown Consultation Team noted that health and dietary impacts would be experienced if community members replaced local country foods with non-traditional and potentially highly

processed or unhealthy foods. Cultural, mental, and emotional impacts would also result from community members avoiding traditional fishing practices due to perceived health risks.

21.3.8 Existing Socio-Economic Conditions and Constraints

Biigtigong Nishnaabeg provided an overview of the socio-economic conditions as context for the assessment of effects on their community. Biigtigong Nishnaabeg noted that systemic racism in Crown policies, including Indian Residential Schools, the *Indian Act*, and other colonial policies and legislation, would exacerbate most, if not all, of the negative socio-economic impacts of the Project. Biigtigong Nishnaabeg further noted they expect that vulnerable and diverse subgroups within Indigenous communities, including members of low-income households, women, and youth, would be the most likely to experience disproportionate effects of the Project with respect to socio-economic conditions.

Biigtigong Nishnaabeg noted that the Project would exacerbate the many systemic shortcomings and stressors within their community, including infrastructure, social services, emergency response, health and education. Biigtigong Nishnaabeg was of the view that these issues must be addressed prior to permitting, and that the responsibility to mitigate is with both the Proponent and the Crown. The Crown Consultation Team agreed with Biigtigong Nishnaabeg that it is not the sole responsibility of the Proponent to remedy pre-existing or cumulative socio-economic impacts from the Project on the Biigtigong Nishnaabeg community.

Biigtigong Nishnaabeg questioned whether mitigation of these socio-economic effects can be addressed in a community benefit agreement, and noted that any such agreement is a confidential document that would likely be executed after the Panel makes their recommendations. Biigtigong Nishnaabeg stated that they would like to see some binding commitments from the Proponent prior to permitting.

Biigtigong Nishnaabeg also commented on the Proponent's analysis of residual effects that were not considered to be significant on the basis that these issues could be addressed by government programs and policies. Biigtigong Nishnaabeg noted they have had no discussions or heard any firm commitments regarding government programs and policies and enhancement measures, which they need to have prior to permitting. Biigtigong Nishnaabeg was of the view that they are "caught in this Mobius loop as a metaphor whereby mitigation can happen later."

Changes to Economic Opportunities

Biigtigong Nishnaabeg acknowledged that the Project could benefit Biigtigong Nishnaabeg by providing jobs and economic opportunities. Biigtigong Nishnaabeg noted the on-reserve population is expected to increase as employment and training opportunities from the Project would likely incentivize the return of off-reserve members. However, Biigtigong Nishnaabeg

indicated that this anticipated increase in population could result in pressures on housing, water, sewage, education, health, safety, family, and social services.

The Crown Consultation Team indicated more information about the Proponent's employment strategy would help the Indigenous workforce position itself for employment, and present opportunities for local Indigenous-owned businesses during and after mine closure. The Crown Consultation Team indicated that the Proponent should clarify their plan for employee retention, specifically to better understand how female workers would be retained.

Housing and infrastructure constraints

Biigtigong Nishnaabeg noted that there are currently at least 40 people and/or families on various housing wait lists, including those for single- or two-bedroom units for Elders, families requiring multiple-bedroom homes, and families who have outgrown their existing homes and need more space. Biigtigong Nishnaabeg anticipates that there would be an additional demand should the Project proceed and job opportunities become available to community members, increasing the numbers on this waiting list.

According to Biigtigong Nishnaabeg, expanding the number of reserve houses is challenging because of insufficient infrastructure to bring potable water to new housing, the lack of sufficiently dry land on the existing reserve to build new foundations and functioning septic systems, and limited access to funding and support to plan, prepare, and build new homes.

Biigtigong Nishnaabeg acknowledged the Proponent's proposal to build an Accommodations Complex but did not agree that this would appropriately mitigate the pressures the Project would place on housing and infrastructure. A survey of the community suggested that the majority of Biigtigong Nishnaabeg's members would not use, or choose to live, in the proposed Accommodations Complex. Without meaningful dialogue and firm commitments to address the impacts on housing, Biigtigong Nishnaabeg was of the view that the residual effects of the Project on housing would be significant.

Biigtigong Nishnaabeg added that community infrastructure has not kept pace with community growth, resulting in water and sanitation services significantly below any municipal standards in Canada. Biigtigong Nishnaabeg noted that the community is routinely on boil-water advisories, and that the water supply is already at capacity. They stated that any new development pressures caused by the Project would add to these stressors.

To address these issues, Biigtigong Nishnaabeg requested the Crown commit to funding a land suitability study, a comprehensive community needs assessment, and geotechnical studies. The Crown Consultation Team indicated that Indigenous Services Canada had provided funding to Biigtigong Nishnaabeg to complete a land use plan, and that Biigtigong Nishnaabeg were determining if additional financial support is required to complete the necessary needs

assessments and geotechnical studies. Biigtigong Nishnaabeg would inform the appropriate Crown agencies to initiate further discussion.

Biigtigong Nishnaabeg requested that the Crown commit funding to prepare 50 subdivision lots as well as funding for 40 houses. The Crown Consultation Team indicated that discussions were required to identify funding and other support to address this issue. Biigtigong Nishnaabeg would provide preliminary cost estimates and assessments, as needed, to support further discussions and to identify potential solutions.

Biigtigong Nishnaabeg requested the Crown commit to the design and construction of a new sewage treatment plant. The Crown Consultation Team did not provide an updated response as of the close of the record.

Biigtigong Nishnaabeg requested the Crown commit to fast-track funding approvals for construction of the new water treatment plant and continue to help navigate the associated approval process. The Crown Consultation Team indicated that Indigenous Services Canada; the Agency; the Ministry of the Environment, Conservation and Parks; and MNMNR had actively worked with Biigtigong Nishnaabeg on the approval process associated with a water treatment facility, and that this was accomplished by Biigtigong Nishnaabeg's mid-May 2022 deadline.

Pressures on the Education and Learning System

Biigtigong Nishnaabeg indicated their multi-generational educational process has been greatly affected as a result of residential schools. Biigtigong Nishnaabeg emphasized the value and importance of experiential learning through a combination of experience and practice within their community. As stated by Biigtigong Nishnaabeg, multi-generational learning through experiences on the land with family and Elders, with the transmission of knowledge through language and practice, contributes significantly to community well-being and cultural health. As previously noted, Biigtigong Nishnaabeg identified the Biigtig Zibi and the Community Trapline as preferred locations for transmission of knowledge that would be affected by the Project.

According to Biigtigong Nishnaabeg, the community school is currently operating beyond its capacity and the community is experiencing challenges recruiting qualified teachers and early childhood educators. This cannot be offset by accessing educational resources outside of the community in Marathon, as this notion does not align with Biigtigong Nishnaabeg's objective of directing their children's education. They noted that community members seeking to return to the community with their families would add pressure to these existing challenges.

Among the funding commitments requested of the Crown to address these challenges were a new school, special education teachers and occupational therapists, new school buses and transportation services, and land-based education infrastructure. As of the close of the record, the Crown Consultation Team indicated that the Government of Canada had committed the necessary funding for a new school, and indicated that funding for special education teachers

and occupational therapists would be available through the Province. Biigtigong Nishnaabeg also requested protection of core areas used for outdoor education, including permitting and support for outdoor classrooms on the land (e.g., a long house, cabins, and cooking station). The Crown Consultation Team indicated that MNDMRNF initiated discussion to continue exploring existing government funding that aligns with the request to support outdoor classrooms on the land.

Biigtigong Nishnaabeg operates a small-scale Brook Trout hatchery as part of their outdoor education curriculum, which provides students with the opportunity to learn about and observe fish growth and development. Biigtigong Nishnaabeg stated they plan to expand their hatchery, which they identified as a key request of the Proponent and the Crown, both in relation to compensating for effects on fish and as a measure to address the loss of the community trapline as an outdoor classroom. The primary objective of the program would be to establish self-sustaining Brook Trout populations within the Exclusive Title Area, thereby providing nature-based learning opportunities for students and youth, and fostering appreciation within the community for the conservation of native species. This is further discussed in the Section 10 (Fish and Fish Habitat).

Health Services and Safety

Biigtigong Nishnaabeg commented that the Proponent had not provided a fulsome evaluation of other residual social impacts stemming from population increases and other Project impacts related to drug and substance abuse, addiction, women's safety, family health, and mental health issues.

Biigtigong Nishnaabeg noted that almost all community health and social services available to the community are currently at capacity or are under stress, and they expected that the Project would increase demands and place additional stress on services that are already strained. For example, Biigtigong Nishnaabeg noted that residential mental health and addiction treatment were not available on-reserve and that the hiring of health care providers and retention of staff has been challenging. Biigtigong Nishnaabeg also noted that these issues have been exacerbated by other large resource-based projects in the area, including the Hemlo Gold Mine. These capacity constraints have been compounded by the COVID-19 pandemic, which led to additional demands for physical and mental health services or programs.

Biigtigong Nishnaabeg did not agree with the Proponent's determination of significance related to health and social services, which assumed that future or anticipated government programs, policies, or proposed mitigation and enhancement measures would be in place to address any exceedance of available capacity of infrastructure and services or a substantial decrease in their quality, on a persistent and ongoing basis. Biigtigong Nishnaabeg commented that, without having these mitigation measures identified and committed to prior to permitting, Biigtigong Nishnaabeg must conclude the residual impacts on health and social services would be significant.

Biigtigong Nishnaabeg added that the Project might exacerbate potential impacts on social well-being and safety, particularly for vulnerable populations such as Indigenous women and girls, citing findings of the *National Inquiry into Missing and Murdered Indigenous Women and Girls*, which noted that there is a risk of potential racism, violence, and safety issues associated with shared living complexes. In this respect, Biigtigong Nishnaabeg and the Proponent agreed that the Proponent should develop mandatory, cultural-competency training for all mine workers that would include content on residential schools, the Truth and Reconciliation Commission, missing and murdered Indigenous women and girls, and Indigenous rights, including Biigtigong Nishnaabeg's asserted exclusive Aboriginal title rights.

To address issues related to health, Biigtigong Nishnaabeg requested GenPGM and the Crown commit to supporting and funding a social service plan and targeted health services plan. As noted in Section 18 (Socio-economic Environment), the Proponent committed to supporting this measure. The Crown Consultation Team indicated they would continue discussions with Indigenous Services Canada regarding how the community wellness program would work with existing programs, communities, and partner organizations to support community health and wellness.

Biigtigong Nishnaabeg noted that both the Proponent and the Crown committed to supporting and funding a wellness and safety plan for women and children. As noted in the Section 18 (Socio-economic Environment), the Proponent made a commitment to develop and implement workplace policies and procedures to address and minimize risks associated with sexual harassment, violence, and discrimination. Such policies and procedures are applicable in the workplace and local communities. The Crown Consultation Team provided Biigtigong Nishnaabeg with information related to the Indigenous Shelter and Transitional Housing initiative to support construction of shelters, and noted a commitment by the Crown Consultation Team to continue discussions with Indigenous Services Canada on this matter.

Biigtigong Nishnaabeg asked that the Crown commit additional staff and support to the North East Mental Wellness and Crisis Response Team, as well as support and fund the annual monitoring and evaluation of programs and services to align resources with changing needs (e.g., additional community health nurses, mental health and addiction services programs, home and community care programs and nurses, medical transportation programs, Indigenous traditional healing programs, and Elder support programs).

Biigtigong Nishnaabeg requested that the Crown design, fund, and build a new Emergency Response Centre (including a consolidated fire, police, and medical transport program, helicopter airlift landing station, new fire trucks, and new police staff and equipment). The Crown Consultation Team indicated Biigtigong Nishnaabeg should consult the Emergency Management Assistance Program as resources became available, and acknowledged that additional Crown support and funding could be required to address this concern. The Crown

Consultation Team committed to continue a dialogue with Biigtigong Nishnaabeg to address these needs and concerns.

Biigtigong Nishnaabeg requested that the Proponent and the Crown create a coordinated Emergency Response Plan relating to the mine. The Proponent committed to engaging with Biigtigong Nishnaabeg and the Town of Marathon to jointly create a coordinated Emergency Response Plan relating to the Project.

21.3.9 Panel Conclusions and Recommendations

Current Use of Lands and Resources for Traditional Purposes

In reaching their conclusions on the effect of the Project on current use of lands and resources for traditional purposes by Biigtigong Nishnaabeg, the Panel considered the following factors to be particularly relevant:

- Biigtigong Nishnaabeg would lose an important intergenerational trapline, as well as access to preferred areas within Biigtigong Nishnaabeg's Exclusive Title Area, would be lost, with limited options for replacement locations to practise current use elsewhere.
- The resources available for harvesting that support activities related to hunting, fishing, trapping and gathering in Biigtigong Nishnaabeg's Exclusive Title Area would be permanently modified. This would include irreversible changes in habitat, and permanent alteration of the landscape that would also change the experience of being on the land.
- The perception of contamination would alter the use of preferred areas for harvesting fish resources, notably in Hare Lake, Angler Creek, and the Biigtig Zibi.
- Reduction of flows in Angler Creek may have effects on fish species important to Biigtigong Nishnaabeg, such as salmonids; this would interfere with fishing activities at a preferred location.
- Noise, dust, odors, and other sensory disturbances resulting from mining activities would affect the experience of using the area for fishing, hunting and plant gathering in the vicinity of the mine.
- A long-term alteration or complete loss of key areas used for intergenerational transmission of knowledge, on the Biigtig Zibi and at Angler, could be expected.

Access and Experience

The Panel is of the view that Biigtigong Nishnaabeg's Exclusive Title Area has already experienced past and current alienations that have limited the number of sites available for community members to practise current use activities safely and undisturbed. The presence of

the mine would further reduce access to areas where community members prefer to practise current use activities, and diminish the experience that Biigtigong Nishnaabeg members associate with the Biigtig Zibi and the Community Trapline.

Specifically, the Project would restrict community access to the northern part of Biigtigong Nishnaabeg's Exclusive Title Area. In doing so, access to the Community Trapline would be restricted until the post-closure phase. This would end associated harvesting, communal, cultural, and training activities that Biigtigong Nishnaabeg members have been practising for generations. In the Panel's view, loss of the trapline is irreversible as it would all but eliminate its use, jeopardizing intergenerational transmission of knowledge specific to the use of these resources in this area for at least two generations.

While the Panel recognizes that discussions are underway between the Province of Ontario and Biigtigong Nishnaabeg to identify an alternative trapline, no suitable alternative location for a new community trapline had been identified by the close of the record.

The Panel recognizes that the Proponent is committed to the creation of a protocol for the safe use of the initial portion of Camp 19 Road, and to provide limited and escorted access through the Site Study Area when safety permits. The Panel heard from Biigtigong Nishnaabeg that their members were not likely to take advantage of escorts through the Site Study Area to access harvesting areas through the mine site, as the land would be perceived to be occupied by someone else. Additionally, the sensory disturbances around the mine would likely result in avoidance by Biigtigong Nishnaabeg harvesters, changing not only preferred harvesting habits, but also affecting the experience.

The Panel is of the view that the proposed Gaffhook Lake access road may potentially mitigate the loss of access to Biigtigong Nishnaabeg's Exclusive Title Area. However, as at the close of the Panel's record, the Biigtigong Nishnaabeg's bypass road request remained exploratory, and the jurisdictional responsibility for carrying out this measure was unclear. There were no firm commitments by any party, and there was disagreement regarding the responsibilities of the Proponent and the Crown. As such, the Panel could not, and did not, consider the proposed bypass road a mitigation measure to inform their determination of significance.

The Panel agrees with Biigtigong Nishnaabeg that, although alternative access to Bamoos Lake would remain via Hare Lake, the Project would affect the preferred means of accessing the northern part of their Exclusive Title Area.

Quantity of Resources

The Panel understands that although access to the Project area and the Exclusive Title Area would be returned progressively after closure, the natural landscape would be irreversibly altered, even with reclamation. Post-closure, the Panel finds that the Project would result in changes to vegetation composition and habitat for wildlife, which would affect the quality and quantity of traditional resources available for harvest activities.

Hunting

Biigtigong Nishnaabeg indicated that moose are a species of importance associated with traditional harvesting. The Panel understands that the degree to which effects on moose would affect current use depends on whether the population is stable, or decreasing, as well as the opportunity for hunting to occur elsewhere in the Biigtigong Nishnaabeg's Exclusive Title Area. Biigtigong Nishnaabeg noted that a decline in the moose population would have significant impact on their ability to hunt.

The Panel notes that Biigtigong Nishnaabeg also identified the area of the Project as important for trapping a variety of furbearing species. Most furbearers would be displaced through site development and construction.

Gathering

The Panel understands that Biigtigong Nishnaabeg use the area where the mine would be located to gather various types of traditional plants of interest. As noted in Section 11 (Terrain, Soils and Vegetation), the Panel expects that there would be a permanent effect on the landscape from direct loss of vegetation. However, the Panel acknowledges that revegetation of the site could allow for traditional plants of interest to be planted.

While MN DMNR's site reclamation objective is a return to pre-disturbance conditions, the Panel notes that the type of vegetation that is of importance to Biigtigong Nishnaabeg should be prioritized in reclamation, and traditional knowledge to inform this reclamation plan should guide its development.

Fishing

The Panel notes fishing occurs throughout Biigtigong Nishnaabeg's Exclusive Title Area, and the Biigtig Zibi is of particular importance to the community. The Panel also respects the connection that Biigtigong Nishnaabeg have with the location referred to as "Angler," where Angler Creek flows into Lake Superior at Sturdee Cove. The community considers this an important and preferred fishing location. Biigtigong Nishnaabeg stated that any reduction in flows that have the potential to affect fish and fish habitat, and salmonids in particular, is unacceptable.

As discussed in Section 8 (Surface Water Quantity) and Section 10 (Fish and Fish Habitat), the Panel understands the flow in Angler Creek would be reduced by 33% to 36% from baseline annually, for close to 20 years — or longer if water quality in the process solids management Facility does not allow for discharge at year 6 of the closure phase. Following this, in the post-closure phase, Angler Creek would not return to baseline flows, but would continue to experience fluctuating water levels, including changes to the baseline volume and timing of flows. The Panel found lower flows would affect the habitat suitability for the spawning run of salmonids in the lower reaches of this creek, reducing spawning success, resulting in a smaller fish population at this location. The Panel finds that this would result in reduced fishing

opportunities for Biigtigong Nishnaabeg at this preferred location. The Panel acknowledges there is some uncertainty as to whether salmonids would continue to inhabit the lower reaches of Angler Creek at all during the extended periods of low flow.

The Panel finds that effects on fish and fish harvesting at Angler Creek, would affect the transmission of knowledge and connection experienced at this location by Biigtigong Nishnaabeg. The Panel acknowledges that the Proponent committed to assess feasible supplemental water flow options for Angler Creek to minimize disruption to this watercourse during operations. However, at the close of the Panel's record, no feasible option had been identified.

Quality of Resources

The Panel heard extensively from Biigtigong Nishnaabeg that the community is deeply connected to the Biigtig Zibi. With the community being located downstream of the Project, the Panel heard serious concerns from Biigtigong Nishnaabeg about the potential for contaminated waters to enter the river and affect the resources in the river that they rely on for fishing, recreation, and educational activities. The Panel also heard about existing fish mercury levels in the Biigtig Zibi and associated consumption advisories. The Panel acknowledges that changes in current use practices may occur as a result of perceived contamination of resources, especially fish, and that this perception may endure in the long-term, affecting the use of future generations.

The Panel also understands that the presence of the upstream dam associated with the process solids management facility might create the perception of a risk of contamination, and could result in community members avoiding the general downstream area for harvesting and other current use practices. As discussed in Section 20 (Accidents and Malfunctions), the Panel found that a dam breach or other event resulting in accidental discharge of process-affected water to the Biigtig Zibi and/or Angler Creek, would result in severe deterioration of the environment. The Panel is of the view however that the likelihood of such an occurrence is remote. The Panel is satisfied that the proposed design features, regulatory requirements, the Proponent's commitment to establish an independent tailings review board, and the Panel's own recommendations would minimize the risk to the extent possible.

The Panel acknowledges that the Proponent committed to monitoring and follow-up measures related to surface water quality and fish and fish habitat at the outlet of Angler Creek, and to monitor how changes in the watershed would impact cultural and traditional uses by Biigtigong Nishnaabeg.

The Panel understands that any discharge to the Biigtig Zibi is unacceptable to Biigtigong Nishnaabeg, and that Biigtigong Nishnaabeg expects the Proponent to explore an alternative for passive water discharge from the north pit lake during the post-closure phase as part of their Closure Plan. The Panel recognizes that the Proponent and Biigtigong Nishnaabeg have

worked to identify continuing commitments that can resolve outstanding issues. These commitments included obtaining Biigtigong Nishnaabeg's consent for the final closure plan, and allowing for an ongoing review of feasible closure plan alternatives. However, as at the close of the Panel's record, no proposed alternatives related to post-closure discharge in the Biigtig Zibi had been identified. As a result, the Panel considered the Project as proposed when assessing the effects on current use of lands and resources for traditional purposes as they related to the Biigtig Zibi.

The Panel notes that the Proponent concluded the effects on current use of lands and resources for traditional purposes would not be significant, mainly on the basis of commitments to continue engaging with Biigtigong Nishnaabeg and identifying appropriate monitoring and compensation. The Panel finds that, while engagement and follow-up monitoring measures are appropriate and necessary, they are not mitigation measures that would avoid or reduce the level of effects on the current use of lands and resources for traditional purposes.

The Panel concludes that the Project is likely to cause a significant adverse environmental effect on Biigtigong Nishnaabeg's current use of lands and resources for traditional purposes.

The Panel makes the following recommendations that involve Biigtigong Nishnaabeg, the Crown, and the Proponent. The Panel did not consider these measures when making their conclusion above, given that Biigtigong Nishnaabeg have indicated that firm commitments were not finalized at the time of the close of the hearing.

The Panel acknowledges that for some of these recommendations, neither the Proponent nor the Crown have confirmed that the proposed measures would be feasible. Nonetheless, the Panel expects that every effort should be made to identify measures that could address the residual effects of the Project on Biigtigong Nishnaabeg, and the Panel encourages continued engagement among the parties to clearly identify roles and responsibilities for engagement, development, implementation, and follow-up on these measures.

The Proponent, in collaboration with Biigtigong Nishnaabeg, should develop and implement the following measures:

Recommendation 95: Participate in and support the transition to a replacement trapline to mitigate the adverse effects on current use from loss of the Community Trapline, prior to construction, through activities such as identifying available lands, assisting with the provincial registration process, and providing resources for development of infrastructure related to the implementation of a trapline, should a permit be provided.

Recommendation 96: If the Proponent changes the location of the post-closure discharge of water from the open pits, report back to the Agency and MNDMNR to confirm the revised Project design. Describe any contemplated changes to post-closure discharge and related environmental effects. The Proponent should be required to provide updates on the final option for post-closure discharge to the Agency and MNDMNR at regular intervals to be posted on the public registry for the environmental assessment.

In addition to their recommendations to the Proponent, the Panel recommends that the federal and/or provincial governments implement the following measure:

Recommendation 97: Identify and allocate, through the necessary studies and permitting requirements, a replacement trapline to mitigate the adverse effects on current use from loss of the community trapline, prior to construction, in collaboration with the Proponent.

Cumulative Effects on Current Use

Views of the Proponent

With respect to cumulative effects on traditional land and resource use, the Proponent assessed potential cumulative effects that could be caused by changes to wildlife, plant and material harvesting, and changes in access to the Biigtigong Nishnaabeg Community Trapline and travel routes.

In their approach to the cumulative effects assessment, the Proponent was of the view that lack of spatial overlap between a change due to past activities and a change due to the Project meant that those effects would not require further consideration for cumulative effects. For example, the Proponent noted the presence of treated effluent discharge from the Hemlo Gold Mine to the Black River, which is a tributary of the Biigtig Zibi that enters the river downstream of the Project. The Proponent was of the view that there was no spatial overlap between this discharge and the Project's valued ecosystem components, which would necessitate the consideration of cumulative effects from a water quality perspective, or for other valued ecosystem components, including for Indigenous considerations.

Based on potential interactions between the Project and other projects and activities on valued ecosystem components, the Proponent predicted there would be an adverse cumulative residual environmental effect on traditional land and resource use. The Proponent determined this effect would not be significant. The Proponent noted that extensive areas exist in the Local Study Area and Regional Study Area where traditional wildlife harvesting is currently practised that would continue to be available to Indigenous communities.

The Proponent acknowledged that Biigtigong Nishnaabeg are of the view that significant cumulative effects have occurred as a result of past and present projects and activities within their traditional territory. The Proponent noted such effects would have occurred and are likely

to occur independent of the Project. The Proponent therefore concluded that, with mitigation and environmental protection measures for Project-specific effects, the contribution of the Project to cumulative effects would be negligible.

The Proponent committed to engaging with Biigtigong Nishnaabeg to support the proposed Crown accommodation measure and Crown funding to create a bypass road (Gaffhook Lake Access), with access controlled by Biigtigong Nishnaabeg. The Proponent clarified they were of the view that funding this measure would be the Crown's responsibility, despite the Crown's suggestion that the funds should come from the Proponent.

Views of Biigtigong Nishnaabeg

Biigtigong Nishnaabeg explained that past and ongoing policies, activities, and projects have affected their ability to carry out current use activities in their Exclusive Title Area. Biigtigong Nishnaabeg identified many sources of land alienations in their Exclusive Title Area, including mineral exploration, forest harvesting, patenting of private lands, alienations of lands through parks, municipalities and protected areas, hydroelectric power transmission corridors, rail lines, roads, aggregate pits, and Crown dispositions such as easements, licenses of occupation, and land use permits. These all combine to result in cumulative effects on their Exclusive Title Area. Historical and active claims alone represent 35% of their Exclusive Title Area, with GenPGM ranking third in terms of the total area of claims.

Biigtigong Nishnaabeg expressed concern that the Proponent had not included in the assessment of cumulative effects the Geco Mine, the Hemlo Gold Mine, future mineral exploration activities, the Peninsula Harbour Remediation Project, and several other activities identified as land alienations. They noted that both the Geco Mine and the Hemlo Gold Mine are within the Black River watershed, which meets the Biigtig Zibi downstream of the Project but upstream of the community's reserve. Both mines have the potential to contribute to cumulative effects on the aquatic environment and human health from anticipated or unforeseen discharges that would interact with discharges from the Project to the Biigtig Zibi, as has previously occurred with cyanide spills from the Hemlo Gold Mine.

Panel Conclusions and Recommendations

The Panel recognizes that Biigtigong Nishnaabeg expressed concern for cumulative effects on the aquatic environment due to the Hemlo Gold Mine cyanide spill. The Panel accepts that this spill altered current use practices, especially fish harvesting on the Biigtig Zibi, and understands that this effect may still persist. While the Panel does not anticipate the Project would introduce contaminants into the river, the Panel agrees with Biigtigong Nishnaabeg that anticipated and unforeseen discharges from the Project would interact with past, existing, and future discharges upstream of the community reserve. These interactions would result in cumulative effects on fish harvesting as well as other current use practices affected by measurable or perceived changes in water quality in the Biigtig Zibi.

The Panel accepts Biigtigong Nishnaabeg's view that significant cumulative effects have already occurred as a result of past and present projects and activities within their traditional territory. The Panel is of the view that Project effects would interact with past, existing, and future projects and activities within Biigtigong Nishnaabeg's Exclusive Title Area and would result in further changes in their ability to access and experience – and in the quality and quantity of – resources currently available for their use. The Panel is of the view that, where cumulative effects from past and existing projects and activities are already significant, residual Project effects that would interact with those cumulative effects would also be significant.

The Panel agrees with the Proponent and Biigtigong Nishnaabeg that the Crown is responsible for addressing Biigtigong Nishnaabeg's requests to mitigate cumulative effects resulting from past and ongoing projects and activities in their Exclusive Title Area. The Panel agrees with Biigtigong Nishnaabeg that the Proponent is responsible for contributions of the Project to cumulative effects.

The Panel notes that the measures most relevant to mitigate cumulative effects on Biigtigong Nishnaabeg's current use are identification of an alternative community trapline, and the creation of a bypass road to mitigate change in access. The Panels finds that both the Proponent and the Crown would be responsible for exploring these measures with Biigtigong Nishnaabeg.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is likely to cause a significant adverse cumulative effect on Biigtigong Nishnaabeg's current use of lands and resources for traditional purposes.

Recommendation 98: The Proponent, in collaboration with Biigtigong Nishnaabeg and the federal and/or provincial government, should support the development of a bypass road and explore other measures to provide convenient and safe access by Biigtigong Nishnaabeg to their Exclusive Title Area to mitigate cumulative effects resulting from access restrictions and disturbances caused by the Project.

In addition to their recommendation to the Proponent, the Panel recommends that the federal and/or provincial government, in collaboration with Biigtigong Nishnaabeg and the Proponent:

Recommendation 99: Develop a bypass road or explore other measures to provide convenient and safe access by Biigtigong Nishnaabeg to their Exclusive Title Area to mitigate existing cumulative effects resulting from land alienations documented by Biigtigong Nishnaabeg, to which the Project would contribute.

Physical and Cultural Heritage

In reaching their conclusions on the effect of the Project on Biigtigong Nishnaabeg's physical and cultural heritage, the Panel considered the following factors to be particularly relevant:

- The Biigtig Zibi is sacred to Biigtigong Nishnaabeg and is the foundation of the community's identity.
- The Angler location is extremely important to the culture of Biigtigong Nishnaabeg and would be indirectly altered by changes to flow from overprinting of Angler Creek, potentially changing Biigtigong Nishnaabeg's cultural association with the area.
- Biigtigong Nishnaabeg members practise communal and cultural activities within their sole Community Trapline, which would be removed by the Project. The trapline is recognized to contribute to Biigtigong Nishnaabeg's health, spirituality, sense of community, traditional knowledge, and ability to live off the land.
- Moose and caribou are species of critical cultural importance to the community. The Project would displace moose and affect the critical habitat of caribou.
- The Project would result in the loss of, or loss of access to, culturally and spiritually important sites. These losses would adversely affect the experience of, and impair the ability of Biigtigong Nishnaabeg members to engage in, traditional cultural activities.

Biigtigong Nishnaabeg have indicated that water is of central importance to their identity and culture, and intrinsic to their history in the area, particularly the Biigtig Zibi. Concerns regarding the integrity of the Biigtig Zibi and the Angler area, respectively through perceived contamination and predicted flow reductions, may affect the use of these areas for cultural practices. The interaction of the Project with both the Biigtig Zibi and Angler Creek has the potential to permanently affect cultural heritage.

At the close of the Panel's record, there were no proposed alternatives related to post-closure discharge in the Biigtig Zibi, and no options identified as feasible to supplement flows in Angler Creek. As a result, the Panel considered the Project as proposed when assessing the effects on cultural heritage as they related to Angler Creek and the Biigtig Zibi.

The Panel understands that trapping and harvesting represent significant social structures and systems that are vital for cultural connectivity and continuity for Biigtigong Nishnaabeg. Effects related to the Community Trapline would also affect Biigtigong Nishnaabeg cultural heritage. While the Proponent has proposed measures to fund harvest and trapline training programs, the Panel agrees with the Crown Consultation Team that these measures might not mitigate cultural, social, and spiritual impacts that are inextricably linked to commercial and non-commercial trapping and harvesting activities in the Project area. The Panel finds that the loss

of the trapline and indirectly the restricted access on Camp 19 Road would affect Biigtigong Nishnaabeg's cultural heritage.

Biigtigong Nishnaabeg stated that they have strong cultural ties to caribou, and aspire to caribou oversight and management within Biigtigong Nishnaabeg's Exclusive Title Area. As stated in Section 13 (Caribou), the Panel found that the Project is likely to cause a significant adverse effect on critical caribou habitat, as well as on connectivity of habitat within the Lake Superior Coastal Range. The Panel concluded that the Project is likely to cause a significant adverse cumulative effect on caribou habitat and connectivity. This effect would conflict with Biigtigong Nishnaabeg's objectives for the recovery of caribou. The Panel therefore finds that the Project would also interfere with Biigtigong Nishnaabeg's aspiration to see caribou return to the area as a species of cultural importance.

The Panel recognizes that moose is of cultural importance to Biigtigong Nishnaabeg. The Panel concluded in Section 12 (Wildlife Species) that moose would be displaced by the Project but would not be significantly affected. The Panel agrees with Biigtigong Nishnaabeg that population declines would have a significant effect on cultural heritage for Biigtigong Nishnaabeg, and the Panel is of the view that further discussions on moose management between Biigtigong Nishnaabeg and the Crown are required. The Panel finds the main effect on moose as an element of cultural heritage is related to the loss of access, rather than a change in the resource itself.

The Panel also examined whether there were potential effects on Biigtigong Nishnaabeg's cultural heritage related to accidents and malfunctions tied to the Biigtig Zibi and Angler Creek. Although the scenario of a dam breach predicted an accidental discharge of process-affected waters to the Biigtig Zibi and Angler Creek, the Panel found that the likelihood of this occurrence is remote and the risk would be minimized to the extent possible, as discussed in Section 20 (Accidents and Malfunctions).

Finally, the Panel examined whether there were potential effects on Biigtigong Nishnaabeg's cultural heritage related to any structure, site, or thing that is of historical, archaeological, paleontological, or architectural significance. The Panel understands that there are no known built heritage resources or cultural landscapes in the Site Study Area. With respect to archaeological resources, the Panel is satisfied that the completion of an additional archaeological assessment on Hare Lake would identify whether there are archaeological resources present that might be affected by the Project and that, if archaeological resources are discovered, they would be addressed through the provincial protocol. The Panel accepts that the Proponent would have sufficient space to adjust the location of the planned discharge structure to avoid or minimize disturbance.

The Panel finds that the Project would interfere with the Biigtig Zibi and Angler Creek, both areas of high cultural importance, and that this interference is likely to affect the cultural integrity of both areas for Biigtigong Nishnaabeg. As well, restricted access and permanent

alteration of the community trapline and other culturally important areas accessed via Camp 19 Road would impede the Biigtigong Nishnaabeg ability to use these areas for cultural purposes, and affect the transmission of knowledge regarding these areas to future generations.

The Panel recommends that the Proponent, in collaboration with Biigtigong Nishnaabeg and the federal and/or provincial government:

Recommendation 100: Develop and implement, prior to construction, measures to further the transfer of knowledge related to historical and current uses, as well as cultural, social, and spiritual aspects tied to the Community Trapline, Angler Creek, and caribou, such as educational programs and baseline studies.

The Panel concludes that the Project is likely to cause a significant adverse environmental effect on Biigtigong Nishnaabeg's physical and cultural heritage.

Cumulative Effects on Physical and Cultural Heritage

Views of the Proponent

GenPGM assessed cumulative effects on heritage and archaeological resources related to Biigtigong Nishnaabeg's Community Trapline. The Proponent found no future projects and activities whose spatial influence would affect the ability to access the Biigtigong Nishnaabeg Community Trapline. The Proponent predicted that residual effects from the Project on the trapline, caused by access restrictions, would result in an adverse cumulative residual environmental effect on heritage and archaeological resources. They stated the effect would not be significant.

Views of Biigtigong Nishnaabeg

Biigtigong Nishnaabeg stated they continue to experience the cumulative impact of past and present development and pressure from ongoing mineral exploration, including exploration work in the immediate proximity of the Biigtig Zibi. They noted that:

"Historically, that river has always been a part of us. One elder that passed, used to tell us it's our highway. We still use [it] for fishing and hunting, canoe trips to talk to high school students about history. It is still a big part of us. Trying to get a new water source is very hard to find should [the Biigtig Zibi] become contaminated. There are stories that come from the river. Decades ago, our water came from Black River, but we had to move to bottled water when tailings impoundment from other mining projects failed, as wells had not been dug yet."

Biigtigong Nishnaabeg shared historical information on cultural uses in their Exclusive Title Area. Surveys completed in 1993, 2005, 2011, and 2012 captured more than 12,000 cultural features that illustrated how the land was being used by harvesters within living memory. Included in those features were 600 fixed cultural sites, such as burial sites, spiritual areas, medicine plant-gathering sites and cabin sites, noting it showed “how the territory has been anchored in its use within living memory.” Living off the land is a major component of Biigtigong Nishnaabeg cultural heritage.

Biigtigong Nishnaabeg identified the Deadhorse area as a highly sensitive core cultural use area for moose hunting. They noted that, as a result of wildlife management by the Province, Deadhorse Road is used by hundreds of non-Indigenous hunters. Biigtigong Nishnaabeg noted that harvesters have recorded numerous conflicts with hunters and this has forced community members to go elsewhere, including moving their annual moose camp over an hour’s drive away from the community up the Manitouwadge highway.

Panel Conclusions and Recommendations

The Panel recognizes and accepts that uses of the land are inherently tied to Biigtigong Nishnaabeg’s cultural heritage. As the Panel has accepted Biigtigong Nishnaabeg’s view that significant cumulative effects have already occurred on their current use of the land, the Panel also finds that significant cumulative effects have already occurred on Biigtigong Nishnaabeg’s cultural heritage.

The Panel finds that residual effects of the Project on Biigtigong Nishnaabeg’s cultural heritage related to Angler Creek and the Biigtig Zibi would interact with effects of other projects and activities on cultural heritage related to land alienation that have occurred in Biigtigong Nishnaabeg’s Exclusive Title Area. This is supported by documented use by Biigtigong Nishnaabeg of the lands within the Exclusive Title Area for access to cultural features and the conduct of cultural activities, such as their annual moose camp.

The Panel understands that the Biigtig Zibi, the Community Trapline, and the Angler area are inextricably tied to the culture of Biigtigong Nishnaabeg and their identity. The safe and undisturbed access and use of these places is essential for Biigtigong Nishnaabeg’s transfer of knowledge as part of their education systems. Biigtigong Nishnaabeg also noted the cultural importance of caribou, for which the Panel found there would be significant effects from the Project and significant cumulative effects. These effects on places and species of high cultural value would further contribute to already significant cumulative effects on cultural heritage.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is likely to cause a significant adverse cumulative effect on Biigtigong Nishnaabeg’s physical and cultural heritage.

Health

In reaching their conclusions on the effect of the Project on Biigtigong Nishnaabeg health, the Panel considered the following factors to be particularly relevant:

- Biigtigong Nishnaabeg associate multiple aspects of their health with that of the Biigtig Zibi, the safe practice of current use on the land, and the protection of their cultural heritage.
- Perception of contamination could lead to changes in harvesting practices and compromise a very important part of Biigtigong Nishnaabeg's diet.

Analysis and conclusions regarding human health are provided in Section 17 (Human Health) are applicable to the assessment of Project effects specific to the health of Biigtigong Nishnaabeg. The Panel notes that Biigtigong Nishnaabeg was of the view that the Proponent's health assessment was lacking for reasons the Panel understands to be primarily related to concerns about mercury contamination, existing conditions related to health services and safety in the community, and lack of data gathered from Biigtigong Nishnaabeg harvesters. Concerns about existing health services and safety are discussed in the Panel's analysis of socio-economic conditions in Section 18 (Socio-economic Environment).

The Panel agrees with Biigtigong Nishnaabeg that lack of inclusion of specific data from the community regarding health and impacts on harvesting affects the level of confidence with which the Proponent was able to accurately assess potential effects on Biigtigong Nishnaabeg's health due to changes in country food quality and availability. However, the Panel understands that the Proponent and Biigtigong Nishnaabeg collaboratively developed the Proponent's commitments to address Biigtigong Nishnaabeg's concerns about the collection of baseline data for country foods and accurate monitoring of changes in country food quality, consumption, and related effects on health. The Panel's recommendations regarding human health in Section 17 (Human Health) have taken these commitments into account.

With regard to potential mercury contamination, the Panel concluded that the risks of mercury and methylmercury associated with the Project would be low, as discussed in Section 17 (Human Health). The Panel concluded that the Project is not likely to cause a significant adverse environmental effect on human health as a result of the pathways examined in that section. The Panel further examines the following pathways of effects on health specific to Biigtigong Nishnaabeg.

The Panel understands that Biigtigong Nishnaabeg were concerned that perceived contamination from the Project would compromise harvesting of country foods. The Panel understands that the Site Study Area and Local Study Area contribute meaningfully to Biigtigong Nishnaabeg's traditional diet. The Panel agrees with the Crown Consultation Team that fear of consuming contaminants could result in community members refraining from

fishing or consuming fish or other traditional food sources, which could have psychosocial impacts. The Panel finds that perceived contamination within and outside the Project footprint, including in waterways downstream of the Project, could affect the harvesting of country foods, which would further negatively affect traditional activities that support Biigtigong Nishnaabeg's physical, cultural, and spiritual health.

The Panel acknowledges that the Proponent plans to address such perceptions by building trust. The Panel is of the view that the joint development of commitments to mitigate and monitor health effects is a positive step in this direction. However, the Panel finds that these measures would not fully eliminate potential effects on the harvesting of country foods and related cultural and spiritual practices due to fear of contaminated foods, particularly due to the discharge at Hare Lake and into Hare Creek, the post-closure passive discharge to the Biigtig Zibi, and the post-closure alteration of the landscape within the mine footprint.

The Panel understands that the potential effects on current use and cultural heritage could also affect Biigtigong Nishnaabeg's health. The Panel recognizes that any potential effects on Biigtigong Nishnaabeg's spiritual and cultural health are inextricably tied to the Biigtig Zibi. Similarly, potential effects on current use and cultural heritage tied to Angler and Biigtigong Nishnaabeg's Community Trapline would affect Biigtigong Nishnaabeg's spiritual and cultural health. The Panel notes again that there are likely significant effects on current use and cultural heritage tied to these places.

Due to the intangible nature of these effects, the Panel finds they cannot readily quantify or define the residual effects on cultural and spiritual health that the Project would have, and how that would further affect the mental health of Biigtigong Nishnaabeg. Nor can the Panel quantify the residual effects on physical health that may occur due to fear of contaminated foods and associated changes in harvesting practices. Notwithstanding these limitations to quantifying residual Project effects on the health of Biigtigong Nishnaabeg, using a precautionary approach, the Panel finds that those effects would likely occur and could be profound for the health of the community as a whole.

The Panel concludes that the Project is likely to cause a significant adverse environmental effect on the health of Biigtigong Nishnaabeg.

Cumulative Effects on Health

Views of the Proponent

With regard to Indigenous health, GenPGM noted that projects and activities that could affect harvesting activities in the Regional Study Area were not likely to be associated with air emissions and discharges to water that would affect country food exposure pathways.

Accordingly, the Proponent anticipated no cumulative effects on human health related to country foods.

Views of Biigtigong Nishnaabeg

Biigtigong Nishnaabeg reported that there is a growing sentiment that the land has been given away, with Biigtigong Nishnaabeg harvesters routinely meeting strangers while being out on the land, and finding that these individuals have been granted authority to be there from the Crown. Biigtigong Nishnaabeg commented this has long-term psychological impacts.

Biigtigong Nishnaabeg also commented on issues with safety on the land. They described past cultural camps up in the Deadhorse area, where they took children for kinship and transfer knowledge and cultural identity, and shared that “We had a sign up, and that sign got shot, full of bullet holes. [...] Never mind taking care of the land, never mind taking care of your kinship. Here, you will get shot at.”

Biigtigong Nishnaabeg explained that the community needs a land-based facility to create a safe and exclusive place for Biigtigong Nishnaabeg members to gather, one that doesn't have to be taken down at the end of the season, and where they can carry out continued education and mental health programs to strengthen their connection to the land.

Panel Conclusions and Recommendations

The Panel is of the view that effects on health due to different pathways can interact to result in cumulative effects on health for sensitive receptors, even if there is no spatial or temporal overlap. In Section 17 (Human Health), the Panel noted there are existing fish consumption advisories in nearby waterbodies due to elevated levels of methylmercury in fish tissue. The Panel considered that both avoidance of fish consumption and consumption above the advisory concentrations or amounts would have an effect on Indigenous health. The Panel also understands Biigtigong Nishnaabeg experienced effects from the past spill at the Hemlo Gold Mine. The Panel also expects effects of the Project on availability of preferred fish species at Angler Creek. These effects have the potential to act cumulatively on the physical, mental, cultural, and spiritual health of Biigtigong Nishnaabeg. The Panel agrees with the views Biigtigong Nishnaabeg and the Crown Consultation Team that these types of effects are a likely result of the Project.

The Panel also shares Biigtigong Nishnaabeg concerns that the proposed camp and Accommodations Complex would disproportionately affect women in light of potential racism, violence, and safety issues that have been known to occur in shared living complexes, which could add to the stresses already experienced by the community.

In reaching their conclusions on the cumulative effects of the Project on Biigtigong Nishnaabeg's health conditions, the Panel found the following factors to be particularly relevant:

- Biigtigong Nishnaabeg demonstrated that the current health conditions in their community were already significantly affected by past and existing activities and projects on their Exclusive Title Area.
- Biigtigong Nishnaabeg described the state of services in the community as being at a point of critical stress, which would impair their ability to mitigate any new effects the Project may have on their health as a community, as individual members, and, most specifically, among vulnerable groups within the community, such as youth, women, and Elders.
- The Panel concluded the Project would have a significant adverse effect on Biigtigong Nishnaabeg's health.
- The Project's direct and cumulative effects on current use and cultural heritage have the potential for negative effects on traditional activities that support Biigtigong Nishnaabeg's physical, cultural, and spiritual health.
- Biigtigong Nishnaabeg and GenPGM jointly developed commitments to meet Biigtigong Nishnaabeg's request regarding the safeguarding of the health of their members.
- The accommodation measures required by Biigtigong Nishnaabeg to address past and existing effects on health are within the jurisdiction of the provincial and federal Crowns.

The Panel finds that the Proponent has met, in principle, all the requirements Biigtigong Nishnaabeg identified to mitigate effects on their health that are within the Proponent's care and control.

The Panel recognizes the efforts made by the Crown throughout the process to engage and provide updates on Biigtigong Nishnaabeg requests. However, the Panel accepts Biigtigong Nishnaabeg's view that firm commitments by the Crown were not provided as part of the environmental assessment process. As a result, the Panel did not include these measures in their determination of the significance of cumulative effects on health for Biigtigong Nishnaabeg.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is likely to cause a significant adverse cumulative effect on the health of Biigtigong Nishnaabeg.

The Panel recommends that the Proponent, in collaboration with Biigtigong Nishnaabeg and the federal and/or provincial government, implement the following mitigation measures:

Recommendation 101: Develop and implement a targeted health and social services plan that would complement and enhance Biigtigong Nishnaabeg's existing services to address Project-related effects on the cumulative health conditions of Biigtigong Nishnaabeg including assisting the community to provide services to all community members to address effects of the Project on mental health as a result of effects on traditional practices and cultural heritage.

Recommendation 102: Provide culturally appropriate places for the transfer of intergenerational knowledge necessary for cultural, spiritual, and mental health. Biigtigong Nishnaabeg-specific options could include the creation, protection and/or expansion of land-based education infrastructure, outdoor classrooms, and the fish hatchery learning facility.

In addition to their recommendation to the Proponent, the Panel recommends that the federal and/or provincial government, in collaboration with Biigtigong Nishnaabeg and the Proponent, implement the following measures:

Recommendation 103: Develop and implement targeted health and social supports to assist the community in meeting wellness objectives to address existing constraints faced by Biigtigong Nishnaabeg.

Recommendation 104: Provide culturally appropriate places for the transfer of intergenerational knowledge necessary for cultural, spiritual, and mental health, including Biigtigong Nishnaabeg-specific options for the creation, protection and/or expansion of land-based education infrastructure, outdoor classrooms, and the fish hatchery learning facility.

Socio-Economic Conditions

The Panel divides their conclusions for effects on socio-economic conditions for Indigenous communities into two categories:

- effects of any change that may be caused to the environment on socio-economic conditions as required under paragraph 5(1)(c) of CEAA 2012, such as effects that may be caused by changes to access and resources used to derive economic benefits, and
- effects directly related to changes on socio-economic conditions, such as positive effects derived from employment and training, and adverse effects on housing, social services, education, infrastructure, health, and safety.

Socio-Economic Effects due to Changes in the Environment

In reaching their conclusions on the effect of any change that may be caused to the environment on socio-economic conditions for Biigtigong Nishnaabeg, the Panel found the following factors to be particularly relevant:

- The Registered Trapline Area (TR022) that encompasses the proposed Project is Biigtigong Nishnaabeg's sole Community Trapline. There are potential adverse socio-economic effects from the severing of their Community Trapline that provides traditional, cultural, educational, and commercial value.
- Biigtigong Nishnaabeg indicated that members are unlikely to use Camp 19 Road while the mine is in operation, regardless of mitigation measures put in place, and would need to go elsewhere for harvesting. Biigtigong Nishnaabeg indicated that moving from a preferred area would result in increased costs, with travel times to access new areas, and reduced harvesting opportunities.

Biigtigong Nishnaabeg stated that members harvest and consume a large amount and variety of country foods, including moose, which are anticipated to be affected by Project activities. The Panel understands that, as noted in the 2012 harvest study prepared for Biigtigong Nishnaabeg, harvesters who rely on land-based resources for income would suffer a financial loss. The Panel understands that a lack of access, or avoidance of use of areas near the mine by way of disturbance due to noise, dust, and reduced animal presence, may have the consequential effect of increasing travel costs and time when moving to other, more viable harvesting areas.

The Panel recognizes that GenPGM has proposed financial measures to support harvest and trapline training programs and compensate for the loss of access and economic benefits from trapping. The Panel understands that these measures are applicable to the mitigation of socio-economic effects related to the loss of a trapline. However, the Panel was not privy to provisions included in community benefit agreements, and did not have access to the level of detail that would underlie confidence that the proposed measures would be commensurate with financial losses and costs related to the loss of the trapline. Using a precautionary approach, the Panel finds there would be a residual adverse effect from the Project on Biigtigong Nishnaabeg's ability to rely on the Community Trapline for economic purposes.

The Panel recognizes that discussions are underway between the Province and Biigtigong Nishnaabeg to identify an alternative trapline. However, at the close of the record no suitable alternative location for a new trapline had been identified, and the Panel did not consider it as mitigation.

The Panel concludes that the Project is likely to cause a significant adverse environmental effect on Biigtigong Nishnaabeg's socio-economic conditions.

The Panel recommends the Proponent, in collaboration with Biigtigong Nishnaabeg and the federal and/or provincial government, implement the following measures:

Recommendation 105: Develop and implement appropriate measures to compensate for the loss of access and economic benefits related to trapping, as well as for other financial costs incurred by Biigtigong Nishnaabeg from having to relocate harvesting activities away from the existing Community Trapline, including provision of a harvester training fund to support Biigtigong Nishnaabeg's continuity of harvesting.

Recommendation 106: Develop a socio-economic monitoring plan to identify measures to mitigate the socio-economic impacts of the Project on Biigtigong Nishnaabeg and measure positive and negative impacts. This plan would include monitoring of impacts on harvesters, including tracking the ability of harvesters to relocate and the level and change of harvesting near the Project. The Proponent should share the monitoring results with Biigtigong Nishnaabeg and the Crown.

Recommendation 107: Develop and implement a follow-up program to verify the accuracy of assessment of socio-economic effects on Biigtigong Nishnaabeg harvesters, including effects related to the displacement of harvesting activities away from the trapline, and implement adaptive management measures should the effects exceed predictions, including any adjustments to proposed harvester training fund to adequately compensate Biigtigong Nishnaabeg harvesters.

Cumulative Effects on Socio-Economic Conditions due to Changes in the Environment

Views of the Proponent

For Indigenous and non-Indigenous communities, GenPGM concluded that any incremental contribution of the Project to cumulative effects on the economy and employment, infrastructure and community services, and land and resource use, would be negligible. The Proponent predicted that any adverse cumulative residual environmental effect on these factors would not be significant, after taking into account proposed mitigation and environmental protection measures.

With respect to land and resource use, the Proponent was of the view that the Project, in combination with past, present, and reasonably foreseeable future projects, would not restrict or degrade present land-use capabilities to a point where land-use activities cannot continue at or near current levels. The Proponent assumed that any future projects or activities would be required to implement various mitigation measures and to comply with regulatory requirements, thereby further reducing cumulative effects.

Views of Biigtigong Nishnaabeg

It is Biigtigong Nishnaabeg's view that the additive cumulative effects of the Project would have significant impacts on the socio-economic well-being of Biigtigong Nishnaabeg. Biigtigong Nishnaabeg continues to experience the cumulative impact of past and present development and pressure from ongoing mineral exploration in their Exclusive Title Area, including exploration work in the immediate proximity of the Biigtig Zibi within the Local and Regional Study Areas.

Biigtigong Nishnaabeg noted that forest harvesting, patenting of private lands, alienations of lands through parks, municipalities, and protected areas, hydroelectric transmission corridors, rail lines, roads, aggregate pits, and Crown dispositions such as easements, licenses of occupation, and land use permits all combine to result in significant impacts on the terrestrial environment and the exercise of Biigtigong Nishnaabeg's rights. In Biigtigong Nishnaabeg's view, consideration of these cumulative impacts should also include impacts from Crown policies, such as wildlife management regimes (Ontario) and the lack of community infrastructure and services support (Canada), which also exacerbate the seriousness and magnitude of these impacts.

Biigtigong Nishnaabeg noted that municipalities can be an asset in the services they provide but also bring impacts such as competition for resources from non-native land users, discrepancies in services, and the need for waste disposal in the territory. Biigtigong Nishnaabeg stated that the main alienation related to municipalities comes in the form of regulations on permitting of land uses within municipal boundaries, which represent close to 10% of Biigtigong Nishnaabeg's Exclusive Title Area.

Parks and conservation areas have also reduced the amount of land available for harvesting that can be associated with revenues for Biigtigong Nishnaabeg members. Pukaskwa National Park represents 15% of the Exclusive Title Area.

Biigtigong Nishnaabeg noted restrictions to harvesting occur either by limiting the ability to harvest in these protected areas or by attracting recreational users who increase competition for resources in the area. A planning consultant, speaking to their work for Biigtigong Nishnaabeg, said that, "To this day, harvesters who I've met within the community have told me that they aren't allowed to hunt or use the [Pukaskwa National] park for traditional activities."

Biigtigong Nishnaabeg noted that for most of activities on their Exclusive Title Area, they were not consulted and resources are not protected for their use.

Panel Conclusions and Recommendations

The Panel did not receive quantitative estimates of the effects on socio-economic conditions due to past, ongoing, and future projects and activities other than what was provided in the context of the 2012 harvest study prepared for Biigtigong Nishnaabeg.

In light of Biigtigong Nishnaabeg's explanations of historical and current land alienations on their Exclusive Title Area, the Panel finds that it is reasonable to expect that past, ongoing and future projects and activities would have a cumulative effect on Biigtigong Nishnaabeg's socio-economic conditions related to benefits derived from trapping and harvesting activities. The example provided by Biigtigong Nishnaabeg regarding harvesting restrictions indicates that there may be many sources of land alienations that have failed to adequately compensate Biigtigong Nishnaabeg harvesters for socio-economic losses.

Based on the extent and proximity of the town of Marathon and Pukaskwa National Park, which are only a subset of the alienations listed by Biigtigong Nishnaabeg, the Panel believes that cumulative effects on socio-economic conditions due to the loss of access and resources, and costs of relocating practices on the land from which Biigtigong Nishnaabeg derived economic benefits, is already significant.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is likely to cause a significant adverse cumulative effect on Biigtigong Nishnaabeg's socio-economic conditions.

Direct Socio-Economic Effects

The Panel appreciates that these direct socio-economic effects are not tied to their federal mandate under CEAA 2012. However, given the magnitude of potential effects identified in relation to these socio-economic areas by Biigtigong Nishnaabeg, the Panel is of the view that these direct socio-economic effects require acknowledgement. Importantly, measures should be identified and implemented by the Proponent and the Crown to address these potential impacts to extent possible.

In reaching their conclusions on effects directly related to changes on socio-economics for Biigtigong Nishnaabeg, the Panel found the following factors to be particularly relevant:

- The Proponent committed to implementing measures that enhance economic and employment opportunities for Biigtigong Nishnaabeg, including youth and women.
- Community benefit agreements with Biigtigong Nishnaabeg would include provisions for training and skills development, including youth training and apprenticeships. Positive effects are anticipated from jobs, contracts, and training opportunities.

- The Project could result in adverse socio-economic effects related to pressure on housing and infrastructure, social services, and education.
- The influx of workers and economic activity related to the Project might affect the safety and well-being of Biigtigong Nishnaabeg members, and vulnerable groups and women within the community in particular.
- The Proponent continues to update their analysis of the demographic composition of the available workforce in the region and develop and implement a labour market strategy to support human resources, aimed at opportunities for Indigenous Peoples.

The Panel agrees with the Crown that Biigtigong Nishnaabeg would benefit from further information from the Proponent on their employment strategy to plan the workforce in the long-term. This would ensure that Biigtigong Nishnaabeg has access to employment opportunities throughout Project phases, retains the ability to mitigate negative impacts from the post-closure transition and improves retention of female workers.

The Panel recognizes that the Proponent and Biigtigong Nishnaabeg agreed to jointly develop a community-specific socio-economic management and monitoring plan, which would help verify the assessment on effects from the Project directly on Biigtigong Nishnaabeg's socio-economic conditions. The Panel notes that, although this plan would help the Proponent and Biigtigong Nishnaabeg monitor effects of the Project on Biigtigong Nishnaabeg's socio-economic conditions, the Crown and the Proponent would likely share responsibilities regarding addressing socio-economic inequities that result from Project effects.

The Panel recognizes that the Proponent's key measure to address the challenge of housing and infrastructure shortages is the Accommodation Complex, which would eliminate the need for workers to find accommodation in communities within the Regional Study Area, although workers may still choose to settle elsewhere. The Panel agrees with Biigtigong Nishnaabeg that the Accommodation Complex would not address concerns related to off-reserve community members returning for employment purposes, as they are likely to want to live on reserve.

Although the Proponent committed to supporting workplace sensitivity training and a security presence at the Accommodation Complex, the Panel finds that Biigtigong Nishnaabeg's concern regarding the potential for higher rates of violence toward Indigenous Peoples, and women in particular, associated with the presence of worker camps is legitimate and would not be completely eliminated as a result of the proposed measures.

With regard to education, Biigtigong Nishnaabeg noted that its single school has only four classrooms and is currently operating beyond its capacity. The community is experiencing challenges in recruiting qualified teachers and early childhood educators, and the potential influx of returning Biigtigong Nishnaabeg members seeking employment with the Project would exacerbate existing pressures on educational and early childcare programs.

The Panel finds that measures proposed to address additional housing requirements to accommodate the anticipated influx of workers back to the community, particularly for Biigtigong Nishnaabeg, are associated with accommodation measures that Biigtigong Nishnaabeg identified for the Crown. As of the close of the Panel's records, firm commitments in that regard were not finalized.

The Panel recognizes that the Proponent has made a commitment to provide and enhance benefits, training, and employment contract and procurement opportunities to Biigtigong Nishnaabeg. The Panel anticipates that those measures would result in direct positive effects on Biigtigong Nishnaabeg's socio-economic conditions. However, uncertainty remains about the extent to which these positive benefits would offset direct adverse effects on Biigtigong Nishnaabeg's socio-economic conditions.

The Panel concludes that the Project is likely to cause considerable impact directly on Biigtigong Nishnaabeg's socio-economic conditions related to housing, social services, education, infrastructure, health, and safety.

The Panel makes the following recommendations that involve Biigtigong Nishnaabeg, the Crown and the Proponent. The Panel did not consider these measures in making their conclusion above, given that Biigtigong Nishnaabeg indicated that firm commitments were not finalized at the time of the close of the hearing.

The recommendations below are based on several requests that the Panel received from Biigtigong Nishnaabeg and the Crown Consultation Team, as well as the list of Proponent commitments. The Panel recommends that the Proponent, in collaboration with Biigtigong Nishnaabeg, implement the following measures:

Recommendation 108: Develop and implement workplace policies and procedures to address and minimize risks associated with related violence, harassment, and discrimination toward Indigenous Peoples that are applicable in the workplace and local communities, as part of an overall cultural competency training program.

The Panel notes that Recommendation 108 would only need to be considered under the Ontario *Environmental Assessment Act*.

In addition to their recommendations to the Proponent, the Panel recommends that the federal and/or provincial governments, collaboratively with Biigtigong Nishnaabeg, develop and implement the following measures:

Recommendation 109: The Canada Mortgage and Housing Corporation and the Agency should develop and implement, with Biigtigong Nishnaabeg, a plan regarding an Indigenous Shelter and Transitional Housing initiative that could support the construction of shelters that would accommodate women and vulnerable peoples.

Recommendation 110: Indigenous Services Canada should provide additional funding for the community land-use plan, as determined by Biigtigong Nishnaabeg to support the work needed to conduct geotechnical studies regarding soil saturation and suitability for the location and construction of new homes.

Recommendation 111: The Crown should work collaboratively with Biigtigong Nishnaabeg to explore options to address pressures related to educational services and early childcare demands. These discussions should consider how best to develop a recruitment and retention program to attract qualified teachers and early childcare providers within the community.

21.4 PAYS PLAT FIRST NATION

Pays Plat First Nation, or “Pawgwasheeng” in Ojibway, meaning “where the water is shallow,” is located on the central north shore of Lake Superior, approximately 125 km west of Marathon. The people of Pays Plat have occupied their traditional lands on the central north shore of Lake Superior since time immemorial.

Pays Plat First Nation stated that the proposed mine site is located within their traditional territory, which extends westerly from the Nipigon River, north to Highway 11, and east to the Marathon area, to the boundaries of the Biigtigong Nishnaabeg community. Pays Plat First Nation’s traditional territory overlaps the traditional territory of Biigtigong Nishnaabeg and Netmizaaggamig Nishnaabeg.

Pays Plat First Nation view Lake Superior as a living entity, supplying freshwater for drinking, harvesting, subsistence, ceremonies, and recreation, as well as for healing. Pays Plat First Nation consider it is their inherent duty to protect Lake Superior for generations to come. Hare Lake and the Angler area are also important to Pays Plat First Nation as part of their cultural heritage.

Pays Plat First Nation stated that numerous developments have been imposed on their traditional lands and allotted reserve, including rights of ways for the highway and hydro lines that cut across the community. Pays Plat First Nation also noted that mineral exploration on or around their traditional lands began nearly a century ago. Pays Plat First Nation commented that, while assimilation pressures have made it challenging for younger generations to find time to trap and hunt with the ancestral frequency, many still fish and pick blueberries in the summer.

21.4.1 Overprinting of Angler Creek

Pays Plat First Nation shared that approximately one-third of Pays Plat First Nation members have a grandparent who was born at Angler Creek, where there once was a semi-permanent settlement. They reported that the area was used for commercial fishing, trapping, and as a campsite to shelter along the journey of Pays Plat people to Pic and Long Lake for trade, and as far as Michipicoten for treaty payments. One Pays Plat First Nation member recalled that his great-grandparents “used to stay there, they would sell their fish at Coldwell, at Marathon as well as trading post in the Biigtig Zibi. So we do have long ties to these lands.”

Pays Plat First Nation recalled the presence of a train station as well as a seasonal campsite where people used to harvest blueberries in the 1940s and '50s. A Pays Plat First Nation Councillor told the Panel, “We would take our fish to the posts to sell the fish. We would also take the beaver, the marten and fishers to the Biigtig Zibi post to sell, in the early 1800s. We would sell all those things there and we would get flour, lard, the basics.”

Pays Plat First Nation reported fishing and plant harvesting at Angler Creek, notably for trout and blueberries, as well as practising ceremonies tied to these activities. They noted visiting the area for recreational, healing, and spiritual purposes, including regaining a connection to the area. They described Angler as a sacred place.

Pays Plat First Nation noted that water flows affected by the process solids management facility may be restored post-closure, but land use in this area would likely be restricted for generations due to the perceived negative consequences of utilizing streams whose water originates from a decommissioned process solids management facility.

If a dam failure at the process solids management facility upstream of Angler Creek were to take place, Pays Plat First Nation considered it would mean irreversible damage to their traditional territory. Pays Plat First Nation explained that to lose waters and lands they utilize due to a tailings or water treatment failure would be “life altering,” posing an identifiable and appreciable adverse effect on both present and future Pays Plat First Nation members.

The Crown Consultation Team acknowledged that, although no Project components would directly overlap the culturally significant site at Angler, there is potential for the cultural value and experience at the site to be diminished for Pays Plat First Nation and their members. The Crown Consultation Team commented they understood that Pays Plat First Nation members’ use and cultural connections to the area could be compromised due to the perception that the site was “spoiled.”

Quoting guidance from the Agency, the Crown Consultation Team noted that “Aboriginal spiritual and cultural practices are often integrally linked to specific locations and landscape features. Environmental effects resulting from a designated project may impact these places, which may in turn limit the ability of Aboriginal peoples to engage in their spiritual and cultural

practices.” The Crown Consultation Team found that GenPGM did not present information regarding the potential effect of the Project on spiritual and cultural practices.

21.4.2 Access and Resources for Harvesting

Activities reported by Pays Plat First Nation that could be affected by the Project included hunting, fishing, plant gathering, trapping, swimming, hiking, camping, and ceremonial activities. Pays Plat First Nation noted those activities occur at Bamooos Lake, Hare Creek, Hare Lake, up and down the Biigtig Zibi, and down Angler Creek.

Pays Plat First Nation noted concerns with how the Project could impact their access to land and waters they use. Pays Plat First Nation were concerned that the Project would result in a loss of access to traditional lands due to the mine footprint and roads extending out from the mine, as well as stigmatization and avoidance of the Project site as a result of noise and light. Pays Plat First Nation also noted the potential for overcrowding of the remaining hunting and fishing areas available to Pays Plat First Nation members, from use by Indigenous and non-Indigenous users displaced by the mine and mine activities.

Pays Plat First Nation were concerned that waste rock piles and deforestation associated with the Project would visually impair the Lake Superior skyline. Pays Plat First Nation expressed the desire for plants of interest to be restored, noting that some of these plants were medicinal.

Pays Plat First Nation noted that culturally significant food species include moose, beaver, rabbit, northern pike, yellow perch, walleye, lake trout, brook trout, steelhead, and wild blueberries. Pays Plat First Nation reported historically hunting caribou and being concerned with the loss of caribou habitat within the Lake Superior Coastal Range.

Pays Plat First Nation indicated that they rely heavily upon traditional foods, and anticipate the Project would have a negative impact on dietary habits, resulting from the loss of fish, animals, and country foods.

Pays Plat First Nation expressed concerns related to the potential for a reduction in the diversity and quantity of fish species in Hare Lake and effects on fish and fish habitat as a result of reduced flow in streams, including Angler Creek, where several species were documented. Pays Plat First Nation also expressed concern for Lake Sturgeon in the Biigtig Zibi in the event of a washout of Camp 19 Road. Pays Plat First Nation noted that offsetting measures implemented offsite might align with regional fisheries objectives, but did not help offset the loss of resources locally, given the distance to the area of the Project.

Pays Plat First Nation were particularly concerned about potential contamination of waters in Hare Lake and Lake Superior from discharge of effluent at the mouth of Hare Creek. Pays Plat First Nation commented that “Hare Lake represents a bastion of Pays Plat First Nation Traditional Knowledge. Generations of [Pays Plat First Nation] Band Members have fished, hunted, and trapped in vicinity of the Lake. Traditional Knowledge relating to the area has been

passed down through countless years, leaving Band Members with a profound connection to Hare Lake.”

Pays Plat First Nation requested that the Proponent consult with Pays Plat First Nation as part of their Environmental Monitoring and Management Program, as an integral aspect of the monitoring of Hare Lake, Angler Creek, and the surrounding area.

21.4.3 Effects on Socio-Economic Conditions

Pays Plat First Nation indicated that there is historical evidence of strong ties between economic activities and many places on Lake Superior related to fur trading.

Pays Plat First Nation expressed concern that the Project would be a camp-based mine, noting that people would not likely move into the area with their families in this case, and that people and their resources would leave the area rather than contribute to building the local population, economy, and tax base.

Pays Plat First Nation noted that, if the Project were approved, it would be vital that the Proponent continue to work closely with them on environmental monitoring programs, emergency response plans, and economic and employment opportunities. Being involved in monitoring would encourage education, strengthen the social and mental health of the Pays Plat First Nation community, and enable them to maintain a connection to the land.

Pays Plat First Nation noted the rising costs of housing in Marathon and nearby Manitowadge, and expected demand to grow in response to mining interests in general in the region.

21.4.4 Panel Conclusions and Recommendations

Current Use of Lands and Resources for Traditional Purposes

In reaching their conclusions on the effects of the Project on current use of lands and resources for traditional purposes by Pays Plat First Nation, the Panel considered the following factors to be particularly relevant:

- Current use activities were reported by Pays Plat First Nation, particularly around Hare Lake and Angler Creek, as well as in Bamooos Lake and the Biigtig Zibi.
- The effects on water quality and fish in Lake Superior are of utmost concern to Pays Plat First Nation. Pays Plat First Nation believe it is their inherent duty to protect Lake Superior for generations to come.
- The Project would result in permanent modification of the resources available for harvesting that support activities related to hunting, fishing, trapping, and gathering in Pays Plat First Nation’s traditional territory.

- Key areas used for intergenerational transmission of knowledge on the Biigtig Zibi and at Angler would be altered over the long term.
- Perception of contamination would alter the patterns of use of preferred areas for harvesting fish resources, notably Hare Lake, Angler Creek, and the Biigtig Zibi.
- Lower water levels at Angler Creek would affect fish species harvested by Pays Plat First Nation, which would interfere with fishing activities at preferred locations.
- Sensory effects from noise, dust, light, and other disturbances resulting from mining activities would affect the experience of using the area for fishing, hunting, and plant gathering in the vicinity of the mine.

Access and Experience

The Panel notes that the area that would be affected by the Project is at the eastern boundary of Pays Plat First Nation's traditional territory. The Panel understands that locations for which Pays Plat First Nation had the most concern related to use are Hare Lake and Angler. Pays Plat First Nation also noted they use the Biigtig Zibi and Bamooos Lake for current use activities.

The Panel understands that Pays Plat First Nation was concerned that Indigenous and non-Indigenous hunters, fishers, and recreators displaced by the mine and mine activities could overcrowd the remaining hunting and fishing areas available to their members. The Proponent committed to maintaining access to the Biigtig Zibi via Camp 19 Road and to Bamooos Lake via the existing trail through Hare Lake. However, the Panel finds it is reasonable to expect that the route that passes through Hare Lake to access Bamooos Lake could become more frequently used as a result of restricted access to Camp 19 Road. The Panel also finds that current use activities on and around Hare Lake could intensify as people travelling to Bamooos Lake use this alternate route. The Panel is of the view that increased use of Hare Lake itself and the route to Bamooos Lake via Hare Lake would adversely affect the experience of Pays Plat First Nation members who practise current use activities at these preferred locations. As a result, Pays Plat First Nation members may seek to practise current use activities such as fishing, hunting, plant gathering and camping away from Hare Lake. This change to historical traditional practices could undermine the connection Pays Plat First Nation members have with this area.

The Panel notes Pays Plat First Nation's concern about potential stigmatization and avoidance of the area as a result of sensory disturbances is recognized by the Proponent in their assessment of effects on traditional land and resource use. The Panel agrees with the Proponent and Pays Plat First Nation that sensory disturbances would adversely affect the experience of land users at preferred locations or on the way to access them. The Panel expects that these changes would be experienced by Pays Plat First Nation users mainly at Hare Lake due to the discharge and its associated infrastructure, and on the Biigtig Zibi, where the Proponent reported mining activities could be heard, and where the mine rock storage area

could be visible. Some of these effects would be temporary and reversible after mine closure, while others, such as effects on experience on the Biigtig Zibi due to the visual presence of the mine, would be permanent.

The Panel notes that Pays Plat First Nation were of the view that land use at Angler post-closure could be affected due to the perceived negative consequences of utilizing streams whose water originates from a decommissioned process solids management facility.

The Panel acknowledges that the Proponent committed to develop a protocol for use of the initial portion of Camp 19 Road, and to provide escorted access through the Site Study Area during construction and operations when safety permits. The Proponent also made commitments to address impacts on traditional land and resource use, minimize disturbances from mining activities, and to keep Indigenous communities informed of Project activities, locations, and timing. The Panel is of the view that the proposed measures to mitigate effects due to access restrictions and sensory disturbances reduce the adverse effects on access and experience for Pays Plat First Nation; however, these measures would not eliminate the effects completely.

Quantity of Resources

The Panel understands that Bamooos Lake, Hare Lake, the Biigtig Zibi, and Angler Creek are considered by Pays Plat First Nation to be part of their traditional territory where they hunt, fish, gather plants, and conduct social and ceremonial practices. Important resources for Pays Plat First Nation include moose, furbearers, salmonids, medicinal plants and blueberries.

With respect to effects on resources within the mine footprint, the Panel understands the natural landscape would be irreversibly altered, even with reclamation. Post-closure, the Panel finds that the Project would result in changes to vegetation composition and habitat for wildlife, which would permanently affect the quantity of traditional resources available for harvest activities.

Hunting

Based on historical and more recent information provided publicly to the Panel, it appears that Pays Plat First Nation's hunting activities include hunting for moose and furbearers in the Angler area, at Hare Lake, and at Bamooos Lake. The Panel found that moose and furbearers would relocate outside the Site Study Area. As discussed in Section 12 (Wildlife Species), the Proponent acknowledged that the mine itself and sensory disturbances outside the mine footprint could displace wildlife. However, it is expected that limited wildlife would be affected and others would become habituated to human disturbances. Accordingly, the Panel finds that the resources hunted by Pays Plat First Nation at Hare Lake and along the Biigtig Zibi could relocate during the life of the mine, but may return before or after cessation of mining

activities. No effects on wildlife resources are anticipated at Bamoos Lake or at the Angler site that would substantially affect the harvesting of these resources.

Fishing

With respect to the Angler area, the Panel found that lower water levels in Angler Creek would affect habitat suitability for the spawning run of salmonids in the lower reaches of this creek, reducing spawning success and resulting in smaller fish populations at this location. The Panel finds that this would reduce fishing opportunities for Pays Plat First Nation at this preferred location. The Panel acknowledges there is some uncertainty as to whether salmonids would continue to inhabit the lower reaches of Angler Creek during the extended periods of low flow.

The Panel acknowledges that the Proponent has committed to assess feasible supplemental water flow options for Angler Creek to minimize disruption to this watercourse during operations. However, as at the close of the Panel's record, no feasible option had been identified. The Panel notes that the effects on fish harvesting at Angler Creek would also affect the transmission of knowledge and the connection experienced at this location by Pays Plat First Nation.

As discussed in Section 10 (Fish and Fish Habitat), the Panel is of the view that proposed mitigation and monitoring measures are appropriate to reduce potential changes to water temperatures and water chemistry in Hare Lake. The Panel further notes that the Proponent committed to monitoring the effects on fish species of importance to Indigenous communities at preferred harvesting locations. The Panel does not anticipate an effect on fish habitat, communities, or abundance in Hare Lake that would in turn affect Pays Plat First Nation's fishing activities. The effluent discharge at Hare Lake during operations could result in perception-based effects on fish harvesting practices by Pays Plat First Nation.

The Panel anticipates no effect of the Project on fish and fish habitat at Bamoos Lake that would substantially affect fishing.

Gathering

As noted in the Section 11 (Terrain, Soils and Vegetation), the Panel concludes there would be a permanent effect on the landscape from direct loss of vegetation. However, the Panel acknowledges that revegetation of the site could allow for planting of traditional plants of interest.

The Panel understands that Pays Plat First Nation members value certain plants that are located within the mine footprint. However, the Panel was not made aware of plant-gathering activities by Pays Plat First Nation within the Site Study Area, and therefore finds that there would be no residual effect on plant gathering by Pays Plat First Nation.

Quality of Resources

The Panel acknowledges that, although remote, a dam breach scenario would result in an accidental discharge of process-affected water to Angler Creek and Lake Superior, which could have a catastrophic impact on Pays Plat First Nation. The Panel found that the likelihood of this occurrence is remote and the risk would be minimized to the extent possible, as discussed in Section 20 (Accidents and Malfunctions).

The Panel acknowledges that the Proponent committed to monitoring and follow-up measures related to surface water quality and fish and fish habitat at the outlet of Angler Creek.

The Panel also understands that Pays Plat First Nation was primarily concerned with migration of contamination, not just from an accidental event at Angler from the process solids management facility, but from Hare Lake into Hare Creek and Lake Superior. However, as discussed in Section 9 (Surface Water Quality) and Section 17 (Human Health), the Panel found that the Project would not result in effects on water quality that would exceed relevant benchmarks for aquatic resources. The Panel is of the view that the Project, under normal operations, would not pose a risk to water quality that could affect water and aquatic resources of importance to Pays Plat First Nation. However, the Panel understands that changes in current use practices could occur as a result of perceived contamination of resources.

In summary, the Panel finds that residual effects of the Project to current use activities by Pays Plat First Nation would likely occur due to changes at Angler Creek, restrictions of access that would displace users, and sensory disturbances that would affect user experiences on the land as well as availability of harvested wildlife.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on the Pays Plat First Nation's current use of lands and resources for traditional purposes.

Physical and Cultural Heritage

In reaching their conclusions on the effect of the Project on Pays Plat First Nation's physical and cultural heritage, the Panel considered the following factors to be particularly relevant:

- Indigenous spiritual and cultural practices are often integrally linked to specific locations and landscape features.
- Angler is culturally and spiritually important to the history and family ties of Pays Plat First Nation. Pays Plat First Nation view Angler Creek as sacred. They report using the area for spiritual and ceremonial purposes.
- Pays Plat First Nation consider it their duty to protect Lake Superior, and view the lake as a living entity.

- The Panel does not anticipate that the Project, under normal operations, would affect Lake Superior.

The Project's overprinting of the upper reaches of Angler Creek by the process solids management facility would result in a reduction in flow in Angler Creek for close to 20 years. As at the close of the Panel's record, no feasible options to supplement flows in Angler Creek had been identified. As a result, the Panel considered the Project as proposed, finding that the change in flows at Angler Creek would result in effects on Pays Plat First Nation's cultural and ceremonial practices at that location. The Panel finds that this effect cannot be mitigated.

The Panel understands that Pays Plat First Nation is of the view that a process solids management facility dam failure would result in irreversible damage to their traditional territory for present and future members of their community. The Panel agrees with Pays Plat First Nation that the effects of such an event would be significant. The Panel found that the likelihood of an occurrence is remote and the risk would be minimized to the extent possible, as discussed in Section 20 (Accidents and Malfunctions).

The Panel also considered potential effects on cultural and ceremonial sites, including archeological potential, that may affect Pays Plat First Nation's physical and cultural heritage. For Hare Lake, the Panel is satisfied that completion of additional archaeological assessments would identify whether any archaeological resources are present and would be affected by the Project and that, if archaeological resources are discovered, they would be addressed through provincial protocols. The Panel also accepts that the Proponent would have sufficient space to adjust the location of the discharge structure at Hare Lake to avoid or minimize disturbance to any archaeological sites of importance.

The Panel recognizes that Pays Plat First Nation consider Hare Lake a bastion of Pays Plat First Nation traditional knowledge and culture. The Panel finds that the Project could affect Pays Plat First Nation cultural heritage, should their members avoid Hare Lake due to perceived contamination.

The Panel finds that the Project would likely affect Pays Plat First Nation's cultural activities at Angler. Given the context provided by Pays Plat First Nation to support the importance of this site, the Panel concludes that a change in the conditions of the site of this duration would be significant. The Panel finds that this environmental effect cannot be mitigated.

The Panel concludes that the Project is likely to cause a significant adverse environmental effect on Pays Plat First Nation's physical and cultural heritage.

Health

In reaching their conclusions on the effect of the Project on Pays Plat First Nation's health, the Panel found the following factors to be particularly relevant:

- Pays Plat First Nation rely heavily on country foods.
- Pays Plat First Nation report using Angler and Angler Creek for spiritual and ceremonial purposes, and for healing.
- The analysis and conclusions provided in Section 17 (Human Health) are applicable to the assessment of Project effects specific to the health of Pays Plat First Nation.

The Panel understands that Pays Plat First Nation were particularly concerned about potential changes to water quality as a result of effluent from the Project entering Hare Lake, Angler Creek, and Lake Superior, which may lead to further consumption restrictions for fish. Based on the Panel's assessment of the effects on human health, the Panel finds that Project's effects on water quality would not likely cause a significant adverse environmental effect on human health.

However, the Panel recognizes that perception of contamination may alter harvesting habits. The Panel finds that changes in harvesting habits, including avoidance of preferred locations for fish harvesting, could diminish the contribution of country foods in Pays Plat First Nation's traditional diet and indirectly affect health.

Pays Plat First Nation also reported hunting moose, beaver and rabbit for food. The Panel is of the view that those resources would be displaced by the Project temporarily within and near the mine footprint. Access and experience for Pays Plat First Nation harvesters may also be affected. The Panel finds that displacement of harvesting activities related to plant and wildlife would also have the potential to diminish the contribution of country foods in Pays Plat First Nation traditional diet and indirectly affect health.

The Panel is of the view that the effects on Indigenous health conditions are interconnected with other valued ecosystem components and do not involve just physical health, but spiritual, cultural, and socio-economic aspects as well. The Panel recognizes that effects on harvesting country foods can affect the quality of life and cultural and spiritual health for Pays Plat First Nation community members.

The Panel further considered the potential for effects on Pays Plat First Nation's spiritual and cultural health tied to the Angler area. The Panel understands that Pays Plat First Nation's cultural and spiritual health is intimately tied to tangible and intangible effects on cultural heritage at Angler Creek, such as the lower flows predicted as a result of overprinting, and the expected presence of mine effluent discharge at Hare Lake, which ultimately flows through Hare Creek to Lake Superior. Pays Plat First Nation reported using the Angler area for healing

purposes. The Panel finds that effects of the Project on Angler Creek, both measurable and perceived, would affect Pays Plat First Nation's spiritual health.

The Panel understands that Pays Plat First Nation's concerns related to Angler Creek were primarily related to the possibility of a dam breach. The Panel is of the view that the potential effects on health due to a dam breach would be significant. The Panel found that the likelihood of such an occurrence is remote and the risk would be minimized to the extent possible, as discussed in Section 20 (Accidents and Malfunctions).

Although the Panel understands that Pays Plat First Nation rely heavily on country foods for their diet and quality of life, the Panel does not expect that the restricted access, diminished experience, and perceived contamination of resources due to the Project would have a significant effect on Pays Plat First Nation's ability to use the affected areas.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on the health of Pays Plat First Nation.

Socio-Economic Conditions

In conducting their assessment, and based on the information provided by all participants, the Panel took into account the following relevant factors:

- Pays Plat First Nation have strong historical ties to economic activities in the area related to fur trading.
- The Project would result in restrictions on access and have potential effects on Pays Plat First Nation's important harvesting areas, consequentially reducing harvest yield.
- Competition for resources in Hare Lake and Bamoos Lake would increase, resulting in a reduction in harvest potential and/or an increase in travel time and costs to access new areas for harvesting.
- The Proponent has proposed financial measures to help compensate for the loss of access and economic benefits from trapping through a Harvesters Training Fund Initiative.

The Panel did not receive quantitative or qualitative information from Pays Plat First Nation regarding commercial revenues from harvesting by community members. As such, it is difficult to gauge any effect on Pays Plat First Nation's socio-economic conditions as a result of a change to the environment.

The Panel acknowledges the commitment from the Proponent but was not privy to provisions included in Community Benefit Agreements.

The harvester training fund initiative might address some of the effects related to any loss of income associated with reduced harvesting opportunities associated with the Project. However, there is not enough information to assess the extent to which the fund would address the effects.

The Panel recommends that the Proponent, in collaboration with Pays Plat First Nation, develop and implement the following measures:

Recommendation 112: Provide a harvester training fund to support Pays Plat First Nation continuity of harvesting.

Recommendation 113: Develop and implement a follow-up program to verify that the proposed harvester training fund adequately compensate Pays Plat First Nation for commercial and non-commercial economic losses caused by the Project's environmental effects.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on Pays Plat First Nation's socio-economic conditions.

21.4.5 Cumulative Effects

Views of the Proponent

GenPGM identified potential interactions with other projects and activities with respect to traditional land and resource use, wildlife, the ability to fish, and access and travel routes. The Proponent predicted there would be an adverse cumulative residual environmental effect on traditional land and resource use, but it would not be significant.

On the subject of heritage and archaeological resources, GenPGM noted that portions of existing access and travel routes that are associated with cultural, societal, and spiritual connections to the land would be restricted. The Proponent did not specify the potential for cumulative effects on components of heritage and archaeological resources of relevance to Pays Plat First Nation.

With respect to Indigenous health, the Proponent concluded that cumulative effects on human health related to country foods were not anticipated.

In their review of socio-economic conditions, the Proponent concluded that any incremental contribution of the Project to cumulative effects would be negligible, and that any adverse cumulative residual environmental effect would not be significant.

Views of Pays Plat First Nation

Pays Plat First Nation explained that the residual effects of industrial activity over the past century have resulted in numerous sections of Lake Superior becoming ecologically impaired. In addition, several parts of the lake, including Jackfish Bay, Peninsula Harbour, Nipigon Bay, and Thunder Bay, have been designated as areas of concern. Pays Plat First Nation were particularly concerned about the potential risk to the recovery of Jackfish Bay and Peninsula Harbour Areas of Concern, where they historically fished.

Pays Plat First Nation reported that they had been advised not to eat fish within their traditional territory due to health risks associated with contaminated fish.

Pays Plat First Nation reported that fishing and fish consumption practices in their traditional territory were already affected due to the risks posed by eating contaminated fish east of Batchawana Bay. Pays Plat First Nation recalled that effluent from the pulp mill in Terrace Bay began to be discharged into the waters of Lake Superior in the 1940s, leading to a decline of the fishery in Jackfish Bay and forcing Pays Plat First Nation members to fish elsewhere. Pays Plat First Nation noted that the pulp mill has resumed operations and effluent is again entering the lake.

Pays Plat First Nation noted that a decrease in Hare Lake water quality due to mine effluent and the migration of contaminants into Lake Superior could result in cumulative effects associated with mercury levels and consumption restrictions for fish. Pays Plat First Nation were of the view that if a spill or tailings pond failure were to ever occur, mine effluent could enter Port Munro at the outlet of Hare Creek and make its way to the already damaged Jackfish Bay in Lake Superior.

Panel Conclusions and Recommendations

In reaching their conclusions on cumulative effects of the Project on current use, physical and cultural heritage, health and socio-economic conditions for Pays Plat First Nation, the Panel considered the following factors to be particularly relevant:

- Pays Plat First Nation's connection to Lake Superior is of great importance to their traditional practices, cultural and spiritual health, and economic activities.
- Pays Plat First Nation's concerns about cumulative effects were centred on water quality and fish in Lake Superior.
- Water quality along the north shore of Lake Superior has been degraded by industrial activities over time.
- The Panel finds that, under normal operations, the Project would not result in effects on water quality or fish populations in Lake Superior.

The Panel concluded, in Section 9 (Surface Water Quality), that if the recommended mitigation measures and monitoring and follow-up programs were implemented, the Project is not likely to have a significant adverse environmental effect on water quality. This conclusion is related to contaminant concentrations in the Local Study Area. The Panel believes there would be less spatial overlap between Project-affected waters and those of Lake Superior. The Panel therefore concludes that no environmental effects would occur on Lake Superior due to Project activities. Upstream of Lake Superior, the Panel finds that the residual effects of the Project on Pays Plat First Nation's current use would be temporary, other than an irreversible change to experiences on the Biigtig Zibi due to the visual presence of the Project for harvesters on the river. With regard to Hare Lake, the Panel does not anticipate an effect on fish other than perception-based changes in fish harvesting practices, which would include changes due to perceived contamination and sensory disturbances. At Angler, effects on salmonids due to lower water levels in Angler Creek would be localized and offset.

Overall, for current use, the Panel finds little overlap between the cumulative effects of concern to Pays Plat First Nation related to Lake Superior and the residual effects of the Project on the current use of Pays Plat First Nation upstream of Lake Superior.

The Panel concludes the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Pays Plat First Nation's current use of land and resources for traditional purposes.

Pays Plat First Nation were clear that they rely on Lake Superior for traditional and cultural practices. With respect to cultural heritage, the Panel is of the view that there would be Project-specific residual effects at Angler, which would be significant. The Project would also result in residual effects at Hare Lake, which would not be significant. Although Pays Plat First Nation emphasized the impact the Project would have on physical and cultural heritage at Angler, the Panel did not receive information that would indicate the potential for significant cumulative effects on Pays Plat First Nation specifically with respect to their cultural heritage on Lake Superior, or that would have the potential to interact with the Project's residual effects on Angler and Hare Lake.

The Panel concludes the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Pays Plat First Nation's physical and cultural heritage.

With respect to health and socio-economic conditions, the Panel understands that Pays Plat First Nation have been displaced from preferred locations to harvest fish due to past projects associated with commercial and non-commercial activities.

The Panel's approach to health includes physical, cultural, and spiritual aspects. The Panel understands that past activities have resulted in changes in the availability and quality of the fish that Pays Plat First Nation harvest and consume. The examples Pays Plat First Nation provided relating to Jackfish Bay and Peninsula Harbour demonstrate that past effects, although improving, continue to prevent Pays Plat First Nation from regaining traditional access to health-related resources.

The Panel also finds that the residual effects from the Project on current use and physical and cultural heritage would interact with the effects on Pays Plat First Nation's overall health conditions. The Panel finds that Pays Plat First Nation's health has already been affected by past and existing projects, such that effects from the Project would interact with their physical, cultural, and spiritual health. The Panel finds that the Project has the potential to affect Pays Plat First Nation health and socio-economic conditions, but is unable to fully assess the potential cumulative effects due to a lack of detailed information. The Panel further acknowledges that several initiatives are in place to mitigate the effects of past projects and activities on Lake Superior and protect the lake from further pollution.

The Panel recommends that the federal and/or provincial government, work in collaboration with Pays Plat First Nation, develop and implement the following measures:

Recommendation 114: Support initiatives to restore culturally appropriate conditions at preferred locations on Lake Superior for the harvesting of country foods and cultural practices that support the health and socio-economic conditions of Pays Plat First Nation.

The Panel concludes the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant adverse cumulative effect on Pays Plat First Nation's health and socio-economic conditions.

21.5 MÉTIS NATION OF ONTARIO

The Métis Nation of Ontario represents a regional rights-bearing Métis community that lives, uses, and relies on the Lakehead/Nipigon/Michipicoten traditional territory. There has been a distinct Métis presence in the Lakehead/Nipigon/Michipicoten region since the late 1700s or early 1800s. The Métis Nation of Ontario indicated that they value water, ecological health, and the Métis way of life, which guides their views on the Project.

The Métis Nation of Ontario raised concerns related to potential contaminants and exposure of harvesters, perception-based effects, cumulative effects on vegetation, and impacts on harvesting rights. The Métis Nation of Ontario commented on the importance of intergenerational transmission of knowledge, and noted that the duration of the Project and post-closure period could result in significant impacts on their harvesters.

The Métis Nation of Ontario stated that they were committed to working with GenPGM, and were confident that continued engagement and consultation could solve outstanding issues to get the Project off the ground in a safe, environmentally conscious direction.

21.5.1 Traditional Knowledge and Land Use

The Métis Nation of Ontario provided the Panel with their *Report on the Findings of the Métis Nation of Ontario's Lakehead / Nipigon / Michipicoten Consultation Protocol Area Land Use and Occupancy Study*. The study documented land use in a “study region” that encompassed the Lakehead/Nipigon/Michipicoten traditional territory. The study also identified when current use occurred within the Stillwater Project Boundary Claim.¹⁵ The study indicated that although the number of interviewees was not sufficient to be considered representative, it was a good starting point to understand Métis use in the region.

The study’s findings include:

- Food resources harvested by Métis people do not just feed the harvester, but also their family, extended family, and community.
- Common practices included learning at an early age to hunt upland game birds (mostly partridge), small furbearing animals such as rabbits, and deer and moose. Fishing and plant collection were also reportedly learned at an early age.
- No interviewees indicated that they earned an income from their harvesting activities.
- Participants spoke of the intangible benefits of harvesting, such as having a deeper connection to the local environments, and opportunities for familial bonding.
- A wide area of land-use occurs in the study region, including multiple uses within the Stillwater Project Claim Boundary, and in the area surrounding the Project. Among others, the Métis Nation of Ontario documented used associated to Hare Lake, Hare Creek, Bamoos Lake, Three Finger Lakes, and rivers and stream downstream of the Project.
- Harvesting reported within the Stillwater Project Claim Boundary included moose hunting, rabbit snares, and game bird (i.e. grouse) hunting.
- Fishing for walleye, pike, lake, trout, speckled trout, and perch also occurred in the Stillwater Project Claim Boundary, and sturgeon fishing was reported downstream of the Project.

¹⁵ The Métis Nation of Ontario’s 2012 study was based on the former Stillwater Project Claim Boundary, which included parts of Hare Lake, Bamoos Lake, and Three Finger Lakes, and which were not included in the revised Site Study Area or Local Study Area.

- The collection of berries was recorded along the banks of rivers that flow directly from areas within the Stillwater Project Boundary Claim. The collection of other plants for consumption and medicinal or ceremonial purposes was also reported but not attributed to specific areas in relation to the Stillwater Project Claim Boundary.

21.5.2 Effects on Harvesting

The Métis Nation of Ontario were concerned with how the Project would affect water, including fish populations. They commented that studies conducted on fish contamination must accurately represent the consumption habits of Métis citizens. The Métis Nation of Ontario requested that any large loss of species be reported to Indigenous communities that may be affected.

The Métis Nation of Ontario raised concerns about pollution from dust and tailings, potential effects on flora and fauna, and return of the land to its original state upon closure. They commented that, if the perception of air, soil, and water quality among harvesters shifts, they may no longer harvest in proximity to the Project. The Métis Nation of Ontario were of the view that the avoidance of harvesting due to negative perceptions or experiences would constitute a significant loss to the Métis. They commented that accumulation of dust on plants and sediments in waterbodies could drive harvesters from the area due to perceived negative effects.

The Métis Nation of Ontario were of the view that, should they need to wait upwards of 20 years for wildlife to return to the area after mine closure, there would be a permanent effect on harvesting, way of life, and the sharing of intergenerational traditional knowledge. Due to the long timeline of this Project, the Métis Nation of Ontario predicted that teaching sites would be lost and that this loss would be irreversible as the timeline for reestablishment is beyond the key harvesting years of a single land user.

The Métis Nation of Ontario requested that the species used in the revegetation process come from local seed stock, be certified weed-free, and not include invasive species. The Métis Nation of Ontario recommended that GenPGM consider Indigenous planter boxes to supplement some of the valued species near the mine site. The Métis Nation of Ontario was of the view that these measures would help mitigate some of the impacts from the Project, and would provide a site for Indigenous communities to harvest and a safe site to meet and engage with those who may be visiting or exercising their rights.

The Métis Nation of Ontario requested that the Project's fish capture and rescue activities be conducted in the presence of a Métis environmental monitor. The Métis Nation of Ontario also requested the Proponent establish an environmental monitor to participate in revegetation.

21.5.3 Panel Conclusions and Recommendations

Current Use of Lands and Resources for Traditional Purposes

In reaching their conclusions on the effect of the Project on current use of lands and resources for traditional purposes by the Métis Nation of Ontario, the Panel considered the following factors to be particularly relevant:

- The Métis Nation of Ontario use and rely on lands and resources throughout the Lakehead, Nipigon, and Michipicoten traditional territory.
- The Métis Nation of Ontario have indicated that they harvest plants, fish, and wildlife within the former Project boundary and in rivers downstream of the Project.
- The Métis Nation of Ontario use Hare Creek, Hare Lake, and Bamoos Lake as well as rivers downstream from the Project.
- The Métis Nation of Ontario raised concerns primarily related to effects resulting from perceived contamination, effects on water and fish, loss of intergenerational knowledge, and the post-closure return of vegetation and wildlife.
- Although traplines and the trapping way of life are important for the Métis Nation of Ontario, the Project is not located on a Métis-held trapline.

Access and Experience

The Panel finds that the Project would result in changes in access and experience for Métis harvesters. Changes in access consist of restricted access to Camp 19 Road during the life of the mine. This change would force harvesters travelling to Bamoos Lake from the Site Study Area to use the alternative corridor at Hare Lake. The initial portion of Camp 19 Road would also be affected by mining-related traffic, which could change access conditions to the Biigtig Zibi, and further displace harvesters or create avoidance of these areas for harvesting.

The Panel finds that harvesting practices in the vicinity of the mine site would be affected by sensory disturbances and by potential displacement of users who would have otherwise used Camp 19 Road to access Bamoos Lake. The Panel understands that sensory disturbances related to noise and light, as well as fear of dust contamination, could further deter harvesters and displace traditional practices. The Panel notes that the Métis Nation of Ontario were of the view that avoidance of harvesting due to negative perceptions or experiences constitutes a significant loss.

The Panel acknowledges that the Proponent committed to developing a protocol for use of the initial portion of Camp 19 Road, and to provide escorted access through the Site Study Area during construction and operations when safety permits. The Proponent also committed to

providing appropriate accommodation for impacts on traditional land and resource use, work to minimize disturbances from mining activities, and keep Indigenous communities informed of Project activities, locations, and timing throughout the life of the Project. The Panel is of the view that, although the proposed measures would mitigate the effects on access and experience for Métis Nation of Ontario harvesters, they would not be eliminated completely.

Quantity of Resources

The Panel understands that important resources for the Métis Nation of Ontario include moose, furbearers, game birds, partridge, walleye, pike, sturgeon, trout, berries and fungi, among many other species that are harvested for food and medicinal and ceremonial purposes. The Panel finds that the Project would result in changes to vegetation composition and habitat for wildlife, which would permanently affect the quantity of traditional resources available for harvest activities, even after reclamation.

Hunting

The Panel found that moose, furbearers, and birds would be able to relocate outside the Site Study Area. As discussed in Section 12 (Wildlife Species), the Panel notes that the Proponent acknowledged that sensory disturbances outside the mine footprint could displace wildlife, but that few individuals would be affected and others would become habituated to human disturbances. The return of these resources to the landscape could take up to 20 years for species such as hare, and up to 70 to 80 years for species associated with mature forests. Accordingly, the Panel finds that while resources hunted by the Métis Nation of Ontario would relocate during the life of the mine and some would return quickly after the cessation of mining activities, others would not return beyond the 20-year time frame that the Métis Nation of Ontario identified as significant for sharing intergenerational knowledge.

Fishing

The Panel recognizes that the Métis Nation of Ontario use waters downstream of the Project to fish. As discussed in Section 8 (Surface Water Quantity), the Panel finds that the 20 years of lower flows predicted for Angler Creek would reduce fishing opportunities. The Panel acknowledges there is some uncertainty as to whether salmonids would continue to inhabit the lower reaches of Angler Creek during the extended periods of low flow.

The Panel understands that the Métis Nation of Ontario harvest fish at Hare Lake. As discussed in Section 10 (Fish and Fish Habitat), the Panel is of the view that proposed mitigation and monitoring measures are appropriate to reduce potential changes to water temperature and water chemistry in Hare Lake. The Panel further notes that the Proponent has committed to monitoring the effects on fish species of importance to Indigenous communities at preferred harvesting locations. The Panel does not anticipate an effect on fish habitat, communities, or abundance in Hare Lake to the extent that it would affect Métis Nation of Ontario's fishing

activities. However, effluent discharge and associated infrastructure at Hare Lake during operations could result in perception-based effects on fish harvesting practices by the Métis Nation of Ontario.

The Panel notes that the effects on fish harvesting at Angler Creek and Hare Lake could also affect the transmission of knowledge and connection experienced at these locations by the Métis Nation of Ontario.

Gathering

The Panel notes some uncertainty regarding whether the Métis Nation of Ontario gather plants within the Project footprint, but accepts that they noted general harvesting use of the area, which may include areas that would be permanently altered. Outside the Project footprint, the Panel finds that vegetation would not be affected by Project activities.

The Panel acknowledges that the Proponent made a commitment to use plant species of interest to Indigenous communities during rehabilitation, where and when such species are appropriate and technically feasible. The Panel acknowledges the Métis Nation of Ontario's recommendation to install planter boxes to mitigate some effects. The Panel agrees with the Métis Nation of Ontario that this measure would be applicable to the mitigation of effects on current use related to plant gathering and associated teaching that would be affected by vegetation removal or sensory disturbances.

Quality of Resources

The Panel found that the Project would not result in effects on water quality that would exceed relevant benchmarks for aquatic resources. The Panel is of the view that the Project, under normal operating conditions, does not pose a risk to water quality that could affect water and aquatic resources of importance to the Métis Nation of Ontario.

In summary, the Panel finds that residual effects of the Project on the current use of the Métis Nation of Ontario would be likely as a result of changes in access that would displace users, and sensory disturbances that would affect user experiences on the land, as well as the availability of harvested plants and wildlife. Some of these effects, such as sensory disturbance, would be temporary and reversible after mine closure. Others, such as alteration of the landscape, would be permanent.

The Panel recognizes that the Métis Nation of Ontario were of the view that a timeline of 20 years following mine closure for certain species of interest to return to the area would represent significant losses in harvesting opportunities, way of life, and the sharing of intergenerational traditional knowledge. The Panel also recognizes that the Métis Nation of Ontario noted that outstanding issues could be resolved through further engagement and consultation and were generally supportive of the Project.

The Panel finds that the Project alone would not result in significant effects on harvesting within the Métis Nation of Ontario's traditional territory.

The Panel recommends that the Proponent, in collaboration with the Métis Nation of Ontario, should develop and implement the following mitigation measure:

Recommendation 115: Develop and implement initiatives to mitigate effects on gathering of plants valued by the Métis Nation of Ontario and other Indigenous communities and foster learning and knowledge transfer in a culturally appropriate environment for First Nation and Métis harvesters in the region.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on the Métis Nation of Ontario's current use of lands and resources for traditional purposes.

Cumulative Effects on Current Use

Views of the Proponent

Based on potential interactions with other projects and with wildlife, and the ability to fish and access and travel traditional routes, GenPGM predicted there would be an adverse cumulative residual environmental effect on traditional land and resource use. The Proponent determined this effect would not be significant.

Views of the Métis Nation of Ontario

The Métis Nation of Ontario noted that cumulative effects and climate change have the potential to affect their harvesting area and would continue to do so in perpetuity. They stated that the combined effects of the Project and the planned forest harvest within the Pic River Forest Management Unit must be evaluated, which would constitute a major disruption in available areas for the exercise of Métis harvesting. Large-scale understanding of all anthropogenic projects within the area is needed to better determine the cumulative, long range effects of these projects.

Panel Conclusions and Recommendations

In reaching their conclusion on the cumulative effects of the Project on current use of lands and resources for traditional purposes by Métis Nation of Ontario, the Panel found the following factors to be particularly relevant:

- The Project would have residual adverse effects on harvesting practices of the Métis Nation of Ontario.

- The Métis Nation of Ontario engage in harvesting activities throughout their traditional territory.
- Although the effects on the biophysical environment may not interact spatially and temporally, effects on harvesting practices would interact from the perspective of the harvesters, resulting in cumulative effects on current use.

The Panel agrees with the Métis Nation of Ontario and the Proponent that the Project's effect on harvesting would interact with those of other projects and activities, which have been included by the Proponent in their cumulative effects assessment.

The Panel acknowledges that the Métis Nation of Ontario's harvesting practices and way of life are likely to have been affected in the past, which is supported by the Métis Nation of Ontario's view that avoidance of harvesting is a significant loss. However, the Panel did not receive information indicating that access to other areas in the vicinity of the mine have already been compromised to a large extent for Métis Nation of Ontario harvesters.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant cumulative effect on Métis Nation of Ontario's current use of lands and resources for traditional purposes.

Physical and Cultural Heritage

In reaching their conclusions on the effect of the Project on the Métis Nation of Ontario's physical and cultural heritage, the Panel considered the following factors to be particularly relevant:

- Social and cultural events, gatherings, and traditional ceremonies are closely related to harvesting and learning activities, which contribute to the cultural, mental, and physical health of individuals, families, and overall health of the community.
- No specific places or features are associated with physical and cultural heritage for the Métis Nation of Ontario in relation to the Project.

The Panel understands that the Métis Nation of Ontario's cultural heritage is connected to the value placed on water, ecological health, and way of life. The Panel previously concluded that the Project would have a residual adverse effect on current use for the Métis Nation of Ontario. Measures to mitigate loss of opportunities to transfer of knowledge on the land would contribute to mitigation of Project effects on the cultural heritage of the Métis Nation of Ontario.

The Panel concludes the Project is not likely to cause a significant adverse environmental effect on the Métis Nation of Ontario's physical and cultural heritage.

Cumulative Effects on Physical and Cultural Heritage

Views of the Proponent

GenPGM noted that portions of existing access and travel routes associated with cultural, societal, and spiritual connections to the land would be restricted. The Proponent did not identify the potential for cumulative effects for components of heritage and archaeological resources of relevance to the Métis Nation of Ontario.

Views of Métis Nation of Ontario

The Métis Nation of Ontario, as discussed above, expressed concern about the cumulative effects on their harvesting area, such as those that could result from the Project due to climate change and anthropogenic activities.

Panel Conclusions and Recommendations

In reaching their conclusion on the cumulative effects of the Project on the physical and cultural heritage of the Métis Nation of Ontario, the Panel considered the following factors to be particularly relevant:

- Access to areas associated with cultural, societal, and spiritual connections to the land would be restricted.
- Due to the long timeline of this Project, the Métis Nation of Ontario predicted that teaching sites would be irreversibly lost.

The Panel acknowledges that the Métis Nation of Ontario's harvesting practices and way of life are likely to have been affected in the past, and this is supported by the Métis Nation of Ontario's view that loss of teaching sites would be irreversible. However, the Panel did not receive information indicating that physical and cultural heritage sites in the vicinity of the mine site have already been compromised to a large extent for Métis Nation of Ontario harvesters.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant cumulative effect on Métis Nation of Ontario's physical and cultural heritage.

Health

In reaching their conclusions on the effect of the Project on the Métis Nation of Ontario's health, the Panel considered the following factors to be particularly relevant:

- Harvesting and learning activities contribute to the cultural, mental, and physical health of individuals, families, and overall health of the community for the Métis Nation of Ontario.
- Food resources harvested by Métis people do not just feed the harvester, but also their family, extended family, and community.
- The Métis Nation of Ontario were of the view that the avoidance of harvesting due to negative perceptions or experiences constitutes a significant loss to the Métis.
- The analysis and conclusions in Section 17 (Human Health) are applicable to the assessment of the Project's effects specific to the health of the Métis Nation of Ontario.

The Panel understands that the Métis Nation of Ontario were particularly concerned about potential changes to water quality as a result of effluents from the Project. However, the Panel finds no significant risk that changes to water quality would affect human health.

The Panel recognizes that perception of contamination could alter harvesting habits. The Panel understands that members of the Métis Nation of Ontario fish for several species in waters near the Project. Fishing and gathering berries also occur downstream from the Project. The Panel understands that changes in harvesting habits, including avoidance of preferred locations for fish harvesting, could affect the physical, cultural, and spiritual aspects of Métis Nation of Ontario harvesters, their families, and the community.

The Métis Nation of Ontario reported hunting game birds, rabbit, and moose for food. The Panel is of the view that those resources would be displaced by the Project temporarily within and near the mine footprint. Access and experience for Métis Nation of Ontario harvesters may also be affected. The Panel finds that displacement of harvesting activities related to plant and wildlife would have the potential to diminish the contribution of country foods in Métis Nation of Ontario traditional diets and indirectly affect health.

The Panel is of the view that the effects on Indigenous health conditions are interconnected with other valued ecosystem components and incorporate physical, spiritual, cultural, and socio-economic aspects. The Panel acknowledges changes to the harvesting of country foods can affect the quality of life and cultural and spiritual health of Métis Nation of Ontario community members.

As a result of restricted access, diminished experience, and perceived contamination, the Panel finds that a residual adverse effect on the Métis Nation of Ontario would be likely. Although the Panel understands that Métis Nation of Ontario harvesters use areas that may be affected by

the Project, the Panel is of the view that the Project alone would not significantly affect the overall health of the Métis Nation of Ontario.

The Panel understands that the Métis Nation of Ontario's concerns regarding the effects the Project may have on country foods and harvesting practices could be addressed by ensuring that the Métis Nation of Ontario are meaningfully engaged in the development and implementation of follow-up and monitoring activities.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on the health of the Métis Nation of Ontario.

Cumulative Effects on Health

Views of the Proponent

With regard to Indigenous health, GenPGM noted that projects and activities that could affect harvesting activities in the Regional Study Area were not likely associated with air emissions and discharges to water that would affect country food exposure pathways. Accordingly, GenPGM concluded that cumulative effects on human health related to country foods were not anticipated.

Views of Métis Nation of Ontario

The Métis Nation of Ontario, as discussed above, expressed concern about the cumulative effects on their harvesting area, such as those that may result from climate change and anthropogenic activities.

The Métis Nation of Ontario reported that they had observed changes in harvesting and consumption habits as a result of mercury contamination in fish. A member of the Métis Nation of Ontario spoke about effects of past activities in Marathon Harbour, which is also referred to as Peninsula Harbour. He stated that the pulp and paper industry had caused problems in Marathon, and that a cleanup project occurred in the harbour a couple of years ago, which helped considerably. He shared that: "I have seen a young lady one time who come in with a fish, and after they weighed it, she was trying to trade it off for a smaller one because she was still in child-bearing years, [...] and she was worried about the amount of mercury that might be in a fish that large." He added that for "most people it's common knowledge today that the bigger the fish the higher the chance of mercury, so a lot of people throw these fish back if they think it's too large."

Panel Conclusions and Recommendations

The Panel agrees with GenPGM that the Project would not result in cumulative effects to human health solely as a result of pathways related to the contamination of water and country foods.

As described previously, the Panel notes that cumulative effects do not necessarily involve changes to the environment that spatially overlap. The Panel finds that past effects on the environment are to be assessed explicitly, and are not necessarily reflected in the baseline.

The example shared by the Métis Nation of Ontario related to Marathon Harbour demonstrates that past effects, although improving, could still persist and can affect Métis Nation of Ontario harvesting habits and the contribution of country foods to their diet.

The Panel finds that the Project would result in cumulative effects on current use and cultural heritage for the Métis Nation of Ontario. These effects contribute to effects of the Project on the overall health of the Métis Nation of Ontario, and the Panel understands this include the cultural and spiritual aspects of health.

The Panel acknowledges there is uncertainty with respect to whether the Métis Nation of Ontario's health is already significantly affected by past and existing projects. However, the Panel did not receive information that would indicate that the health of Métis Nation of Ontario's members has already been significantly affected.

The Panel recommends that the federal and/or provincial governments, collaboratively with the Métis Nation of Ontario and the Proponent, develop and implement the following measures

Recommendation 116: Support initiatives to provide culturally appropriate places for the transfer of intergenerational knowledge necessary for cultural, spiritual, and mental health.

The Panel concludes that the Project, in combination with other projects and physical activities that have been or will be carried out, is not likely to cause a significant cumulative effect on the health of the Métis Nation of Ontario.

Socio-Economic Conditions

In reaching their conclusions on the effect of the Project on Métis Nation of Ontario's socio-economic conditions, the Panel found the following factors to be particularly relevant:

- Although traplines and the trapping way of life are important for the Métis Nation of Ontario, the Project is not located on a Métis-held trapline.
- No Métis Nation of Ontario community members reported earned income from harvesting activities. However, the Métis Nation of Ontario indicated that the

assessment conducted by GenPGM lacked sufficient information related to socio-economic conditions of Métis.

- The Proponent noted that the area of the Project holds important value for the Métis Nation of Ontario, who practise activities associated with current and traditional land use that play an important role in their economic, social, cultural, and spiritual lives.
- The Métis Nation of Ontario indicated to the Panel that they have concerns about the limited information in the socio-economic assessment of alternatives and impacts on vulnerable populations.

Based on the limited information available, the Panel concludes that the Project is not likely to cause a residual adverse environmental effect on the Métis Nation of Ontario's socio-economic conditions.

The Panel recommends the following measures, to address potential adverse effects to socio-economic conditions:

Recommendation 117: Engage with the Métis Nation of Ontario to better understand harvesting uses for socio-economic purposes, and the extent to which those uses may be impacted by the Project;

Recommendation 118: Provide a harvester training fund to support the Métis Nation of Ontario continuity of harvesting based on the information gathered in Recommendation 117.

21.6 RED SKY MÉTIS INDEPENDENT NATION

The Red Sky Métis Independent Nation's traditional territory covers roughly 115,000 km² along the northern shore of Lake Superior in Northern Ontario.

21.6.1 Traditional Knowledge and Land Use

The Red Sky Métis Independent Nation stated that their citizens continue to actively engage in a range of traditional land use practices as well as contemporary adaptations of traditional practices within their traditional territory, including hunting, fishing, trapping, recreation, gathering, and consumption of country foods. The Red Sky Métis Independent Nation indicated the Biigtig Zibi holds spiritual and cultural importance as a land and water travel corridor for harvesting, traditional activities, and fishing, and as a ceremonial site. They also indicated that community connections and relationships are important; a sense of shared interest, kinship, traditional activities, knowledge, and history help form the unique culture of the Red Sky Métis Independent Nation and the Métis way of life.

The corridor between Hare Lake and Bamooos Lake was identified as a location for both past and present traditional activities. The Red Sky Métis Independent Nation reported using areas on and around Hare Lake, Bamooos Lake, Seeley Lake, and Camp 19 Road for harvesting activities, including fishing. They stated that Camp 19 Road is one of the few north-south corridors that provide direct access to plant harvesting. They noted that alternative access is available to lands within the Local Study Area along a travel corridor between Hare Lake and Bamooos Lake that is currently used by their members.

The Red Sky Métis Independent Nation stated that their members harvest plants, including medicinal species, in the vicinity of the Project, and that their citizens were concerned about the effects of mining on these plants, as well as the loss of access to plants of interest. They requested that the revegetation closure plan include wild berries such as saskatoons and blueberries, and important medicinal plants, noting that some plants, such as sweetgrass, may not be suitable for post-closure revegetation.

The Red Sky Métis Independent Nation expressed concern about how they would be notified should the Project affect plants, or if a spill occurs, or if another environmental issue arises that affects the water, land, or air at any point in the life of the mine.

21.6.2 Socio-Economic Conditions

The Red Sky Métis Independent Nation have shared both positive and negative socio-economic potential impacts from the Project. They indicated that jobs would provide economic development for their community, including the ability to acquire work and bid on contracts, which would create jobs and training opportunities for their citizens. They indicated there may also be other negative social aspects, such as increases in drugs and crime, an increase in the cost of groceries, and financial strain for people on fixed incomes. They also expressed concern about the mental, social, and spiritual well-being of individuals and families due to the changing socio-economic environment.

The Red Sky Métis Independent Nation noted concern for members that live in Marathon, indicating they might experience housing insecurity due to increases in housing and renting costs. They indicated that this impact is already being experienced in Marathon with other mining work that has been recently approved.

The Red Sky Métis Independent Nation indicated they support the Project and look to benefit from economic opportunities to improve member retention in the region, joint ventures, training for youth, and the filling of skills gaps for the workforce.

21.6.3 Panel Conclusions and Recommendations

Current Use of Lands and Resources for Traditional Purposes

In reaching their conclusions on the effect of the Project on current use of lands and resources for traditional purposes by Red Sky Métis Independent Nation, the Panel found the following factors to be particularly relevant:

- The Project lies within the Red Sky Métis Independent Nation's traditional territory along the northern shore of Lake Superior.
- The Red Sky Métis Independent Nation use and rely on lands and resources in the Hare Lake-to-Bamoos Lake corridor for traditional activities.
- The Red Sky Métis Independent Nation indicated that they fish in Bamoos Lake and harvest plants in the vicinity of the Project.
- The Red Sky Métis Independent Nation's concerns related primarily to access restrictions, perceived contamination effects on water and fish, and the post-closure return of vegetation.

The Panel finds that the Project would result in changes in access and experience for Métis harvesters. The change in access consists of restricted access to Camp 19 Road during the life of the mine. This change would force harvesters travelling to Bamoos Lake from the Site Study Area to use the alternative corridor at Hare Lake.

The Panel finds that harvesting practices in the vicinity of the Project would be affected by sensory disturbances and by potential displacement of users that would have otherwise had road access to Bamoos Lake.

The Panel acknowledges that the Proponent committed to developing a protocol for use of the initial portion of Camp 19 Road, and to provide escorted access through the Site Study Area during construction and operations when safety permits. The Proponent also committed to address effects on traditional land and resource use, minimize disturbances from mining activities, and keep Indigenous communities informed of Project activities, locations, and timing throughout the life of the Project. The Panel recommended that the Proponent also develop a communication plan, in consultation with Indigenous communities, that would be used in the case of accidents or malfunctions.

The Panel finds that the Project would result in changes to vegetation composition and habitat for wildlife, which would permanently affect the quantity of traditional resources available for harvest activities, even after reclamation. The Panel acknowledges some uncertainty regarding whether the Red Sky Métis Independent Nation gather plants within the Project footprint, but accepts that they use the area for general harvesting, and that some affected areas would be

permanently altered. Outside the Site Study Area, the Panel finds that vegetation would not be affected by Project activities. The Panel acknowledges that the Proponent committed to incorporating plant species of interest to Indigenous communities during rehabilitation, where and when the use of these species is appropriate and technically feasible.

The Panel understands that the Red Sky Métis Independent Nation fish at Hare Lake. As discussed in Section 10 (Fish and Fish Habitat), the Panel is of the view that proposed mitigation and monitoring measures are appropriate to reduce potential changes to water temperature and chemistry in Hare Lake. The Panel does not anticipate the Project would have an effect on fish habitat, fish communities, or abundance in Hare Lake that would affect Red Sky Métis Independent Nation fishing activities. Effluent discharge and associated infrastructure at Hare Lake during operations could result in perception-based effects on fish harvesting by the Red Sky Métis Independent Nation. The Panel further notes that the Proponent committed to monitoring the effects on fish species of importance to Indigenous communities at preferred harvesting locations.

The Panel finds that the Project would not result in effects on water quality that would exceed relevant benchmarks for aquatic resources. The Panel is of the view that the Project, under normal operations, would not pose a risk to water quality that could affect waterbodies of importance to the Red Sky Métis Independent Nation.

In summary, the Panel finds that residual effects of the Project on the current use by the Red Sky Métis Independent Nation are likely to occur due to changes in restrictions of access that would displace users. As well, sensory disturbances would affect user experience and would reduce the availability of harvested plants. Some of these effects, such as sensory disturbance, would be temporary and reversible after mine closure. Others, such as alteration of the landscape, would be permanent.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on Red Sky Métis Independent Nation's current use of lands and resources for traditional purposes.

Other 5(1)(c) Factors

The Panel received minimal information related to potential Project-specific effects on the Red Sky Métis Independent Nation physical and cultural heritage and health and related socio-economic conditions. As a result, the Panel's assessment of Project effects on the Red Sky Métis Independent Nation under section 5 of CEAA 2012 is limited.

The Panel accepts that the Red Sky Métis Independent Nation use the Hare Lake-to-Bamoos Lake corridor for traditional activities. However, the Panel received little information about how

the Project may affect the Red Sky Métis Independent Nation's cultural and spiritual use of the area.

The Panel is of the view that the analysis and conclusions provided in Sections 17 (Human Health) and 18 (Socio-economic Environment) apply generally to the Red Sky Métis Independent Nation.

Based on the limited information available, the Panel concludes that the Project is not likely to cause a residual adverse environmental effect on Red Sky Métis Independent Nation's physical and cultural heritage, health or socio-economic conditions.

The Panel recommends the following measures, to address potential adverse effects to socio-economic conditions:

Recommendation 119: The Proponent should engage with Red Sky Métis Independent Nation to better understand harvesting uses for socio-economic purposes, and the extent to which those uses may be impacted by the Project.

Recommendation 120: Provide a harvester training fund to support Red Sky Métis Independent Nation continuity of harvesting based on the information gathered in Recommendation 119.

21.6.4 Cumulative Effects

Views of the Proponent

Based on potential interactions of other projects and activities with wildlife, the ability to fish, and access and travel routes, the Proponent predicted there would be an adverse cumulative residual environmental effect on traditional land and resource use. The Proponent determined this effect would not be significant.

Views of the Red Sky Métis Independent Nation

The Red Sky Métis Independent Nation expressed general concern about cumulative effects on fish and water quality in the Robinson Superior Treaty area.

Panel Conclusions and Recommendations

In reaching their conclusion on the cumulative effect of the Project on current use of lands and resources for traditional purposes by Red Sky Métis Independent Nation, the Panel found the following factors to be particularly relevant:

- The Project would have residual adverse effects on harvesting practices of the Red Sky Métis Independent Nation.

- The Red Sky Métis Independent Nation practise harvesting activities throughout their traditional territory.
- The Panel received minimal information from the Red Sky Métis Independent Nation and the Crown Consultation Team regarding the effects of past and present projects and activities on their member's abilities to harvest or practise cultural activities within their traditional territory.
- The Panel received minimal information from the Red Sky Métis Independent Nation and the Crown Consultation Team regarding the effects of past and present projects and activities on the current health and/or socio-economic conditions of the Red Sky Métis Independent Nation.

The Panel accepts that historical pressures have likely affected the Red Sky Métis Independent Nation's ability to harvest within their traditional territory, and that these effects would be exacerbated by the Project. However the Panel did not receive sufficient information from the Red Sky Métis Independent Nation or the Crown Consultation team to characterize the cumulative effects, or determine their significance.

21.7 MICHIPICOTEN FIRST NATION

Michipicoten First Nation are located 145 km southeast of the Project. Their traditional territory extends from the Pukaskwa River and the mouth of the White River in the west to the Kabinakagami, Missinaibi, and Kapuskasing Rivers in the north, beyond the Groundhog River in the East, toward the St. Mary's River in the south.

Michipicoten First Nation were primarily concerned about the Project's effects on Lake Superior, including potential cumulative effects on Peninsula Harbour and increased mercury levels in fish. They noted that fish are a prime resource and food source for Michipicoten First Nation and fish populations are known to migrate across vast distances into multiple water bodies. Michipicoten First Nation expressed concern about the potential for mercury mobilization to be exacerbated in Hare Lake, resulting in increased downstream mercury levels in fish.

21.7.1 Panel Conclusions and Recommendations

The Panel received minimal information related to the potential Project-specific effects on Michipicoten First Nation's current use of lands and resources, physical and cultural heritage and health, and socio-economic conditions. As a result, the Panel's assessment of Project effects on Michipicoten First Nation under section 5 of CEAA 2012 is limited.

The Panel concluded, in the section on surface water quality, that if the recommended mitigation measures and monitoring and follow-up programs are implemented, the Project is

not likely to cause a significant adverse environmental effect on water quality. The Panel concluded that no environmental effects would occur to Lake Superior.

Based on the limited information with respect to Michipicoten First Nation's use of the Project area, and the distance of their community, 145 km south east of the Project, the Panel does not expect the Project to have any adverse effects on Michipicoten First Nation.

The Panel is of the view that the analysis and conclusions provided in Sections 17 (Human Health) and 18 (Socio-economic Environment) apply generally to the Michipicoten First Nation.

Based on the limited information available, the Panel concludes that the Project is not likely to cause a residual adverse environmental effect on Michipicoten First Nation's current use of lands and resources for traditional purposes, physical and cultural heritage, health, or socio-economic conditions.

21.8 GINOOGAMING FIRST NATION

Ginoogaming First Nation are located approximately 120 km north of the Marathon area and upstream of the Project. Ginoogaming First Nation are a signatory to James Bay Treaty No. 9 of 1905 and are a member of the Matawa First Nations Management tribal council.

Ginoogaming First Nation stated the Project footprint is within their homelands and traditional territory; it also lies within the Biigtig Zibi watershed, which is significant to the community. Ginoogaming First Nation also have traditional territory, family trap lines, and family land-use areas that extend to Terrace Bay on Lake Superior. Ginoogaming First Nation stated water was their main concern related to the proposed Project.

Ginoogaming First Nation explained that McKay Lake, the headwaters of the Biigtig Zibi, is within their traditional territory. They noted that a traditional historic canoe route was used by early explorers, going from the start of the Biigtig Zibi at the southeastern bay of McKay Lake, 200 km south to where the Project is proposed. The Ginoogaming First Nation representative shared that their grandmother was from the community of Netmizaaggamig Nishnaabeg. They stated that "her and her family used to paddle up and down the 200-km route. This is before trains and before cars and trucks in this area. That's how people used to get from place to place." They noted that "there are still people that retrace the traditional routes, and we keep it alive for our youths."

Ginoogaming First Nation expressed concerns regarding the impact the Project may have on their community members' abilities to practise harvesting activities, and stated that "it is clear that the ability to continue harvesting holds cultural and spiritual significance to the community." Ginoogaming First Nation reported that members use the land around the Project area, including the Highway 11 corridor, and south along Highway 17 and Lake Superior, for a variety of harvesting practices, including fishing, hunting, trapping, and plant gathering.

Ginoogaming First Nation also indicated that four to six families and members who engage in trapping activities 5 to 10 km north of Marathon could be impacted by the Project.

21.8.1 Panel Conclusions and Recommendations

Current Use of Lands and Resources for Traditional Purposes

In reaching their conclusions on the effect of the Project on current use of lands and resources for traditional purposes by Ginoogaming First Nation, the Panel found the following factors to be particularly relevant:

- The Project lies within Ginoogaming First Nation homelands and traditional territory along the northern shore of Lake Superior.
- A number of families from the Ginoogaming First Nation might engage in trapping activities 5 to 10 km north of Marathon.
- Ginoogaming First Nation members have reported using the land around the Project area, including along Highway 17 and Lake Superior, for a variety of harvesting practices, including fishing, hunting, trapping, and plant gathering.

The Panel understands that the Project is within the traditional territory of Ginoogaming First Nation and their members may use the area for harvesting.

The Panel finds that the Project would result in changes to vegetation composition which would permanently affect the quantity of traditional resources available for harvest activities, even after reclamation. The Panel notes some uncertainty regarding whether Ginoogaming First Nation practises plant gathering within the Site Study Area, but accepts that they use the area for general harvesting and that some of this area would be permanently altered. Outside the Site Study Area, the Panel finds that vegetation would not be affected by Project activities. The Panel acknowledges that the Proponent made commitments to use plant species of interest to Indigenous communities during rehabilitation where and when technically feasible.

The Panel found that furbearers would relocate outside the Site Study Area. As discussed in Section 12 (Wildlife Species), the Panel notes that the Proponent acknowledged that sensory disturbances outside the Site Study Area could displace wildlife, but that few individuals would be affected and others would become habituated to human disturbances.

The Panel finds that the Project would not result in effects on water quality that would exceed relevant benchmarks for aquatic resources. The Panel is of the view that the Project, under normal operating condition, does not pose a risk to water quality that could affect waterbodies of importance to Ginoogaming First Nation.

In summary, the Panel finds that residual effects of the Project on the current use of Ginoogaming First Nation may occur; however, there is uncertainty regarding the extent to which members of the Ginoogaming First Nation harvest in the Project area.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on Ginoogaming First Nation's current use of lands and resources for traditional purposes.

Other 5(1)(c) factors

The Panel received minimal information related to the potential Project-specific effects on Ginoogaming First Nation's physical and cultural heritage and health and socio-economic conditions. As a result, the assessment of the Project's effects on Ginoogaming First Nation's under section 5 of CEAA 2012 is limited.

The Panel is of the view that the analysis and conclusions provided in Sections 17 (Human Health) and 18 (Socio-economic Environment) apply generally to Ginoogaming First Nation.

Based on the limited information available, the Panel concludes that the Project is not likely to cause a residual adverse environmental effect on Ginoogaming First Nation's physical and cultural heritage, health or socio-economic conditions.

21.8.2 Cumulative Effects

Views of the Proponent

Based on potential interactions of other projects and activities with wildlife, and the ability to fish and access traditional travel routes, the Proponent predicted there would be an adverse cumulative residual environmental effect on traditional land and resource use. The Proponent determined this effect would not be significant.

Views of Ginoogaming First Nation

Ginoogaming First Nation reported being "surrounded by industry proponents and patent lands and mining permit activity." They noted that industrial sites and forestry activities that took place in the early to mid-20th century affected the Biigtig Zibi as well as White Otter River near Hillsport. Log drives affected spawning locations of several fish species, including walleye. Ginoogaming First Nation expressed concerns that many landscapes have been altered by forestry activities over that last century, and noted the need to be cautious in all projects to protect values and biodiversity.

Panel Conclusions and Recommendations

In reaching their conclusion on cumulative effects of the Project on current use of lands and resources for traditional purposes by Ginoogaming First Nation, the Panel found the following factors to be particularly relevant:

- The Project could have residual adverse effects on harvesting practices of the Ginoogaming First Nation.
- Ginoogaming First Nation practise harvesting throughout their traditional territory.
- The Panel received minimal information from Ginoogaming First Nation or the Crown Consultation Team regarding the effects of past and present projects and activities on their members' abilities to harvest or practise cultural activities within their traditional territory.
- The Panel received minimal information from Ginoogaming First Nation or the Crown Consultation Team regarding the effects of past and present projects and activities on the current health and/or socio-economic conditions of Ginoogaming First Nation.

The Panel accepts that historical pressures have likely affected Ginoogaming First Nation's ability to harvest within their traditional territory. The Panel finds there could be an adverse cumulative effect on the current use of Ginoogaming First Nation. However the Panel did not receive sufficient information from Ginoogaming First Nation or the Crown Consultation team to characterize the cumulative effects, or determine their significance.

21.9 NETMIZAAGGAMIG NISHNAABEG

Netmizaaggamig Nishnaabeg are located 50 km from the Project. They are not a signatory to the 1850 Robinson-Superior Treaty, and have an outstanding Aboriginal title claim to their traditional territory.

Netmizaaggamig Nishnaabeg have not participated in the environmental assessment since 2014. More recently, prior to the public hearing, Netmizaaggamig Nishnaabeg confirmed to the Crown that they would not be providing any new information to the Panel, nor did they participate in the public hearing.

Prior to their withdrawal from the environmental assessment, Netmizaaggamig Nishnaabeg raised concerns primarily about potential cumulative effects on hunting, trapping, and fishing, particularly at White Lake. The Panel notes that the Netmizaaggamig Nishnaabeg reserve is located on White Lake and adjacent to White Lake Provincial Park.

Netmizaaggamig Nishnaabeg reported that a labour force analysis should be conducted early in the process to identify the needs and opportunities for training and preparing the local workforce, which is experiencing sustained high levels of unemployment, to meet the needs of

the Project. Netmizaaggamig Nishnaabeg noted that, for many First Nation communities, basic services are nonexistent and that, in these circumstances, base-case conditions cannot be compared to the forecasted demand for services over the life of the Project.

Netmizaaggamig Nishnaabeg noted that in the community “basic services such as health care, fire services, housing, ambulance services, education services (secondary and post secondary), recreational centers, safe water, access to justice and retail services are non-existent. In these circumstances, base case conditions cannot be compared to the forecasted demand for services over the life of the Project.”

21.9.1 Panel Conclusions and Recommendations

The Panel received minimal information related to potential Project-specific effects on Netmizaaggamig Nishnaabeg’s current use of lands and resources, physical and cultural heritage, and health and socio-economic conditions. As a result, the Panel’s assessment of Project effects on Netmizaaggamig Nishnaabeg under section 5 of CEAA 2012 is limited.

Based on the information provided by Netmizaaggamig Nishnaabeg that is on the record, the Panel understands that Netmizaaggamig Nishnaabeg are concerned about water quality and have indicated that measures should be taken to limit or prohibit contaminated water (e.g., tailings water) from entering the Biigtig Zibi watershed. The Panel concluded, as noted in Section 9 (Surface Water Quality), that if the recommended mitigation measures and monitoring and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on water quality.

Despite the limited information with respect to use of the Project area by Netmizaaggamig Nishnaabeg, the Panel notes that the Project is fairly close to the community, and as such it is reasonable to expect that the Project could have an adverse effect on the current use of Netmizaaggamig Nishnaabeg in the area, where hunting, fishing, trapping, and gathering occur.

The Panel did not receive any information from Netmizaaggamig Nishnaabeg that would support a specific assessment of the potential effects of the Project on physical and cultural heritage, or on health. The Panel is of the view that the analysis and conclusions provided in Section 17 (Human Health) apply generally to Netmizaaggamig Nishnaabeg.

Netmizaaggamig Nishnaabeg indicated that direct social effects on infrastructure, housing, education, and social services should be considered given the community is already challenged in these areas. The Panel is of the view that the analysis and conclusions provided in Section 18 (Socio-economic Environment) apply generally to Netmizaaggamig Nishnaabeg.

Based on the limited information available, the Panel concludes that the Project is not likely to cause significant adverse environmental effects on Netmizaaggamig Nishnaabeg’s current use of lands and resources for traditional purposes.

Based on the limited information available, the Panel concludes that the Project is not likely to cause a residual adverse environmental effect on Netmizaaggamig Nishnaabeg's physical and cultural heritage, health or socio-economic conditions.

21.9.2 Cumulative Effects

Views of the Proponent

Based on potential interactions of other projects and activities with wildlife, the ability to fish, and access and travel routes, GenPGM predicted there would be an adverse cumulative residual environmental effect on traditional land and resource use. The Proponent determined this effect would not be significant.

Views of Netmizaaggamig Nishnaabeg

Netmizaaggamig Nishnaabeg raised concerns regarding cumulative effects on hunting, trapping, and fishing, particularly at White Lake. Netmizaaggamig Nishnaabeg indicated that White Lake Provincial Park should be factored into the cumulative effects assessment. Netmizaaggamig Nishnaabeg indicated that competition from recreational users of the park has essentially ruined their commercial fishery. As a result of Netmizaaggamig Nishnaabeg's expressed concerns regarding an increase in recreational fishing and camping on White Lake due to an influx of people and human activity from the Project, the Proponent — Stillwater at the time — proposed to restrict the use of White Lake by their employees. Netmizaaggamig Nishnaabeg noted there was no evidence that this measure would be effective.

Further, Netmizaaggamig Nishnaabeg indicated that the mining activity and economic spin-offs from the Hemlo Gold Mine have created an influx of people in the park. In their view, this puts increased pressure on their natural resources. Netmizaaggamig Nishnaabeg anticipated that a similar influx of non-Indigenous fishing and recreational users would occur due to the Project.

Panel Conclusions and Recommendations

The Panel accepts that historical pressures have likely affected Netmizaaggamig Nishnaabeg's ability to harvest within their traditional territory. The Panel finds there could be an adverse cumulative effect on Netmizaaggamig Nishnaabeg's current use. However, the Panel did not receive sufficient information from the Netmizaaggamig Nishnaabeg or the Crown Consultation team to further characterize the cumulative effects, or determine the significance of those effects.

21.10 JACKFISH METIS ASSOCIATION

The Jackfish Metis Association, also identified as an associate of the Ontario Coalition of Indigenous Peoples, are based in Schreiber and Terrace Bay, approximately 87 km from the Project.

The Jackfish Metis Association's nearest traplines are approximately 32 km from the Project. As many trappers in their community make a living as full-time trappers, which underscores the importance of respecting this way of life, the Jackfish Metis Association indicated that access to areas associated with traditional and current uses are very important to them; these do not include the exact area of the proposed mine, but do include the surrounding area of lakes, rivers, and forests, namely the Biigtig Zibi, the Pic Forest, and Bamoos Lake.

The Jackfish Metis Association stated that the Biigtig Zibi is a special, time-honoured place, and they expressed concern over the possibility of rock debris and runoff from the mine entering the river system.

The Jackfish Metis Association stated that they have used Bamoos Lake for generations to harvest lake trout and expressed concern about the potential for the Project to affect their ability to access Bamoos Lake via an existing access road from Highway 17 into Hare Lake and via Camp 19 Road. They noted that restricted access on Camp 19 Road would make it more difficult for their members to access Bamoos Lake and could affect their fishing interests.

The Jackfish Metis Association also raised concerns regarding the Project's proximity to Bamoos Lake and its potential effects on water quality, and Lake trout populations, which require pristine coldwater conditions. General concerns regarding water quality also extend to Lake Superior. The Jackfish Metis Association also expressed concern about increased fishing pressure from mine workers at Bamoos Lake, and increased mercury levels and water quality in Hare Lake as a result of effluent discharge.

The Jackfish Metis Association commented that five family-operated registered traplines are held by their members near the Project; the closest being approximately 32 km away. They did not foresee issues with their members' registered trapline interests given the distance between the Project and the registered traplines.

The Crown Consultation Team noted that the Jackfish Metis Association provided information regarding their spiritual and physical bond to the land in the Project area.

The Jackfish Metis Association noted that they would discuss any unforeseen effects that occurred during the construction or operations of the mine with the Proponent. The Jackfish Metis Association stated including them in follow-up monitoring would help them communicate with their people and alleviate concerns.

The Jackfish Metis Association indicated that the financial benefits of the Project would affect their members in a positive way by encouraging youth retention and return to Marathon through job opportunities. They stated that they stand with the Proponent in the application for approval of the Project and expressed concern with the length of the approval process with respect to development in Northwestern Ontario.

The Jackfish Metis Association noted that the Project should be sustainable and referred to the importance of viable closure planning and regulatory processes to protect the area for present and future use by members of the Jackfish Metis Association.

21.10.1 Panel Conclusions and Recommendations

Current Use of Lands and Resources for Traditional Purposes

The Panel received minimal information related to potential Project-specific effects on the Jackfish Metis Association's current use of lands and resources, physical and cultural heritage and health, and socio-economic conditions. As a result, the assessment of Project effects on the Jackfish Metis Association under section 5 of CEAA 2012 is limited.

In reaching their conclusions on the effect of the Project on current use of lands and resources for traditional purposes by the Jackfish Metis Association, the Panel found the following factors to be particularly relevant:

- The Project lies within the Jackfish Metis Association's traditional use area.
- The Jackfish Metis Association uses and relies on lands and resources in the Hare Lake-to-Bamoos Lake corridor for traditional activities.
- The Jackfish Metis Association have indicated that they fish in Bamoos Lake.
- The Jackfish Metis Association concerns relate primarily to access restrictions, and perceived contamination effects on water and fish.

The Panel understands that the Jackfish Metis Association use the Hare Lake-to-Bamoos Lake corridor for traditional activities, including fishing.

The Panel finds that the Project would result in changes in access and experience for Métis harvesters. The change in access consists of restricted access to Camp 19 Road during the life of the mine. This change would force harvesters travelling to Bamoos Lake from the Site Study Area to use the alternative corridor at Hare Lake. The Panel finds that harvesting practices in the vicinity of the mine site would be affected by sensory disturbances and by potential displacement of users who would have otherwise used Camp 19 Road to access Bamoos Lake.

The Panel acknowledges that the Proponent committed to developing a protocol for use of the initial portion of Camp 19 Road, and to provide escorted access through the Site Study Area

during construction and operations when safety permits. The Proponent also committed to address impacts on traditional land and resource use, minimize disturbances from mining activities, and keep Indigenous communities informed of Project activities, locations, and timing throughout the life of the Project. The Panel has further recommended that the Proponent develop a communication plan, in consultation with Indigenous communities, that would be used in case of accidents or malfunctions.

The Proponent has committed to prohibiting workers from hunting, fishing, or harvesting onsite. The Proponent has stated workers would also be prohibited from bringing firearms and/or angling gear to the Project site.

The Panel finds that the Project would not result in effects on water quality that would exceed relevant benchmarks for aquatic resources. The Panel is of the view that the Project, under normal operating conditions, would not pose a risk to water quality that could affect waterbodies of importance to the Jackfish Metis Association. The Panel further notes that the Proponent has committed to monitoring the effects on fish species of importance to Indigenous communities at preferred harvesting locations.

In summary, the Panel finds that residual effects of the Project on the current use of the Jackfish Metis Association are likely to occur as a result of changes in restrictions of access that would displace users and sensory disturbances that would affect user experience on the land. Some of these effects, such as sensory disturbance, would be temporary and reversible after mine closure. Others, such as alteration of the landscape, would be permanent.

The Panel concludes that the Project is not likely to cause a significant adverse environmental effect on the Jackfish Metis Association's current use of lands and resources for traditional purposes.

Other 5(1)(c) factors

The Panel received minimal information related to the potential Project-specific effects on the Jackfish Metis Association's physical and cultural heritage, health, and socio-economic conditions. As a result, the Panel's assessment of Project effects on the Jackfish Metis Association under section 5 of CEAA 2012 is limited.

The Panel is of the view that the analysis and conclusions provided in Sections 17 (Human Health) and 18 (Socio-economic Environment) apply generally to the Jackfish Metis Association.

The Panel understands that the Jackfish Metis Association are in support of the Project and are of the view that the financial benefits of the Project would affect their members, including youth, in a positive way.

Based on the limited information available, the Panel concludes that the Project is not likely to cause a residual adverse environmental effect on physical and cultural heritage, health or socio-economic conditions of the Jackfish Metis Association.

Based on the information received from the Jackfish Metis Association, the Panel expects direct socio-economic effects would be positive.

The Panel recommends the following measures, to address potential adverse effects to socio-economic conditions:

Recommendation 121: The Proponent should engage with the Jackfish Metis Association to better understand harvesting uses for socio-economic purposes, and the extent to which those uses may be impacted by the Project.

Recommendation 122: Provides a harvester training fund to support Jackfish Metis Association continuity of harvesting based on the information gathered in Recommendation 121.

21.10.2 Cumulative effects

Views of the Proponent

Based on potential interactions of other projects and activities with wildlife, the ability to fish, and access and travel routes, GenPGM predicted there would be an adverse cumulative residual environmental effect on traditional land and resource use. The Proponent determined this effect would not be significant.

Views of the Jackfish Metis Association

The Jackfish Metis Association did not share information regarding historical pressures that have affected their ability to harvest.

Panel Conclusions and Recommendations

In reaching their conclusion on the cumulative effect of the Project on current use of lands and resources for traditional purposes by the Jackfish Metis Association, the Panel found the following factors to be particularly relevant:

- The Project could have residual adverse effects on harvesting practices of the Jackfish Metis Association.
- The Panel received minimal information from the Jackfish Metis Association or the Crown Consultation Team regarding the effects of past and present projects and

activities on their members' ability to harvest or practise cultural activities within their traditional territory.

- The Panel received minimal information from the Jackfish Metis Association or the Crown Consultation Team on the effects of past and present projects and activities on the current health and/or socio-economic conditions.

The Panel accepts that historical pressures have likely affected the Jackfish Metis Association's abilities to harvest. The Panel finds there could be an adverse cumulative effect on the Jackfish Metis Association's current use. However, the Panel did not receive sufficient information from the Jackfish Metis Association or the Crown Consultation team to further characterize the cumulative effects, or determine the significance of those effects.

SECTION 22: INDIGENOUS RIGHTS

22.1 CONSIDERATION OF INDIGENOUS RIGHTS

This section documents information the Panel received on Indigenous rights and identifies those recommendations that relate to the manner in which the environmental effects of the Project could adversely impact Indigenous rights. The Panel's mandate with respect to Indigenous rights is described in Section 3 (Mandate of the Panel and Scope of Review), and Section 21 (Effects on Indigenous Peoples).

Views of the Proponent

GenPGM recognized that all Indigenous communities have unique rights recognized under section 35 of the Canadian *Constitution Act, 1982*. On this basis, GenPGM engaged with Indigenous communities throughout the environmental assessment to help inform the process regarding the potential for the Project to have an impact on Indigenous rights.

The Proponent recognized that Indigenous communities have a traditional relationship with the land, which is used as part of their way of life, and that the exercise of Indigenous rights could be affected by the Project based on where they practise traditional activities, or through effects on biophysical values such as air, water and wildlife.

The Proponent acknowledged that Biigtigong Nishnaabeg are the most proximate Indigenous community to the Project location, with their community located downriver of the Project on the banks of the Biigtig Zibi, and may be disproportionately impacted by the Project. Further, the Proponent acknowledged that water and waterways are spiritually and culturally important and play a vital role in the health and cultural identity of Biigtigong Nishnaabeg.

The Proponent indicated their commitment to work with all Indigenous groups to meaningfully address the interests of Indigenous groups.

Crown Consultation Team

The Crown Consultation Team provided a preliminary assessment of the potential impacts on the rights of Indigenous Peoples. The Crown Consultation Team submitted this document with the purpose of informing the Panel's mandate related to Indigenous Peoples.

The Crown Consultation Team identified seven communities for whom the Project could adversely impact Indigenous rights: Biigtigong Nishnaabeg, Ginoogaming First Nation, the Métis Nation of Ontario (Region 2), Michipicoten First Nation, Netmizaaggamig Nishnaabeg (Pic Moberg First Nation); Pays Plat First Nation; and the Red Sky Métis Independent Nation. The Crown Consultation Team also noted that the Jackfish Metis Association have been an active participant in the process, sharing their views regarding the Project's potential impacts on their interests.

In collaboration with Indigenous groups, the Crown Consultation Team applied a methodology to assess the potential for preliminary impacts of the Project on Indigenous rights, intended to help inform the Panel. The Crown Consultation Team provided a submission and presentation to the Panel that described how they worked with all Indigenous groups and consulted to identify and understand the nature and content of the established or asserted section 35 rights and values of the communities, along with their preliminary conclusions and recommendations. This preliminary assessment will be updated based on the outcomes of the Panel's report.

The Crown Consultation Team indicated that the Panel's recommendations would further inform the Crown's final assessment of the severity of the Project's potential impacts on established or asserted section 35 rights and any appropriate accommodation measures that may be considered by decision-makers regarding the Project.

The Crown Consultation Team's assessment of impacts on the rights of each Indigenous group is included as part the information summarized by the Panel below.

Biigtigong Nishnaabeg

Biigtigong Nishnaabeg assert exclusive title to the territory in which the Project is located, and have a comprehensive title land claim in the Ontario Superior Court that contends they did not enter the Robinson-Superior Treaty in 1850 and did not adhere to the Robinson-Superior Treaty after 1850. Biigtigong Nishnaabeg emphasized throughout the environmental assessment that they are rights holders and stewards of their Exclusive Title Area, and the lands and resources within it.

The proposed Project falls directly within Biigtigong Nishnaabeg's Exclusive Title Area. Within this area, the community, and its members, assert Indigenous rights, including the rights that flow from the community's assertion of Aboriginal title. The Project is located adjacent to the Biigtig Zibi, which Biigtigong Nishnaabeg regard as a sacred river. The Biigtig Zibi flows past the community's reserve.

Members of Biigtigong Nishnaabeg exercise rights near the Project area through trapping, harvesting, gathering, fishing, and ceremonies. This includes the use of historical and family-based travel and access to land and water resources. Biigtigong Nishnaabeg reported that hunting, trapping, and harvesting activities generally involve the larger waterways, such as the Biigtig Zibi, Bamoos Lake, and Hare Lake.

Caribou and moose have been identified as important cultural resources for the community, with moose being an important food source. According to Biigtigong Nishnaabeg, the ability to manage these species is linked to Biigtigong Nishnaabeg's stewardship objectives, which include management of resources on the lands required to exercise their rights. In particular, Biigtigong Nishnaabeg have requested the Province transfer full control of wildlife management programs (e.g., the assigning of moose tags and quotas for Wildlife Management Area 21A

[Deadhorse Road Area], and the management of caribou recovery strategies) to Biigtigong Nishnaabeg within their Exclusive Title Area.

MNDMNR indicated they would continue to communicate with Biigtigong Nishnaabeg on moose management, specifically in the Deadhorse Road area, and look for ways to address Biigtigong Nishnaabeg's interests and expressed concerns. The Panel also acknowledges the commitment by the Crown to engage in further discussions regarding a caribou recovery strategy supported by Biigtigong Nishnaabeg's traditional knowledge, and consider any programs available that may serve to support the protection of caribou.

Historically, mining exploration and projects have reduced Biigtigong Nishnaabeg's access and ability to exercise their rights and interests. Although Biigtigong Nishnaabeg indicated that they believe the Proponent is committed to mitigating the Project's impacts, the community predicts that the Project would further compound these issues.

Biigtigong Nishnaabeg made presentations on several issues that they indicated must be addressed by both the Proponent and the Crown to ensure that impacts are lessened and Biigtigong Nishnaabeg can continue to exercise their rights over the long-term.

Biigtigong Nishnaabeg stated that it is not the Proponent's sole responsibility to remedy the cumulative impacts of the Project on Biigtigong Nishnaabeg's community or their Exclusive Title Area. As noted in their joint public letter with the Proponent, Biigtigong Nishnaabeg believe it is the Crown's exclusive responsibility to address pre-existing issues and concerns that are under the Crown's jurisdiction.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team's preliminary assessment found the Project has the potential for high negative impacts on Biigtigong Nishnaabeg's established or asserted section 35 rights associated with hunting, trapping, harvesting and Aboriginal title rights associated with the terrestrial environment.

The Crown Consultation Team also identified the potential for a moderate-to-high impact on the aquatic environment related to the exercise of rights that could affect the ability to fish and engage in other uses of the areas of importance related to the Biitig Zibi, Angler Creek, and Hare Lake.

The Crown Consultation Team also identified the potential for considerable impacts on rights related to socio-economic values and conditions.

The Crown Consultation Team viewed the Project as having a high potential to contribute to the cumulative effects of past and ongoing land uses on Biigtigong Nishnaabeg's established or asserted section 35 rights.

Beyond the mitigation measures identified by the Proponent to address environmental effects, the Crown Consultation Team commented on the following additional measures to address impacts on rights, which require the Crown to work collaboratively with Biigtigong Nishnaabeg to:

- identify specific solutions to address forecasted housing shortages and increased demands for school and childcare programs among other social services (a more detailed needs assessment from Biigtigong Nishnaabeg would be required);
- fund a new school in the Biigtigong Nishnaabeg community to address the strain from returning families would have on educational services; and
- explore the use of existing government funding that could align with the request to support outdoor classrooms on the land.

Pays Plat First Nation

Pays Plat First Nation reported that they have consistently exercised their Indigenous Rights over their traditionally occupied lands, which extend westerly from the Nipigon River, north to Highway 11, and east to the Marathon area up to the boundaries of Biigtigong Nishnaabeg.

Pays Plat First Nation noted that protected rights include the Aboriginal rights of Pays Plat First Nation members to hunt, fish, and gather in their traditional territory, as well as those Treaty rights flowing from the Government of Canada's perception of Pays Plat First Nation as a signatory to the Robinson-Superior Treaty of 1850. Pays Plat First Nation maintained that they are not a signatory to the Robinson-Superior Treaty, and that no community representatives were present at the signing of the treaty in 1850.

Pays Plat First Nation noted that community elders recall their lives in relation to the land and water, and how they would go "swimming in the Rivers, Lakes in Robinson Superior specifically Pays Plat River, Lake Superior and [the Biigtig Zibi]..." They remember "how clean and pristine the water was...". To Pays Plat First Nation, these activities are the rights promised in section 35.

Pays Plat First Nation also noted that the hunting and fishing rights of band members who live in Marathon could be affected by the Project. Pays Plat First Nation stated that any observed changes in the rights practices of younger generations should be regarded not as an indication of abandonment, but as evidence of the enduring importance of rights practices to the Pays Plat First Nation.

Pays Plat First Nation indicated that the Project would have a significant impact on their rights and practices, and they expressed a number of serious outstanding environmental concerns. Activities were traditionally carried out with priority consideration of the generations to come, and today preserving the land for future generations remains front of mind for Pays Plat First

Nation when making decisions. The Pays Plat First Nation also conveyed that the shared relationship between humans and the land remains one of stewardship. According to Pays Plat First Nation, the impacts from the Project would undermine their ability to ensure their stewardship of the land, which is intrinsic to the exercise of their rights.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team identified the potential for low to moderate negative impacts from the Project on Pays Plat First Nation's established or asserted section 35 rights associated with the exercise of rights as they pertain to water and fishing resources. The basis for this conclusion is the potential for Hare Lake, Bamooos Lake, and Angler to be affected by the Project.

Métis Nation of Ontario

The harvesting rights of Métis living in this traditional territory have been accommodated by the Ontario Government based on actual knowledge of Métis claims in the Ontario–Métis Nation of Ontario Harvesting Agreement.

The community was in existence prior to effective control in the region and was excluded, as a collective, from the Treaty that was negotiated with First Nations (i.e., the Robinson-Superior Treaty). Many of the Métis citizens living in this region today are descendants of historical and regional rights-bearing Métis communities as well as the descendants of Métis from throughout the Métis Nation.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team's preliminary assessment indicated that there would be a low to moderate negative impact on the Métis Nation of Ontario's asserted harvesting rights on the basis of potential effects on vegetation and disturbance to harvesting areas, among other considerations.

The Crown Consultation Team indicated that they did not have enough information regarding impacts on the Métis Nation of Ontario's fish harvesting activities at specific locations in the Project area. However, the team noted the potential for impacts on fish species of interest, country foods, access, and cultural activities associated with fish harvesting. The Crown Consultation Team's preliminary assessment concluded that there would be a negligible to low negative impact on the Métis Nation of Ontario's fishing rights.

Red Sky Métis Independent Nation

The Red Sky Métis Independent Nation shared that their community consists of the descendants of the 84 individuals who were recognized by the Crown as beneficiaries and annuitants under the Robinson Superior Treaty of 1850. Red Sky Métis Independent Nation

stated they are distinct from the First Nation peoples, by way of their traditional lands, traditions, customs, and practices. The Red Sky Métis Independent Nation have asserted rights to plant harvesting, water, and fish in the Site Study Area and Local Study Area and throughout the Robinson-Superior-Treaty Area.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team noted that the Red Sky Métis Independent Nation provided limited information on their rights. The Crown Consultation Team's preliminary assessment found that the Project would likely have a positive impact on the socio-economic interests of the Red Sky Métis Independent Nation, based on discussions with them concerning jobs and training programs.

The Crown Consultation Team's preliminary assessment indicated that there would likely be low negative impact on the Red Sky Métis Independent Nation's asserted harvesting rights on the basis of potential effects to vegetation, disturbance to harvesting areas, and harvesting rights related to water and fishing.

Ginoogaming First Nation

Ginoogaming First Nation are a signatory to Treaty 9 and have an asserted traditional territory that overlaps the Project's Regional Study Area and Local Study Area. Ginoogaming First Nation expressed that they have long inhabited and occupied the lands and waters of the area before the Treaty came into effect.

Many Ginoogaming First Nation families identify ancestral connections to migration routes both northward (to the Hudson Bay coast) and southward (to the Biigtig Zibi and Lake Superior). Ginoogaming First Nation states that these routes connect them to other Nations found along waterways, and the kinship and family connections formed across their traditional territories depend on the waters that connect them. The importance of these waterways is enshrined in their Nanagjitoong Nibi Water Protection Declaration. Ginoogaming First Nation is concerned that the Project would affect these waterways and, in turn, interfere with their ability to ensure that their duty to protect these waters for future generations is upheld.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team reported their preliminary assessment of potential impacts from the Project on Ginoogaming First Nation's established or asserted section 35 rights or interests, as they relate to water and harvesting. The Crown Consultation Team determined that the potential impact would be negligible to low.

Netmizaaggamig Nishnaabeg

Netmizaaggamig Nishnaabeg are an Ojibwe community of Anishinaabe people and a member of both Anishinabek Nation and the Nokiiwin Tribal Council. Netmizaaggamig Nishnaabeg have indicated that they never signed the Robinson-Superior Treaty of 1850 and have an outstanding Aboriginal title claim to their traditional territory, which includes Pic Moberg South and Pic Moberg North. The Netmizaaggamig Nishnaabeg have indicated they have inherent rights to the lands and waters entrusted to them by the creator, and the community is governed by a Chi-Naaknigewin (Community Constitution).

In November 2012, Netmizaaggamig Nishnaabeg submitted a letter to the Panel acknowledging the overlapping territories of Biigtigong Nishnaabeg and Pays Plat First Nation in the Regional Study Area; and noting that there may be other Indigenous users of the area. Netmizaaggamig Nishnaabeg indicated that they would not be presenting any information to the Panel that suggests exclusivity over the area, but would provide their own historical information and use of the Project locality and beyond, including the Regional Study Area.

On January 7, 2014, Netmizaaggamig Nishnaabeg notified the former panel that they would not participate in the public hearing. Netmizaaggamig Nishnaabeg did not participate in the environmental assessment process, including the public hearing, when it was re-initiated in 2020.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team indicated in their submission that the Crown remains open to discussing any potential impacts of the Project on the rights of Netmizaaggamig Nishnaabeg. The team noted that, prior to withdrawing from participation in the environmental assessment, Netmizaaggamig Nishnaabeg expressed concerns regarding the cumulative impacts of development activities in the region about water quality, fishing, and closure plans. The Crown Consultation Team indicated that, because no new information was brought forward by Netmizaaggamig Nishnaabeg since the environmental assessment resumed, and given Netmizaaggamig Nishnaabeg indicated that they would not be participating in the hearing or providing written submissions, a preliminary assessment of impacts on rights was not conducted.

Michipicoten First Nation

Michipicoten First Nation are signatories to the Robinson-Superior Treaty of 1850. They have a traditional territory that extends from the Pukaskwa River and the mouth of the White River in the west to Kabinakagami, Missinaibi, and Kapuskasing Rivers in the north, beyond the Groundhog River in the East, toward the St. Mary's River in the south.

Michipicoten First Nation sees the area of the Project as shared territory and have concerns about their hunting and fishing rights in relation to any environmental effects, such as water

quality, on the land resources that support those rights. Michipicoten First Nation also shared concerns about the Project's potentially adverse effects on caribou, including restoration efforts.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team's preliminary assessment recognized that effects on water quality have the potential to affect Michipicoten First Nation's established or asserted section 35 rights to fish and hunt, although the team had no knowledge of Michipicoten First Nation's practice of rights at or near the Project area. The team noted it had limited information regarding potential impacts from the Project on specific species of concern or those that are frequently harvested by Michipicoten First Nation.

The Crown Consultation Team concluded that there is a negligible to low potential for negative impacts from the Project on Michipicoten First Nation's established or asserted section 35 rights related to water quality, such as fishing.

Jackfish Metis Association

The Jackfish Metis Association asserts Metis rights in the region around the Project, including safe access and use by members for spiritual purposes and a way of life going back several generations. The Jackfish Metis Association noted that engagement with the Proponent left them with the understanding that their asserted rights to access and use the area, in a traditional manner, would continue.

Preliminary Assessment by the Crown Consultation Team

The Crown Consultation Team's preliminary assessment found that the Project would likely have a positive impact on the socio-economic interests of the Jackfish Metis Association, based on the information provided by the Jackfish Metis Association, who anticipated that the financial impact of the Project would benefit the association and its members by allowing youth retention/youth return to Marathon through increased job opportunities.

The Crown Consultation Team also noted that the Jackfish Metis Association shared information about the importance of Bamoos Lake, both in a cultural sense and for fishing activities. Taking into consideration proposed mitigation measures by the Proponent, the Crown Consultation Team was of the view that the Project would likely have low to moderate negative impacts on the Jackfish Metis Association's interests associated with fishing.

The Crown Consultation Team acknowledged the interests of Jackfish Metis Association associated with trapping would not likely be impacted due to the distance of the Project from their trapline of interest, and found that the Project would not interact with their traplines or compromise access to them. On this basis, the Crown Consultation Team concluded there

would be negligible to low negative impacts on the Jackfish Metis Association's interests associated with trapping and harvesting.

22.2 PANEL RECOMMENDATIONS

The Panel considers many of the recommendations made to address environmental effects of the Project on Indigenous Peoples would also serve to address impacts on Indigenous rights. In addition to the recommendations made throughout the report, the Panel makes the following recommendation specific to addressing potential impacts on Indigenous rights:

Recommendation 123: MNDMNR should work collaboratively with Biigtigong Nishnaabeg on moose management and continue to look for ways to address Biigtigong Nishnaabeg's interests and concerns.

Recommendation 124: The federal and/or provincial government should continue to explore the potential need for a principles-based monitoring committee to address potential impacts on Indigenous rights that cannot be addressed by the Proponent's proposed monitoring committees. A principles-based monitoring committee would be distinct from the requirement for monitoring led by the Proponent as part of a follow-up program. Should the need be confirmed, the committee should include the participation of Biigtigong Nishnaabeg, as well as other Indigenous groups.

PART 8: OTHER MATTERS

SECTION 23: ENVIRONMENTAL MANAGEMENT

23.1 REQUIREMENTS FOR THE CONSIDERATION OF ENVIRONMENTAL MANAGEMENT

This section addresses the proponent's proposed environmental management system. Section 2.8 of the *Guidelines for the Preparation of an Environmental Impact Statement* required the proponent to describe the Proponent's environmental management system, including the conceptual environmental management plans for all stages of the Project and a framework upon which follow-up and effects monitoring, and compliance monitoring will be based throughout the life of the Project, including the post-closure phase, should the Project proceed.

Views of the Proponent

GenPGM provided a draft copy of their Framework as a response to Information Request 3-2. The Proponent stated that the purpose of their framework was to summarize the procedures that they would use to ensure that their environmental programs, including the environmental management plans were developed, implemented, and maintained. The environmental management system would be consistent with the *Occupational Health and Safety Management System 18001, ISO 14001 (Environmental) Management System Standards*. The environmental management system framework would facilitate integration of occupational health and safety, environmental management systems, and the application of the precautionary principle throughout the life of the Project.

The Proponent noted that the environmental management system and environmental management plans were works in progress and would be completed in consultation with relevant stakeholders, government and Indigenous communities after the environmental assessment is complete.

The Proponent stated that it would identify commitments arising from the environmental assessment process, conditions in permits, organizational conformance requirements as well as obligations arising from on-going public and Indigenous consultation. These commitments would be documented in an overarching environmental management system with a clear implementation strategy for each and integrated into the applicable environmental management plan, where appropriate. Requirements would be communicated effectively to contractors and personnel at start-up and regularly thereafter based on the review cycle, with

contractual obligations to follow the requirements (e.g., contracts with goods and service providers and employment agreements).

The final Environmental Management System would include the following components:

- the Waste and Recycling Material Management Program;
- the Emergency Preparedness and Response Plan;
- Environmental Management Plans; and
- Monitoring and Follow-up Programs and Adaptive management.

Waste and Recycling Material Management Program

The Waste and Recycling Material Management Program would be intended to manage the non-hazardous and hazardous waste generated on the Project site. The Proponent has indicated that, where feasible, recyclable materials would be re-used onsite to reduce the volume of waste. Organic and solid non-hazardous waste would be disposed of at the Marathon landfill. Hazardous waste would be trucked offsite to appropriate licensed facilities. The Proponent indicated that they would rely on third-party domestic sewage collection and disposal during construction of the mine site. An onsite membrane bioreactor would treat domestic sewage during site operations. Excess sludge from the treatment system would be hauled for off-site disposal using third party services.

Emergency Preparedness and Response Plan

The Emergency Preparedness and Response Plan would be intended to establish procedures and provide clear direction in case of an on-site emergency, including the identification of responsibilities of parties. Further information on this plan is provided in Section 20 (Accidents and Malfunctions).

Environmental Management Plans

The Environmental Management Plan would be used as a means of implementing the mitigation measures identified through the environmental assessment and would include performance measurements, monitoring, and regular updates. The Proponent noted that environmental management plans are “living documents” that would evolve and be updated regularly over the lifecycle of the Project to reflect continuous improvements achieved.

The Proponent stated that they have prepared the following draft environmental management plans (a full list can be found in Appendix 2):

- Access Management;
- Concentrate Transfer Station Management;

- Process Solids (Tailings) Management Facility Operations;
- Materials Handling;
- Erosion and Sediment Control;
- Fish Habitat Offsetting Strategy and Compensation;
- Air Quality Management;
- Noise Management;
- Surface Water Management;
- Ground Water Management;
- Acid Rock Drainage/Metal Leaching Management;
- Vegetation Management;
- Wildlife Species at Risk Management;
- Wildlife Conflict Management;
- Reclamation and Closure;
- Soil Salvage and Storage;
- General Construction and Operations Management; and
- Occupational Health and Safety Management.

Monitoring and Follow-up Programs and Adaptive Management

The Proponent has proposed several monitoring and follow-up programs to verify the accuracy of the predicted effects and determine the effectiveness of the measures implemented to mitigate any adverse effects of the Project. The results of monitoring and follow-up would be reviewed at various frequencies (i.e., weekly, monthly, semi-annually, annually) depending on the frequency of data monitoring associated with these programs.

The Proponent stated that they would adaptively manage the effects on valued ecosystem components that exceed predictions or where proposed mitigation measures are determined to be less effective than predicted. The Proponent stated they would undertake a review of each situation to understand the nature and rationale for the exceedance and to determine what alternative measures could be technically and economically feasible. Any additional mitigation measures deemed necessary would be developed based on the specific situation to meet applicable regulatory criteria in conjunction with the relevant regulatory agency. During

the hearings, the Proponent clarified that thresholds and adaptive management measures would be established on a case-by-case basis. The thresholds would be below regulatory or prescribed limits to allow the company to respond pre-emptively to assess the data, investigate, and then implement appropriate mitigation measures.

The Proponent committed to seeking Indigenous input into all of their follow-up and monitoring programs.

A full list of follow-up and monitoring programs can be found in Appendix 2 which includes a summary of the mitigation, residual effects, monitoring, thresholds, and adaptive management measures to link any predicted residual environmental effects of the Project to monitoring and follow-up programs.

Compliance

In keeping with the principles of the Environmental Management System the Proponent planned to regularly audit the Project for compliance with established requirements and implement reporting mechanisms to document audit findings and address any non-compliance.

The Proponent's environmental staff would routinely audit Project activities to determine whether requirements are being met, with immediate reporting to the General Manager in the event of any non-compliance with established requirements. It would be the General Manager's responsibility to implement corrective actions that meet the requirements in a timely manner and report to the executive team on a monthly basis at a minimum. As part of the Proponent's enabling policy, an annual audit on behalf of the executive team would be completed to assess the adequacy and implementation of the Environmental Management System and its Environmental Management Plan.

Compliance would be reported annually to the appropriate agencies in accordance with the requirements of the federal and provincial approvals, with a minimum annual frequency in the form of a report to the Impact Assessment Agency of Canada.

The Proponent stated during the hearings that there would be a structured inspection and monitoring program implemented throughout construction, operations, and into the closure phases. A full complement of staff would be available to perform the environmental monitoring requirements as prescribed by regulatory obligations. The Proponent stated that staffing would likely follow a daily, seven-days-a-week schedule to ensure onsite environmental personnel are available throughout all activity periods, and that coordinators and managers would ensure that checks and balances have been completed.

Consultation Program

The Proponent stated they would maintain an open-door policy with contact information widely distributed so that stakeholders and Indigenous communities could contact GenPGM if a

concern arises. Concerns would be investigated with the objective of resolving the cause. The concern would be added to the Proponent's Issues Tracking Matrix portion of the environmental management system and screened to determine if it needed to be reported to a government agency as part of a permit condition or to an Indigenous community as part of a commitment. The Proponent would maintain a proactive outreach program to provide governments, public stakeholders, and Indigenous communities with regular status updates regarding environmental and operational performance. In the event a material change is proposed to the Project, the Proponent would consult government agencies regarding environmental assessment and permit requirements and then commence focused consultations under appropriate agency guidance. The Proponent stated such consultations with government agencies would take place on an on-going basis and that they would participate in any compliance promotion programs regarding new or evolving legislation.

During the hearing, the Proponent explained that three standing environmental committees have been established. The first involves Biigtigong Nishnaabeg, the second the Pays Plat First Nation, and the third is a regional committee that includes representatives from the Métis Nation of Ontario, the Red Sky Métis Independent Nation, the Jackfish Metis Association, Michipicoten First Nation, Ginoogaming First Nation, and the Town of Marathon. The Proponent noted that the regional committee has been meeting monthly since March 2021, and the other two committees have been meeting more frequently. The Proponent stated that the meetings use an open forum to raise concerns about key environmental topics. The committees discuss topics of community interest, such as closure planning, fish compensation, Caribou, exploration updates, and the country foods program. The committees are also intended to keep communities up to date on field programs the Proponent is undertaking and invite members to participate and attend.

The Proponent stated that the committees' roles would likely change slightly throughout different phases of the Project. During the construction phase, the Proponent expects the committees would meet frequently and then settle into a more steady and less frequent meeting schedule during operations and closure.

The Proponent stated they would engage Biigtigong Nishnaabeg in the design and implementation of the follow-up and monitoring programs and committed to obtaining Biigtigong Nishnaabeg's approval of several of its proposed monitoring plans and programs, including mercury monitoring plans.

View of the Participants

Biigtigong Nishnaabeg communicated the need for community-led environmental monitoring. They stated that Indigenous-led environmental monitoring programs that recognize and respect Indigenous sovereignty, traditional knowledge, and jurisdiction are now common across Canada. They noted that, because this Project falls entirely within Biigtigong Nishnaabeg's

Exclusive Title Area, they have a right to oversee environmental management and monitoring of the Project and to influence adaptive management decisions made as a result of the monitoring.

Pays Plat First Nation stated that, as a condition of approval of the Project, they would like to work closely with the Proponent in the environmental monitoring of their traditional territories. Specifically, they asked that the Proponent train and hire Pays Plat First Nation community members to independently monitor water and soil and conduct sediment sampling on affected areas of their traditional territory, particularly Stream 5 (Hare Creek), Stream 6 (Angler Creek), and related outlets to Lake Superior.

The Métis Nation of Ontario requested the Proponent establish an environmental monitor position for revegetation as well as for fish capture and rescue activities.

Environment North commented on the Proponent's consultation process. They stated that the forms of public engagement that were used were primarily passive in nature and focused on one-way information sharing. They stated that informing does not denote nor reflect the concept of meaningful public participation. This requires relationship-building and collaboration to incorporate community values critical for the long-term success of the Project, avoid conflict and constrained relations with the nearby communities, and promote confidence in the process among various stakeholders. With regard to the committees established, Environment North stated that it is unclear which perspectives are being represented. They recommended that the Proponent work with the community to identify those perspectives that need to be represented and who would best represent those perspectives. Environment North found the Proponent had provided insufficient information to conclude that "meaningful public participation" had taken place in accordance with the purposes of the *Canadian Environmental Assessment Act, 2012*.

Citizens for Responsible Industry in Northwestern Ontario stated that they would like to see a commitment to transparency with respect to the Project's operations, and the environmental monitoring processes linked to the operation and closure phases in particular, given the Project's proximity to Lake Superior.

Citizens for Responsible Industry in Northwestern Ontario cited several concerns with federal and provincial compliance and enforcement activities. They stated that they are concerned about government's capacity to effectively monitor and enforce environmental regulations and protocols at the Project site. Specifically, they noted concerns with the low number of government inspections and enforcement activities, and the high number of outstanding fines levied against Ontario mines due to infractions of federal and provincial legislation. The group stated that the Panel needed to ensure that there would be sufficient federal and provincial government capacity to monitor, enforce, and report on any permits and approvals that are issued. The group wanted to ensure that industrial projects approved in Northwestern Ontario would be assessed and monitored with consideration for the well-being of both present and

future generations. They pointed out that, years after operations cease at the mining site, revenues from mining would have ceased but communities surrounding the mine will still be here. Inadequate monitoring and environmental enforcement puts the community and local aquatic and terrestrial environments at risk.

Citizens for Responsible Industry in Northwestern Ontario stated that environmental performance standards must guide the issuance of any permits and environmental compliance approvals. They stated that the Proponent needs to prioritize these targets and not merely attempt to adhere to them whenever possible. They added that any government funding provided to this Project needs to be tied to environmental performance. The group also recommended that any forms of financial assurance associated with this Project, whether through the closure plan governed by the *Mining Act* or other provided permits, must be accompanied by a hard form of assurance, such as cash, letters of credit, or insurance bonds. They stated that relying on the corporate financial test increases the risk that the public would be on the hook for the costs of cleaning up the mine site.

Citizens for Responsible Industry in Northwestern Ontario stated that adaptive management should not undermine the precautionary principle or be used as a substitute for proposing specific mitigation measures. They noted that adaptive management may not always be appropriate to use in every element of managing environmental effects of Project operations. For example, it might be inappropriate if mitigation was not being identified or if there was uncertainty about the significant adverse environmental effects and/or if significant adverse environmental effects were likely. The group stated that if risks were downplayed, an adaptive management process would not necessarily capture mitigation measures until it is too late.

23.2 PANEL CONCLUSIONS AND RECOMMENDATIONS

The Panel finds that the Proponent's approach to environmental management is acceptable. However, the Panel encourages government agencies to consider the presentation made by Citizens for Responsible Industry in Northwestern Ontario during the hearings regarding the track record of provincial and federal compliance and enforcement activities in Canada.

The Panel recommends that the Proponent implement the following measures:

Recommendation 125: Implement an adaptive management approach based on the results of monitoring and follow-up programs as part of an overall environmental management system. The approach should include the development of triggers and/or thresholds and the identification of alternative and/or additional mitigation measures in consultation with government agencies and Indigenous groups and in advance the relevant Project phase or activity. The approach should not be used as a substitute for specific measures that mitigate Project effects.

Recommendation 126: The Proponent should continue to use the standing environmental committees during all phases of the Project as a form of consultation and engagement regarding Project activities, monitoring, and follow-up programs and results, and to receive feedback and/or complaints from communities.

Recommendation 127: The Proponent should create a program to ensure that Indigenous Peoples are provided with the opportunity and resources to define and occupy the role of environmental monitors in relation to the follow-up programs and other matters related to the Project, independently or in collaboration with the Proponent. The Proponent should undertake a collaborative process to determine, in consultation with Indigenous communities, the scope, purpose and objectives of the participation of Indigenous monitors. As part of that process, the Proponent should determine how each Indigenous monitor should be involved in monitoring their areas of interest, how the Proponent should support the participation of Indigenous monitors, including through the provision of training, and how the Proponent should incorporate the information obtained from Indigenous monitors.

Recommendation 128: The Proponent should seek consent from Biigtigong Nishnaabeg regarding their monitoring and follow-up programs with respect to water quality, fish and fish habitat, and mercury.

SECTION 24: CAPACITY OF RENEWABLE RESOURCES

24.1 CONSIDERATION OF CAPACITY OF RENEWABLE RESOURCES

This section addresses environmental effects of the Project on the capacity of renewable resources. The Panel's Terms of Reference required the Panel to consider the capacity of renewable resources that would likely be significantly affected by the Project to meet the needs of the present and those of the future. The Panel sees the definition of capacity of renewable resources as closely linked to the CEAA 2012 definition of sustainable development. CEAA 2012 defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Views of the Proponent

GenPGM concluded that the Project would have no significant adverse effects on the following renewable resources: air (clean air for breathing), surface water (drinking water source), groundwater (drinking water source), aquatic resources (fish as food sources) or terrestrial resources (wildlife as food sources and timber). The Proponent stated that the assimilative capacity of the ecosystem, including the Biigtig Zibi, Hare Lake and Stream 5 (Hare Creek) systems, would accommodate any discharge from the Project without resulting in significant adverse effects. They noted that the resilience of the affected ecosystems to respond to internal and external changes would not be significantly affected. The Proponent's effects assessment of valued ecosystem components within this report also informed the Panel's analysis and conclusions.

Panel Conclusions and Recommendations

For the Panel, understanding the capacity of renewable resources is similar to the concept of sustainable development. The Panel notes that Canada is a member state of several international conventions and treaties that provide the framework for provincial, national, and international cooperation for the conservation and the wise use of natural resources.

The Panel reviewed GenPGM's assessment of the Project's potential to affect the capacity of renewable resources to meet the needs of present and future generations. The Panel does not fully agree with the valued ecosystem components selected by the Proponent. The Panel views the use of a renewable resource as both consumptive, such as fish as a food source, and non-consumptive, such as aesthetic views, recreation, and hunting. As such, the Panel has also included vegetation, current use of lands and resources for traditional purposes, recreation and tourism, visual resources, and human health as renewable resources, in addition to air, surface water, groundwater, fish and fish habitat, wildlife, and timber identified by the Proponent.

In reaching their conclusions on the capacity of renewable resources, the Panel considered their conclusions on significance, and the following factors, to be particularly relevant:

- The Project would have residual adverse effects on air, surface water, groundwater, fish and fish habitat, vegetation, wildlife, recreation and tourism, visual resources, and human health. With the exception of surface water quantity (see below), the Panel concludes these effects would not be significant.
- As noted in Section 8 (Surface Water Quantity), the Project is likely to cause a significant environmental adverse effect on the hydrology of Stream 6 (Angler Creek).
- As noted in Section 11 (Terrain, Soils and Vegetation), productive commercial forest would not likely be restored in the Site Study Area.
- As noted in Section 13 (Caribou), the Project is likely to cause a significant adverse environmental effect on critical habitat for caribou, as well as on connectivity of habitat within the Lake Superior Coastal Range.
- As noted in Section 14 (Terrestrial Species at Risk), the Project is likely to cause a significant adverse effect on species at risk bats (i.e., Little Brown Myotis and Northern Myotis) and on bat habitat.
- As noted in Section 21 (Effects to Indigenous Peoples), the Project is likely to cause a significant adverse effect on Biigtigong Nishnaabeg's current use of lands and resources for traditional purposes.

The Panel notes that a commercial forest is unlikely to return to the Site Study Area. Although this affects a renewable resource, the Panel finds that there is an abundance of forests in the region that support a sustainable commercial harvest. Similarly, the Panel anticipates that the overall capacity of the renewable resources of the area would not be affected by the potential adverse effects on water quality, air quality, groundwater, fish, wildlife species that are not at-risk, recreation, visual resources, or human health.

Although Caribou are not consumed for food at this time, the Panel considers the species to be a renewable resource in the sense that Caribou were consumed for food within living memory and that local populations could be re-established and become self-sustaining.

The lands and resources necessary to sustain current use by Indigenous groups for traditional purposes are both a consumptive and a non-consumptive renewable resource. They are consumptive in the sense that resources are harvested to consume, and non-consumptive in the sense that the landscape provides the ability to carry out activities associated with traditional uses on the land and cultural heritage. The current use of lands and resources, specifically for Biigtigong Nishnaabeg, would be significantly affected by the Project, should it proceed, as they rely on both consumptive and non-consumptive renewable resources.

The Panel concludes that caribou may not meet the needs of future generations and that the Project would diminish the capacity of renewable resources to support current use of lands and resources by Indigenous peoples.

SECTION 25: BIOLOGICAL DIVERSITY

25.1 CONSIDERATION OF BIOLOGICAL DIVERSITY

This section addresses environmental effects of the Project on biological diversity. The Panel considers these to be environmental effects that must be assessed under Ontario's *Environmental Assessment Act*.

The Panel's Terms of Reference required the Panel to consider the extent to which biological diversity would be affected by the Project. This includes any federally listed wildlife species, its critical habitat, or the residences of individuals of that species, as well as any affect the Project might have on a provincially threatened or endangered species and/or their protected habitat.

For the purposes of the assessment, the Panel accepted the definition of biological diversity, or biodiversity, as the variability among living organisms from all sources, including, terrestrial, and aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems.

Views of the Proponent

GenPGM did not explicitly assess and make conclusions on the effects of the Project on biodiversity; however, they provided information through their assessment of each valued ecosystem component to determine the effects on biodiversity.

In the terrestrial environment, the Proponent reported finding 359 species of vascular plants and 40 non-native species in the Site Study Area. 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, ranging in age between 71 and 150-plus years. The Proponent stated that the wetlands in the Local Study Area are limited in area and diversity and would not likely meet the criteria to be designated "provincially significant" due in part to their low diversity, limited hydrological function, and paucity of special features. The Proponent also reported that 24 species of mammals, 10 species of amphibians, and 97 bird species use the site.

In the aquatic environment, the Proponent reported that some subwatersheds within the Local Study Area provide cold- or coolwater nursery and spawning habitat for both resident and downstream Biigtig Zibi and Lake Superior coldwater fish species, including salmonids. The diversity and species within these cold- or coolwater communities vary as a result of the physical size of the watershed as well as barriers to colonization. Many of the smaller waterbodies in the Site Study Area are fishless.

The clearing of vegetation, removal of wildlife habitat, effects on water quality and quantity, and overprinting of aquatic ecosystems, are the main Project effects that have the potential to reduce biodiversity. The Proponent committed to, and the Panel included as recommendations, various measures to improve biodiversity on the site once the initial effects have occurred. This includes undertaking closure reclamation using native seeds, planting seedlings, managing invasive species, offsetting the residual effects to caribou and support its recovery, restoring natural flows on site during closure, and offsetting the residual effects on fish and fish habitat as approved by Fisheries and Oceans Canada.

When asked during the hearings about biodiversity, the Proponent replied that the onsite post-closure environment would evolve over time in response to their actions. They stated that the focus of the restoration activities would be on enhancing the diversity of native species and including sources and cover for wildlife. Plants with inherent value in the ecosystem include native wildflower species and Common Milkweed, which serve as a source of nectar and pollen for the Monarch Butterfly and Yellow-banded Bumblebee, which are identified as species at risk. The Proponent stated that, as vegetation matures, a different suite of wildlife would use the site.

25.2 PANEL CONCLUSIONS AND RECOMMENDATIONS

The Proponent's assessment of the valued ecosystem components and the Panel's analysis and conclusions regarding these components considered the diversity of species, habitat, and ecological function. The Panel concludes that the effects of the Project on vegetation, wildlife, water quality, and fish and fish habitat would be adverse but not significant. The effects of the Project on water quantity would be adverse, but only significant in Stream 6 (Angler Creek). The Panel concluded that the Project is likely to cause a significant adverse effect on critical habitat for caribou, as well as on connectivity of habitat within the Lake Superior Coastal Range, and is likely to cause a significant adverse effect on species at risk bats (i.e. Little Brown Myotis and Northern Myotis) and on bat habitat.

The Panel observes that a notable change in habitat could put added pressure on the species that depend on it, particularly species at risk such as bats, caribou, Northern Brook Lamprey and Lake Sturgeon. Species diversity is a major component of biodiversity. The loss of a species on the landscape can result in overall shifts to the functioning of an ecosystem.

The Panel concludes that because of the significant adverse effects identified on caribou habitat, for Little Brown Myotis and Northern Myotis as a result of the Project there would be an increased risk of loss of biodiversity. Taking into account the past and future cumulative effects, this risk becomes greater.

PART 9:
SUMMARY OF PANEL'S CONCLUSIONS AND RECOMMENDATIONS

SECTION 26: PANEL FINDINGS AND RECOMMENDATIONS

26.1 ADDITIONAL CONSIDERATIONS UNDER CEAA 2012

26.1.1 Requirements for the Consideration of Effects on Federal Lands

The Joint Review Panel is mandated to prepare a report for the federal Minister of the Environment that identifies those conclusions that relate to the environmental effects to be taken into account under section 5 of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). Subparagraph 5(1)(b)(i) of CEAA 2012 requires the Panel to consider any change that maybe be caused to the environment on federal lands.

For the Project, the Panel considered reserve lands, Pukaskwa National Park, and the Lake Superior Marine Conservation Area meet the definition of federal lands.

Reserve Lands

Views of the Participants

Biigtigong Nishnaabeg is a First Nation whose reserve is located approximately 9 km southeast of the Project site. Biigtigong Nishnaabeg filed a land claim in 1982, asserting Aboriginal Title over their unceded Aboriginal territorial lands, and is presently in negotiation with the federal and provincial Crown. The Project is situated within Biigtigong Nishnaabeg's Exclusive Title Area, which comprises a portion of their traditional territory. Biigtigong Nishnaabeg's Aboriginal Title and Aboriginal Rights Area encompasses more than 2 million ha of combined Exclusive and Shared Aboriginal title territory. The Biitig Zibi flows adjacent to the community and discharges to Lake Superior within 1 km of the reserve lands.

Panel Conclusions and Recommendations

The Panel considered whether there were any changes, as a result of the Project, that would occur to the biophysical environment on Biigtigong Nishnaabeg's reseve land. The Panel determined that no changes to the environment, as defined under CEAA 2012, would occur on the Biigtigong Nishnaabeg reserve due to the Project. More information on the effects of the Project on Biigtigong Nishnaabeg and their Exclusive Title Area is provided in Sections 21 (Effects to Indigenous Peoples) and 22 (Indigenous Rights).

The Panel also concludes that no environmental effects would occur on the reserve lands of other Indigenous groups, as these are located farther from the Project.

Pukaskwa National Park

Views of the Participants

Pukaskwa National Park is approximately 20 km south of the proposed Project site on the shores of Lake Superior and covers 1,878 km². The park is within the Coastal Range of the Boreal Caribou. Parks Canada, as the manager of all national parks, has stated that the park likely cannot maintain caribou within its boundaries without sufficient habitat and connectivity within the Coastal Range outside the park.

Caribou recovery was identified in the Park's management plan in 2014. The last recorded resident caribou was observed in the park in 2011. Parks Canada acknowledged during the hearings that the park's ability to sustain a caribou population would be indirectly affected by the Project as connectivity within the Coastal Range becomes reduced.

Panel Conclusions and Recommendations

The Panel considered if any changes would occur to the Pukaskwa National Park biophysical environment as a result of the Project. The Panel concludes that no such effects would occur. More information on the effects of the Project on Boreal Caribou is provided in Section 13 (Caribou).

Lake Superior National Marine Conservation Area

In 2015, a Lake Superior Action and Management Plan was prepared through a joint initiative with the federal, provincial, and US governments, as well as Indigenous groups. The Plan established a number of objectives aimed at protection of a unique marine ecosystem with historical significance and under increasing threats from land development. One of the initiatives spoke to identifying a marine conservation area. The Lake Superior National Marine Conservation Area safeguards aspects of the ecosystem and provides benefits to coastal communities that depend on marine industries, such as commercial fishing, sport fishing, recreational boating, and shipping. It is administered by Parks Canada and the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR).

At the time of consideration of the joint initiative, a Zero Discharge Demonstration Program was developed by Canada and the US. The Program was developed in response to the International Joint Commission's recommendation that Lake Superior be designated a demonstration area where discharges and emissions of persistent and bioaccumulative toxic substances would not be permitted. The goal of the Zero Discharge Demonstration Program was to achieve zero discharge or emission of nine pollutants, including mercury, by 2020.

Views of the Proponent

The Lake Superior National Marine Conservation Area, as defined by the *Canada National Marine Conservation Areas Act*, extends 140 km eastward from Thunder Cape in the west at the tip of Sleeping Giant Provincial Park to Bottle Point in the east, and stretches southward to the Canada-US border, linking with Isle Royale National Park. It also anchors existing protected areas to the north, including the Nipigon River, Lake Nipigon, and the Wabakimi Provincial Park. The Conservation Area is the largest freshwater protected area in the world, with a water-based area of approximately 11,000 km². The eastern boundary of the Conservation Area is approximately 40 km west of the Project. The Proponent did not predict any changes to water quality in Lake Superior.

Views of the Participants

To minimize the potential for release of mercury to Lake Superior, the Ministry of the Environment, Conservation and Parks stated they may consider imposing a more stringent water quality criterion for mercury in any environmental compliance approvals that may authorize Project discharges to watersheds that drain to Lake Superior, should the Project be given approval to proceed.

Environment and Climate Change Canada stated that the *Canada-US Great Lakes Water Quality Agreement* provides a framework for ensuring binational cooperation and action to restore and maintain the water quality and ecological health of the Great Lakes. The agreement includes common water quality objectives and commitments and outline provisions for the development of cooperative strategies and research. The articles also identify specific commitments such as notification of planned activities that could lead to a pollution incident or have a significant cumulative impact on the waters of the Great Lakes.

Participant views on the potential cumulative effects from the Project to Lake Superior are presented in Sections 3 (Mandate of the Panel and Scope of Review) and 9 (Surface Water Quality).

Panel Conclusions and Recommendations

In reaching its conclusions on potential Project effects on the Lake Superior National Marine Conservation Area, the Panel found the following factors to be particularly relevant:

- The Citizens for Responsible Industry in Northwestern Ontario submitted information stating the water quality in the Northeastern portion of Lake Superior's watershed was poor and pollution was very high.
- Intergovernmental initiatives limit the amount of pollution in Lake Superior.
- No water quality objectives were predicted to be exceeded as a result of the Project.

- Mercury concentrations in receiving waterbodies were not expected to rise as a result of the Project.

The Panel understands that the Proponent has stated that while the Project is not a source of mercury, there may be mercury mobilization from land clearing, resulting in either a direct or diffuse discharge to waterbodies that discharge to Lake Superior. The Panel is of the opinion that any change in the water quality along the north shore of Lake Superior could have an effect on the federal lands of the Lake Superior National Marine Conservation Area. The Panel appreciates that water quality along the north shore of Lake Superior has been degraded by industrial activities over time. The Panel is supportive of intergovernmental efforts to reduce the level of pollution in Lake Superior and improve the lake's water quality. The Panel is also mindful of the importance of Lake Superior to both Indigenous and non-Indigenous communities that live along and near its shoreline.

The Panel concluded in the section on surface water quality that, if the recommended mitigation measures and monitoring and follow-up programs are implemented, the Project is not likely to cause a significant adverse environmental effect on water quality. This conclusion is related to contaminant concentrations in the Local Study Area (see Appendix 6). The Panel believes there would be less spatial overlap between Project-affected waters and those of the Lake Superior National Marine Conservation Area. Therefore, the Panel concludes that no environmental effects on the Conservation Area would occur due to Project activities.

26.1.2 Requirements for the Consideration of Transboundary Effects

The Joint Review Panel is mandated to prepare a report for the federal Minister of the Environment that includes an identification of those conclusions that relate to the environmental effects to be taken into account under section 5 of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012). Subparagraphs 5(1)(b)(ii) and (iii) of CEAA 2012 require the Panel to consider any change that may be caused to the environment in another province, or outside of Canada.

For the Project, the Panel considered transboundary environmental effects to be those related to water quality, air quality, and greenhouse gas emissions. Information on the potential effects of the Project on these VECs are found in Sections 9 (Surface Water Quality) and 15 (Atmospheric Environment).

Panel Conclusions and Recommendations

Water Quality

The Panel heard that no provincial water quality objectives were predicted to be exceeded in any of the receiving water bodies in any Project phase. The Panel notes that GenPGM made several commitments to mitigate, monitor, and manage contaminants of concern, including

mercury. The Panel concluded in the section on surface water quality that, if the recommended mitigation measures and monitoring and follow-up programs were implemented, the Project is not likely to cause a significant adverse environmental effect on water quality. This conclusion is related to contaminant concentrations in the Local Study Area. The Panel finds that the environmental effects of the Project on water quality would be negligible in Lake Superior. As waters move farther away from the Project site, there is an expectation that there would be no elevated contaminants originating from the Project affecting waters outside of Ontario, or outside of Canada.

Air Quality

The Panel heard that air quality criteria were predicted to be exceeded for certain contaminants of potential concern at special receptors and along the property boundary of the Project site. The Panel notes that, for most of these contaminants, elevated concentrations dropped off quickly beyond the property boundary, and for all cases did not occur beyond the Local Study Area. The Panel concluded, in Section 15 (Atmospheric Environment) that if the recommended mitigation measures and monitoring and follow-up programs were implemented, the Project is not likely to cause a significant adverse environmental effect on air quality. The Panel finds the environmental effects of the Project on air quality would be negligible in airsheds in a province other than Ontario, or outside of Canada, as air contaminants disperse the further they migrate from the source.

Greenhouse Gas Emissions

The Panel heard the Project would cause a net increase in greenhouse gas emissions. The Panel concluded in the section on the effects on the atmospheric environment that, if the recommended mitigation measures and monitoring and follow-up programs were implemented, the Project is not likely to cause a significant adverse environmental effect on greenhouse gas emissions or climate change. The Panel recognizes however, the Project would make a minimal contribution to increased greenhouse gas emissions.

26.2 CONSIDERATIONS FOR THE JUSTIFICATION OF SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS

The *Canadian Environmental Assessment Act, 2012*, subsection 52(2), states that if the Minister decides that the Project is likely to cause significant adverse environmental effects, the Minister must refer to the Governor in Council the matter of whether those effects are justified in the circumstances.

Subsection 3.20 of the Panel's Terms of Reference state that:

For the purposes of CEAA 2012, where, taking into account the implementation of any mitigation measures, the Joint Review Panel concludes that the Project is likely to cause

significant adverse environmental effects, the Joint Review Panel shall obtain and include in its report information with respect to the justifiability of any significant adverse environmental effects.

The Panel concluded that the Project would result in adverse environmental effects, many of which could be partially or fully addressed through the implementation of mitigation measures. There were, however, adverse effects, including cumulative effects, that after taking into account mitigation measures the Panel found would likely be significant. These are predicted for:

- species at risk, including mammals, birds and fish and;

With respect to Indigenous peoples:

- the current use of lands and resources for traditional purposes, physical and cultural heritage, and health and socio-economic conditions.

The analyses of these environmental effects are presented in detail for each species at risk in Sections 10 (Fish and Fish Habitat), 13 (Caribou), and 14 (Terrestrial Species at Risk). An analysis is presented for each of the CEAA 2012 5(1)(c) environmental effects for the eight Indigenous communities and groups who actively participated in the Project review in Section 21 (Effects on Indigenous Peoples).

The Panel understands that their role is not to come to any conclusion or decision on justifiability but to provide information for consideration by the Governor in Council (federal cabinet). In this context, the Panel has considered that the justifiability considerations fall into three categories:

- economic benefits of the Project;
- employment benefits of the Project;
- social and cultural benefits.

26.2.1 Economic Benefits

The Project would generate economic benefits for individuals, businesses, the Town of Marathon, and the governments of Ontario and Canada, particularly in the construction and operations phases of the Project. These estimates, provided by GenPGM, are summarized as follows:

- \$24 million in local school and property taxes over the life of the Project;
- fee-based service payments to Marathon such as potable water or waste disposal;
- \$81 million in federal tax revenue, and \$54 million in provincial tax revenue from capital spending;

- \$26 million in federal tax revenue and \$19.5 million in provincial tax revenue from sustaining capital investment;
- \$20 million in federal tax revenue and \$13 million in provincial tax revenue annually from expenditures associated with operations;
- \$245 million in Ontario mining duties;
- \$279 million in provincial income taxes and \$419 million in federal income taxes;
- \$4 million in other property royalties.

The Proponent estimated that the total amount of tax collected by the Town of Marathon would offset the incremental annual costs to the town as a result of the Project, estimated at \$912,000 for the construction phase and \$399,500 for the operations phase.

The Proponent stated the Project would provide Canada and Ontario critical minerals as identified by the Crown.

26.2.2 Employment Benefits

During the hearing, GenPGM provided employment estimates for the construction and the operations phases of the Project. They estimated that during the construction phase, there would be an average of 430 to 550 workers with a peak of between 800 and 1,000 workers. For operations there would be an average of 430 employees. The Proponent estimated that 80-90% of the Project's operational labour force would be comprised of workers from Regional Study Area communities (see Appendix 6), with the remaining 10-20% being transient workers.

The Proponent also estimated there would be indirect and induced employment as described in Section 18 (Socio-economic Environment).

The Proponent acknowledged the labour force participation in the regional mining and mining-related sectors is skewed towards non-Indigenous and male workers. Therefore, it is likely that a greater number of men than women and non-Indigenous persons than Indigenous people would benefit from employment with the Project. The Proponent advised the Panel they would provide opportunities for training to women and Indigenous people so that they can acquire the skills to participate in the Project, as described in Section 18 (Socio-economic Environment).

The employment benefits would diminish and cease as the Project transitions to the active closure phase. However, employees who previously did not have training and/or experience may now have skills that could help them obtain new employment.

The Panel notes that while the Project could provide employment benefits, measures need to be taken by the Proponent and potentially the Government of Ontario and/or Government of

Canada to ensure this benefit is equitably experienced. Specifically training programs, partnerships, and recruitment practices would need to be implemented so that employment benefits are also realized by women and Indigenous Peoples.

26.2.3 Social Benefits

The Panel heard that Marathon has a strong historic socio-economic connection to resource-based industries. The Hemlo Gold Mine has operated in the area for over 35 years. For over 70 years, the Marathon Pulp Mill operated in the town.

The Town of Marathon referenced a March 2022 study undertaken by the Northern Policy Institute that indicates job opportunities are the key for youth to remain in northern Ontario. The Panel was advised that the study found 48% of youth surveyed wished to stay in the north.

The Panel heard from the Town that the Project represents an opportunity to invest money received in the form of taxes into sports, recreation and quality of life initiatives. This in turn would enhance and reinforce Marathon's role as a regional centre on the North Shore.

Marathon's mayor suggested that, without developments such as this mine, the town would continue to experience population shrinkage, including out-migration of professionals, loss of critical services and infrastructure, economic decline, and social fabric loss. He stated that there are "many real-world examples of communities who lost their primary industry and wealth generators that never rebounded and whom are now just shadows of the communities they were."

The Panel is of the opinion that the federal government should carefully consider and weigh the impacts to the Indigenous groups against the potential economic, employment, and social benefits to arrive at its decision of whether the Project should proceed.

The Project is proposed for an area within the Exclusive Title Area of the Biigtigong Nishnaabeg. For this Indigenous community to realize a long-term, net benefit from the Project, beyond limited-term employment opportunities, the community services and infrastructure should be upgraded and the housing shortage on-reserve should be addressed to enable Biigtigong Nishnaabeg members to reside in their community and work at the mine.

The Panel recommends, should the federal government determine that this Project proceed, that part of the justification for this Project be that it creates a net benefit for Biigtigong Nishnaabeg and other local Indigenous communities.

26.3 RECOMMENDATION ON APPROVAL FOR PROVINCE OF ONTARIO

The provincial Minister of the Environment, Conservation and Parks, with the approval of the Lieutenant Governor in Council, will be required to make a decision on whether to approve the Project. This decision may take one of the following forms:

- give approval to proceed with the Project in accordance with the Joint Review Panel Report;
- give approval to proceed with the Project subject to such conditions as the Minister considers; or
- refuse to give approval to proceed with the Project.

As set out in paragraph 1(d) of the Harmonization Order, made under the *Environmental Assessment Act* Agreement, which varies section 9(2) of the *Environmental Assessment Act* for the purpose of the Project such that the provincial Minister of the Environment, Conservation and Parks, in making this decision, shall consider the following matters:

- the purpose of the *Environmental Assessment Act*;
- the Joint Review Panel's Report; and
- such other matters as the Minister considers relevant to his or her decision.

Section 2 of Ontario's *Environmental Assessment Act*, states:

The purpose of this Act is the betterment of the people of the whole or any part of Ontario by providing for the protection, conservation and wise management in Ontario of the environment. R.S.O. 1990, c. E.18, s. 2.

The Panel, in making their recommendations to the Minister, have given careful consideration to this purpose. Section 26.2 of this Panel report documents information received for the justification of the Project. As indicated in Section 26.2, there would be economic, employment and social benefits of this proposed Project that contribute to the betterment of the people of Ontario. However, the benefits may not be equitably experienced amongst the communities where this Project is proposed. Specifically, Indigenous communities that have occupied the lands since time immemorial, would experience adverse effects. These effects are well documented in this Panel report and in the submissions from the joint federal-provincial Crown Consultation Team. Most notably, the Project is proposed for an area within the Exclusive Territory of the Biigtigong Nishnaabeg. The Panel recommends, if the Minister decides this Project should go ahead, that the measures identified in this report that support the betterment of the Biigtigong Nishnaabeg and other Indigenous Peoples affected by the Project are adopted. These recommendations are set out in Section 18 (Socio-economic Environment), Section 21 (Effects on Indigenous Peoples) and Section 22 (Indigenous Rights).

In accordance with their Terms of Reference, the Panel is to identify any measures to enhance any beneficial environmental effects, which includes socio-economic effects. The Panel concludes that the creation of employment opportunities for underemployed segments of the workforce can be considered an enhancement measure.

The purpose of the *Environmental Assessment Act* is also to provide for the protection, conservation, and wise management in Ontario of the environment. In their report, the Panel has fully considered the Proponent's EIS and EIS Addendum, commitments as set out in Appendix 2 of this document, and all other information obtained during the assessment by the Joint Review Panel.

The Panel is of the view that should the provincial Minister of the Environment, Conservation and Parks decide to approve the Project, it will be with the understanding that the Project is likely to cause significant adverse effects, which by definition are adverse effects that cannot be fully mitigated.

To minimize the adverse effects from the Project, recommendations have been set out in this Panel report for the Proponent and both levels of government. The Panel recommends, if the Minister decides to approve the Project, that the full set of recommendations that fall within the provincial government's jurisdiction be implemented. The Panel further notes that the recommendations should inform future provincial permitting and approval processes as appropriate.

26.4 CONCLUDING REMARKS

This concludes the Panel's report. This report has been authored by the Joint Review Panel and represents our collective views and determinations.

The Panel's report is based on evidence and information provided up to May 19, 2022, when the Project record was closed. The Panel has included their rationale, conclusions, and recommendations for mitigation measures and requirements for follow-up programs.

The recommendations identified by the Panel should be considered collectively. For example, the Panel's recommendations relating to surface water quality also serve to mitigate effects on fish and fish habitat, human health, and Indigenous Peoples. The exclusion of any of these recommendations may result in a change to the Panel's conclusions on the significance of adverse effects.

Throughout the review process, the Panel was inspired by the level of engagement that participants demonstrated, in particular the dedicated and sustained efforts of Indigenous communities with the Proponent and all levels of government to address their collective concerns. The Panel would encourage the continuation of these collaborative efforts and respectfully urges a whole-of-government approach to similar initiatives in order to identify and

address the multiple interests of all parties prior to and throughout the environmental assessment process.

The Panel would like to extend our thanks to the Secretariat for their professionalism, expertise, boundless effort and resilience over almost two years. This group of individuals collectively enabled the Panel to carry out its mandate and facilitated each and every detail of the process review to allow for a timely conclusion.

Finally, we extend our sincere thanks to all participants for their commitment to this review process. We are deeply grateful for the dedication that was required to review the extensive material, provide comments and technical reviews, and/or present at the public hearing. This is especially noteworthy due to the extensive effort required of all parties to orchestrate their involvement during a public health pandemic, balancing the needs for effective and sustained participation and keeping their communities protected. The Panel acknowledges the personal and professional accommodations that took place and we are truly thankful.

APPENDIX 1: BIOGRAPHIES OF PANEL MEMBERS

MS. DEBRA SIKORA (PANEL CHAIR)

Debra Sikora retired in 2019 after more than 30 years with the Ontario Public Service. A graduate of the University of Toronto in 1981 with a Bachelor of Applied Science in Geological Engineering, Debra began her early career working in the mining industry in Ontario prior to joining the Public Service.

Debra held various executive positions in the last 20 years at the Ministries of Environment and Climate Change and Agriculture, Food and Rural Affairs. As Assistant Deputy Minister of Food Safety and Environment Division, Debra was responsible for oversight of the development and delivery of programs in support of agricultural stakeholders. Her teams led the implementation of Agricultural Environmental programs including those supporting specific remediation activities within the Great Lakes as part of the Great Lakes Protection Act and the Great Lakes Water Quality Agreement. Working with multiple provincial, federal and international partners and a dedicated science unit, she led various regulatory programs responsible for the delivery of safe food and the health of animals in Ontario.

Working in the Ministry of Environment and Climate Change, Debra was the Assistant Deputy Minister of the Corporate Management Division and the Ministry's Chief Administrative Officer. She supported strategic change and transformation initiatives as executive lead for the Corporate Division. From 2013 – 2021 Debra served as a Board Member with the Ontario Clean Water Agency and from 2017 – 2020 as a Commissioner with the Ontario Northland Transportation Commission. Debra has worked with multiple stakeholders and jurisdictions throughout her career forging positive working relationships and developing inclusive programming.

MS. LAURIE BRUCE

Ms. Laurie Bruce is an environmental planner with over 30 years of experience. During her career, Laurie has drawn on her knowledge and skills as an environmental assessment (EA) and public consultation specialist to ensure that legislative requirements are being addressed by proponents and government agencies. She has carried out the role of EA reviewer, strategic adviser, EA manager and public consultation specialist for a wide range of projects subject to the *Canadian Environmental Assessment Act*, *Impact Assessment Act* and/or the *Ontario Environmental Assessment Act*. As an EA practitioner, Laurie has extensive experience with the interpretation of technical information and the application of EA practices such as multi-criteria decision-making, identification of net effects and the assessment of cumulative effects. Laurie

has frequently been retained by government agencies to assist with the development of EA related policies, guidelines and training programs.

From 2014-2021 Laurie was a part-time adjudicator with the Ontario Environmental Review Tribunal and the Local Planning Appeal Tribunal (now collectively the Ontario Land Tribunal).

Laurie holds a Bachelor of Environmental Studies from the University of Waterloo and a Master of Arts and Certificate in Corporate Social Responsibility from the University of Toronto.

MS. GAY DRESCHER

Ms. Drescher has a comprehensive background in the regulation and practice of environmental impact assessment at the federal and provincial levels. As a provincial regulator, she has chaired many intergovernmental committees in the review of large-scale natural resource projects. She has extensive experience in community engagement and has supported First Nation communities in developing land use planning tools. In her career, Ms. Drescher chaired the Canadian Standards Association Technical Working Group for a national environmental assessment standard, presented on environmental assessment related topics nationally and internationally and taught at the university level. She is currently Chair of the Professional Standards Committee for the Planning Profession in Canada which is developing national competency standards for land use planners. She is also Vice President of the New Brunswick Association of Planners.

Ms. Drescher holds a Master of Environmental Studies from Dalhousie University, a certificate in Regulatory Studies from Michigan State University and is a Registered Professional Planner and a Member of the Canadian Institute of Planners. She is co-founder and partner with Alliance Planning and Environmental Consulting Inc., a boutique consultancy based in New Brunswick.

APPENDIX 2: UPDATED TABLE OF COMMITMENTS

Table 8.1: Updated Table of Commitments

Commitment	Timing
ENVIRONMENTAL MONITORING AND MANAGEMENT PROGRAM (EMMP)	
<p>GenPGM'S EMMP is intended and will be designed to:</p> <ul style="list-style-type: none"> • Maintain compliance with applicable performance standards (e.g., limits and requirements imposed or a result of approval of this EIS and subsequent federal and provincial permits and approvals) • Verify the predicted effects and effectiveness of mitigation measures • Reduce risk of potential accidents and malfunctions • Provide a structure for the implementation of an adaptive management strategy • Streamline program and subsequent plans to meet applicable Federal and Provincial regulatory requirements and informed by agreements and through consultation with Indigenous communities and the Town of Marathon 	<p>Conceptual EMMP developed through the EIS Addendum will be refined through detailed design and applicable permits and approvals. An EMMP will be in place prior to the commencement of construction. The EMMP will be amended and updated periodically through the life of the Project.</p>
<p>Management Plans will be developed and implemented for:</p> <ul style="list-style-type: none"> • Waste and recycling material management – details the segregations, storage and disposal of materials to be in compliance with Regulation 347 under the <i>Environmental Protection Act</i> • Access management – details access protocols for non-employees to travel from the Gate House to the north of the SSA • Concentrate transfer station (rail load-out facility) management – details operational procedures and mitigations to reduce noise and dust generation under an Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR) in accordance with the <i>Environmental Protection Act, Ontario Regulation 419/05 and Guideline A-7</i> • Tailings (process solids) impoundment operations – details operational procedures and mitigations to be employed for the safe storage of Type 2 material under an ECA or EASR in accordance with the <i>Environmental Protection Act</i> and the <i>Ontario Water Resources Act</i>. The construction of the PSMF Dam will also need to be in accordance with Ontario Regulation 454/96 of the <i>Lakes and Rivers Improvement Act</i> • Materials handling (non-mined materials) – details operational procedures and mitigations for the proper storage of explosives, fuels and other hazardous substances. A Licence for a Factory and Magazine for Explosives will be required in accordance with the <i>Explosives Act</i>. A Licence to Operate a Bulk Storage Plant will be required for the storage of fuels in accordance with the <i>Technical Standards and Safety Act</i> • Emergency preparedness and response – details operational procedures and mitigations to be enacted in the event of an emergency • Erosion prevention and sediment control – details the mitigation measures to be implemented to prevent erosion of disturbed soils and to prevent sediment transport from the site. This plan will be prepared taking guidance from the Ontario Provincial Standard Specifications for Temporary Erosion and Sediment Control Measures (OPSS 805) and guidance from the <i>Environmental Protection Act</i> and <i>Ontario Water Resources Act</i> - details the operations practices and mitigations to be employed to manage and to prevent the release of sediment • Fish Habitat Offsetting Strategy and Compensation Plan – details the measures to be employed to provide an offset for the permanent alteration and loss of fish habitat in accordance with the <i>Fisheries Act</i> subsection 35(2) and Section 27.1 of the <i>Metal Mining Effluent Regulations</i> • Atmospheric quality management – details the mitigation measures to be implemented to reduce Project-related effects to air quality and noise. An Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR) will be obtained in accordance with the <i>Environmental Protection Act, Ontario Regulation 419/05 and Guideline A-7</i>, including: <ul style="list-style-type: none"> ○ Air quality management ○ Noise management (including noise and vibration) • Water Management – details the mitigation measures to be implemented to reduce Project related effects to surface and ground water. An Environmental Compliance Approvals (ECA) or Environmental Activity and Sector Registry (EASR) for industrial sewage will be obtained in accordance with the <i>Ontario Water Resource Act</i>: <ul style="list-style-type: none"> ○ Surface water management (including quality and quantity) ○ Groundwater management • Acid Rock Drainage / Metal Leaching (ARD/ML) management – details the management and mitigation measures for Type 2 materials. An Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR) for industrial sewage will be obtained in accordance with the <i>Ontario Water Resources Act</i> Vegetation management (including invasive species) – details the mitigation and approach to removing and managing vegetation. A Forest Resource Licence will be required for removal of trees on Crown land • Wildlife and Species at Risk management - details the management strategies and mitigations to manage wildlife and species at risk. Vegetation removals will be conducted in accordance with the <i>Migratory Bird Convention Act</i> and the Habitat Management Guidelines for Bats of Ontario (MNR). Bat boxes will be installed in accordance with the Best Management Practices for Bats in British Columbia. A Scientific Collection Permit For Initial Wildlife relocation will be required in accordance with the <i>Fish and Wildlife Conservation Act</i>. An Overall Benefit Permit as per Section 17(2)C of the <i>Engendered Species Act</i> may be required • Reclamation and closure - details regarding the mine closure plan will be required in accordance with Ontario Regulation 240/00 of the <i>Mining Act</i> • Soil salvage and storage – details the storage and management strategies for overburden and soil within the mine site. This plan will need to comply with Ontario Regulation 406/19, On-Site and Excess Soil Management • General construction and operations management – details construction and operations procedures including various mitigation practices to reduce potential Project-related effects • Spills Prevention and Response Plan - details mitigation measures and response procedures in the event of a spill. This plan should consider Ontario Regulation 675/98 	<p>Conceptual information on these programs is provided in the original EIS (2012), responses to IRs, SIRs, and AIRs, and as updated to reflect project design changes in Chapter 1 (EIS Addendum Vol 1) and Chapter 7 of this EIS Addendum (Vol 2).</p> <p>Further, program details to be developed in consultation with applicable regulatory agencies and stakeholders after the EA process either as part of permitting, prior to commencement of Site Preparation and Construction. These management plans will be refined throughout the life of the Project, as necessary, as part of the various follow-up and monitoring programs.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<ul style="list-style-type: none"> Occupational health and safety - details the health, safety, security, and environmental practices that are to be followed by employees. Plan will be developed in accordance with the <i>Occupational Health and Safety Act</i>. <p>Follow-up and monitoring programs will be developed and implemented for:</p> <ul style="list-style-type: none"> atmospheric environment (including air quality, noise, and greenhouse gases) groundwater (including levels and quality) surface water (including quality and quantity) sediment and benthos fish and fish habitat (including mitigation and compensation measures) soils and terrain (including soil quality and geotechnical stability) vegetation (including invasive and noxious plants) wildlife (including wildlife mortality and encounters) migratory birds (including conformity with the <i>Migratory Bird Convention Act</i>) species at risk (including Woodland Caribou use) socio-economics (including demography and community services / infrastructure usage) human health (including connection to the air, surface water and groundwater programs) country foods (including blueberries, fish, and moose) archaeological and heritage resources <p>Indigenous land use and rights, Indigenous employment and contracting, country foods, and archaeological resources will be monitored as part of the EMMP by GenPGM and in partnership with Biigtigong Nishnaabeg, the Town of Marathon and other Indigenous groups impacted by the Project.</p> <p>*see updated Monitoring and Follow Up Plan table included as attachment A</p>	<p>Conceptual information on these programs is provided in the original EIS (2012), responses to IRs, SIRs, and AIRs, and in Chapter 7 of this report.</p> <p>Further, program details to be developed in consultation with applicable regulatory agencies and stakeholders after the EA process either as part of permitting, prior to commencement of Site Preparation and Construction or, in the case of socio-economics, in consultation with the Town of Marathon and Biigtigong Nishnaabeg.</p>
INDIGENOUS CONSIDERATIONS	
<p>All commitments made for the Project are proposed to reduce potential adverse environmental and social effects of the Project that could adversely affect Indigenous communities and people. With regard to Indigenous communities potentially affected by the Project, GenPGM will:</p> <ul style="list-style-type: none"> Inform the design through consultation with communities, consideration of traditional knowledge/TLRU reports provided by communities and reduced the mine's physical footprint Inform the design through Biigtigong Nishnaabeg Travel Route Mapping Survey, if available, to reduce conflict between mine design and existing travel routes Maintain access to the Pic River via Camp 19 Road and to Bamooos Lake via the existing trail through Hare Lake for the duration of the Project Develop a protocol prior to construction for use of the initial portion of the Camp 19 Road from which there is access to the Pic River and other travel corridors used to access areas for traditional wildlife, fish and plant harvesting Provide escorted access through the SSA during construction and operations when safety permits, to the extent possible Develop a communications protocol prior to the construction with Biigtigong Nishnaabeg for reporting of any road mortality of large mammals along the access road Design and operate the mine and associated infrastructure to reduce environmental effects (including the various measures described in this table) with a focus on water and waterbodies identified by Indigenous communities as VECs, fisheries, and air quality Provide appropriate accommodation for impacts to traditional land and resource use, prior to restricting access to the SSA Offer education and training programs, as well as apprenticeships, to build capacity and increase employability and job ready skills to support Indigenous workers and females and offer employment opportunities to Indigenous workers and females, throughout the life of the Project Work with economic development groups of Indigenous communities to increase contracting opportunities for qualified and cost-competitive bids, throughout the life of the Project Establish environmental committees with representation from identified Indigenous communities, the Town of Marathon, and other relevant stakeholders. These committees will be used for engagement through the permitting process and throughout the life of the Project. These committees have been established and will continue to operate throughout the life of the Project Offer training, participation, development, and implementation of environmental monitoring programs for the duration of monitoring activities Ongoing Indigenous consultation on the results of the mine environmental effects monitoring (EEM) program through the various Environmental Committees, throughout the life of the Project Engage with Biigtigong Nishnaabeg to support the following proposed Crown accommodation measure "Support and funding of a social service plan and targeted health services plan" (CIAR# 1083, PDF 80) for Biigtigong Nishnaabeg members who are employed through the Project Engage with Biigtigong Nishnaabeg to identify solutions to the impacts of the Project on community infrastructure and social services to help minimize negative impacts. Include the soils and terrain, vegetation, wildlife and fish, and fish habitat monitoring programs to monitor the potential impacts of the Project on human health and establish rigorous baselines for metal concentrations in foods and medicines of importance to Biigtigong Nishnaabeg 	<p>Throughout mine life, as appropriate</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<ul style="list-style-type: none"> Develop, in consultation with Biigtigong Nishnaabeg, and other relevant authorities as may be determined by GenPGM and Biigtigong Nishnaabeg from time to time, a follow-up program to verify the accuracy of the effects assessments predictions as they pertain to adverse environmental effects on human health caused by changes in concentrations of contaminants of potential concern in country foods, based on completed baseline testing and additional monitoring Develop, in consultation with Biigtigong Nishnaabeg, and other relevant authorities as may be determined by GenPGM and Biigtigong Nishnaabeg, a sampling program to assess concentrations of contaminants of potential concern in country foods to monitor for future human health assessments. Develop and implement, in collaboration with Biigtigong Nishnaabeg, a country foods monitoring program Implement a Harvester Training Fund to support annual harvests and trapline training programs, Provide reasonable support to Biigtigong Nishnaabeg to secure a replacement for the community Trapline TR-022 Develop, in collaboration with Biigtigong Nishnaabeg, a socio-economic management and monitoring plan (SEMMP) to measure and mitigate the socio-economic impacts of the Project on Biigtigong Nishnaabeg Engage with Biigtigong Nishnaabeg to support the proposed Crown accommodation measure and Crown funding to “Create a bypass road (Gaffhook Lake Access), with access controlled by Biigtigong” (CIAR# 1083, PDF 57) Engage with Biigtigong Nishnaabeg to determine and implement monitoring and mitigation effects for potential effects to species of high importance to Biigtigong Nishnaabeg Continue and progress discussions relating to community arrangements and benefit agreements with Biigtigong Nishnaabeg and other identified Indigenous communities <p>Other measures, as appropriate, that may result from ongoing engagement and agreements with Indigenous communities affected by the Project.</p>	
WASTE AND RECYCLING MATERIAL MANAGEMENT PROGRAM (WRMMP)	
<p>GenPGM will develop and implement a WRMMP that will describe the Project’s waste storage and disposal infrastructure, which includes the following components:</p> <ul style="list-style-type: none"> Solid non-hazardous waste disposal will be directed to the Town of Marathon Landfill A material storage area, which allows storage of all recyclable and potentially re-usable items that will ultimately be shipped off site A special waste storage area to handle certain wastes; for example, waste oil, oil filters, diesel fuel, anti-freeze, solvents, and lubricants (and containers in which they are contained), aerosol containers, hydraulic hoses and batteries prior to shipment off site Proper on-site management and off-site disposal of food refuse, lubricants, and other waste that may be attractive to wildlife. A hazardous waste area, which allows for temporary storage of all hazardous waste materials that will ultimately be shipped off site A sewage system to manage sewage on site <p>This plan will be prepared in accordance with Regulation 347 under the <i>Environmental Protection Act</i>.</p> <p>On-site waste facilities will follow standard environmental protection measures; hazardous wastes will be stored in secondary containment, will be constructed to reduce footprint, and drainage will be managed within the PSMF.</p> <p>Procedures and policies for the storage, transport and disposal of waste and recycling materials will be developed as part of the WRMMP. Waste management policies will be developed to meet current waste management legislation.</p>	<p>WRMMP to be developed prior to commencement of Site Preparation and Construction and to be implemented for the life of the Project.</p>
MATERIAL HANDLING (NON-MINED MATERIAL)	
<p>To mitigate the potential for an incident involving hauling concentrate, GenPGM will:</p> <ul style="list-style-type: none"> Retain appropriately licensed or trained operators both for long distance transport of concentrate and for on-site haul trucks Post and monitor speed limits along the site access road and roads within the site Follow up with contractors/employees on reports of haul trucks travelling at excessive speeds Equip trucks with soft covers to prevent dusting during transport Require all trucks to have a means of communicating with the Project site or their dispatch 	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential of a chemical release during transport, GenPGM will:</p> <ul style="list-style-type: none"> Only allow licensed companies to deliver to site Require third-party contractors to have active service agreements with licensed release response contractors Require all drivers to have appropriate training, including release response training Require all trucks to have appropriate communication capabilities Maintain vehicles and equipment operated by GenPGM that are used to transport chemicals Post and monitor speed limits on the site access road and on-site roads 	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential of a fuel release during transport, GenPGM will:</p> <ul style="list-style-type: none"> Only contract appropriately licensed companies and drivers to deliver to site Require third-party contractors to have active service agreements with licensed release response contractors Require all on-site drivers to be appropriately trained, including release response training Require all trucks to have appropriate communication capabilities Maintain vehicles operated by GenPGM 	<p>Throughout mine life as appropriate.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<ul style="list-style-type: none"> Post and monitor speed limits on the site access road and roads within the site and will follow-up with any reports of excess speed <p>To mitigate the potential of a fuel release from on-site storage, the facilities will contain the following design features:</p> <ul style="list-style-type: none"> Fuel storage areas (excluding small containers moveable by hand) will be isolated from watercourses, waterbodies and other sensitive environments by a minimum of 100 m Areas used for day tanks will have been previously cleared to facilitate site development and will be isolated from sensitive features Fuel storage equipment will comply with applicable legislative requirements Tanks will have secondary containment and/or will be double-walled with collision protection The main fuel farm will have lined aprons and collection catchments Release response equipment will be maintained on site Operational procedures will be posted at all storage facilities A high-level alarm will be placed on Project storage tanks (or an equivalent approach will be provided), so that that the operators are made aware of the fill level during filling operations Automatic shut-off valves and other such equipment will be installed to further reduce the risk of spills during fuel transfer operations <p>Fuel storage will be licensed as a Bulk Storage Plant in accordance with the <i>Technical Standards and Safety Act</i>. Details regarding the safe handling and storage of fuels on site, and the measures to be followed in the event of an accidental spill, will be defined in an Emergency Preparedness and Response Plan and Materials Handling Plan.</p>	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential of a fuel release during on-site dispensing, GenPGM will:</p> <ul style="list-style-type: none"> Provide fuel dispensing equipment that complies with applicable legislative requirements Require that mobile refueling vehicles are properly maintained and inspected regularly for leaks Maintain suitable setbacks and appropriate containment between portable dispensing equipment and sensitive environmental features Design the main fuel dispensing location with compacted gravel or concrete containment pads with drive-on facilities capable of capturing minor releases Maintain release response equipment on site Develop operational procedures and training materials Install automatic shut-off valves to further reduce the risk of spills during fuel transfer operations <p>Details regarding the safe handling and storage of fuels on-site, and the measures to be followed in the event of an accidental spill, will be defined in a Materials Handling Plan (per EMMP) and EPRP.</p>	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential of an explosives incident, GenPGM will:</p> <ul style="list-style-type: none"> Follow appropriate regulatory requirements, including the installation of chain-link fencing surrounding the explosives facility If a third-party contractor is employed, they would be licensed to operate the storage facility and/or manufacturing plant, as well as using specifically designed secure storage magazines for blasting accessories Follow good housekeeping practices Develop explosives storage, handling, and blasting procedures and train personnel appropriately Provide suitable protection for above ground fuel tanks used in the explosives manufacturing process in accordance with Subsection 4.3.7 of the National Fire Code of Canada (2015) <p>Explosives handling will be in accordance with the <i>Explosives Act</i> and a Licence for a Factory and Magazine for Explosive will be obtained. Details regarding the safe handling and storage of explosives will be defined in procedures.</p>	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential of a chemical release within the mine site, GenPGM will:</p> <ul style="list-style-type: none"> Construct buildings or structures for chemical storage that include sealed floors and sumps or drains and collection tanks to contain material released to ground Establish on-site transport routes with consideration of appropriate setbacks from environmentally sensitive features Store and handle all chemicals as appropriate according to material safety data (MSD) sheet information Appropriately train (e.g., WHMIS) all personnel handling chemicals <p>Details regarding the safe handling and storage of chemicals on site and the measures to be followed in the event of an accidental spill will be defined in a Materials Handling (non-mined materials) Plan (per the EMMP) and EPRP.</p>	<p>Throughout mine life as appropriate.</p>
EMERGENCY PREPAREDNESS AND RESPONSE PLAN (EPRP)	
<p>GenPGM will develop and implement an EPRP in accordance with appropriate federal and provincial regulations that will include the following elements:</p> <ul style="list-style-type: none"> An emergency response policy – a concise policy that highlights the company’s commitment to and support for the EPRP Roles and responsibilities – the identification of those responsible for emergency preparedness and response plan coordination and planning An emergency identification, prevention and protection process – the EPRP will define resources as necessary to identify potential emergency situations that may arise and document appropriate prevention and protection measures An emergency notification procedure – a procedure to notify required personnel in the event of an emergency - will be in place 	<p>EPRP to be developed in consultation with the Town of Marathon, Biigtigong Nishnaabeg and emergency service providers prior to commencement of Site Preparation and Construction.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<ul style="list-style-type: none"> The designation of an emergency management centre – the physical location of the emergency management centre will be identified, and its location and telephone numbers shall be noted The definition of duties and responsibilities of mine personnel – key emergency personnel will be named as individuals or named as per their job titles and their corresponding duties and responsibilities will be outlined An evacuation plan – including escape routes and muster areas A crisis communication plan – the EPRP will outline the means of communication in the event of an emergency or crisis A training plan – a training plan for all individuals named in the emergency procedures will be developed and implemented so that key personnel will know how to react A continual improvement plan – the EPRP will be updated periodically according to standard industry practice and/or legal requirements as appropriate <p>Engage with Biigtigong Nishnaabeg and the Town of Marathon to jointly create a coordinated Emergency Response Plan relating to the Project.</p>	
<p>To mitigate the potential of project-related fires, GenPGM will:</p> <ul style="list-style-type: none"> Install fire detection and alarm systems, where appropriate Co-ordinate with local emergency response services Design fire protection systems consistent with applicable codes and regulations Equip remote buildings with portable extinguishers Have a pumper truck on site equipped with a foam generation system Prepare a fire response plan and conduct regular fire drills <p>Details regarding fire safety, prevention and response will be defined in the EPRP.</p>	Throughout mine life as appropriate.
<p>To mitigate the potential for a process solids slurry or reclaim water pipeline failure, GenPGM will:</p> <ul style="list-style-type: none"> Specify that the pipeline design considers appropriate safety factors Route the pipelines in a manner that allows for access and inspection Regularly inspect the pipeline Position pipelines, where possible, to direct a release resulting from a failure into the PSMF or other means of containment Route pipelines away from sensitive environmental features, where practical Install emergency catchment features (e.g., berms, ditches and catch basins) to manage the risk of failure that may result in the release of material to a sensitive environmental feature Install a telemetric flow meter on the pipeline to monitor real-time pipeline flow rates <p>An ECA or EASR for industrial sewage in accordance with the <i>Environmental Protection Act</i> and the <i>Ontario Water Resources Act</i> will be obtained. Details regarding the measures to be followed in the event of a process solids slurry or reclaim water pipeline failure will be defined in the EPRP.</p>	Throughout mine life as appropriate.
<p>To mitigate the potential release of water from the MRSA Catch basins due to pipeline failure, GenPGM will:</p> <ul style="list-style-type: none"> Connect the pump system to the backup power system Develop a regular maintenance and inspection program for pump equipment Locate replacement pumps on-site in the event of pump failure <p>An ECA or EASR for industrial sewage in accordance with the <i>Environmental Protection Act</i> and the <i>Ontario Water Resources Act</i> will be obtained.</p>	Throughout mine life as appropriate.
ACCESS MANAGEMENT	
<p>To provide and manage access to the mine site, GenPGM will:</p> <ul style="list-style-type: none"> Construct a new site access road joining the mine to Camp 19 Road Construct and operate a site guard house (security) and gate near the entrance to the mine site, which will be staffed 24 hours a day, to restrict access to the site. Maintain access to the Pic River via Camp 19 Road and to Bamooos Lake via the existing trail through Hare Lake Implement a routine inspection program for Camp 19 Road during construction and periodically over the life of the Project Develop a procedure for escorted access through the SSA to areas north of the mine site. This procedure will be developed prior to access being restricted to the SSA and will remain in place until operations cease, and the site is considered safe for public access 	Throughout mine life as appropriate.
CONCENTRATE TRANSFER STATION (RAIL LOAD-OUT FACILITY) MANAGEMENT	
<p>If the rail load-out option is selected, it will contain the following design features:</p> <ul style="list-style-type: none"> A concentrate storage building that is enclosed Equip trucks with soft covers to prevent dusting during transport Unload concentrate either by bottom dumping from the bottom of the trailer or as a side tip arrangement directly onto a concrete floor slab. Concentrate will be transferred to rail cars with a dedicated rubber-tired loader that remains within the load-out facility Drainage capture points to hold spills or overfills at the facility An appropriate setback distance and engineered controls to meet applicable air and noise criteria 	Throughout mine life as appropriate.

Table 8.1: Updated Table of Commitments

Commitment	Timing
<p>To reduce potential noise and vibrations associated with the rail load-out facility, specific mitigation strategies will be implemented such as:</p> <ul style="list-style-type: none"> • Coupling concentrate rail cars at the rail load-out facility only during the daytime hours of 7:00 am to 7:00 pm • Limiting coupling of concentrate rail cars to allow the rail carrier to complete a pickup • Only couple concentrate rail cars in the zones where compliance with applicable NPC-300 impulsive noise criteria can be met 	<p>Throughout mine life as appropriate.</p>
TAILINGS (PROCESS SOLIDS) IMPOUNDMENT OPERATIONS	
<p>To mitigate the potential for unanticipated seepage from the PSMF, GenPGM will:</p> <ul style="list-style-type: none"> • Design the upstream surface and bedrock interface of the PSMF to be appropriately lined or sealed to decrease dam permeability, more specifically: <ul style="list-style-type: none"> ○ Install HDPE liner or better technology on upstream face of embankments where designed ○ Appropriately anchor liner material to manage seepage between the liner and permeable bedrock • Clean and inspect bedrock surfaces and treat them with slush grout where required • Develop a process solids deposition plan and management strategy aimed at maintaining potentially reactive Type 2 material in a saturated state to prevent oxidation • Monitor seepage during and after operations, pursuant to the Water Monitoring Plan • Install seepage collection basins and ditches along the downstream toes of dams to intercept seepage water and runoff water from the embankments • Install groundwater monitoring wells downgradient of the PSMF <p>An ECA or EASR for industrial sewage in accordance with the <i>Environmental Protection Act</i> and the <i>Ontario Water Resources Act</i> will be obtained. Details regarding the design of the PSMF, including associated tailings impoundment operations and ARD/ML management, will be defined in the Operations, Maintenance and Surveillance Manual for the PSMF (per the EMMP)</p>	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential of a PSMF slope failure, conservative design criteria and design safeguards have been incorporated into the PSMF including:</p> <ul style="list-style-type: none"> • A design that meets or exceeds the requirements of the <i>Lakes and Rivers Improvement Act</i> and the Canadian Dam Association safety guidelines • Maintain an Engineer of Record for dam construction, raises and operation • Spillway design to allow controlled release of the intensity-duration-frequency (IDF) during all PSMF development stages • Install survey monuments on the crests of the embankments to monitor for potential settlement and/or movement and monitoring phreatic surfaces within the embankments • Reduce free standing water behind dam structures at closure • Complete dam safety inspections at appropriate intervals • Develop and implement an Operations, Maintenance and Surveillance Manual detailing regular monitoring, inspection and reporting requirements and emergency response measures in the event of upset operating conditions • Establish an Independent Tailings Review Board and engage Biigtigong Nishnaabeg in this effort • Sharing the Engineer of Record Dam Breach Assessment with Biigtigong Nishnaabeg <p>Details regarding the design of the PSMF and geotechnical stability will be defined in the design summary report for the PSMF.</p>	<p>Throughout mine life as appropriate.</p>
EROSION AND SEDIMENT CONTROL	
<p>To mitigate adverse effects on erosion and sediment in receiving watercourses, including effects on sediment quality and benthos, GenPGM will:</p> <ul style="list-style-type: none"> • Reduce the potential loss of aquatic habitat through mine design by reducing the level of interaction between aquatic habitat features and Project infrastructure • Comply with water discharge requirements as defined in the Metal and Diamond Mining Effluent Regulations (MDMER) and Environmental Compliance Approval (provincial) • Employ standard management practices for erosion control such as: <ul style="list-style-type: none"> ○ Isolating disturbed areas with sediment fences, sediment curtains, or similar structures ○ Maintaining appropriate work area setbacks from surface water features ○ Grading and/or covering surfaces to reduce erosion potential ○ Controlling run-off from erosion-sensitive features ○ Providing settling ponds or basins in which solids can be collected (i.e., WMP and SWM Pond) ○ Promptly stabilize shoreline or banks disturbed by activities associated with the Project to prevent erosion and/or sedimentation, preferably through revegetation with native species appropriate for the site <p>Details regarding the management of sediment quality and measures to protect benthos will be defined in the Water Management Plan and the Erosion and Sediment Control (ESC) Plan.</p>	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential of an MRSA slope failure and release of mine rock to the Pic River, the MRSA design criteria and safeguards will include:</p> <ul style="list-style-type: none"> • Slope angles that do not exceed the natural angle of repose and maintain a suitable factor of safety as defined by a professional engineer • Utilization of the natural site topography to support and contain the MRSA • Foundation will consist of bedrock or suitably competent material • Adequate setback from the Pic River 	<p>Throughout mine life as appropriate.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
Details regarding the design of the MRSA and geotechnical stability will be defined in the design summary report for the MRSA (per the EMMP)	
FISH AND FISH HABITAT	
<p>To mitigate and compensate for adverse effects on fish and fish habitat, GenPGM will:</p> <ul style="list-style-type: none"> • Develop and implement an offset plan under Section 35(2) and Section 27.1 of MDMER of the <i>Fisheries Act</i> to offset project-related effects to fish and fish habitat and restoration of Streams 2, 3 and 6 after closure. This plan will be developed and accepted by DFO prior to the removal of fish habitat and will contain an implementation schedule. • Apply culvert design, installation and maintenance that follows and conforms to appropriate DFO and MNRF operational statements, guidance, interim codes of practice, and protocols including: <ul style="list-style-type: none"> ○ Sizing culverts to convey water under high flow conditions ○ Maintaining fish passage during low flow conditions ○ Embedding the culverts to allow the creation of natural substrates • Implement PSMF discharge pipeline design that follows and conforms to appropriate DFO and MNDMNRF operational statements, guidance and protocols including but not limited to: <ul style="list-style-type: none"> ○ Scheduling the constructing and decommissioning work to coincide with times of year that reduce risk to resident fish species as necessary (i.e., fisheries timing windows) ○ Avoiding where possible or maintaining setbacks and buffers from sensitive features, where necessary ○ Isolating access and work areas with temporary sediment control features such as berms and providing for the collection of drainage from disturbed areas ○ Restoring disturbed areas as soon as is practical following disturbance ○ incorporate an end-of-pipe screen compliant with the DFO guidelines, or a screen design otherwise approved by DFO • Implement management practices for work around water including: <ul style="list-style-type: none"> ○ Avoiding where possible or maintaining setbacks from sensitive features ○ Isolating work areas via temporary berms ○ Providing for the collection of drainage from disturbed areas in channels and settling basins ○ Restoration of disturbed areas as soon as is practical following disturbance • Implement management practices for work in water including: <ul style="list-style-type: none"> ○ Avoiding using explosives in or near water. Where this is necessary use the guidelines for the DFO <i>Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters</i> (Wright and Hopky 1998) to identify appropriate setback distances to avoid lethal or sub-lethal effects to fish ○ Planning in-water work, undertaking or activity to respect timing windows to protect fish, including their eggs, juveniles, spawning adults, the organisms upon which they feed and migrate. ○ Where possible conduct instream work during periods of low flow (e.g., summer or winter) to further reduce the risk to fish ○ Whenever possible, operate machinery on land above the high-water mark, on ice, or from a floating barge in a manner that limits disturbance to the banks and bed of the waterbody ○ Adherence, as applicable, to the Interim Code of Practice for Temporary Cofferdams and Diversion Channels (DFO, 2020) ○ Prior to commencement of work, prepare and execute a fish salvage plan in discussion with responsible authorities • Water takings from local surface waters would incorporate an end-of-pipe screen compliant with the DFO guidelines, or a screen design otherwise approved by DFO • Limit access to waterbodies and banks to protect riparian vegetation and limit bank erosion • Allow controlled access to Claw Lake for baitfish collection • Focus fish monitoring programs on water bodies such as Pic River extending downstream of the Project site to the mouth of Lake Superior, Hare Lake, the outlet of Hare Creek at Port Munro and Stream 6 (Angler Creek) and the outlet at Sturdee Cove that are important VECs to Indigenous communities and work with associated communities to develop and implement the program. • Incorporate fish tissue sampling into the Country Foods Follow-up and Monitoring program • Incorporate 2021 and 2022 fish tissue sampling data into relevant monitoring programs • Offset the flow reduction and impact to fish and fish habitat in Stream6/Angler Creek in the Fisheries Offsetting and Compensation Plan • Develop and implement a monitoring program with Biigtigong Nishnaabeg for Stream 6/Angler Creek prior to the start of construction to monitor the impact of changes to the watershed, if any, on (a) fish and fish habitat and other aquatic life in Angler Creek/Stream 6, as well as (b) other traditional and cultural uses of Stream 6/Angler Creek by Biigtigong Nishnaabeg • Engage and provide reasonable support to Biigtigong Nishnaabeg in designing community programs for fish and fish habitat offsetting as part of the Fish and Fish Habitat Offsetting and Compensation Plan • Support a Biigtigong Nishnaabeg Fish Hatchery program <p>Details regarding mitigation measures and compensation habitat to offset adverse effects on fish and fish habitat will be defined in the Updated Proposed Fish Habitat Offsetting Strategy and Compensation Plan and will include community-based Projects proposed by BN, PPFN and potentially other communities.</p>	<p>Throughout mine life as appropriate.</p>
ATMOSPHERIC QUALITY MANAGEMENT	

Table 8.1: Updated Table of Commitments

Commitment	Timing
<p>To mitigate emissions of fugitive dust (TSP, PM₁₀, PM_{2.5}), associated metals, and SO₂ emissions, GenPGM will:</p> <ul style="list-style-type: none"> • Maintain all site roadways in good condition, with regular inspections and timely repairs to reduce silt loading on the roads • Implement standard dust suppression activities such as water sprays, regular road maintenance and posting and monitoring of speed limits • Apply water on roads and construction areas when conditions require and / or apply calcium or magnesium chloride to roads seasonally and when initial application is no longer achieving mitigation • Equip the concentrate handling facility with fugitive emission control technology • Load trucks with concentrate, during operation, in a covered environment • Reduce the amount of beach exposed in Cell 2 of the PSMF and mitigate airborne dust by wetting or chemically stabilizing exposed beach areas with polymers and/or “crusting” agents as is safe and practicable • Maintain water cover on Cell 1 in the PSMF during operations • Locate the primary crusher within an enclosed structure with an appropriate dust collection system • Cover the crushed ore stockpile • Install dust collection on the lime delivery, lime slaking and CMC feed bin systems • Control particulate emissions from the assay lab, assay furnace and cupel furnace with dust collectors • Provide scrubbers on the base metals fume hood and the assay lab AA unit • Reclaim, in a progressive manner as reasonable and practicable, exposed surfaces that are dust sources, especially during decommissioning and closure • Use low sulphur diesel for equipment • Implement a fuel use tracking system to identify anomalies in fuel use • Explore green technologies such as use of bio diesel and Trolley Assist • Use and properly maintain equipment that meets Transport Canada off-road emission requirements • Purchase new mining vehicles and mining equipment that meet US EPA Tier 4 emission standards • Implement an idling policy • Monitor air quality and fugitive dust from the site at sensitive receptors, including crystalline silica, nitrogen (NO₂), PM_{2.5} and PM₁₀ and other constituents of potential concern. Monitoring will commence prior to construction • Aggregate crushing systems will include the use of water addition and water sprays to maintain moisture levels to effectively suppress and mitigate the generation of dust • Incorporating design features such as wind breaks to limit fugitive dust emissions • Measure silt content in access and haul roads <p>Details regarding the mitigation and management measures to be implemented to reduce air emissions from mobile and non-mobile equipment will be defined in an Atmospheric Management Plan (per EMMP).</p>	<p>Throughout mine life as appropriate.</p>
<p>To mitigate the potential for effects from noise, GenPGM will:</p> <ul style="list-style-type: none"> • Purchase vehicles and equipment that meet the applicable noise suppression regulations • Prohibit tailgate slams when dumping materials • Schedule concentrate delivery at times of the day to reduce complaints whenever possible • Design curved portions of rail track at the Rail load-out Facility in a manner to reduce wheel squeal • Implement an overpressure and vibration monitoring program on site upon commencement of blasting operations, assessing and modifying the program as site-specific data becomes available. Mitigation measures include but are not limited to modifying blasting techniques, the use of blast mats, altering charge size and blasting frequencies. This plan will be prepared prior to blasting occurring and will be implemented for the course of blasting activities <p>Details regarding the mitigation and management measures to be implemented to reduce noise emissions from mobile and non-mobile equipment will be defined in an Atmospheric Management Plan (per the EMMP).</p>	<p>Throughout mine life as appropriate.</p>
<p>A formal complaints procedure for nuisance noise will be established for stakeholders and Indigenous peoples during the construction, operation, and decommissioning phases of the Project. A response protocol will also be established so that appropriate follow up occurs.</p>	<p>Procedure to be developed prior to Site Preparation and Construction.</p>
<p>To reduce potential light emissions, specific mitigation strategies will be implemented such as:</p> <ul style="list-style-type: none"> • Optimization of lighting design to reduce total amount of lighting needed • Using directional lighting • Using shielded fixtures to reduce glare, reduce sideways and upward light leakage, and light pollution • Affixing fixtures on poles or buildings at the lowest possible height 	<p>Throughout mine life as appropriate.</p>
SURFACE WATER QUALITY AND QUANTITY	
<p>To mitigate adverse effects on surface water quality, GenPGM will:</p> <ul style="list-style-type: none"> • Incorporate field test cells into the monitoring programs to inform water management and closure planning. Field test cells will be used once Run of Mine material becomes available • Protect L8 in situ 	<p>Throughout mine life as appropriate.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<ul style="list-style-type: none"> • Plan activities near water such that deleterious materials including, but not limited to, paint, primers, blasting abrasives, rust solvents, degreasers, grout, or other chemicals do not enter the watercourse • Wash, refuel, and service machinery and store fuel and other materials for the machinery in a manner that prevents deleterious substances from entering the water • Implement a Spill Prevention and Response Plan (SPRP). This plan will be prepared prior to site alteration • For operations, develop and implement appropriate operating practices for explosives and blasting operations to reduce nitrogen residuals in mine water • For operations, collection of water associated with the MRSA and management of these waters so that there will not be a routine discharge to the Pic River. Implement treatment measures so that effluent discharge meets applicable regulatory criteria • For operations, monitor constituent concentrations in MRSA catch basins and increase water transfer rates to WMP if concentrations exceed predicted levels • For operations, monitor and report on PGMs within effluent discharge • Maintaining the water management system in place during the closure phase of the Project until such time that water quality is suitable to release to the environment. • During the active closure phase, monitor pit lake quality as the lakes fills • Monitoring and management/treatment as required so that water discharge objectives are achieved as defined in the Environmental Compliance Approval (provincial) and the <i>Metal and Diamond Mining Effluent Regulations</i> • Work with the associated communities to develop and implement the program and develop a framework to share the results for the purpose of assessing the performance of the water management system. • During operations, use the water collection system for the Process Solids Management Facility (PSMF) to allow water to move south from the Pit to be managed within the PSMF. • Assess, with Biigtigong Nishnaabeg, technically and economically feasible supplemental flow options for Stream 6/Angler Creek during the operations Phase of the Project. Where economically feasible, GenPGM commits to minimize disruptions to Stream 6/Angler Creek during the operations Phase of the Project. • Develop and implement, in conjunction with Biigtigong Nishnaabeg, a site-wide water management plan that provides an integrated framework to manage water quality that includes provision for water management practices for each of the primary site aspects, as well as areas of the site where there is contact water. The overarching goal of the plan is to maintain care and control of water during all mine phases for the purpose of protecting downstream uses (habitats, aquatic biota, use by people and preservation of Aboriginal rights). GenPGM'S environmental monitoring programs will have specific components related to mercury and phosphorus. • Engage with Biigtigong Nishnaabeg in the design and implementation of the mercury monitoring plan and other site-wide water management plans and programs • Obtain Biigtigong Nishnaabeg's approval of mercury monitoring plans. • Develop and implement, in conjunction with Biigtigong Nishnaabeg, focused monitoring programs on waterbodies such as the Biigtig Zibi (Pic River) extending downstream of the Project site to the mouth of Lake Superior, the outlet of Hare Creek at Port Munro and Stream 6 (Angler Creek) and the outlet at Sturdee Cove that have significance to Indigenous communities. These programs will include the collection of surface water, sediment, benthic invertebrates, and fish tissue samples as well as monitoring for mercury, phosphorus, and other indicators of eutrophication, as well as toxicity testing for mill reagents prior to effluent discharge to receiving water bodies. GenPGM will establish reference areas on the Biigtig Zibi (Pic River) and other areas, upstream of the Project, for use in a comparative analysis of results. GenPGM will engage Biigtigong Nishnaabeg in the design and implementation of the water quality monitoring programs and commits to obtaining Biigtigong Nishnaabeg's approval of its proposed monitoring plans and programs. • At all phases of Life of Mine, to implement best practices to prevent mercury methylation, such as stripping organic soils in advance of flooding an area. • At all phases of Life of Mine, to collect additional up-to-date data to adequately characterize impacts to water quality, water resources and fish and fish habitat, specifically for the Biigtig Zibi (Pic River), and subwatershed 101. GenPGM will also monitor watersheds 102, and 103, which are largely overprinted by MRSA. • At all phases of Life of Mine, to collect and update as necessary, a separate pit lake water quality model for each pit lake which considers various scenarios of rate of pit lake infilling, as well as the how other contact water inputs from the site could affect the pit lake models • At all phases of Life of Mine, to engage with and support Biigtigong Nishnaabeg 's water quality and aquatic monitoring efforts, including the development of adaptive management measures and associated triggers. <p>Details regarding the management of surface water will be defined in the Water Management Plan and the Erosion and Sediment Control Plan.</p>	
<p>To mitigate adverse effects on surface water quantity, GenPGM will:</p> <ul style="list-style-type: none"> • Appropriately size water management design features (e.g., retention and collection ponds, drainage infrastructure, ditches) to manage water volumes associated with storm and/or flow events • Design the MRSA Catch basin to have storage capacity for the 1:100-year storm event. • Plan to discharge only that water from the site that is considered excess from a management/need point of view (e.g., recycle and re-use water as much as practical) • Diversion of surface water runoff from undisturbed areas away from disturbed areas • Discharge water from the site in a manner that is consistent with the natural hydrograph of the receiving water body • Monitor the quantity of water taken from Hare Lake, Pic River, or other surface water sources, along with flow triggers, as per PTTW requirements • Monitor the quantity of water discharged from the site • Restore natural drainage patterns to the extent possible at the end of the mine life 	<p>Throughout mine life as appropriate.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<p>Details regarding the management of surface water, including water balance, intake and discharge, will be defined in the Water Management Plan. This plan will include triggers and thresholds for received waterbodies and reference lakes.</p>	
GROUNDWATER	
<p>To mitigate adverse effects on groundwater quantity and quality, GenPGM will:</p> <ul style="list-style-type: none"> • Limit construction footprint (i.e., SSA) to the extent possible to reduce the potential for reductions in groundwater recharge and limit the number of watersheds overprinted by the SSA • Use standard management practices throughout the Project, including drainage control and excavation and open pit dewatering • Use standard construction methods, such as seepage cutoff collars, where trenches extend below the water table to mitigate preferential flow paths • Design the MRSA to increase the amount of runoff and reduce the amount of infiltration through the MRSA, thereby reducing the recharge and loading to groundwater • Monitoring locations will be maintained until the location is no longer required. If a monitoring location/station is no longer required but is identified as part of a regulatory approval, it will only be removed from the monitoring program once the required amendments are approved • Monitor groundwater levels and water quality in monitoring wells upgradient, cross-gradient, and downgradient of the MRSA, open pits, and PSMF, and in nearby key surface water features, to monitor for changes in groundwater quality and flow regime due to Project development • Monitor groundwater levels and water quality in background monitoring wells, through the use of nested groundwater monitoring wells that comprise a screen completed in overburden and shallow bedrock to monitor vertical distribution of groundwater level and quality, as applicable • Conduct a water supply well inventory along the stretch of properties along Highway 17 southwest of the SSA to confirm the number of users, well construction and the existing baseline groundwater quality conditions. This survey will be completed prior to site alteration • Develop a communication plan as part of the monitoring program to notify well users in the event of groundwater trigger thresholds being met • Collaborate with Biigtigong Nishnaabeg to identify any groundwater springs on the east site of SSA that are important to the community for consideration as part of the monitoring program • Complete a water well survey within and adjacent to the SSA to confirm the results of the MECP WWR and PTTW database review 	<p>Throughout mine life as appropriate.</p>
ACID ROCK DRAINAGE AND METAL LEACHING MANAGEMENT	
<p>To properly manage potential acid-generating mine rock, GenPGM will implement a mine rock segregation program that includes the following:</p> <ul style="list-style-type: none"> • Developing a detailed mine rock management strategy centering around the distribution of Type 1 (non-PAG) and Type 2 (PAG) materials, including the selection of materials to be used for mine site construction • Storing Type 2 rock in designated areas to allow for effective drainage management • Stockpiling Type 1 rock in the MRSA and only using Type 1 rock for site construction • Maintaining a sulfur content cut-off percentage of 0.18% that distinguishes Type 1 (non-PAG) and Type 2 (PAG) material • Developing a program of ongoing testing that will be carried out during operations to assess the metal leaching and acid-generating potential of mine rock being removed to confirm water quality predictions • Employ high precision GPS and associated technology on loading units to identify ore grades within the deposit to segregate Type 1 and Type 2 mine rock as it is mined from the open pits • Permanent storage of Type 2 rock in a saturated state to prevent ARD after closure <p>Details regarding the management of ARD / ML will be defined in the EMMP. This plan will be developed prior to potential Type 2 material being mined and will remain in place until operations cease, and all materials have been permanently covered.</p>	<p>Throughout mine life as appropriate.</p>
<p>To properly manage Type 1 and Type 2 process solids in the PSMF, GenPGM will:</p> <ul style="list-style-type: none"> • Sample Type 1 process solids during operations to verify the low sulphur content and confirm material as non-PAG • Separate Type 1 and Type 2 process solids in the Process Plant and manage separately in the PSMF • Permanently store Type 2 material below the water table • Cover Type 2 process solids with a minimum 2 m layer of Type 1 process solids in the PSMF at closure • Run humidity cell tests on Type 1 run-of-mill process solids to confirm water quality predictions • At all phases of Life of Mine, to undertake best efforts to avoid the temporary storage of type 2 waste rock. Where temporary storage is absolutely necessary due to emergency or risk to human health, GenPGM will ensure that type 2 waste rock requiring temporary storage has a storage location with sufficient capacity for the volume of material and that the water management pond has sufficient capacity for the volume of leachate to be collected. <p>Details regarding the management of the PSMF, including associated tailings impoundment operations and ARD / ML management, will be defined in the Operation, Maintenance and Surveillance Manual for the PSMF.</p>	<p>Throughout mine life as appropriate.</p>
VEGETATION MANAGEMENT	
<p>To mitigate adverse effects on vegetation, GenPGM will:</p> <ul style="list-style-type: none"> • Optimize the location of the site infrastructure (e.g., pit development, aggregate and rock fill supply) and size of the footprint to reduce the potential effects on the environment 	<p>Throughout mine life as appropriate.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<ul style="list-style-type: none"> • Transplant rare plants found on site to other local sites prior to disturbance of rare plant areas • Implement mitigation measures associated with dust creation, as noted under atmospheric quality management above • Construct a concentrate handling facility within a reduced footprint, and, if possible, within a previously disturbed or developed site • Implement a number of additional measures to reduce the effect of the transmission line (and access road) such as: <ul style="list-style-type: none"> ○ Leaving vegetated buffer zones around watercourses and other sensitive features ○ Leaving lower vegetation in place while harvesting larger trees ○ Not grading or stripping within the transmission line corridor to the extent that the mitigation of potential fire hazards allows ○ Hand-clearing vegetation at sensitive stream crossings and within erosion control zones to reduce soil disturbance ○ Seeding the transmission line corridor and decommissioned roads at closure (consistent with the Closure Plan) ○ Stabilizing disturbed soil to assist vegetation regrowth and to control erosion • Development of the reclamation plan and progressive reclamation commencing as early in the site development process as practicable to provide early re-establishment of vegetation. This plan will be in place prior to construction in accordance with Ontario Regulation 240/00 • Rehabilitation of as much of the mine site as possible to a natural even-aged conifer dominated forest after decommissioning • Vegetation control measures consistent with provincial standards • Re-vegetate approximately 275 ha of PSMF and 85 ha of the horizontal portion of the MRSA benches, augmenting with overburden and seed as needed. • Incorporation of plant species of interest to Indigenous communities during rehabilitation where the use of these species is appropriate and technically feasible • Removing buildings and covering other disturbed surfaces with overburden as needed, and seed at closure (consistent with the Conceptual Closure Plan) • Implement specific mitigation measures to prevent establishment of invasive species such as: <ul style="list-style-type: none"> ○ Implementing an invasive species awareness and control program, including requirements for vehicles to enter site in a clean state ○ Use manual/mechanical treatment for the removal of invasive species as an alternative to herbicides ○ Isolating sensitive areas until adequate native vegetation is established through reclamation ○ Maintaining healthy, non-invasive, vegetative cover wherever possible on site ○ Managing areas with exposed soil to prevent the establishment of unwanted vegetation in disturbed/high traffic areas ○ Evaluating the quality control of reclamation seed mixes so that seed mixes are of high quality ○ Progressive reclamation of disturbed lands 	
WILDLIFE AND SPECIES AT RISK MANAGEMENT	
<p>To mitigate adverse effects on wildlife during construction, GenPGM will:</p> <ul style="list-style-type: none"> • avoid, where practical, clearing of vegetation during bird nesting and bat breeding season. If avoidance is not feasible, surveys will be conducted by a qualified biologist in accordance with appropriate regulatory protocols 	Throughout mine life as appropriate.
<p>To mitigate adverse effects on wildlife throughout the life of the Project, GenPGM will implement the following general wildlife mitigation measures:</p> <ul style="list-style-type: none"> • Reclamation plans that aim to restore forest habitat • Posting speed limits on roads to reduce collisions • Sufficiently clear ROW to provide adequate lines of sight to give advance warning of wildlife, particularly on corners • Installing wildlife crossing signs at the beginning of the main access road coming from both directions and at strategic locations, as necessary • Driver training to reduce risk of collision • Plowing practices in winter that provide gaps where mammals can easily exit the road (OMNR 2013) • Recording of wildlife collisions and near misses and developing additional mitigations should a collision hot spot be identified • Decommissioning roads and transmission line by re-establishing vegetation consistent with the Caribou Conservation Plan • Stabilizing disturbed soil to assist vegetation regrowth and to control erosion • Removing animal remains from active mining areas and mine roads to protect raptors and scavengers who might feed on them • Establishment of a wildlife policy and training, including SAR awareness training, to reduce human interaction with wildlife and decrease the potential for habituation, including strict waste management protocols to limit human food sources for wildlife (e.g., bird feeders, waste management practices) • Designing the site infrastructure to reduce the area of the disturbed footprint therefore reducing habitat alteration with special attention paid to sensitive habitats (i.e., water crossings) • Prior to disturbance of amphibian habitat, prepare and execute an amphibian salvage and translocation plan in discussion with responsible authorities • Avoiding direct impacts to identified raptor nesting areas and contacting a qualified avian biologist for direction • Maintaining the embankments of the PSMF to be free of vegetation to limit attraction by waterfowl and/or wildlife • Use of visual and auditory bird deterrents around PSMF, once operational • Using directional lighting • Installing luminescent and/or reflective markers on transmission lines over Canoe Lake where there is greater risk of collision due to the topography and presence of waterbodies • Clearing vegetation within 50 m of the side of building with windows to reduce potential bird abundance and collisions, where practical 	Throughout mine life as appropriate.

Table 8.1: Updated Table of Commitments

Commitment	Timing
<ul style="list-style-type: none"> Proper handling and disposal of road salt, reagents used in ore processing, or other substances that may be attractive to moose or other mammals craving dietary salt or trace minerals. 	
<p>To mitigate adverse effects on nesting birds, GenPGM will implement the following wildlife mitigation measures:</p> <ul style="list-style-type: none"> All clearing will be completed in accordance with the <i>Migratory Bird Convention Act</i>, <i>Fish and Wildlife Conservation Act</i> and other applicable guidance thereunder Where possible, tree and brush clearing will be scheduled outside the bird nesting season Where tree and brush clearing occur during the migratory bird nesting season, areas that are to be cleared will be surveyed for nest sites, and any identified nests will be marked, and appropriate protections put in place to prevent such trees from being harvested at that time Conduct surveys for common nighthawk and eastern whip-poor-will, as part of the Wildlife Management Program 	Throughout mine life as appropriate.
<p>To mitigate adverse effects on bats and bat habitat, GenPGM will implement the following wildlife mitigation measures:</p> <ul style="list-style-type: none"> Avoiding forest clearing during the window May 15 to August 31 to reduce the risk of destruction of bat occupied maternity trees. If limited clearing must be done during this window, bat maternity surveys using the Significant Wildlife Habitat and Wind Project Protocol would be used to confirm bat presence/absence in any suitable trees (e.g., large diameter chicots) and appropriate protection measures applied Installation of a minimum of five (5) bat or rocket boxes as an alternate form of maternity roost in LSA Develop an annual monitoring program to determine occupancy of bat boxes Suspended construction/operation activities if a bat hibernaculum is discovered until a plan can be put in place with a qualified biologist in consultation with MECP, as part of the Wildlife Management Plan <p>The Best Management Practices for Bats in British Columbia will inform the development of these measures.</p>	Throughout mine life as appropriate.
<p>To decrease potential effects on Woodland Caribou habitat, GenPGM will implement the following on-site mitigation measures:</p> <ul style="list-style-type: none"> Reducing the design footprint of the mine and associated infrastructure Plant and seed access roads and remove watercourse crossings when roads are no longer required, to the extent practical Suspended construction/operation activities if individual caribou are observed until caribou have left the area and the observation reported to the MNRF Prohibition of hunting by Project personnel at the Project site to avoid risk of inadvertent caribou mortality due to misidentification or poaching Prohibition of recreation snowmobile and ATV / UTV use by Project personnel at the Project site Posting educational signage at the start of the access road to increase awareness of the potential presence of caribou to reduce the potential for collisions, encourage reporting, and reduce accidental hunting mortality. Pits and trenches that are not geologically important will be backfilled or contoured to a stable angle of repose and, if greater than 3 m deep, will provide at least one sloped ramp as a point of egress for caribou Non backfilled pits or trenches >3m deep will be fenced unless a means of egress for caribou is provided by a sloped ramp Disturbed bedrock will be stockpiled on site in a safe and stable manner Non-merchantable timber and slash will be piled at appropriate locations along trails and roads to reduce predator sight lines and foraging efficiency. Trails will be otherwise left for natural regeneration <p>The development of these measures will be informed by the ECC's Environmental Code of Practice for Metal Mines, the Range Management Policy in Support of Woodland Caribou Conservations and Recovery, and the Recovery Strategy for Woodland Caribou.</p>	Throughout mine life as appropriate.
<p>To benefit off-site Woodland Caribou, GenPGM will implement the following off-site mitigation measures to be developed in consultation with MNDMNR and Biigtigong Nishnaabeg:</p> <ul style="list-style-type: none"> Selection of locations for rehabilitation that will provide connectivity, consider landscapes on a regional scale, and builds off the long-term caribou and forest management plan for the region Enhanced silviculture (e.g., aerial/ground spray, infill planting, seeding, clearing, tending, slash pile burning, etc.) and road decommissioning, where appropriate An effectiveness monitoring program that will focus on the success of the silviculture treatments Conduct an aerial survey of the RSA west of Pukaskwa Engage in consultation with Biigtigong Nishnaabeg to revise current off-site caribou mitigations to consider the current landscape, and cultural proposals from Biigtigong Nishnaabeg. <p>Details regarding off-site mitigation for Woodland Caribou will be defined in the Updated Caribou Habitat Offset Mitigation Report and will be further developed with MECP and Indigenous communities. The development of these measures will be informed by, the Range Management Policy in Support of Woodland Caribou Conservations and Recovery, and the Recovery Strategy for Woodland Caribou, which will be approved by MECP through an Overall Benefit Agreement. The timing of this agreement will be determined in consultation with MECP.</p>	Throughout mine life as appropriate.

Table 8.1: Updated Table of Commitments

Commitment	Timing
RECLAMATION AND CLOSURE	
<p>The draft Closure Plan includes activities designed so that the mine site is decommissioned and closed in a manner that reduces the potential effects on the social and natural environments and, to the extent possible, returns the site to a land use that is supported by Indigenous peoples, the public, government and wildlife including:</p> <ul style="list-style-type: none"> • Restoring the natural drainage patterns as much as possible • Directing drainage from the pit lake under the MRSA in an underdrain • Taking reasonable steps to reclaim some disturbed areas of the Project site in a progressive manner, including re-establishment of vegetation conditions supportive of Woodland Caribou, monarch and yellow-banded bumble bees where possible • Incorporate wildflower seed mix and common milk weed into the re-vegetation plan to provide potential habitat for Monarch butterfly and Yellow-banded bumble bee • Incorporate wetland habitat into the restoration of the water management pond • Maintaining overall MRSA slopes of approximately 2.3 horizontal:1 vertical (2.3H:1V), with minor re-contouring of the overall slopes at closure • Contouring slopes of the PSMF at closure, reducing standing water on PSMF, establishing a vegetative cover, decommissioning, and dismantling management and process solids slurry pipeline systems, ongoing monitoring to confirm suitable water quality, overflow at closure preferred to Stream 6 • Decommissioning roads to the extent possible while maintaining access to the site for necessary closure and long-term land uses • Use of overburden on horizontal surfaces of the MRSA to promote revegetation as a proactive reclamation strategy, when necessary • Use of non-merchantable coarse woody debris from site clearing in rehabilitation efforts • Removing and/or covering concrete foundations with overburden to support revegetation • Rehabilitating the general mine site area through a process of scarification of heavily compacted areas, regrading, applying overburden cover as needed, and revegetation • Incorporate species of interest to Indigenous communities in reclamation activities • Monitoring during closure will include: <ul style="list-style-type: none"> ○ Monitoring to verify success of reclamation and confirm on-site water quality has stabilized and there are no long-term geochemistry concerns ○ Monitoring pit water quality prior to pit overflow to determine if mitigation is required and monitoring water discharged from the pits to surface water for a suitable time period after overflow • Details regarding decommissioning and closure of the mine site following completion of operations will be provided in a Closure Plan in accordance with O. Reg 240/00 and filed with the Ministry of Northern Development, Mines, Natural Resources and Forestry (MNDMNR) prior to the start of construction. Identified Indigenous groups will be invited to participate in the preparation of the closure plan through information sharing and direct participation in selection of long-term reclamations projects. • Engaging Biigtigong Nishnaabeg in end land use planning for the Project site and will ensure the site is designed to support habitats and species of interest to Biigtigong Nishnaabeg. • Obtain Biigtigong Nishnaabeg's consent to the closure plan as expressed in a Band Council Resolution • On an ongoing basis, to review feasible closure plan alternatives with Biigtigong Nishnaabeg 	<p>Closure Plan to be developed prior to Site Preparation and Construction.</p>
<p>To monitor the long-term groundwater level and quality in PSMF Cell 2a during closure of the PSMF, GenPGM will implement the following:</p> <ul style="list-style-type: none"> • Installation of groundwater monitoring wells and vibrating wire piezometer in the process solids contained in Cell 2A at the start of the closure phase • Groundwater level data will be compared to predicted levels to confirm that Cell 2A is performing as designed. Importantly, it will be confirmed that the Type 2 (PAG) process solids contained in Cell 2A continue to remain in a saturated state to prevent the generation of acid drainage • Groundwater quality data will be collected (from within the PSMF) to verify water quality predictions for Cell 2A and to evaluate the effectiveness of the mitigation measures implemented for the Type 2 process solids <p>In the event the groundwater monitoring program identifies an issue with the performance of Cell 2A, the following contingency measures could be implemented to maintain the groundwater table at the required level:</p> <ul style="list-style-type: none"> • Closure spillway invert elevations could be increased to retain additional water in the Cell 2A pond during the spring freshet resulting in increased net infiltration into the process solids • An engineered cover could be placed over a portion of Cell 2A to reduce surface evaporation and increase infiltration into the process solids <p>Details regarding the monitoring program for PSMF Cell 2A, including the triggers for implementation of contingency measures, will be provided as part of the Water Management Plan.</p>	<p>During active closure.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
SOIL SALVAGE AND STORAGE	
<p>To manage soil on site during site preparation and construction, and to provide available soils for decommissioning and closure of the site, GenPGM will:</p> <ul style="list-style-type: none"> • Provide results of 2021 soil sampling to the Panel and use results to inform the design of the access road and management plan for the storage of excess materials • Limit the construction footprint to the extent possible to minimize the need for soil/overburden excavation. • Strip topsoil to the extent possible to be stockpiled in the same area as the overburden and subsequently used following construction during mine life for progressive reclamation and closure to restore disturbed areas • Ensure that soil/overburden stockpiles that are created to facilitate development of the site have appropriate slopes, and maintaining the piles to prevent erosion and slide hazard • Limiting potential erosion of disturbed areas and / or soil stockpiles by implementing appropriate erosion and sediment control measures (i.e., seeding) to stabilize these areas <p>Details regarding the soil monitoring and management, including monitoring for constituents of potential concern, will be provided as part of the Soil and Terrain Monitoring Program.</p>	
SOCIO-ECONOMIC CONDITIONS	
<p>To mitigate potential socio-economic effects, GenPGM will:</p> <ul style="list-style-type: none"> • Provide adequate housing to accommodate the workforce during the site preparation and construction phase through a temporary construction camp, to be operated by a third party • Provide adequate housing to accommodate the workforce during operation through an Accommodations Complex with a minimum of 180 rooms, to be operated by a third party • Establish and enforce a code of conduct for workers housed in the Accommodations Complex and work with the third-party developer of the temporary construction camp to establish and enforce a similar code of conduct. The code of conduct will be established prior to the commencement of site construction • Facilitate rotational work arrangements which allow some employees to return to distant housing during operations • Work proactively with municipal authorities to co-ordinate planning, development or upgrades of infrastructure, as necessary • During decommissioning, implementing strategies to help transition the workforce • Work with economic development groups to increase contracting opportunities for local businesses throughout the life of the Project • Work with regional institutions to implement employment and training programs, including the development of a program focusing on underrepresented populations • Establishing measures to encourage and recruit employees from the existing populations in local communities • Providing opportunities for training to facilitate employment by residents of the LSA and RSA and supporting initiatives to train local youth and members of Indigenous groups • Work with economic development groups to increase contracting opportunities for local businesses • Providing Project employees with health services (physical, mental and social health), including Employee Assistance Programs (EAP) and on-site emergency service infrastructure, including fire-fighting equipment. GenPGM will co-ordinate its EPRP with the Town of Marathon emergency services department • Develop, in collaboration with Biigtigong Nishnaabeg, a mandatory, cultural competency training for all mine workers that will include content on Residential Schools, the Truth and Reconciliation Commission, Missing and Murdered Indigenous Women and Girls, and Indigenous rights, including Biigtigong Nishnaabeg's asserted exclusive Aboriginal title rights. • Develop and implement, in collaboration with Biigtigong Nishnaabeg, workplace policies and procedures to address and minimize risks associated with related sexual harassment, violence, harassment and discrimination. Providing support to fund key community services or organizations and provide fitness and recreational programs for workers within the existing facilities. • GenPGM will engage with the Town of Marathon and provincial Crown lands permit holders to address potential disturbance to or access restrictions to municipal and Crown land areas • Signage will be installed around the SSA to alert the public and land users of the presence of the Project and its facilities. Signage will be installed during construction • Hunting / fishing / harvesting of wildlife will be strictly prohibited on the site. Workers will not be permitted to hunt / fish / harvest and will not be permitted to bring firearms or angling gear to site • Implement a Harvester Training Fund to support trapline training programs • To the extent possible, clearing and wood utilization will follow the requirements contained in the Forest Management Plan. This may include a commercial market for the harvested wood from the Project site or may be used for firewood for the general public. Un-merchantable wood, as defined by the <i>Crown Forest Sustainability Act</i>, may be left scattered throughout the harvested area to serve as coarse woody debris. • Project activities, locations, and timing will continue to be communicated to Indigenous communities, affected land and resource users, environmental non-government organizations, the provincial government, and local authorities throughout the life of the Project • Desired land and resource end-uses will be considered in the preparation of the Rehabilitation and Closure Plan 	<p>Throughout mine life as appropriate.</p>

Table 8.1: Updated Table of Commitments

Commitment	Timing
<p>To mitigate potential traffic effects, GenPGM will implement the following mitigation measures:</p> <ul style="list-style-type: none"> • Bussing of employees and shift changes in consultation with the Town of Marathon • Scheduling concentrate delivery to the rail load-out facility (if this option is used) in consultation with the Town of Marathon • Scheduling shift changes and truck movements to avoid peak traffic hours and school bus pick-up and drop-off times. • Regular communications with the Town of Marathon, MTO, and OPP representatives to monitor and mitigate traffic effects • Implementing a Traffic Management Plan, which will include encouraging car-pooling and providing bus transport to and from the Project site and requiring all Project drivers and employees to observe speed limits and take safety precautions. This plan will be developed prior to construction. 	<p>Throughout mine life as appropriate.</p>
ARCHAEOLOGY AND CULTURAL HERITAGE	
<p>To mitigate potential effects on physical and cultural heritage resources, GenPGM will:</p> <ul style="list-style-type: none"> • Complete an additional area of Stage 2 archaeological assessment in 2021, prior to construction, if the final alignment of the discharge pipeline remains in close proximity to the area of high archaeological potential on Hare Lake, however avoidance of this area is the preferred mitigation measure. Any archaeological work would be completed in accordance with the MHSTCI's <i>Standards and Guidelines for Consultant Archaeologists</i>. • Invite local Indigenous communities to participate in archaeological field work programs (i.e., as field monitors) and to review and inform the assessment of any findings resulting from this work • Train all employees engaged in activities that have the potential to unearth heritage or cultural features • Immediately suspend all work in the vicinity of the discovery in the instance that built heritage and cultural heritage landscape features are identified and contact the MHSTCI and Indigenous peoples • Immediately suspend all work in the vicinity of the discovery in the instance that human remains are identified and notifying the OPP, or local police and also notifying Indigenous representatives, the MHSTCI • Notify stakeholders and local Indigenous peoples as part of its routine response to the identification of built heritage and cultural heritage landscape features <p>Details regarding measures to protect archaeological resources and to identify the procedures to be followed where archaeological resources are identified or in the unlikely event that human remains are encountered during construction will be defined in the General Construction and Operations Management plan (per EMMP).</p>	<p>Throughout mine life as appropriate.</p>
OCCUPATIONAL HEALTH AND SAFETY	
<p>Occupational health and safety to be implemented and followed in accordance with all applicable legislation and regulations (see Section 7.4 of this EIS Addendum [Vol 2])</p> <ul style="list-style-type: none"> • As part of the General Construction and Operations Management Program, develop a procedure for recording operation health and safety incidences and near misses and the identification of potential hazards 	<p>Throughout mine life as appropriate.</p>

**ATTACHMENT A:
UPDATED MITIGATION,
MONITORING AND FOLLOW-UP
SUMMARY**

Attachment A: Updated Mitigation, Monitoring and Follow-up Summary

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
ATMOSPHERIC ENVIRONMENT						
<u>Change in air quality</u> – Emissions of CoPCs will increase as a result of Project-related activities						
<ul style="list-style-type: none"> Equipment to meet applicable emissions standards and to be maintained regularly Use of low sulphur diesel for equipment Use of dust suppression techniques Implementation of dust collection system and baghouses 	<ul style="list-style-type: none"> Maintenance of equipment improves efficiency and reduces emissions Use of low sulphur diesel reduces emissions Managing dust through active and passive controls reduces potential for fugitive dust emissions Dust collection system and baghouses reduce dust released to the atmosphere, including PM 	<p>The air quality modelling predicts a scenario where 79 of the 83 CoPCs examined will meet applicable AAQC during either the construction or operations phase. With mitigation, four (4) exceedances are predicted:</p> <ul style="list-style-type: none"> Benzo(a)pyrene (B(a)P) is predicted to increase during construction and operations as a result of vehicle emissions along Peninsula Road. However, the Project is considered to be a negligible contributor to these levels as only 3.8% (Construction) and 3.2% (operation) of the total modeled B(a)P concentrations is estimated to be from the Project. Crystalline silica exceedances are predicted during construction and operations. These exceedances are limited in geographic extent (1.8% of the LSA during construction) (0.8% of the LSA during 	<p><u>Atmospheric Environment Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Measurement of ambient levels of particulates, criteria air contaminants, and other parameters of potential concern at identified air quality monitoring locations. Air quality samples will be collected through high-volume samples of ambient air at locations identified through the effects assessment. Sampling will occur periodically during the Project lifespan using standard protocols, including updated baseline, construction, operation and closure phases of the Project. Ambient air quality measurements of nitrogen (NH4 and NO3), crystalline silica, benzene and other relevant contaminants of potential concern will be collected to inform the Follow-up and Monitoring Program Silt content of haul roads will be measured during construction. The Atmospheric Environment Follow-up and Monitoring Plan will be developed in consultation with agencies (MECP and Health Canada) and Indigenous communities. 	<p>Results from this testing will be compared to the appropriate federal and provincial ambient air criteria and to the predictions in the EIS Addendum. Additional mitigation will be employed in the event that the Project results in measured levels being greater than these criteria.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Site specific dust suppression measures at the rail-load out facility Use of alternative / additional dust suppressants Focused dust suppression at mine entrance or other areas where increased dustfall levels are experienced Improvement/ procurement of vehicles as new technology becomes technically and economically viable 	<p>Atmospheric Quality Management Plan</p> <p>Atmospheric Environment Follow-Up and Monitoring Plan</p> <p>General Construction and Operations Management Plan</p>

¹ Details regarding mitigation measures will be developed and confirmed as part of the relevant management plan listed. Details regarding the listed follow-up and monitoring plans, including adaptive management thresholds and triggers, will be confirmed prior to implementation.

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>operation) and are predicted to be in areas where human presence is infrequent.</p> <ul style="list-style-type: none"> Exceedances of the 24-hour and annual average nickel levels are predicted at the rail load out facility. However, these exceedances are expected to be addressed through the implementation of additional mitigation in the design of the facility. 				
Change in dustfall – Project-related activities will result in an increase in dustfall						
<ul style="list-style-type: none"> Use of dust suppression techniques Implementation of dust collection system and baghouses 	<ul style="list-style-type: none"> Managing dust through active and passive controls reduces potential for fugitive dust emissions. Dust collection system and baghouses reduces dust released to the atmosphere, including PM. 	<p>The air quality modelling predicts an exceedance of the monthly dustfall criterion (25%) close to the mine entrance at the modelled property boundary, within a limited geographic extent. However, predicted dustfall levels are below the criterion at special receptors.</p>	<p><u>Atmospheric Environment Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Fugitive dust will be collected using dustfall jars; locations will be determined based on a number of factors including locations of maximum predicted dustfall levels, proximity to residential or sensitive land use areas, MECP siting criteria for ambient dustfall monitors, etc. and will be reviewed and approved by the MECP. These locations will take into consideration the areas representative of the Braun's Holly fern. Sampling will occur at appropriate intervals throughout the life of the Project (monthly during construction and operation, reduced frequency thereafter). Total dustfall mass per unit area and total metal levels will be measured. 	<p>Results will be reported as total dustfall mass per unit area, which will be compared with predictions in the EIS Addendum, and to applicable regulatory criteria. Additional mitigation will be employed in the event that the Project results in measured levels being greater than these criteria and those predicted in the EIS Addendum.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Use of alternative / additional dust suppressants Focused dust suppression at mine entrance or other areas where increased dustfall levels are experienced 	<p>Atmospheric Quality Management Plan</p> <p>Atmospheric Environment Follow-up and Monitoring Plan</p> <p>General Construction and Operations Management Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
			<ul style="list-style-type: none"> The Atmospheric Environment Follow-up and Monitoring Plan will be developed in consultation with regulatory agencies and Indigenous communities. 			
Change in ambient light levels – Project-related activities will result in a localized change in ambient light levels						
<ul style="list-style-type: none"> Optimization of lighting design (including mounting lights as low as possible) Use of directional lighting 	<ul style="list-style-type: none"> The location and design of project lighting will be refined to balance safety with reductions in light effects. Limiting and directing lighting to specific work areas reduces overall lighting requirements across the site, thereby reducing the amount of light requiring mitigation. 	The Project is expected to contribute to an increase in ambient light levels through sky glow (brightening of the sky). This increase is considered to be of low magnitude as nearby sensitive receptors already experience periodic elevated light levels associated with highway traffic, airport operations, and lighting at businesses and residences. Sensitive receptors along Highway 17 and Hare Lake will be screened from the SSA by existing vegetation and terrain changes. Light will generally be restricted to the developed area of the site where wildlife activity will be low.	<ul style="list-style-type: none"> No monitoring is proposed for light. 	In the event of complaints regarding light trespass or glare, GenPGM would review the source of the complaint and implement mitigation, if necessary, to address the complaint.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Adjustments to light shielding and direction 	N/A
Change in GHG levels - GHG emissions are associated with the Project						
<ul style="list-style-type: none"> Mine design optimization Employ energy efficient equipment Proactive site reclamation Management of fuel use CO₂ capture 	<ul style="list-style-type: none"> Optimizations to the mine design reduces travel times for equipment and materials, reducing emissions The use of energy efficient equipment improves efficiency and reduces emissions Proactive site reclamation provides opportunities for carbon sequestration by vegetation 	Project construction is predicted to result in a total CO ₂ e emissions range from 212.5 to 231.1 kt annually, while total CO ₂ e emissions during operations are predicted to range from 45.7 to 86.9 kt annually. These predicted levels result in incremental contributions to Ontario's and Canada's total annual GHG emissions (based on 2018 data).	<u>Atmospheric Environment Follow-up and Monitoring Program, GHG monitoring will include:</u> <ul style="list-style-type: none"> Monitoring of GHG emissions as a component of fuel consumption to confirm GHG emission predictions. Measurement of ambient levels of particulates, criteria air contaminants, and other parameters of potential concern at identified air quality monitoring locations. Air quality samples will be collected through high-volume samples of ambient air at 	Results from this testing will be compared to the appropriate federal and provincial ambient air criteria and to the predictions in the EIS Addendum. Additional mitigation will be employed in the event that the Project results in measured levels being greater than the predictions within the EIS Addendum and regulatory criteria.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Improvement / procurement of vehicles as new technology becomes technically and economically viable Additional screening of the Project site to sensitive receptors 	Atmospheric Quality Management Plan Atmospheric Environment Follow-up and Monitoring Plan General Construction and Operations Management Plan

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
	<ul style="list-style-type: none"> Management and monitoring of fuel consumption allows for the identification and management of anomalies in usage and is a component of confirming GHG emissions predictions 		locations identified during the development of the Follow-up and Monitoring Program. <ul style="list-style-type: none"> Sampling will occur periodically during the Project lifespan using standard protocols. GHG reporting will be provided to the ECCC in accordance with the CEPA (1999). 			
ACOUSTIC ENVIRONMENT						
Change in noise levels - Project-related activities will result in an increase in local noise levels						
<ul style="list-style-type: none"> Purchase of vehicles and equipment that meet applicable noise suppression regulations Schedule concentrate delivery to reduce complaints, whenever possible Implement an overpressure and vibration monitoring program on-site Only permit coupling at the Rail Load-Out Facility Prohibit tailgate slams when dumping material 	<ul style="list-style-type: none"> The use of equipment with proper noise suppression reduces noise generated during Project related activities Scheduling concentrate delivery during daytime hours, while avoiding high traffic times will reduce potential noise complaints The implementation of monitoring creates a feedback loop, upon which operating practices can be adjusted as needed Coupling is less noise-intrusive than shunting Prohibiting tailgate slams reduces noise generated during Project-related activities 	<p>Noise modelling predicts steady-state noise levels during the worst-case construction and operations scenarios (i.e. all significant noise sources operating at the same time) to be in compliance with the applicable MECP criteria at representative noise-sensitive receptors.</p> <p>Predicted Project traffic levels were predicted to be less than 5 dB over baseline levels, which are below the sound level thresholds provided by MECP and MTO.</p> <p>The setback analysis for air blast results indicate that a 575 m setback is needed. Noise-sensitive receptors within the 120 dB contour for construction blasting will also be monitored. These receptors include North Lake Hare Cottage, Laughing Moose Eatery Restaurant and Residence, Peninsula Inn and May's Gifts. No noise-sensitive receptors were within the</p>	<p><u>Atmospheric Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Measurement of ambient noise levels, overpressure, and vibrations at identified sensitive receptor, locations, during various mining activities including, but not limited to, near surface blasting activities during site preparation and early operation. The location of monitoring stations will be determined based on a number of factors, including locations of maximum predicted noise levels, proximity to residential or sensitive land use areas, MECP siting criteria for noise monitors, etc. and will be reviewed and approved by the MECP. A log of public concerns raised over nuisance noise levels. The Follow-up and Monitoring Program will be developed in consultation with regulatory agencies and Indigenous communities. 	<p>Results from this testing will be compared to the noise levels predicted in the EIS Addendum and to applicable regulations. Additional monitoring may be employed when the public raises a nuisance noise concern. Additional mitigation will be employed if it is determined that ambient noise levels exceed the applicable regulatory criteria.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review of night time activities Improve/procure vehicles and equipment to have increased noise suppression Review of blasting plans in response to monitoring level recordings at sensitive report locations that exceed applicable criteria. 	<p>Atmospheric Quality Management Plan</p> <p>General Construction and Operations Management Plan</p> <p>Atmospheric Environment Follow-Up and Monitoring Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		120 dB contour for operations blasting.				
Change in vibration – Project-related blasting will increase vibration levels						
<ul style="list-style-type: none"> Implement an overpressure and vibration monitoring program on-site 	<ul style="list-style-type: none"> The implementation of monitoring creates a feedback loop upon which operating practices can be adjusted as needed 	The setback analysis for ground vibration results indicate that a 68 m setback is needed. A vibration monitoring of 10 mm/s ground vibration setback was set to identify sensitive receptors requiring monitoring. No receptors were identified within this setback.	<u>Atmospheric Environment Follow-Up and Monitoring Program</u> Measurement of ambient noise levels, overpressure, and vibrations at identified sensitive receptor locations during various mining activities including, but not limited to, near surface blasting activities during site preparation and early operation. The location of monitoring stations will be determined based on a number of factors including locations of maximum predicted noise levels, proximity to residential or sensitive land use areas, MECP siting criteria for noise monitors, etc. and will be reviewed and approved by the MECP. <ul style="list-style-type: none"> A log of public concerns raised over nuisance noise levels. The Follow-up and Monitoring Program will be developed in consultation with regulatory agencies and Indigenous communities. 	Results from this testing will be compared to the noise levels predicted in the EIS Addendum and to applicable regulations. Additional monitoring may be employed when the public raises a nuisance noise concern. Additional mitigation will be employed if it is determined that ambient noise levels exceed the applicable regulatory criteria.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Modifying blasting techniques including, but not limited to, changing frequency of blasts with smaller charges, decreasing powder factor, using electric detonation. using air decking, timing of blasts, and coordination of blast patterns toward a partially open face Use of blasting mats 	Atmospheric Quality Management Plan General Construction and Operations Management Plan Atmospheric Environment Follow-Up and Monitoring Plan
WATER QUALITY AND QUANTITY						
Change in groundwater quantity – Project-related activities will result in the lowering of water table levels during operations and closure due to pit dewatering and final lake pit elevations, as well as localized groundwater mounding in relation to the Process Solids Management Facility (PSMF) and Mine Rock Storage Area (MRSA)						
<ul style="list-style-type: none"> Limit construction footprint (i.e., SSA) to the extent possible to reduce the potential for reductions in groundwater recharge and limit the number of watersheds overprinted by the SSA Use standard management and 	<ul style="list-style-type: none"> Limiting the footprint of disturbance reduces the potential for reductions in groundwater recharge and limits the number of watersheds overprinted by the SSA A seepage collection system can be used 	Groundwater modelling predicts that pit dewatering during the operation phase will lower the water table by up to 0.5 m in overburden and shallow bedrock over an area of approximately 900 m to the north, east, and south, and 500 m to the west of the open pits. Local mounding of the water table is predicted to	<u>Groundwater Follow-Up and Monitoring Program</u> <ul style="list-style-type: none"> Measurement of groundwater levels to document changes in level and flow in response to dewatering. Monitoring groundwater quantity and quality at the receiving environment. A water well survey will be completed within and adjacent to the SSA to confirm the 	Results from this monitoring will be compared to those established through the various approvals (e.g. ECA and PTTW). Additional mitigation will be employed if it is determined that the Project results in water quantity levels that exceed criteria set out in the Project approvals process.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Review of water management plan to consider monitored changes in groundwater levels. 	Groundwater Follow-Up and Monitoring Plan Water Management Plan

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>construction practices throughout the Project</p> <ul style="list-style-type: none"> • Install contact water and seepage collection ditches around the perimeter of the MRSA and ore stockpile to mitigate the migration of seepage • Consider accelerating open pit filling at closure to return groundwater levels to post-closure steady-state conditions in a shorter timeframe • Completion of a water well survey within and adjacent to the SSA to confirm the presence of nearby water supply wells 	<p>to direct contact water to the PSMF for treatment prior to release to the environment</p> <ul style="list-style-type: none"> • Shortening pit filling times reduces the duration of drawdown effects on groundwater levels • Water sample survey results provide baseline data that can be used during monitoring and to inform management strategies 	<p>increase by up to 10 m within the MRSA as a result of the pile size and magnitude of change in hydraulic conductivity of the MRSA vs. the underlying hydrostratigraphic unit.</p> <p>Groundwater flow and discharge into surface water features will decrease in some watersheds and increase in others. Generally, the groundwater discharge rates for each watershed represent a small component of total flow for the given watershed. Changes to surface water bodies are further discussed in the change in surface water quantity section, below.</p>	<p>results of the MECP water well record (WWR) and permit to take water (PTTW) database review. The existing monitoring well network will be reviewed and enhanced as necessary to ensure appropriate up-, down-, and cross-gradient coverage of key mine infrastructure (e.g. open pit, MRSA, PSMF, water management pond (WMP)).</p> <ul style="list-style-type: none"> • Water levels, flow (i.e. pumped volumes), and water quality will be measured at regular intervals. • The program will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 			
<p>Change in groundwater quality – Concentration of select constituents in groundwater will increase as a result of Project-related activities</p>						
<ul style="list-style-type: none"> • Limit construction footprint (i.e., SSA) to the extent possible to reduce the potential for reductions in groundwater recharge and limit the number of watersheds overprinted by the SSA. • Use standard management and construction practices throughout the Project • Design of the MRSA to increase the amount of runoff and reduce the amount of infiltration through the MRSA, thereby reducing the recharge and loading to groundwater. • Install contact water and seepage collection 	<ul style="list-style-type: none"> • Limiting the footprint of disturbance reduces the number of watersheds overprinted by the SSA and the potential for groundwater interactions with contact water • Reducing the amount of infiltration and installing a seepage collection system reduces the interaction potential between contact water and the surrounding environment • Shortening pit filling times reduces the duration of drawdown 	<p><u>Operation:</u> Groundwater recharge from the MRSA during operation is predicted to exceed the ODWQS and/or GCDWQ for nitrate, nitrite, aluminum, and arsenic, and the APVs for copper, selenium, and vanadium. The concentration of aluminum in background groundwater quality exceeds the ODWQS and GCDWQ operational guidelines. The groundwater recharge from the MRSA is predicted to be below the MDMER. Groundwater recharge from the MRSA is predicted to discharge primarily to the open pits (78%) with the remainder of discharge to</p>	<p><u>Groundwater Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> • Measurement of groundwater levels to document changes in level and flow in response to dewatering. • Monitoring groundwater quantity and quality at upgradient, downgradient, and cross gradient of the MRSA, PSMF, and open pit in addition to groundwater monitoring wells located along the predicted flow paths of seepage from these mine features. • A water well survey will be completed within and adjacent to the SSA to confirm the results of the MECP water well record (WWR) and permit to take water (PTTW) database review. The existing monitoring 	<p>Results from this monitoring will be compared to those established through the various approvals (e.g. ECA and PTTW). Additional mitigation will be employed if it is determined that the Project results in water quality levels that exceed criteria set out in the Project approvals process.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> • Review of water management plan to consider monitored changes in groundwater levels. 	<p>Groundwater Follow-Up and Monitoring Plan</p> <p>Water Management Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>ditches around the perimeter of the MRSA and ore stockpile to mitigate the migration of seepage.</p> <ul style="list-style-type: none"> Implement progressive rehabilitation (placement of vegetated soil cover) to reduce infiltration into the MRSA and PSMF, thereby reducing the amount of water and loading to groundwater, resulting in improvements to groundwater quality. Consider accelerating open pit filling at closure to return groundwater levels to post-closure steady-state conditions in a shorter timeframe. Complete a water well survey within and adjacent to the SSA to confirm the presence of nearby water supply wells. 	<p>effects on groundwater levels</p> <ul style="list-style-type: none"> Water sample survey results provide baseline data that can be used during monitoring and to inform management strategies 	<p>subwatershed 101 (17%) and 102 (5%).</p> <p>Groundwater recharge from the ore stockpile during operation is predicted to be less than the ODWQS and/or GCDWQ and exceed the APV for copper. The groundwater recharge from the ore stockpile is predicted to be below the MDMER. Groundwater recharge from beneath the ore stockpile is captured by the dewatering associated with the Central and South pits where it will be pumped to Collection Pond 1 prior to being transferred to the WMP for use as process water or treated, if required, and discharged to Hare Lake.</p> <p>Groundwater recharge from the PSMF during operation is predicted to be less than the ODWQS, GCDWQ, and APVs. The groundwater recharge from the PSMF is predicted to be below the MDMER. Groundwater recharge from beneath the PSMF discharges primarily to subwatershed 106 (68%) with the remainder of discharge to subwatershed 105 (32%).</p> <p>Groundwater recharge from the WMP during operation is predicted to exceed the ODWQS and/or GCDWQ for nitrate, nitrite, aluminum, and arsenic and the APVs for copper, selenium, and vanadium. The concentration of aluminum in background groundwater quality exceeds the</p>	<p>well network will be reviewed and enhanced as necessary to ensure appropriate up-, down-, and cross-gradient coverage of key mine infrastructure (e.g. open pit, MRSA, PSMF, water management pond (WMP)).</p> <ul style="list-style-type: none"> Water levels, flow (i.e. pumped volumes), and water quality (general chemistry and select dissolved metals) will be measured at regular intervals. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 			

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>ODWQS and GCDWQ operational guidelines. The groundwater recharge from the WMP is predicted to be below the MDMER. Groundwater recharge from beneath the WMP discharges to subwatershed 101, a tributary of the Pic River.</p> <p><u>Closure:</u> Groundwater recharge from the MRSA during closure is predicted to exceed the ODWQS and/or GCDWQ for nitrate, nitrite, aluminum, and arsenic and the APVs for copper, selenium, and vanadium, which is consistent with seepage quality during operation. The concentration of aluminum in background groundwater quality exceeds the ODWQS and GCDWQ operational guidelines. The groundwater recharge from the MRSA is predicted to be below the MDMER. Groundwater recharge from beneath the MRSA discharges primarily to the subwatershed 101 (62%), a tributary of Pic River. The remainder of groundwater recharge from beneath the MRSA discharges to the North and Central Pits (25%) and subwatershed 102 (13%).</p> <p>Groundwater recharge from the PSMF during closure is predicted to be less than the ODWQS, GCDWQ, and APVs, consistent with seepage quality during operation. The groundwater recharge from the PSMF is</p>				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>predicted to be below the MDMER. Groundwater recharge from beneath the PSMF discharges primarily to subwatershed 106 (70%) with the remainder of discharge to subwatershed105 (30%).</p> <p>Groundwater recharge from the WMP during closure is predicted to exceed the ODWQS and/or GCDWQ for nitrate, nitrite, aluminum, and arsenic and the APVs for copper, selenium, and vanadium. The concentration of aluminum in background groundwater quality exceeds the ODWQS and GCDWQ operational guidelines. The groundwater recharge from the WMP is predicted to be below the MDMER.</p> <p>Groundwater recharge from beneath the WMP discharges to subwatershed 101, a tributary of the Pic River. The WMP will be decommissioned in closure, once water quality meets criteria for discharge to the environment.</p>				
<p><u>Change in surface water quantity</u> – Through the development of Project infrastructure, including the water management system, removal of several watercourses and the contributing drainage areas for subwatersheds within the Local Study Area (LSA) will occur</p>						
<ul style="list-style-type: none"> Limit and stage construction footprint (SSA) to the extent practicable Maintain existing drainage patterns with the use of culverts Inspect culverts periodically. Remove accumulated material and debris upstream and downstream of the 	<ul style="list-style-type: none"> Limiting the footprint of disturbance reduces the potential for changes to surface water flow regimes and limits the number of watersheds overprinted by the SSA Maintaining drainage and flow patterns reduces the change in baseline flow 	<p><u>Construction:</u></p> <ul style="list-style-type: none"> During construction subwatersheds 101, 102, 103, and 106 are expected to have MAFs decrease from baseline conditions by more than 10% (-33%, -98%, -96%, and -36%, respectively): 	<p><u>Surface Water Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Measurement of water quantity will be conducted at point source discharge locations (e.g. PSMF and MRSA discharge points) and receiving water bodies, such as L8 and L12 and those identified in Table 1 in the response to IR 5-7, including Hare Creek, 	<p>Results of monitoring will be compared to the values used in the EIS Addendum, and to applicable regulatory criteria or objectives, and as set out through the approvals process (e.g. ECA). A trigger threshold of Q100 will be applied for flow increase and a threshold of three consecutive months where MMF is 10% less than the predicted MMF for flow reduction.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review of water management plan to consider monitored changes in surface water levels. Use the system to attenuate peak discharges and augment baseflows to the environment through use of Project water storage features (i.e., 	<p>Surface Water Follow-Up and Monitoring Plan</p> <p>Water Management Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>culverts to prevent erosion, flooding, habitat damage, property damage, and mobilization of sediment</p> <ul style="list-style-type: none"> Maintain access roads by periodically regrading and ditching to improve water flow, reduce erosion, and manage vegetation growth Attenuate peak discharges and augment baseflows to the environment through use of Project water storage features (i.e., catch basins, collection ponds, SWM ponds) Collection of runoff and groundwater seepage from the open pits and run-of-mine stockpile within Collection Pond 1 Excess water pumped from Collection Pond 1 to the WMP for treatment and discharge to Hare Lake Recycling of contact water for use as process water Construction and use of existing subwatershed boundaries to divert fresh water away from Project components Assessment of the downstream watercourse in subwatershed 103 and 112 to implement erosion control measures to reduce the potential for scour and 	<p>characteristics within subwatersheds</p> <ul style="list-style-type: none"> Proper maintenance of infrastructure allows for operation as designed to better mimic flow conditions Collecting of run-off and seepage for treatment prior to discharge allows for collection system reduces the interaction of contact water and the surrounding environment, while mimicking flow characteristics Collecting baseline data and monitoring downstream receivers allows for monitoring and to inform management strategies 	<ul style="list-style-type: none"> In subwatershed 101, six months of the year during construction do not maintain environmental flows but flows are expected to recover to less than the 10% threshold for MAF during closure and post-closure. Subwatershed 102 is expected to undergo permanent changes commencing at construction and extending to post-closure. When the pits overflow and subwatershed 102 discharges to the Pic River, the permanent reductions in catchment area result in permanent reductions in flow with MMFs below environmental flows Subwatershed 103 is predicted to have MMFs that do not maintain environmental flows during construction, with recovery expected above environmental flows once the open pit fills and contributes to the subwatershed MAF during post-closure. In subwatershed 106, during winter 	<p>Hare Lake, and Angler Creek (Stream 6).</p> <ul style="list-style-type: none"> Records will include water level, flow gauging, depth and flow profiling. Monitoring will occur at various times of the year, consistent with ECA and MDMER requirements. All applicable parameters will be monitored at facility commissioning to establish and confirm emissions. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities 	<p>Additional mitigation will be employed if it is determined that the Project results in water quantity levels that exceed these criteria.</p>	<p>catch basins, collection ponds, SWM ponds)</p> <ul style="list-style-type: none"> Monitor receiving watercourses and implement site specific erosion control measures, as needed 	

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
erosion to occur, as needed		<p>and sometimes during summer, lower flow periods extending from construction to the time in post-closure where the PSMF commences discharge to subwatershed 106, MMFs do not maintain environmental flows. However, when the PSMF commences discharge to subwatershed 106, flows will recover, and flow change will be less than the 10% MAF screening threshold</p> <ul style="list-style-type: none"> Subwatersheds 104, 105, 107, 108, and 109 are expected to have a change in MAF of less than 5% (-1%, -2%, -1%, -4%, and 2%, respectively) due to minor watershed loss from mine components but do not trigger further assessment as they remain below the 10% threshold. <p><u>Operations:</u></p> <ul style="list-style-type: none"> Changes to contributing subwatersheds during operation is expected to be consistent with the subwatershed areas during construction. Dewatering of the 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>open pits is expected to lower the groundwater levels and reduce groundwater contribution to surface water within the vicinity of the open pits. Dewatering of the open pits is anticipated to increase the maximum discharge rate for the average-year return period to Hare Lake during operation to 0.092 m³/s. The increased discharge rates are expected to increase Hare Lake water levels during operation by 1.16 cm compared to baseline conditions, an increase of 4%, considered to be insignificant.</p> <ul style="list-style-type: none"> • Subwatersheds 101, 102, 103, and 106 are expected to have MAFs decrease from baseline conditions by more than 10% (-22%, -97%, -95%, and -33%, respectively) and trigger further assessment: <ul style="list-style-type: none"> – In subwatershed 101, two months of the year during operation do not maintain environmental flows but flows are expected to recover to less than the 10% threshold for 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>MAF during closure and post-closure.</p> <ul style="list-style-type: none"> - Subwatershed 102 is expected to undergo permanent changes commencing in construction and extending to post-closure. - Subwatershed 103 is predicted to have MMFs that do not maintain environmental flows during operation, with recovery expected above environmental flows once the open pits fill and contributes to the subwatershed flows during post-closure. - In subwatershed 106, during winter lower flow periods extending to post-closure when the PSMF commences discharge to subwatershed 106, MMFs do not maintain environmental flows. However, when the PSMF commences discharge to subwatershed 106, flows will recover and be less than the 10% MAF screening threshold. • Subwatersheds (105 and 112) are expected to have an 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>increase in MAF greater than 10% (12% and 53%, respectively), triggering additional assessment for Q100 flood flows. The analysis of flood flows resulted in subwatersheds 105 and 112 having a maximum flood flow increase of -1% and 1% compared to baseline flood flow estimates as the discharge to Hare Lake in subwatershed 105 and the change in groundwater contribution to subwatershed 112 during flood flow conditions are minor compared to the overall flow. The increase in MAF for subwatershed 105 is expected to recover during closure and post-closure conditions when the discharge to Hare Lake discontinues. The groundwater change triggering the increase in MAF to subwatershed 112 is expected to be non-reversible due to the mounding from the filled pit lake.</p> <ul style="list-style-type: none"> Subwatersheds 104, 107, 108, 109, 110, 111, 113, 114, 115, 116, and 117 are expected to have a change in MAF of 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>less than 10% (4%, -1%, -7%, 4%, 4%, 5%, 4%, 3%, 1%, 1%, and 3%, respectively) due to minor baseflow changes from groundwater contribution and/or subwatershed loss from Project components.</p> <ul style="list-style-type: none"> The resulting change in the Pic River MAF from Project activities is expected to be negligible (-0.15% - construction) (-0.13% - operation) due to the small percentage of Pic River watershed affected by the Project. <p><u>Closure:</u></p> <ul style="list-style-type: none"> During the closure phases, the removal of Project infrastructure and rehabilitation of disturbed areas will recover some of the contributing subwatershed area changes seen during construction and operation. Contact water associated with the ore stockpile, open pits, and MRSA will continue to be sent to the open pits to accelerate pit filling and will not contribute to applicable subwatershed MAFs. During closure two scenarios were 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>assessed for subwatersheds 102 and 103: MRSA catch basins discharge to subwatersheds 102 and 103, respectively, if effluent discharge quality met effluent criteria during Year 6 of closure, or continued MRSA discharge to the open pits if effluent criteria was not met. If subwatershed 102 and 103 meet discharge criteria and the catch basin walls are breached to allow discharge to the environment, the MAF is expected to be reduced from baseline conditions by 66% and 73%, respectively. If subwatershed 102 and 103 do not meet discharge criteria and continue to get pumped to the open pits, the MAF is expected to be reduced from baseline conditions by 98% and 95%, respectively. Subwatershed 102 is expected to undergo permanent changes commencing in construction and extending to post-closure, with MMFs not maintaining environmental flows during both closure</p>				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>scenarios. Subwatershed 103 is predicted to have MMFs that do not maintain environmental flows during both scenarios of closure, with recovery of the MAF not exceeding the 10% trigger threshold once the open pits fill and contributes to the subwatershed.</p> <ul style="list-style-type: none"> Two scenarios were assessed for subwatershed 106: PSMF discharge to subwatershed 106 if effluent discharge quality met effluent criteria during Year 6 of closure, or continued PSMF discharge to the open pits if effluent criteria was not met. The closure concept for the PSMF covers Type 1 process solids and submergence of Type 2 process solids. Runoff from the surface of the PSMF will be routed to internal constructed wetlands prior to release. When discharge from the PSMF to subwatershed 106 proceeds, the change to the MAF for subwatershed 106 is anticipated to be a 4% reduction and does not trigger further assessment. If 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>discharge from the PSMF continues to be pumped to the open pit, the change in MAF for subwatershed 106, is expected to be maintained at a -33% reduction from operation. MMFs assessed for the -33% reduction in MAF indicated MMFs were not expected to maintain the environmental flows during closure, however recovery was expected during post-closure.</p> <ul style="list-style-type: none"> • One subwatershed (112) is expected to have an increase in MAF of 58%, triggering additional assessment for Q100 flood flows. The analysis of flood flows resulted in subwatershed 112 having a maximum flood flow increase of 1% compared to baseline flood flow estimates as the change in groundwater contribution to subwatershed 112 during flood flow conditions are minor compared to the overall flow. • Subwatersheds 101, 104, 105, 107, 108, 109, 110, 111, 113, 114, 115, 116, and 117 are expected to have a change in 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>MAF of less than 10% (8%, 5%, -1%, -1%, -8%, 5%, 5%, 6%, 5%, 4%, 1%, 1%, and 4%, respectively) due to minor baseflow changes from groundwater contribution and/or subwatershed loss from mine components. Further assessment was not completed as the thirteen subwatersheds remain below the 10% change in baseline MAF threshold.</p> <ul style="list-style-type: none"> • During post-closure, the pit lake will have been filled and water will overflow from the north pit lake under the MRSA within subwatershed 103, where it will be discharged to the existing stream within subwatershed 103. The resulting change in natural subwatershed area due to the redirection of water from the south and central pits previously associated with subwatershed 102 increases the subwatershed area in 103. The resulting change in MAF is expected to be an increase of 74%, triggering additional assessment for flood flows (Q100) which 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>estimated an 88% increase compared to baseline Q100 conditions</p> <ul style="list-style-type: none"> • During post-closure, the PSMF will discharge to subwatershed 106. The MAF for subwatershed 106 is anticipated to be consistent with the discharge scenario during closure, of a 4% reduction from baseline flows. • Consistent with closure, subwatershed 112 is expected to have an increase in MAF of 58%, triggering additional assessment for Q100 flood flows. (see above) 				
Change in water quality – Incremental change in concentrations of constituents relative to baseline conditions						
<ul style="list-style-type: none"> • Develop and implement a site-wide water management plan that provides an integrated framework to manage water quality that includes provision for water management practices for each of the primary site aspects, as well as areas of the site where there is contact water. This plan will have specific components related to mercury and phosphorus. • Develop and implement a mine waste management plan that 	<ul style="list-style-type: none"> • Collecting, management and treatment of site water reduces the interaction of contact water and the surrounding environment • The proper management of Type 2 reduces potential for acid generation • Proper management and storage of explosives reduces the potential for nitrogen to enter water • Collecting baseline data and monitoring receivers allows for 	<p><u>Construction:</u></p> <ul style="list-style-type: none"> • The primary potential water quality change associated with the construction phase of the Project is the mobilization of suspended material into natural surface water features as the result of land clearing activities. Waters (e.g., runoff) associated with areas under development will be collected and either stored within management infrastructure (e.g., 	<p><u>Surface Water Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> • Measurement of water quality will be conducted at point source discharge locations (e.g. PSMF, SWM pond, and MRSA discharge points) and within the open pits (during active closure). • Water quality will also be measured in surface water receiving environments (e.g. Hare Lake, Stream 6 [post closure], Pic River) consistent with ECA and metal and diamond mining effluent regulations (MDMER) requirements. Additional sampling will be completed at 	<p>Results of monitoring will be compared to the values used in the EIS Addendum, and to applicable regulatory criteria or objectives, and as set out through the approvals process (e.g. ECA). Specific triggers will also be established for mercury. Additional mitigation will be employed if it is determined that the Project results in water quality levels that exceed these criteria.</p> <p>During closure, pit lake water quality monitoring will be used as a trigger for discharge to the natural environment.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> • Reviewing the water management plan to consider monitored changes in surface water levels. Employ active means (e.g., filtering), if required to achieve low TSS levels in discharge, in addition to passive means such as settling and clarification in the WMP to manage TSS in the effluent stream to low levels, including in situ water treatment if necessary • Employ passive treatment technology such as permeable reactive barriers 	<p>Surface Water Follow-Up and Monitoring Plan</p> <p>Water Management Plan</p> <p>Acid Rock Drainage/ Metal Leaching Management Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>is keeping with the principals of the mine waste management strategy that has been presented in the original EIS based on the geochemical characterization on the mine waste materials.</p> <ul style="list-style-type: none"> • Incorporate field test cells into the monitoring programs to inform water management and closure planning • For operations, develop and implement appropriate operating practices for explosives and blasting operations to reduce nitrogen residuals in mine water • For operations, collect surface water drainage associated with the MRSA and manage these waters so that there will not be a routine discharge to the Pic River • For operations, monitor constituent concentrations in MRSA catchbasins and increase water transfer rates to the WMP, as necessary • For operations, monitor and report on PGMs within effluent discharge • Maintain the water management system in place during the closure phase of the Project until such time that water quality is suitable to release to the environment 	<p>monitoring and to inform management strategies</p>	<p>PSMF water management ponds) or potentially released into natural surface water features once it is safe to do so – that is, suspended solids levels in the water would be at acceptable levels. No downstream effects to local surface waters are expected.</p> <p><u>Operations:</u></p> <ul style="list-style-type: none"> • During operations, the primary potential water quality effect from the project is the discharge of excess water from the site water management system to Hare Lake. Based on the mine waste testing programs completed to date, phosphorus, as well as total suspended solids (TSS), have been identified as potential management needs. This testing indicates that low levels of metals/metalloids will be generated but, overall, they are not expected to represent a potential risk to water quality in the receiving environment. • With respect to phosphorus, it is noted that a phosphorus (phosphate) based reagent is planned to 	<p>waterbodies of interest near the SSA (e.g. Hare Creek, Stream 1, subwatershed 101, 102 and 103). Proposed monitoring locations are illustrated on Figure 1 in Attachment A of IR5-3.</p> <ul style="list-style-type: none"> • Records will include water quality sampling for a full suite of constituents including metals (total and dissolved)(e.g. mercury/ methyl mercury, PGMs), anions (including sulphate), nutrients (phosphorus, nitrogen), organic carbon, alkalinity, hardness, pH, alkalinity, conductivity, temperature, dissolved oxygen. • Toxicological monitoring will be completed through fish tissue sampling. • Monitoring will occur at various times of the year, consistent with ECA and MDMER requirements. All applicable parameters will be monitored at facility commissioning to establish and confirm emissions. • The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 		<ul style="list-style-type: none"> • Should developed areas with potential to affect water quality be identified, they will be isolated and specific water and sediment control management practices would be implemented to ensure that any water released to natural surface water drainages would be suitable for release and that water quality in these natural surface water drainages would be protected • Prepare effluent treatment strategies specific to water quality levels identified through monitoring. 	

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> • Monitor and manage effluent, including contingency for effluent treatment as may be required, so that water discharge objectives are achieved as defined in applicable provincial and federal regulatory instruments • Develop and implement focused monitoring programs on waterbodies such as the Pic River extending downstream of the SSA to the mouth of Lake Superior, Hare Lake, the outlet of Hare Creek at Port Munro and Stream 6 (Angler Creek) and the outlet at Sturdee Cove that have significance to Indigenous communities • Work with the associated communities to develop and implement the program and develop a framework to share the results for the purpose of assessing the performance of the water management system. 		<p>be used in the floatation circuit. Conservatively, it can be assumed that this phosphorus will remain in the dissolved form within the process water stream. In this case, the dissolved phosphorus would be at levels at end of pipe that could result in phosphorus concentrations that are greater than background and exceeding relevant receiver water quality objectives, without appropriate management. Therefore, there is potential for nutrient enrichment (increased primary productivity) in Hare Lake if not mitigated.</p> <p><u>Closure:</u></p> <ul style="list-style-type: none"> • During the closure phase, once contact and process water quality has stabilized the water management system will be decommissioned. At this time natural surface water drainage will be restored. It is noted that the predictions provided for the post-closure phase, though conservative in nature, are provided for planning purposes. GenPGM will not release water 				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		to the environment from its care and control until such time as monitoring data demonstrate it is safe to do so.				
Change in Sediment Quality -Accumulation of constituents in sediments						
<ul style="list-style-type: none"> Reduce the level of interaction between aquatic habitat features and Project infrastructure Comply with water discharge requirements as defined in the Metal and Diamond Mining Effluent Regulations (MDMER) and Environmental Compliance Approval (provincial) Employ standard management practices for erosion control such as: <ul style="list-style-type: none"> Isolating disturbed areas with sediment fences or similar structures Maintaining appropriate work area setbacks from surface water features Grading and/or covering surfaces to reduce erosion potential Controlling runoff from erosion-sensitive features Providing settling ponds or basins in which solids can be collected (i.e., WMP and SWM Pond) 	<ul style="list-style-type: none"> Limiting interaction between aquatic habitat features and Project infrastructure reduces the potential for cross-contamination of sediment Employing best management practices and complying with the MDMER and ECA criteria reduces potential for discharge water to reduce sediment quality 	<p>During construction and operations, the primary potential sediment quality effect from the Project is the discharge of excess water from the water management system to Hare Lake. It is noted that discharge is not anticipated during the construction phase. There continues to be some risk of transport of solids to watercourses or water bodies through erosion of disturbed areas, though the risk is low and the potential effects are readily mitigatable.</p> <p>The discharge to Hare Lake has the potential to change the concentrations of water quality constituents from background, and in turn this could affect sediment quality. Predictions of sediment quality note incremental increases seen in sediment constituent concentrations in Hare Lake are generally within the background variability seen for individual constituents in Hare Lake based on baseline data and therefore are essentially indistinguishable from existing constituent levels.</p> <p>The exceptions to this pattern are molybdenum</p>	<p><u>Sediment and Benthos Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Sampling of fish communities, including sediments, and benthic communities at receiving watercourses (i.e. Hare Lake and Pic River) will be conducted in accordance with Environment Canada and Climate Change (ECCC) Environmental Effects Monitoring (EEM) program. Additionally, subwatershed 101, 102 and 103 will be monitored. Pre-operational surveys will be conducted at Hare Lake and Pic River to further characterize baseline conditions and ongoing sampling will be completed in accordance with ECCC's EEM program guidelines, MDMER requirements throughout the operation of the mine, and in accordance with the closure plan. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 	<p>Results of monitoring will be compared to the values used in the EIS Addendum, and to applicable regulatory criteria or objectives, and as set out through the approvals process (e.g. ECA). Additional mitigation will be employed if it is determined that the Project results in sediment quality levels that exceed these criteria.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Reviewing the water management plan to consider monitored changes in surface water levels. Employ active means (e.g., filtering), if required to achieve low TSS levels in discharge, in addition to passive means such as settling and clarification in the WMP to manage TSS in the effluent stream to low levels. Should developed areas with potential to effect water quality be identified, they will be isolated and specific water and sediment control management practices would be implemented to ensure that any water released to natural surface water drainages would be suitable for release and that water quality in these natural surface water drainages would be protected Prepare effluent treatment strategies specific to water and sediment quality levels identified through monitoring. 	<p>Fish and Fish Habitat Follow-Up and Monitoring Plan</p> <p>Sediment and Benthos Follow-Up and Monitoring Plan</p> <p>Fish and Fish Habitat Follow-Up and Monitoring Plan</p> <p>Soils and Terrain Follow-Up and Monitoring Plan</p> <p>Erosion and Sediment Control Management Plan</p> <p>Water Management Plan</p> <p>Soil Salvage and Storage Management Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>and vanadium. For molybdenum, the LEL and SEL are 13.8 mg/kg and 1,239 mg/kg, respectively. For vanadium, the LEL and SEL are 35.2 mg/kg and 160 mg/kg, respectively. The maximum predicted molybdenum level in Hare Lake is about half the LEL, and therefore no effects on aquatic biota would be expected. For vanadium, the average and maximum predicted concentrations are 39.6 mg/kg and 49.6 mg/kg, respectively. The maximum predicted vanadium concentration is greater than the LEL but well below the SEL.</p>				
FISH AND FISH HABITAT						
Lethal effects to fish – The loss of approximately 9.22 ha of fish-bearing habitat may result in mortality to fish						
<ul style="list-style-type: none"> Fish habitat/ HADD offsetting Avoid waterbodies of importance to local land users and Indigenous communities, to extent practical Avoid use of explosives near water and, when near water, comply with DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters Planning in-water work to respect applicable fish timing windows Conduct in-water works during low flow periods Prepare and execute a fish salvage plan prior to in-water works Design intake and discharge infrastructure 	<ul style="list-style-type: none"> An offset for loss of fish habitat provides mitigation for the death to fish and the loss of their habitat Proper management of explosives reduces the introduction of nitrogen into water Planning in-water activities to occur outside of the fish breeding timing windows reduces potential effects to fish while spawning and in their juvenile life stage Conducting salvage activities allows for the relocation of fish Designing Project infrastructure to restrict the passage of fish reduces the potential 	<p>The Project related lethal effects to fish associated with overprinting of 9.22 ha of existing fish habitat that may result in death to fish, which will require Authorization under Section 34.4(2) of the Fisheries Act. Blasting is proposed to occur beyond the estimated setback thresholds and lethal effects to fish as a result of these activities are not expected.</p>	<p><u>General Construction and Operations Management Plan</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA Monitor access road and Camp 19 Road for potential stability issues <p><u>Fish and Fish Habitat Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Sampling of fish communities, including tissue sampling, sediments, and benthic communities at receiving watercourse (i.e. Hare Lake and Pic River) will be conducted in accordance with Environment Canada and Climate Change (ECCC) Environmental Effects Monitoring (EEM) program. Pre-operational surveys will be conducted at Hare Lake and 	<p>Results of sampling and monitoring will be compared to assess for lethal effects to fish beyond what was predicted within the EIS Addendum and fish habitat compensation plan. Additional mitigation will be employed if it is determined that the Project results in lethal effects to fish beyond what was predicted through the EIS Addendum and compensation plan.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and modification of the Fish and Fish Habitat Offsetting Plan Update Identification of additional offsetting measures 	<p>Fish and Fish Habitat Follow-Up and Monitoring Plan</p> <p>Fish Habitat Offsetting Strategy and Compensation Plan</p> <p>General Construction and Operations Management Plan (compliance monitoring)</p> <p>Erosion and Sediment Control Management Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>to prevent entrainment or impingement of fish</p> <ul style="list-style-type: none"> Implement an Erosion and Sediment Control Plan 	<p>for fish to enter into the water management infrastructure (i.e. the MRSA catch basins or PSMF)</p> <ul style="list-style-type: none"> Proper Erosion and Sediment Control measures reduce the potential for sediment to enter waterbodies 		<p>Pic River to further characterize baseline conditions and ongoing sampling will be completed in accordance with ECCC's EEM program guidelines, MDMER requirements throughout the operation of the mine, and in accordance with the closure plan.</p> <ul style="list-style-type: none"> Monitoring programs specific to fish habitat compensation measures implemented will be developed. The scope and nature of the programs will depend on scope and nature of the compensation provided and will be communicated as part of the Fish Habitat Compensation Plan. Compensation related monitoring would be implemented following completion of the individual compensation-related works. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 			<p>Water Management Plan</p>
<p>Change resulting in direct physical harmful alteration, disruption or destruction (HADD) – Loss of approximately 15.07 ha of aquatic habitat, with an offset of approximately 9.22 ha, resulting in a net loss of 6 ha</p>						
<ul style="list-style-type: none"> HADD offsetting Mine design optimization Avoid waterbodies of importance to local land users and Indigenous communities, to extent practical Avoidance of more sensitive habitats to the extent practicable Design infrastructure including pipeline crossings and outfalls, and road crossings using best management practices 	<ul style="list-style-type: none"> An offset for HADD provides mitigation for the death to fish and the loss of their habitat Avoidance of waterbodies of significance (i.e. Bamoo's Lake) reduces the effect of the Project on local land users Avoidance of sensitive fish habitat preserves these areas for continued use by fish Designing infrastructure to provide passage for 	<p>The Project will result in the loss of approximately 9.22 ha of habitat frequented by fish.</p> <p>The total amount of required offset associated with the HADD, as a result of the development (and subsequent operation) of the site, has been estimated to be 9.22 ha. Of this, approximately 2.5 ha are specific to indirect impacts to fish habitat due to flow reduction in Stream 6 (106) subwatershed. The direct (or footprint) effects</p>	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA <p><u>Fish and Fish Habitat Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Sampling of fish communities, including tissue sampling, sediments, and benthic communities at receiving watercourse (i.e. Hare Lake and Pic River) will be conducted in accordance with Environment Canada and Climate Change (ECCC) 	<p>Results of sampling and monitoring will be compared to assess for lethal effects to fish beyond what was predicted within the EIS Addendum and fish habitat compensation plan. Additional mitigation will be employed if it is determined that the Project results in lethal effects to fish beyond what was predicted through the EIS Addendum and compensation plan.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and modification of the Fish and Fish Habitat Offsetting Plan Update Identification of additional offsetting measures 	<p>Fish and Fish Habitat Follow-Up and Monitoring Plan</p> <p>Fish Habitat Offsetting Strategy and Compensation Plan</p> <p>General Construction and Operations Management (compliance monitoring)</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>to minimize disturbance to the existing watercourses</p> <ul style="list-style-type: none"> Adherence, as applicable, to the Interim Code of Practice for fish protection screens, cofferdams, diversion channels, and temporary stream crossings 	<p>fish prevents the creation of barriers to fish passage</p>	<p>include several small waterbodies and associated connecting channels that will be within the footprint of mine-related infrastructure (open pits, MRSA, PSMF) in the SSA. The primary fish bearing subwatersheds that will be overprinted are 101, 102, 103 and 106. No direct impacts are expected with respect to the Pic River. Construction / implementation of offsetting measures are likely to occur during the phased approach of closure when the PSMF will be reclaimed, and surface water features will be created to restore the natural drainage patterns in Stream 6 (106 subwatershed).</p>	<p>Environmental Effects Monitoring (EEM) program. Pre-operational surveys will be conducted at Hare Lake and Pic River to further characterize baseline conditions and ongoing sampling will be completed in accordance with ECCC's EEM program guidelines, MDMER requirements throughout the operation of the mine, and in accordance with the closure plan.</p> <ul style="list-style-type: none"> Monitoring programs specific to fish habitat compensation measures implemented will be developed. The scope and nature of the programs will depend on scope and nature of the compensation provided and will be communicated as part of the Fish Habitat Compensation Plan. Compensation-related monitoring would be implemented following completion of the individual compensation-related works. The plan will be in place for all Project phases and will be developed in consultation with DFO, regulatory agencies, and Indigenous communities 			
<p><u>Change in water quantity (as it relates to fish)</u> – Indirect HADD due to redirection of water from upper portions of subwatersheds in the Site Study Area (SSA), specifically in subwatersheds 101 and 106. Flows in these subwatersheds are anticipated to return to normal post-closure.</p>						
<ul style="list-style-type: none"> Design, install and maintain culverts in accordance with DFO and MNR operational statements, guidelines and protocols <p>*See also Change in Water Quantity in Water</p>	<ul style="list-style-type: none"> Designing infrastructure to provide passage for fish prevents the creation of barriers to fish passage 	<ul style="list-style-type: none"> As a result of overprinting portions of subwatersheds in the SSA there is a loss and redirection of water from the upper portions of these systems, resulting in a reduction in the flow at more downstream reaches of the 	<p>See change in water quantity</p>	<p>See change in water quantity</p>	<p>See change in water quantity</p>	<p>See change in water quantity</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>tributaries. Subwatershed specific changes in water quantity are discussed in detail above.</p> <ul style="list-style-type: none"> The flow in subwatersheds 102 and 103 will essentially be lost due to their overprinting by the open pit and mine rock stockpile footprints. Flows in Stream 6 will be reduced during the construction and operation phases by 36% and will also constitute an indirect HADD. Stream 1 (subwatershed 101) flows will be diminished for the operational life of the mine but will be returned to a similar MAF (+8%) following closure and report to the Pic River. Following the acceptability of water quality in the rehabilitated PSMF, discharge from the PSMF will be directed to the environment. The total contributing watershed area will be increased to 10.15 km², leaving a reduction of 4% in MAF from the baseline in Stream 6, during post-closure. 				

Change in water quality (as it relates to effects to fish) – Incremental change in concentrations of constituents relative to baseline conditions

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> • Avoid waterbodies of importance to local land users and Indigenous communities, to extent practical • Plan activities near water such that deleterious materials do not enter watercourse • Implement a Spill Prevention and Response Plan (SPRP) • Whenever possible, operate machinery on land above the high-water mark, on ice, or from a floating barge in a manner that limits disturbance to the banks and bed of the waterbody • Limit access to waterbodies and banks to protect riparian vegetation and limit bank erosion • Promptly stabilize shoreline or banks disturbed by activities associated with the Project to prevent erosion and/or sedimentation • Implementation of an Erosion and Sediment Control Plan (ESCP) • Follow the DFO interim code of practice for temporary stream crossing, culvert maintenance and the waste rock management plan. • Implement Follow-up Monitoring and Environmental Management Plans. 	<ul style="list-style-type: none"> • Avoidance of waterbodies of significance (i.e. Bamooos Lake) reduces the effect of the Project on local land users • Avoidance of sensitive fish habitat preserves these areas for continued use by fish • Proper design and construction practices prevent the release of sediment and deleterious substances to fish habitat • Designing infrastructure to provide passage for fish prevents the creation of barriers to fish passage 	See change in water quality	See change in water quality	See change in water quality	See change in water quality	See change in water quality

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
*See also Lethal Effects to fish, Change in Water Quality in Water VEC, and soils VEC.						
<p>Change in benthic invertebrate communities – Direct loss and indirect impairment of benthic communities through the loss of habitat (e.g. HADD), and indirect loss due to changes in water quantity, changes to concentrations of constituents in sediments</p>						
<ul style="list-style-type: none"> Implementation of an Erosion and Sediment Control Plan (ESCP) Maintaining appropriate work area setbacks from surface water features Avoid use of explosives near water and, when near water, comply with DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters Controlling run-off from erosion-sensitive features Providing settling ponds or basins in which solids can be collected <p>*See also Lethal Effects to fish and HADD.</p>	<ul style="list-style-type: none"> Employing ESC measures and providing setbacks reduces potential for release of sediment to adjacent waterbodies <u>Proper management and storage of explosives reduces the potential for overpressure effects to fish and the potential release of nitrogen to water</u> 	<ul style="list-style-type: none"> Direct and indirect impacts to the benthic invertebrate community will be realized through overprinting and changes in flows due to the development of the Project, which are discussed in detail above. These impacts will require offset under the <i>Fisheries Act</i> and <i>MDMER</i>. The predicted incremental increases in constituent sediment levels are on average essentially indistinguishable from existing constituent levels. Following the cessation of mining operations, the discharge to Hare Lake will cease. It would be expected at this time that since water quality will return to background levels a new water-sediment equilibrium will be reached over time that sees sediment recovery to pre-discharge conditions. This change is also expected to normalize any changes to benthic 	<p><u>Fish and Fish Habitat Monitoring Program</u></p> <ul style="list-style-type: none"> Sampling of fish communities, including tissue sampling, sediments, and benthic communities at receiving watercourse (i.e. Hare Lake and Pic River) will be conducted in accordance with Environment Canada and Climate Change (ECCC) Environmental Effects Monitoring (EEM) program. Pre-operational surveys will be conducted at Hare Lake and Pic River to further characterize baseline conditions and ongoing sampling will be completed in accordance with ECCC's EEM program guidelines, MDMER requirements throughout the operation of the mine, and in accordance with the closure plan. A program consistent with EEM will be developed to monitor metal levels in fish tissues in response to concerns that metal tissue levels will be affected by discharge from mine releases. Specifically, the program will focus on recreational, food fish and /or fish collected as part of an indigenous fisheries. Interested stakeholders, including the public, Indigenous peoples and the government will be consulted when designing the program. The plan will be in place for all Project phases and will be 	<p>Results of sampling and monitoring will be compared to assess effects to benthic invertebrate communities beyond what was predicted within the EIS Addendum and fish habitat compensation plan. Additional mitigation will be employed if it is determined that the Project results in effects to benthic invertebrate communities beyond what was predicted through the EIS Addendum and compensation plan.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and modification of the water management plan to consider monitored changes in surface water levels. Prepare effluent treatment strategies specific to water quality levels identified through monitoring. 	<p>Fish and Fish Habitat Monitoring Program</p> <p>General Construction and Operations Management (compliance monitoring)</p> <p>Erosion and Sediment Control Management Plan</p> <p>Atmospheric Quality Management Plan (Overpressure and Vibration management)</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		invertebrate communities.	developed in consultation with regulatory agencies and Indigenous communities.			
TERRAIN AND SOILS						
Change in soil and overburden quantity – Soil disturbance as a result of site preparation and construction including the potential for soil loss due to erosion						
<ul style="list-style-type: none"> Mine design optimization Committing to stockpiling soil and overburden materials for later use in site rehabilitation activities. Ensuring that soil/overburden stockpiles that are created to facilitate development of the site have appropriate slopes, and maintaining the piles to prevent erosion and slide hazard. Limiting potential erosion of disturbed areas and / or soil stockpiles by implementing appropriate erosion and sediment control measures (i.e., seeding) to stabilize these areas Implement Follow-up Monitoring and Environmental Management Plans. 	<ul style="list-style-type: none"> Optimizations to the mine design reduces areas of disturbance Stockpiling and stabilizing of overburden for re-use on site reduces/eliminates that amount of imported soil required for reclamation Stabilizing soils and employing ESC measures reduces potential for release of sediment to the adjacent environment 	Changes in soil quantity may be associated with each project phase but are principally associated with construction, and to a lesser extent operations. During construction, topsoil and overburden will be removed to clear and excavate the Project site (SSA). It is estimated that approximately 2.0 M m ³ of soil and overburden will be excavated and stockpiled to facilitate site development. This material will be relocated to a single stockpile south of the MRSA. An additional 674,000 m ³ will be excavated and placed in several small stockpiles along the western margin of the PSMF. Once created, the soil and overburden stockpiles have the potential to present a slide hazard due to erosion.	<u>Soil and Terrain Follow-Up and Monitoring Program</u> <ul style="list-style-type: none"> Evaluation of man-made structures for geotechnical stability will be conducted regularly during various Project phases. As-built evaluations will be completed by qualified engineers as development occurs to ensure adherence to design. PSMF dam inspections will occur regularly and into the closure phase. A soils salvage and storage management plan will be developed to identify the suitability of materials stockpiled during stripping for reclamation purposes. The plan will include a strategy for storage of these materials. 	Additional mitigation measures including maintenance activities and design improvements/modifications will be undertaken upon completion of as-built evaluations at the discretion of the qualified engineer.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> A review of soil stockpiling techniques and erosion protection measures to mitigate any unforeseen scenarios 	Soil and Terrain Follow-Up and Monitoring Plan General Construction and Operations Management (compliance monitoring) Erosion and Sediment Control Management Plan Soil Salvage and Storage Management Plan Reclamation and Closure Plan
Change in soil quality – Potential incremental increase in soil constituent concentrations as a result of Project-related fugitive air emissions						
<ul style="list-style-type: none"> Limiting fugitive dust emissions on the PSMF and MRSA by incorporating design features such as wind breaks. Limiting fugitive emissions by watering 	<ul style="list-style-type: none"> Managing dust through active and passive controls reduces potential for fugitive dust emissions that could contaminate soils 	Changes in soil quality may be associated with each Project phase, but are principally associated with construction and operations as the likelihood and rates of fugitive air emissions are greater during these	<u>Atmospheric Environment Follow-Up and Monitoring Program</u> <ul style="list-style-type: none"> Soil sampling will be conducted at identified air quality monitoring locations (see Figure 5 of Appendix D1 of the EIS Addendum). Samples will be analyzed for metals to 	Results of sampling will be compared to the appropriate federal and provincial metal deposition criteria and to the predictions in the EIS Addendum. Additional mitigation will be employed in the event that the Project results in measured	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Use of alternative / additional dust suppressants on soil stockpiles 	Soil and Terrain Follow-Up and Monitoring Plan General Construction and Operations Management

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>construction areas in development, as well as roads and throughways used by mobile equipment and trucks.</p> <ul style="list-style-type: none"> Limiting fugitive dust emissions by progressively rehabilitating disturbed areas of the project site as quickly as is practical. Implement Follow-up Monitoring and Environmental Management Plans. 		<p>periods. The results of the air quality modelling predict low levels of fugitive emissions below applicable criteria. In keeping with those predictions, no quantitative predictions of changes in soil quality were considered warranted since, as indicated, there is no expectation that constituents associated with fugitive emissions would accumulate in soils in the study area.</p>	<p>provide a direct measure of metals deposition. The plan will be in place for all Project phases.</p> <ul style="list-style-type: none"> The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. <p><u>Soil and Terrain Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> A soils salvage and storage plan will be developed to identify the suitability of materials stockpiled during stripping for reclamation purposes. The plan will include a strategy for storage of these materials. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities 	<p>levels being greater than these criteria.</p>		<p>(compliance monitoring)</p> <p>Erosion and Sediment Control Management Plan</p> <p>Atmospheric Environment Monitoring Program</p>
VEGETATION						
<u>Change in forest cover</u> - Direct loss of approximately 1,081 ha of forest and potential indirect change or impairment of approximately 842 ha of forest cover						
<ul style="list-style-type: none"> Mine design optimization Implement standard construction best practices to reduce interactions with vegetation For Transmission corridor: <ul style="list-style-type: none"> No grading or stripping Vegetated buffer zones (slope-dependent) will be left between the line and sensitive habitats Lower vegetation and brush will be left in place 	<ul style="list-style-type: none"> Optimizations to the mine design reduces areas of disturbance Proper vegetation management practices reduce the amount of vegetation removed or damaged Progressive reclamation allows for vegetation to become self-sustainable sooner Management of invasive species improves ability for native species to succeed 	<ul style="list-style-type: none"> Project site development and construction will result in the long-term loss of approximately 1,081 ha of forest. Forest communities in affected areas of the SSA are not predicted to return to original forest conditions. Forest regrowth will occur after closure in areas where soils and topography are suitable for tree growth. 	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. <p><u>Vegetation Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Surveillance monitoring will occur around the SSA to identify the presence, colonization and encroachment of invasive and noxious plants within and around disturbed areas of the Project site. The plan will be in place for all Project phases and will be developed in consultation with 	<p>Any clearing that may occur outside the SSA would necessitate restoration. Should monitoring identify the presence, colonization and or encroachment of invasive or noxious plants within or around disturbed areas of the Project site they will be removed.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and refinement of the Closure Plan A review of the invasive species awareness and control program 	<p>General Construction and Operations Management (compliance monitoring)</p> <p>Vegetation Follow-Up and Monitoring Program</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> - Disturbed soil will be stabilized to assist vegetation regrowth and to control erosion - Hand-clearing of vegetation will be used at sensitive stream crossings and within erosion control zones to reduce soil disturbance • Progressively rehabilitating disturbed areas of the Project site as quickly as is practical with seed and non-invasive vegetation • Implement invasive species awareness and control program <p>*See also Change in Air Quality and Dustfall</p>		<ul style="list-style-type: none"> • After mitigation, negligible effects on vegetation are expected due to dustfall. Effects from dust deposition due to construction, operation and active closure activities will be localized to 30 m from the SSA. Other edge effects will likely vary with local topography, aspect, and other factors, and will be broadly comparable to those experienced in clear-cuts associated with commercial forestry in the Pic FMU or along forest access roads. • Areas within the SSA and LSA may be affected by the spread of invasive species by new roads, construction equipment and vehicles or imported fill. Vegetation communities within 30 m of the SSA will be most susceptible to the introduction of invasive and non-native species. 	regulatory agencies and Indigenous communities.			
<p>Change in non-forest cover – Direct loss or indirect impairment of approximately 38 ha of non-forested wetlands, non-forested upland communities and sparsely vegetated open water habitat</p>						
*See Change in forest cover		The Project is predicted to result in the loss of 21.4 ha of open wetlands and an additional 9.8 ha of sparsely vegetated open water habitat within the SSA. An additional 6.8 ha of non-forested upland will also be removed. 6.0 ha of	<u>General Construction and Operations Management</u> <ul style="list-style-type: none"> • Confirm Project footprint is consistent with SSA. 	<p>Any clearing that may occur outside the SSA would necessitate restoration.</p> <p>Should monitoring identify the presence, colonization and or encroachment of invasive or noxious plants within or around</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> • Review and refinement of the Closure Plan 	<p>General Construction and Operations Management (compliance monitoring)</p> <p>Vegetation Follow-Up and</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		wetland would potentially have indirect effects from groundwater increase, mainly near the PMSF and approximately 1.0 ha could be affected by predicted groundwater drawdown, primarily near the pit and MRSA.		disturbed areas of the Project site they will be removed.	<ul style="list-style-type: none"> A review of the invasive species awareness and control program 	Monitoring Program
Change to regionally and provincially rare plant species – Transplantation of two occurrences of provincially rare algae pondweed and regionally rare Oakes pondweed. Transplant of one occurrence of provincially rare alpine woodsia.						
<ul style="list-style-type: none"> Transfer reproductive structures of rare plant species within the SSA to suitable locations <p>*See also Change in forest cover</p>	<ul style="list-style-type: none"> Transplanting rare plant species provides an opportunity for the species to continue to grow and reproduce 	<p>The Project will permanently remove the habitat for one occurrence of the provincially rare algae pondweed and two adjacent occurrences of the regionally rare Oakes' pondweed. This loss can be partially mitigated by transplanting individuals to receptor lakes in the adjacent landscape, with an estimated moderate to high degree of success.</p> <p>One occurrence of the provincially rare alpine woodsia will also be permanently removed. Transplanting the affected cliff ferns to other suitable habitat outside the LSA is anticipated to have moderate potential for mitigating this loss.</p>	<p><u>Vegetation Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Transplanted Pondweed will be monitored at least once during the first season following transplanting, and attempts will be made to visit them during the optimal season to detect flowering. Transplanted ferns (i.e. alpine woodsia) will be monitored at least twice during the summer after transplanting and watered if necessary. Survivorship monitoring will be conducted the following two years. Documentation on the success of transplant methods will be provided to MNDMNR as the information will be helpful in other similar situations in the future The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities 	In the event that other regionally or provincially rare plant species are identified through detailed design or vegetation monitoring additional protection or transplant measures will be explored.	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> The development of a plan to protect the species and its habitat If protection is not feasible develop a relocation/transplant strategy. 	Vegetation Follow-Up and Monitoring Program
Change to plant species of interest to Indigenous Communities - Removal of habitat that supports plant and fungus species of interest to Indigenous communities from the SSA						
*See Change in forest cover		The removal of habitat that supports plant and fungus species of interest to Indigenous communities from the SSA is not anticipated to affect the viability of populations of these species in the LSA and RSA. Given that these	See changes in forest cover	See changes in forest cover	See changes in forest cover	Vegetation Follow-Up and Monitoring Plan

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		plant and fungus species of interest are relatively common in the RSA and are predicted to maintain viable populations in areas that will be accessible throughout the life of the Project, the magnitude of the residual effect is rated as low.				
WILDLIFE						
Change to wildlife habitat quantity – Displacement (temporary or permanent) of furbearers from the SSA						
<ul style="list-style-type: none"> Mine design optimization Implement standard construction best practices to reduce interactions with vegetation Progressively rehabilitating disturbed areas of the Project site as quickly as is practical with seed and non-invasive vegetation Implement waste control measures Implement a policy and training program for wildlife interactions and practices to reduce wildlife potential in SSA (e.g. no feeding) <p>*See also Change in Air Quality and Dustfall, Changes to Ambient Light, Change in Noise, Change in Forest and Non-forest Cover, Change in Water Quantity (Surface and Groundwater)</p>	<ul style="list-style-type: none"> Optimizations to the mine design reduces areas of disturbance Proper vegetation management practices reduce the amount of vegetation removed or damaged, thus reducing the amount of habitat removed Progressive reclamation allows for vegetation to become self-sustainable sooner, which helps habitat re-establish Proper waste management and worker training can decrease the attraction of wildlife to the SSA 	<p>The removal of forest cover and associated vegetation for Project development has the greatest potential interaction with wildlife. Indirect loss of wildlife habitat is expected to occur as a result of sensory disturbance.</p> <p>During the closure phase, potential impairment from fugitive dustfall, sensory disturbance, and edge effects will lessen as the site activity decreases and progressive rehabilitation activities occur.</p> <p><u>Furbearers</u> – most furbearers will be displaced from the SSA. Some species that are more tolerant of human disturbance may become accustomed to human activity and move back to the periphery of the site. Less tolerant species may be completely displaced during construction and operations. These species may return post-closure.</p>	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. 	Any clearing that may occur outside the SSA would necessitate restoration.	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and refinement of the Closure Plan A review of the invasive species management plan (part of the General Construction and Operations Management plan) 	<p>General Construction and Operations Management (compliance monitoring)</p> <p>Wildlife Follow-Up and Monitoring Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p><u>Black Bear</u> – Clearing of the Project footprint will result in the loss of habitat for black bear, at least during operations. Bears can become habituated to anthropogenic activities and it is expected that bears displaced by the Project will remain in the local landscape and may use some of the margins of the cleared SSA footprint that do not have intensive industrial activities. At closure, revegetation efforts will likely create open habitats that may be a source of forage for bears.</p> <p><u>Moose</u> – One or two moose are projected to be impacted by habitat loss in the SSA and, given their mobility, it is expected they will be displaced rather than killed by the forest clearing. Site rehabilitation may recover some lost habitat for moose after closure, such as shrubby browse along the transmission line corridor.</p> <p><u>Birds</u> - The clearing of the SSA is predicted to result in the temporary loss of habitat for about 8,700 forest birds. The overall impact of loss of forest habitat on the bird populations is uncertain because breeding habitat is likely not limiting for at least some species (e.g., species limited by wintering habitat or other mortality factors) and displaced birds may be</p>				

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		able to occupy vacant territories nearby.				
Change in wildlife habitat quality – Potential effects from elevated sound, vibration, light, smells, dustfall, as well as possible changes as a result of invasive species, groundwater and surface hydrology, or edge effects						
<ul style="list-style-type: none"> Mine design optimization Implement waste control measures Implement a policy and training program for wildlife interactions and practices to reduce wildlife potential in SSA (e.g. no feeding) <p>*See also Change in Air Quality and Dustfall, Changes to Ambient Light, Change in Noise, Change in Forest and Non-forest Cover, Change in Water Quantity (Surface and Groundwater)</p>	<ul style="list-style-type: none"> Optimizations to the mine design reduces areas of disturbance Proper vegetation management practices reduce the amount of vegetation removed or damaged, thus reducing the amount of habitat affected Progressive reclamation allows for vegetation to become self-sustainable sooner, which helps habitat re-establish Proper waste management and worker training can decrease the attraction of wildlife to the SSA 	<p><u>Edge effects</u> – The amount of dust generated, if properly mitigated, is anticipated to have a negligible effect on wildlife habitat. Other edge effects will likely vary with local topography, aspect, and other factors, and will be broadly comparable to those experienced in clear-cuts associated with commercial forestry on the Pic FMU or along forest access roads. Substantial edge effects from subsidized nest predators are not anticipated</p> <p><u>Invasive Plant Species</u> – Wildlife habitat within 30 m of the SSA will be most susceptible to the introduction of invasive and non-native plant species.</p> <p><u>Ground and Surface Water</u> – Effects on wildlife habitat from predicted changes in groundwater and surface water hydrology are expected to manifest slowly as they are reflected in altered successional pathways of the overstory trees. Forested areas within the LSA with raised or lowered groundwater or surface water may see a slow replacement in overstory tree species. However, many of the predominant boreal tree species (e.g., black spruce,</p>	<p><u>Wildlife Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Recording of wildlife fatalities or interactions conducted through a self-reporting program to be followed by all on-site personnel. Monitoring of PSMF for use by waterfowl. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. <p>General Construction and Operations Management</p> <ul style="list-style-type: none"> Prior to tree clearing, surveys of the area will be conducted for migratory birds. 	<p>Should monitoring identify repeated and consistent wildlife interactions a site specific and species wildlife deterrent or other mitigation measures will be explored.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Wildlife deterrents, fencing, or screening specific to monitoring results A review of the invasive species awareness and control program Application of non-reflective films or other window treatments to reduce bird strikes 	<p>Wildlife Follow-Up and Monitoring Plan</p> <p>General Construction and Operations Management (compliance monitoring)</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>balsam fir) in the LSA have rather broad tolerance with respect to soil moisture regime. Understory effects are predicted to be more pronounced but may be difficult to differentiate from natural variation and ecological processes associated with succession and will be of much lower magnitude than observed with natural disturbance (e.g., wildfire, forest pest and disease outbreaks, windthrow).</p> <p><u>Noise Vibration and Light</u> - Some wildlife species may exhibit habitat avoidance of the SSA and affected LSA because of noise, artificial lights, and vibrations. Predicted sound levels at the perimeter of the SSA are anticipated to range from 45 to 60 dBA. Sensory disturbance will be more pronounced during operation, with approximately 444 ha within the LSA expected to experience noise levels up to 50 dBA. Most of the affected area is within 500 m of the SSA, primarily along the southern periphery of the Project footprint and some to the northwest of the proposed pit and processing facility. The response to noise and vibration by wildlife will vary depending on the species.</p>				
Change in wildlife survival – Potential increase in collisions with Project vehicles and other infrastructure						

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> Where possible, forest clearing will be conducted to avoid bat-occupied maternity trees and bird nests in accordance with provincial and federal guidelines. When clearing must occur outside of prescribed windows, surveys and protection measures will be employed Clear ROWs to provide adequate lines of sight to give advanced warning of wildlife, particularly on corners. Regular brushing of roadsides to maintain sight lines Post speed limits and wildlife crossing signs Driver training to reduce risk of collision Removal of roadkill to reduce the risk to scavenging birds and mammals Plowing practices that provide gaps where mammals can easily exit the road Using directional lighting to reduce potential disorientation and collision with windows by migratory birds Install Luminescent and/or reflective markers on transmission lines over Canoe Lake Clear vegetation within 50 m of building windows to reduce 	<ul style="list-style-type: none"> Avoiding nesting seasons reduces the risk of conducting removals of vegetation with an active nest present Brushing and clearing of ROWs and lower speed limits provide wildlife and vehicle/equipment operators with an increased line of sight to avoid collisions Removal of roadkill reduces the attraction of wildlife to active work areas 	<p>Mortality of furbearers and larger mammals is expected to be negligible during clearing. An increase in mortality of species that use roadways more frequently for foraging or travel is anticipated but will be restricted to the SSA.</p> <p>Residual effects to birds are expected to be negligible and will not affect forest bird populations in the RSA provided proper mitigation is employed.</p>	<p><u>Wildlife Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Recording of wildlife fatalities or interactions conducted through a self-reporting program to be followed by all on-site personnel. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities General Construction and Operations Management Prior to tree clearing, surveys of the area will be conducted for migratory birds. 	<p>Should monitoring identify repeated and consistent wildlife interactions resulting in fatality, a site-specific wildlife deterrent or other mitigation measures will be explored.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Wildlife deterrents, fencing, or screening specific to monitoring results Identify wildlife-vehicle collision hot spots Draining of roadside salt ponds to reduce potential attraction of animals 	<p>Wildlife Follow-Up and Monitoring Plan</p> <p>General Construction and Operations Management (compliance monitoring)</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>potential bird abundance and strikes.</p> <ul style="list-style-type: none"> If monitoring indicates elevated window strikes at the Project site (e.g., >50 bird deaths/year), additional mitigation measures will be employed as necessary (e.g., non-reflective films on problematic windows). Implement a policy and training program for wildlife interactions and practices to reduce wildlife potential in SSA (e.g. no feeding) 						
<p>Change in wildlife habitat fragmentation & movement – Potential effects from habitat clearing, collisions with Project vehicles and infrastructure, and waste-related interactions</p>						
<ul style="list-style-type: none"> Mine design optimization Progressively rehabilitating disturbed areas of the Project site as quickly as is practical with seed and non-invasive vegetation 	<ul style="list-style-type: none"> Optimizations to the mine design reduces areas of disturbance Progressive reclamation allows for vegetation to become self-sustainable sooner, which helps re-establish connectivity 	<p>Forest clearing in the SSA will have little effect on fragmentation at the RSA level, either for Ecodistrict 3W-5 or the Pic FMU, with the texture of mature and old forest similar between the current state and the site if the Project goes ahead. Mature and old forest is much more abundant in the RSA.</p> <p>Proposed roads and transmission lines will contribute to forest fragmentation and may adversely affect forest-interior bird species. Conversely, edge adapted birds may benefit from the habitat alteration.</p>	<p><u>Wildlife Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> Recording of wildlife fatalities or interactions conducted through a self-reporting program to be followed by all on-site personnel. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. General Construction and Operations Management Prior to tree clearing, surveys of the area will be conducted for migratory birds. 	<p>Should monitoring identify repeated and consistent wildlife interactions, a site-specific and species wildlife deterrent or other mitigation measures will be explored.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Wildlife deterrents, fencing, or screening specific to monitoring results and to direct species around the active portions of the site. 	<p>Wildlife Follow-Up and Monitoring Plan</p> <p>General Construction and Operations Management</p>
<p>Change to wildlife of interest to Indigenous communities – Residual changes to wildlife habitat quantity and quality, wildlife survival, and wildlife habitat fragmentation and movement also apply to changes to wildlife of interest to Indigenous communities</p>						
<p>*See Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival.</p>		<p>The residual effects described above also include wildlife species of interest to Indigenous communities. Residual</p>	<p><u>Wildlife Monitoring Program</u></p> <ul style="list-style-type: none"> Recording of wildlife fatalities or interactions conducted through a self-reporting 	<p>Should monitoring identify repeated and consistent wildlife interactions, a site specific and species wildlife deterrent or other</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p>	<p>Wildlife Follow-Up and Monitoring Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>changes to wildlife habitat quantity and quality, wildlife survival, and wildlife habitat fragmentation and movement also apply to changes to wildlife of interest to Indigenous communities.</p>	<p>program to be followed by all on-site personnel.</p> <ul style="list-style-type: none"> • Prior to tree clearing, surveys of the area will be conducted for migratory birds. • Develop a communication protocol with Biigtigong Nishnaabeg for reporting the mortality of large mammals along the site access road and in the vicinity of the SSA. • The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 	<p>mitigation measures will be explored.</p>	<ul style="list-style-type: none"> • Wildlife deterrents, fencing, or screening specific to monitoring results and to direct species around the active portions of the site. • A review of the invasive species awareness and control program 	<p>General Construction and Operations Management</p>
SPECIES AT RISK						
<p><u>Change to woodland caribou or their habitat</u> - loss of approximately 107 ha of potential caribou winter habitat in the SSA (albeit only 2.9 ha are currently undisturbed) and an additional 45 ha of disturbed habitat in the LSA.</p>						
<ul style="list-style-type: none"> • Suspended construction/operational activities if individual caribou are observed until caribou have left the area and the observation reported to the MNDMNR • Prohibit hunting by the Proponent's employees and subcontractors on Project site • Provide SAR awareness training for all construction and operations employees, agents, and contractors so that they can recognize woodland caribou and are aware of the proper procedures to follow if caribou are observed • Plow escape routes through snowbanks every 1 km • Prohibit recreational snowmobile and 	<ul style="list-style-type: none"> • Suspension of activities, prohibiting hunting and recreational vehicles reduces the potential interaction with caribou • Providing staff training increases capacity for SAR to be identified and procedures to be followed should species be observed • The use of plow escape routes and pit egress design prevents caribou from being trapped • The use of timber and slash piles decreases predator sight lines, reducing contact with caribou • Progressive reclamation of the site returns the area to caribou habitat 	<ul style="list-style-type: none"> • Updated analyses of modelled caribou habitat indicate there are approximately 106 ha of caribou winter habitat (41 ha preferred, 65 ha usable) and 732 ha of caribou refuge habitat (221 ha preferred, 511 ha used) approximately within the SSA. However, it is noted almost all (97.3%) of the winter habitat and refuge habitat in the SSA is already considered disturbed by MNDMNR's and Environment Canada's disturbance model. As such, the additional disturbance from the Project would have a negligible effect on overall range 	<p><u>Wildlife Follow-Up and Monitoring Program</u></p> <ul style="list-style-type: none"> • Recording of wildlife (including woodland caribou) fatalities or interactions conducted through a self-reporting program to be followed by all on-site personnel. • The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. <p>Species at Risk Follow-up and Monitoring Program</p> <ul style="list-style-type: none"> • Additional Woodland Caribou specific monitoring will be developed in conjunction with MNDMNR and ECCC. This plan will include details regarding monitoring of any off-site mitigation, as necessary. • The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 	<p>Should monitoring identify repeated and consistent wildlife interactions, a site specific and species wildlife deterrent or other mitigation measures will be explored</p> <p>Any clearing that may occur outside the SSA would necessitate restoration.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> • Wildlife deterrents, fencing, or screening specific to monitoring results and to direct species around the active • Review and refinement of the Caribou Offsetting Plan • Review and refinement of the Closure Plan 	<p>Wildlife Follow-up and Monitoring Plan</p> <p>Species at Risk Follow-up and Monitoring Plan</p> <p>General Construction and Operations Management (compliance monitoring)</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>ATV/UTV use at the Project site</p> <ul style="list-style-type: none"> • Post and maintain education signage on potential presence of caribou • Where possible, Pits and trenches will be backfilled or contoured to a stable angle of repose and, if greater than 3 m deep, will provide at least one sloped ramp as a point of egress for caribou. Where egress is not feasible, the area will be fenced • Disturbed bedrock will be stockpiled on site in a safe and stable manner • Non-merchantable timber and slash will be piled at appropriate locations along trails and roads to reduce predator sight lines and foraging efficiency. Trails will be otherwise left for natural regeneration • Other disturbed areas will be stabilized and revegetated using native seed mixes or natural regeneration as appropriate • Where possible, habitat that was disturbed by mineral exploration activities (including roads and landings) will be rehabilitated and restored in a progressive manner. • To reduce potential increase in forage for alternate prey which 		<p>disturbance levels at the RSA level.</p> <ul style="list-style-type: none"> • With appropriate mitigation, no adverse effects on woodland caribou survival are anticipated from the Project given the lack of documented historical or current use of the SSA by woodland caribou and the very low numbers of woodland caribou estimated to remain in the mainland LSCR. • The SSA is approximately 6 km in width and has the potential to be at least a partial barrier to movement by caribou, particularly during the anticipated 2-year site development phase and 13-year mine operating life. This potential risk will be reduced at closure with partial site rehabilitation. 	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> • Confirm Project footprint is consistent with SSA. 			

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>could subsequently attract predators, the use of non-native, invasive, and/or high productivity plant species for erosion control will be avoided. For example, use of clovers (<i>Trifolium</i> spp.) which are palatable to bears, will be avoided</p> <p>*See also Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival.</p>						
<p>Change to little brown myotis / northern brown myotis or their habitat - loss of approximately 1,000 ha of possible bat foraging and day roost habitat in the SSA, as well as the loss of an estimated 39 ha of potential bat maternity roost habitat.</p>						
<ul style="list-style-type: none"> Avoid clearing of trees in the SSA during the maternity period (i.e., May 15th through August 31). If limited clearing must be done during this window, bat maternity surveys using the current MECP protocol would be used, and appropriate protection measures applied. Install 5 bat boxes and / or bat rocket boxes outside of the LSA <p>*See also Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival.</p>	<ul style="list-style-type: none"> Avoiding breeding seasons reduces the risk of conducting removals of vegetation with active roosts Bat boxes and rocket boxes provide roosting opportunities for bats 	<ul style="list-style-type: none"> The loss of approximately 1,000 ha of possible bat habitat and 39 ha of potential bat maternity roost habitat will result in a residual effect to myotis. However, given the abundance of habitat and the proposed mitigation to partially replace habitat, this effect is predicted to be not significant. During clearing, proper mitigation (e.g. time restrictions on clearing or the completion surveys) will reduce potential effects. 	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. <p><u>Wildlife Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Recording of bat use of installed bat boxes and bat rocket boxes. Prior to tree clearing, surveys of the area will be conducted for SAR bats. Additional monitoring specific to SAR bats may be developed through discussions with MNDMNR and ECC. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 	<p>Any clearing that may occur outside the SSA would necessitate restoration.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> If use of maternity roost trees by myotis is confirmed, mitigation will be applied following MNDMNR's AOC prescription for bat maternity roosts that has been developed for the Pic Forest (i.e., Project RSA). 	<p>General Construction and Operations Management (compliance monitoring)</p> <p>Species at Risk Follow-up and Monitoring Plan</p> <p>Wildlife Follow-up and Monitoring Plan</p>
<p>Change to Canada warbler or their habitat – loss of approximately 1071 ha of potential Canadian warbler habitat and potential sensory disturbance of an additional 444 ha within the LSA</p>						
<ul style="list-style-type: none"> stockpiling of non-merchantable coarse woody debris during site clearing for use 	<ul style="list-style-type: none"> Non-merchantable coarse woody debris can be used for the creation of Canada warbler habitat 	<ul style="list-style-type: none"> The development of the Project results in the potential direct loss of habitat. Modelling estimates that a total of 92 	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. 	<p>Any clearing that may occur outside the SSA would necessitate restoration.</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p>	<p>General Construction and Operations Management</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
during future rehabilitation efforts *See also Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival		Canada warblers breeding in the SSA could be potentially displaced by clearing of the SSA <ul style="list-style-type: none"> Approximately 326 ha of ecosites that are modelled as preferred Canada warbler habitat within the LSA (outside the SSA) could potentially be affected by noise during operations of greater than 50 dB. 			<ul style="list-style-type: none"> Review and refinement of the Closure Plan 	(compliance monitoring) Species at Risk Follow-up and Monitoring Plan
Change to rusty blackbird or their habitat – loss of approximately 17.7 ha of potential rusty blackbird habitat						
*See Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival.		<ul style="list-style-type: none"> There are nine small waterbodies (between 0.5 ha and 5.0 ha in size) in the SSA and a total of 17.7 ha of aquatic habitat when smaller ponds are included that may be suitable to this species. Potential effects from collisions with Project infrastructure or vehicles, sensory disturbance, or indirect effects from the Project are expected to be minimal for rusty blackbird given their infrequent use of the LSA and habitat preference for riparian conifer forests. 	<u>General Construction and Operations Management</u> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. <u>Wildlife Follow-up and Monitoring Program</u> <ul style="list-style-type: none"> Recording of wildlife fatalities or interactions conducted through a self-reporting program to be followed by all on-site personnel. Prior to tree clearing, surveys of the area will be conducted for migratory birds. Additional monitoring specific to rusty blackbird may be developed through discussions with MNDMNR and ECCC. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 	Any clearing that may occur outside the SSA would necessitate restoration. Should monitoring identify repeated and consistent wildlife interactions, a site specific and species wildlife deterrent or other mitigation measures will be explored	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Review and refinement of the Closure Plan Wildlife deterrents, fencing, or screening specific to monitoring results and to direct species around the active portions of the site. 	General Construction and Operations Management (compliance monitoring) Wildlife Follow-Up and Monitoring Plan Species at Risk Follow-up and Monitoring Plan
Change to common nighthawk or their habitat – loss of approximately 48 ha of potential common nighthawk habitat						
<ul style="list-style-type: none"> *See Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival. 		Within the SSA, there are only about 6 ha of non-treed upland ecosite and 42 ha of treed conifer Ecosite	<u>General Construction and Operations Management</u>	Any clearing that may occur outside the SSA would necessitate restoration.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with	General Construction and Operations Management

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		B012 that is potentially suitable, where there is sufficient unmapped rock barren area intermixed with jack pine and black spruce forest. There has been no observed use of these habitats and they represent less than 0.1% of the potentially suitable habitat for these species within the RSA, not including cutovers, burns, and anthropogenic features such as transmission line rights-of-way.	<ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. 		pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Review and refinement of the Closure Plan 	(compliance monitoring) Species at Risk Follow-up and Monitoring Plan
Change to eastern whip-poor-will or their habitat - loss of approximately 48 ha of potential whip-poor-will habitat						
<ul style="list-style-type: none"> Conduct nightjar surveys on site in the event that whip-poor-will colonize the site during operations *See Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival. 	Surveys would confirm the potential presence of nightjar within the mine site to identify occupied nesting locations to avoid during active nest season	Within the SSA, there are only about 6 ha of non-treed upland ecosite and 42 ha of treed conifer Ecosite B012 that is potentially suitable, where there is sufficient unmapped rock barren area intermixed with jack pine and black spruce forest. There has been no observed use of these habitats and they represent less than 0.1% of the potentially suitable habitat for these species within the RSA, not including cutovers, burns, and anthropogenic features such as transmission line rights-of-way.	<u>General Construction and Operations Management</u> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. <u>Species at Risk Follow-up and Monitoring Plan</u> <ul style="list-style-type: none"> Nightjar surveys to follow standard survey protocols. The plan will be in place for operations and will be developed in consultation with regulatory agencies and Indigenous communities. 	Any clearing that may occur outside the SSA would necessitate restoration.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Review and refinement of the Closure Plan 	General Construction and Operations Management (compliance monitoring) Species at Risk Follow-up and Monitoring Plan
Change to yellow-banded bumble bee or their habitat – loss of approximately 1,116 ha of potential, yellow-banded bumble bee habitat						
<ul style="list-style-type: none"> Inclusion of selected wildflower species in the seed mixes to provide additional nectar sources throughout the growing season *See also Change to Wildlife Habitat Quantity, Quality,	<ul style="list-style-type: none"> Seed mixes that contain wildflower species help establish habitat for yellow-banded bumble bee 	Given the broad habitat requirements for this species and abundant potential habitat in the RSA, this habitat loss is not expected to affect regional populations. There is the potential mortality of a few individuals, if actually	<u>General Construction and Operations Management</u> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. 	Any clearing that may occur outside the SSA would necessitate restoration.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Review and refinement of the Closure Plan 	General Construction and Operations Management (compliance monitoring)

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
Fragmentation and Wildlife Survival.		nesting in the SSA, during site clearing and development. There is also a minor risk of mortality from vehicle collisions, although this can largely be mitigated				Species at Risk Follow-up and Monitoring Plan Reclamation and Closure Plan
Change to monarch or their habitat – loss of approximately 1,116 ha of potential monarch habitat						
<ul style="list-style-type: none"> Inclusion of selected wildflower species in the seed mixes to provide additional nectar sources throughout the growing season <p>*See also Change to Wildlife Habitat Quantity, Quality, Fragmentation and Wildlife Survival.</p>	<ul style="list-style-type: none"> Seed mixes that contain wildflower species help establish habitat for monarch 	<p>The LSA sees irregular use by adult monarchs, with none observed during 2007-2010 fieldwork but numerous adults (15+) observed on July 7-8, 2020. In some areas, the monarch is vulnerable to mortality from vehicle collisions, particularly throughout its summer range. Given the infrequent use of the LSA by monarchs, the relatively low traffic speeds and volumes (especially compared to Highway 17 immediately to the south), and generally north-south alignment of the road, this risk is expected to be low and can be mitigated.</p>	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. 	Any clearing that may occur outside the SSA would necessitate restoration.	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and refinement of the Closure Plan 	<p>General Construction and Operations Management (compliance monitoring)</p> <p>Species at Risk Follow-up and Monitoring Plan</p>
Change to lake sturgeon or their habitat – Indirect loss of habitat as a result of changes to surface water quality						
<ul style="list-style-type: none"> Maintain existing drainage patterns as is possible so as not to alter natural hydrological patterns, while ensuring water quality is not adversely affected. Avoiding the use of explosives within setback areas as determined by the DFO Guidelines for the Use of Explosives in or Near 	<ul style="list-style-type: none"> <u>Maintaining drainage and flow patterns reduces the change in baseline flow characteristics within subwatersheds</u> <u>Proper management and storage of explosives reduces the potential for overpressure effects to fish and the potential release of nitrogen to water</u> 	No residual effects were identified as it relates to changes in water quantity (e.g. the change in flow to the Pic River will be negligible), water quality (e.g. modelled constituent concentrations in the Pic River will be below water quality benchmarks that are protective of aquatic life, including all life stages of Lake Sturgeon) or the use of explosives (e.g. estimate setbacks of approximately	<p><u>Surface Water Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Water quality will be measured in surface water receiving environments (e.g. Hare Lake, Stream 6 [post closure], Pic River) consistent with ECA and metal and diamond mining effluent regulations (MDMER) requirements. Records will include water quality sampling. Monitoring will occur at various times of the year, consistent with ECA and MDMER 	Results of monitoring will be compared to the values used in the EIS Addendum, and to applicable regulatory criteria or objectives, and as set out through the approvals process (e.g. ECA). Additional mitigation will be employed if it is determined that the Project results in water quality levels that exceed these criteria.	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Reviewing the water management plan to consider monitored changes in surface water levels. 	<p>Fish and Fish Habitat Follow-up and Monitoring Plan</p> <p>Surface Water Follow-up and Monitoring Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>Canadian Fisheries Waters.</p> <ul style="list-style-type: none"> Implement the site waste management, water management and erosion and sediment control strategies and ensure the measures associated with these strategies are maintained as applicable throughout the duration of the Project. <p>*See also changes to fish and fish habitat</p>	<ul style="list-style-type: none"> Proper design and construction practices prevent the release of sediment and deleterious substances to fish habitat 	<p>one kilometer was deemed sufficient).</p>	<p>requirements. All applicable parameters will be monitored at facility commissioning to establish and confirm emissions.</p> <ul style="list-style-type: none"> The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. <p><u>Fish and Fish Habitat Monitoring Program</u></p> <ul style="list-style-type: none"> Sampling of fish communities, including tissue sampling, sediments, and benthic communities at receiving watercourse (i.e. Hare Lake and Pic River) will be conducted in accordance with Environment Canada and Climate Change (ECCC) Environmental Effects Monitoring (EEM) program. Pre-operational surveys will be conducted at Hare Lake and Pic River to further characterize baseline conditions and ongoing sampling will be completed in accordance with ECCC's EEM program guidelines, MDMER requirements throughout the operation of the mine, and in accordance with the closure plan. Monitoring programs specific to fish habitat compensation measures implemented will be developed. The scope and nature of the programs will depend on scope and nature of the compensation provided and will be communicated as part of the Fish Habitat Compensation Plan. Compensation-related monitoring would be 			

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
			implemented following completion of the individual compensation-related works. <ul style="list-style-type: none"> Additional monitoring specific to lake sturgeon may be developed through discussions with MNDMNRF and ECCC. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. 			
SOCIO-ECONOMIC ENVIRONMENT						
Change in employment and income – loss of employment and Project-related income when project transitions from operations to closure						
<ul style="list-style-type: none"> Establishing measures to encourage and recruit employees from the existing populations in local communities Providing opportunities for training to facilitate employment by residents of the LSA and RSA and supporting initiatives to train local youth and members of Indigenous groups During decommissioning, implementing strategies to help transition the workforce Working with existing institutions and employment and training providers such as Lakehead University, Confederation College, and local high schools Identifying opportunities for job readiness programs that include practical hands on training and soft skills 	<ul style="list-style-type: none"> Recruitment of employees from the existing population provides economic benefits to the community while not increasing Project demand on infrastructure and services Developing and implementing training programs focused on the local population creates a larger locally based employment base Developing strategies for the workforce during closure provides a transition for employees 	GenPGM currently estimates that Project construction will involve a workforce ranging from 430 to 550 persons over the 18-to-24-month construction period, with a peak workforce of 800 to 1,000 persons. During operations, the project will generate an average of 419 full-time-equivalents of employment per year, over which an average of 375 persons will be directly employed by the Project. As the Project transitions into decommissioning and closure/post-closure, the workforce will be ramped down, resulting in a loss of employment within local communities. This eventual loss of employment, however, will be anticipated and communicated to Project workers. The skills, experience, and qualifications that workers gained while employed on the Project will help offset the loss of employment, as these improved qualifications will aid with	<u>Socio-economic Follow-up and Monitoring Program</u> <ul style="list-style-type: none"> A conceptual program has been reviewed with both the Town of Marathon and BN (per SIR#7) (CIAR #587). The monitoring program will include monitoring of indicators for demography (population, employment), housing, education, community infrastructure, community services, health services, emergency services, traffic / transportation, employment and income, business development, cultural and Indigenous considerations. Indicators, duration, frequency and other components of the program will be established through on-going consultation. 	On-going discussions with municipal and indigenous communities.	N/A	Socio-economic Follow-up and Monitoring Program

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>such as computer skills, literacy and math</p> <ul style="list-style-type: none"> Developing programs focused on underrepresented populations (e.g. Indigenous peoples or females) within the mining sector 		<p>securing employment on future projects within the LSA, RSA or other parts of Ontario.</p>				
Change in economic and business development – reduction/loss of revenue and opportunities once the Project transitions from operations to closure						
<ul style="list-style-type: none"> Work with economic development groups to increase contracting opportunities for local businesses 	<ul style="list-style-type: none"> Use of local businesses for contracting opportunities provides economic benefits to the community 	<p>The Project will generate opportunities for local and regional businesses to supply goods and services both to the Project directly or indirectly due to the presence of workers and contractors in the local area and region. Economic activity associated with the Project will bolster the economy of the RSA by injecting new capital into the region thereby reducing dependence of local businesses on existing mining and natural resources operations.</p>	<p><u>Socio-economic Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> A conceptual program has been reviewed with both the Town of Marathon and BN (per SIR#7) (CIAR #587). The monitoring program will include monitoring of indicators for demography (population, employment), housing, education, community infrastructure, community services, health services, emergency services, traffic / transportation, employment and income, business development, cultural and Indigenous considerations. Indicators, duration, frequency and other components of the program will be established through on-going consultation. 	N/A	N/A	Socio-economic Follow-up and Monitoring Plan
Change in accommodations – Increase in demand for housing and short-term accommodations (estimate of 240 persons for short-term accommodations), including BN members who may choose to move back to the community						
<ul style="list-style-type: none"> Implementation of a worker housing strategy, which entails the use of an Accommodations Complex in or near Marathon during construction and operation Implementing rotational work arrangements. Establishing measures to encourage and 	<ul style="list-style-type: none"> The use of an accommodation complex reduces Project-related demand on local housing supply Rotational work arrangements reduce the number of people within the accommodation complex at a given time 	<ul style="list-style-type: none"> It is predicted that Project construction will require a peak workforce of approximately 870 and an average of 360 workers to be onsite per day. An existing work camp will be used to house the construction workforce. 	<p><u>Socio-economic Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> A conceptual program has been reviewed with both the Town of Marathon and BN (per SIR#7) (CIAR #587). The monitoring program will include monitoring of indicators for demography (population, employment), housing, and cultural and Indigenous considerations. 	Should monitoring identify a shortage in accommodations as a result of the Project, additional mitigation will be provided.	<p>Mitigation will include the provision of temporary or permanent housing for transient members of the workforce and will be determined based on availability when such a shortage is identified. Alternatives may include:</p> <ul style="list-style-type: none"> The expansion of the modular Accommodation Complex The use of other work camps within the RSA 	Socio-economic Follow-up and Monitoring Plan

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>recruit employees from the existing populations in local communities.</p> <ul style="list-style-type: none"> • Providing opportunities for training to facilitate employment by residents of the LSA and RSA and supporting initiatives to train local youth and members of Indigenous groups. 	<ul style="list-style-type: none"> • Recruitment of employees from the existing population provides economic benefits to the community while not increasing Project demand on infrastructure and services 	<ul style="list-style-type: none"> • The Project operations workforce is predicted to average 430, working a one week on/one week off rotation, therefore, 212 workers per rotation, with roughly half working day shift and half working night shift and these workers do not share rooms. These workers can be housed within the Accommodation Complex (capacity of 180 rooms). 	<ul style="list-style-type: none"> • Indicators, duration, frequency and other components of the program will be established through on-going consultation. 			
<p>Change in community infrastructure use – Potential increased demand on infrastructure and community services as a result of Project-related population growth.</p>						
<ul style="list-style-type: none"> • Mandatory cultural sensitivity training for all Project employees. • Engaging with municipal authorities and BN to coordinate planning of infrastructure development or upgrades that may be needed to ensure that they do not negatively affect the local communities. • Providing support to fund key community services or organizations and provide fitness and recreational programs for workers within the existing facilities. • Providing Project employees with health services (physical, mental and social health), including Employee Assistance 	<ul style="list-style-type: none"> • Cultural sensitivity training outlines GenPGM'S code of conduct and expectations, policies and practices to prevent discrimination, harassment and other forms of misconduct. • Coordination and planning with infrastructure/ services providers improves the ability to respond to capacity demands as a result of the Project • Providing health services to employees reduces demand on existing services and promotes employee wellbeing • Coordinating emergency response preparedness coordination provides a pre-determined plan and associated 	<p>Changes in demand for community services and infrastructure are largely based on population growth – therefore, the extent to which workers choose to relocate to local communities during Project construction and operation will influence the extent to which demand for community services will change. Rotational workers in the LSA and RSA during construction and operation will also require access to certain types of services, although, given the short-term nature of a temporary workforce engaged on a rotational basis, and the fact that some services will be available at the Accommodations Complex, it is not expected that construction phase workers will make substantial use of local community services.</p>	<p><u>Socio-economic Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> • A conceptual program has been reviewed with both the Town of Marathon and BN (per SIR#7) (CIAR #587). The monitoring program will include monitoring of indicators for demography (population, employment), housing, education, community infrastructure, community services, health services, emergency services, traffic / transportation, employment and income, business development, cultural and Indigenous considerations. • Indicators, duration, frequency and other components of the program will be established through on-going consultation. 	<p>Should monitoring identify capacity issues with community infrastructure as a result of the Projects demand on infrastructure (excluding permanent resident use), additional mitigation will be discussed with the community service provider (e.g., Town of Marathon, BN).</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> • Working with municipalities and other infrastructure and service providers to forecast potential demands that require an increase in service capacity 	<p>Socio-economic Follow-up and Monitoring Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>Programs (EAP) and on-site emergency service infrastructure, including fire-fighting equipment.</p> <ul style="list-style-type: none"> GenPGM will co-ordinate its Emergency Preparedness and Response Plan (EPRP) with the Town of Marathon emergency services department and BN. Implementing a Waste Management Plan. Commitment to on-going monitoring of socio-economic effects on the BN community. 	<p>resource needs in the case of an emergency</p> <ul style="list-style-type: none"> Implementing a Waste Management Plan will reduce the amount of waste generated through diversion to recycling Follow-up and monitoring provides a response mechanism to monitor and track potential Project-related effects to surrounding communities 					
Change in transportation infrastructure - Project-related activities and transportation of workers will place increased demands on local transportation infrastructure.						
<ul style="list-style-type: none"> Implementing a Traffic Management Plan, which will include encouraging car-pooling and providing bus transport to and from the Project site and requiring all Project drivers and employees to observe speed limits and take safety precautions. Scheduling shift changes and truck movements to avoid peak traffic hours and school bus pick-up and drop-off times. 	<ul style="list-style-type: none"> The implementation of a traffic management plan will promote the reduction of vehicle trips to and from the site and promote scheduling of deliveries outside of peak traffic times 	<p>The Project is expected to contribute to an increase in road traffic volume (90 passenger vehicles entering the site for each day shift and 60 passenger vehicles for the night shifts; up to 40 tractor trailer truckloads per day of concentrate product; and six tractor trailer loads of supplies) in the vicinity of the Project site. Through upgrades to the Highway 17 and Peninsula Road intersection, it is predicted that infrastructure will operate as anticipated.</p>	<p><u>Socio-economic Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> A conceptual program has been reviewed with both the Town of Marathon and BN (per SIR#7) (CIAR #587). The monitoring program will include monitoring of indicators for demography (population, employment) and traffic / transportation. Indicators, duration, frequency and other components of the program will be established through on-going consultation. 	<p>Should monitoring identify a Project-related demand increase on transportation infrastructure that exceeds these facilities capacities, additional mitigation will be discussed with the pertinent party (e.g. MTO or Town of Marathon).</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Working with municipalities and MTO to monitor traffic volumes 	<p>Socio-economic Follow-up and Monitoring Plan</p> <p>General Construction and Operations Management Plan (compliance monitoring)</p>
Change in land and resource use - loss of, or restricted access to, the SSA, sensory disturbances (i.e., noise and dust) from Project activities, and the reduction in overall user experience from the Project presence						
<ul style="list-style-type: none"> GenPGM will engage with the Town of Marathon and provincial Crown lands permit holders to address potential disturbance to or access restrictions to 	<ul style="list-style-type: none"> Engaging with the Town and Crown land permit holders enables alternative access arrangements to be made, including access around the site and escorted access 	<ul style="list-style-type: none"> For safety and security reasons, resource and recreational activities will be restricted near Project activities (within the SSA). GenPGM will engage 	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. <p><u>Atmospheric Environment Follow-up and Monitoring Program</u></p>	<p>Any clearing that may occur outside the SSA would necessitate restoration.</p> <p>*See changes in air quality and changes in noise level</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and refinement of the Closure Plan 	<p>Atmospheric Environment Follow-up and Monitoring Plan</p> <p>Access Management Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>municipal and Crown land areas</p> <ul style="list-style-type: none"> Develop limited access protocol that includes a provision for guided escorted access through the SSA. Harvester Training Fund. An endowment fund where interest supports annual harvester and trapline training programs. Signage will be installed around the SSA to alert the public and land users of the presence of the Project and its facilities. Hunting / fishing / harvesting of wildlife will be strictly prohibited on the site. Workers will not be permitted to hunt / fish / harvest and will not be permitted to bring firearms or angling gear to site. Project activities, locations, and timing will continue to be communicated to Indigenous groups, affected land and resource users, environmental non-government organizations, the provincial government, and local authorities throughout the life of the Project. Desired land and resource end-uses will be considered in the preparation of the Closure Plan. 	<p>through the site when permitted</p> <ul style="list-style-type: none"> The establishment of a Harvester and Training Fund, as part of CBAs, provides alternative means for training and support for the loss of access to Trap Lines Prohibiting access and restricting workers from hunting/fishing/ harvesting reduces safety incidence and the potential for ingestion of CoPCs Notifying land users of potential obtrusive Project activities can reduce potential for such interactions Collaboration and engagement of land users, including BN, in the development of the end land use plan promotes the restoration of the SSA to a desirable state 	<p>with local resource users (hunters, outfitters, trappers, fishers) regarding the overlap of the Project with hunting, trapping, and fishing areas in the SSA.</p> <ul style="list-style-type: none"> The Project is likely to result in sensory disturbances which can affect the overall experience of resource users (i.e., hunters, trappers, outfitters, and fishers) within the SSA and LSA, as the remoteness is a large part of the draw and appeal of these activities 	<ul style="list-style-type: none"> Nuisance sensory effects (e.g. noise and odor) will be monitored in accordance with changes in air quality and noise levels. 		<p>*See changes in air quality and changes in noise level</p>	<p>General Construction and Operations Management (compliance monitoring)</p>
<p><u>Change in land and resource use</u> - removal of forest land from the commercial forest area could affect the determination of annual allowable cut (AAC) levels.</p>						

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> Site clearing and disturbed areas will be limited to the extent practicable and only as required to accommodate the Project. To the extent possible, clearing and wood utilization will follow the requirements contained in the Forest Management Plan. This may include a commercial market for the harvested wood from the Project site or may be used for firewood for the general public. Un-merchantable wood, as defined by the <i>Crown Forest Sustainability Act</i>, may be left scattered throughout the harvested area to serve as coarse woody debris. 	<ul style="list-style-type: none"> Limiting disturbed areas provides more areas around the SSA that can continue to be used for land and resource use Conducting clearing and wood utilization in accordance with Forest Management Plan aligns clearing activities with those used to manage the broader Forest Management Unit, while the storage of un-merchantable wood allows for re-use on site for reclamation and habitat mitigation 	Timber harvest on site will be staged over a four-year period, commencing with site preparation and construction and continuing as needed during the initial two years of operation as project infrastructure is expanded. The adverse effect on AAC will be a continuous event because the affected productive forest land will remain deforested for the duration of the Project. However, no harvest areas in the SSA were identified in the current forest management plan. Additionally, the Summary of the Proposed Long-Term Management Direction for the Pic Forest Management Plan (2021) outlines potential harvest areas until 2029 and no such areas were identified within the SSA.	<u>General Construction and Operations Management</u> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. 	Any clearing that may occur outside the SSA would necessitate restoration.	Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include: <ul style="list-style-type: none"> Review and refinement of the Closure Plan 	General Construction and Operations Management (compliance monitoring) Reclamation and Closure Plan
HUMAN HEALTH						
<u>Change in Human Health exposure to air</u> – Incremental changes in air quality are predicted and therefore an incremental risk is perceived though no specific Human Health risks are expected						
*See Change in Air Quality and Dustfall		Air quality parameters that exceeded a short-term screening value included nickel, nitrogen dioxide (NO ₂), benzo(a)pyrene and crystalline silica. Air quality parameters that exceeded a long-term screening value included benzene, benzo(a)pyrene, and nickel.	<u>Atmospheric Environment Follow-up and Monitoring Program</u> <ul style="list-style-type: none"> Contaminants of potential concern (CoPC) for air and water (surface and ground) will be monitored as part of the respective monitoring programs. *See changes in air quality for more details	*See changes in air quality for more details	*See changes in air quality for more details	Atmospheric Environment Follow-up and Monitoring Plan Atmospheric Quality Management Plan
<u>Change in Human Health exposure to noise</u> – Incremental changes in noise are predicted and therefore an incremental risk is perceived though no specific HH risks are expected						
*See Change in Noise Levels and ground vibrations		Noise modelling predicted the Percent Highly Annoyed (%HA) to be	<u>Atmospheric Environment Follow-up and Monitoring Program</u>	*See changes in noise levels for more details	*See changes in noise levels for more details	Atmospheric Environment

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
		<p>insignificant, with the closest noise-sensitive receptor having a predicted change of 2.4%HA, where less than 6.5%HA is not expected to impact on community annoyance.</p> <p>The maximum predicted noise levels within the SSA were also below the noise-induced sleep disturbance criteria threshold recommended by the WHO and Health Canada.</p>	<ul style="list-style-type: none"> Measurement of ambient noise levels will be completed during various phases of the Project. <p>*See changes in noise levels for more details</p>			<p>Monitoring Program</p> <p>Atmospheric Quality Management Plan</p>
<p>Change in Human Health exposure to water – Incremental changes in water quality are predicted and therefore an incremental risk is perceived though no specific HH risks are expected</p>						
<ul style="list-style-type: none"> For safety reasons, public access to the SSA will be prohibited during the construction, operations and decommissioning phases of the Project. <p>*See Change in Surface Water and Ground Water Quality</p>	<ul style="list-style-type: none"> Prohibiting access reduces potential for safety incidence or exposure 	<p>Constituent concentrations in surface water are not predicted to exceed water quality benchmarks protective of human health. Therefore, no adverse effects on human health are expected from Project-related changes to surface water quality in Hare Lake for people using water in Hare Lake for drinking water and recreational purposes.</p>	<p><u>Groundwater Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Monitoring of groundwater quality levels at receiving environment. The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. <p><u>Surface Water Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Monitoring of water quality at point source discharge locations (e.g. PSMF and MRSA discharge points). The plan will be in place for all Project phases and will be developed in consultation with regulatory agencies and Indigenous communities. <p>*See change to groundwater quality and change to surface water quality for more details</p>	<p>*See change to groundwater quality and change to surface water quality for more details</p>	<p>*See change to groundwater quality and change to surface water quality for more details</p>	<p>Groundwater Follow-up and Monitoring Plan</p> <p>Surface Water Follow-up and Monitoring Plan</p> <p>General Construction and Operations Management (compliance monitoring)</p>
<p>Change in Human Health exposure to country foods – Incremental changes in country foods are predicted and therefore an incremental risk is perceived though no specific HH risks are expected</p>						
<ul style="list-style-type: none"> For safety reasons, public access to the SSA will be prohibited during the construction, operations and 	<ul style="list-style-type: none"> Prohibiting access and restricting workers from hunting/fishing/harvesting reduces safety incidence and 	<p>Project-related air and water emissions are not expected to cause CoPCs to accumulate in country</p>	<p><u>Country Food Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> A conceptual plan for monitoring country foods for CoPCs and exposure 	<p>If increases in concentrations of COPCs in environmental media are observed to result in a Project related increased risk to human health, additional</p>	<p>Additional mitigation measures will be developed specific to the risk factors and in coordination with country food harvesters</p>	<p>Country Food Follow-up and Monitoring Plan</p>

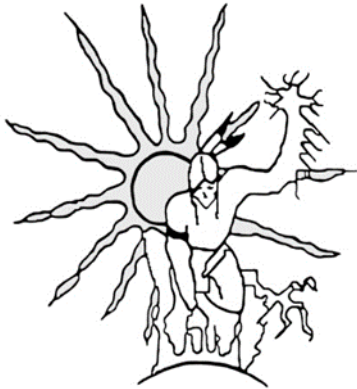
Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
decommissioning phases of the Project. <ul style="list-style-type: none"> Implement a country food monitoring program *See Change in Air Quality, Surface Water and Ground Water	the potential for ingestion of CoPCs <ul style="list-style-type: none"> Development and implementation of a Country Foods Monitoring program in collaboration with BN establishes a monitoring and response mechanism to determine the accuracy of predictions to address potential concerns 	foods to levels of concern for human health.	pathways during the pre-operational and operational phases of the proposed Project has been prepared. <ul style="list-style-type: none"> Sampling of country food will be conducted to set a baseline, once during construction, and every three years during operation. A minimum of five (5) samples will be collected for each of blueberries, moose tissues and fish at each sampling location during a sampling campaign. The Country Foods Monitoring Program will be developed in coordination with Indigenous communities, including the identification of sampling locations with local hunters and harvesters. 	mitigation measures may be proposed.		
PHYSICAL AND CULTURAL HERITAGE						
Change in Archaeological Resources - Potential removal or alteration of archaeological sites or resources						
<ul style="list-style-type: none"> Completion of a Stage 2 archaeological assessment for the Hare Lake discharge pipeline, including infrastructure footprint, access road and temporary work areas associated, If any archaeological resources are documented, the MHSTCI's Standards and Guidelines for Consultant Archaeologists will be followed in order to address follow-up Stage 3 archaeological assessment and, if required, Stage 4 archaeological mitigation 	<ul style="list-style-type: none"> Completion of appropriate archaeological assessment will identify the presence of archaeological resource / site potentially affected by the project, in accordance with MHSTCI standards for consulting archaeologists, and appropriate avoidance and mitigation measures to be followed should resources be found Chance find protocols allow for the identification of undocumented artifacts that may be disturbed during construction 	No archaeological resources have been identified that would be affected by the Project; therefore, no residual effects are anticipated If archaeological sites are identified, avoidance of archaeological sites and completion of appropriate archaeological investigations avoids the unauthorized disturbance or destruction of part or all of a cultural heritage resource Protocols to protect archaeological resources will be implemented in the event of a chance find	<u>General Construction and Operations Management</u> <ul style="list-style-type: none"> Chance find protocol to be developed outlining the responsive action and process of documentation of the unexpected discovery of additional archaeological resources. Protocol will include communication strategy for Indigenous communities. 	In the event that a cultural artifact is discovered, work in the area will cease until the appropriate mitigation has been employed	Mitigation to be determined in collaboration with appropriate regulatory agency (MHSTCI) and Indigenous communities	General Construction and Operations Management

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> Results of archaeological assessments to be provided to Indigenous communities Implementation of a chance finds protocol 	<ul style="list-style-type: none"> Disseminate information through providing archaeological reports to Indigenous communities 					
INDIGENOUS CONSIDERATIONS						
Change to harvesting – loss of area for hunting and harvesting of fish, plants and materials						
<ul style="list-style-type: none"> Harvester Training Fund. An endowment fund where interest supports annual harvester and trapline training programs. Signage will be installed around the SSA to alert the public and land users of the presence of the Project and its facilities. Engage with Indigenous communities and develop a limited access protocol that includes a provision for guided escorted access through the SSA. Hunting / fishing / harvesting of wildlife will be strictly prohibited on the site. Workers will not be permitted to hunt / fish / harvest and will not be permitted to bring firearms or angling gear to site. Project activities, locations, and timing will continue to be communicated to Indigenous groups, affected land and resource users, environmental non-government 	<ul style="list-style-type: none"> The establishment of a Harvester and Training Fund, as part of CBAs, provides alternative means for training and support for the loss of access to Trap Lines Prohibiting access and restricting hunting/fishing/ harvesting reduces safety incidence and the potential for ingestion of CoPCs Developing an access protocol allows for escorted access through the site, when safety permits Notifying land users of potential obtrusive Project activities can reduce potential for such interactions Development and implementation of a Country Foods Monitoring program, in collaboration with BN, establishes a monitoring and response mechanism to determine the accuracy of predictions to address potential concerns. Incorporating TEK/TLRU knowledge 	<p>For safety and security reasons, resource and recreational activities will be restricted near Project activities. GenPGM will engage with local resource users regarding the overlap of the Project with hunting, trapping, and fishing areas in the SSA.</p> <p>The Project is likely to result in sensory disturbances which can affect the overall experience of resource users (i.e., hunters, trappers, outfitters, and fishers) within the SSA and LSA, as the remoteness is a large part of the draw and appeal of these activities</p>	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. <p><u>Atmospheric Environment Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> Nuisance sensory effects (e.g. noise and odor) will be monitored in accordance with change in air quality and noise levels. <p><u>Country Food Follow-up and Monitoring Program</u></p> <ul style="list-style-type: none"> A conceptual plan for monitoring country foods for CoPCs and exposure pathways during the pre-operational and operational phases of the proposed Project has been prepared (per IR21.1) (CIAR #461), (AIR 16) (CIAR #659), and IR6-33 (CIAR #950). Sampling of county food will be conducted to set a baseline, once during construction, and every three years during operation. A minimum of five (5) samples will be collected for each blueberries, moose tissues and fish at each sampling location during a sampling campaign. The Country Foods Monitoring Program will be developed in 	<p>Any clearing that may occur outside the SSA would necessitate restoration.</p> <p>*See changes in air quality and changes in noise level</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and refinement of the Closure Plan <p>*See changes in air quality and changes in noise level</p>	<p>General Construction and Operations Management (compliance monitoring)</p> <p>Atmospheric Environment Follow-up and Monitoring Plan</p> <p>Country Food Follow-up and Monitoring Plan</p> <p>Access Management Plan</p> <p>Reclamation and Closure Plan</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<p>organizations, the provincial government, and local authorities throughout the life of the Project.</p> <ul style="list-style-type: none"> Incorporate new TEK/TLRU information provided into detailed design and to inform the development follow-up and monitoring programs Desired land and resource end-uses will be considered in the preparation of the Closure Plan. 	<p>into the various Follow-up and Monitoring programs provides direct land use experience to be incorporated into the plans as it relates to baseline information and the development of triggers and thresholds in order to monitor potential effects to land and resource use activities</p> <ul style="list-style-type: none"> Collaboration and engagement of land users, including BN, in the development of the end land use plan promotes the restoration of the SSA to a desirable state 		<p>coordination with Indigenous communities, including the identification of sampling locations with local hunters and harvesters.</p>			
<p>Change of access to BN Community Trapline – loss of 1116 ha of trapline area and altered access to remaining area</p>						
<ul style="list-style-type: none"> Engage with Indigenous communities and develop a limited access protocol for guided escorted access through the SSA. Develop a protocol for use of the initial portion of the Camp 19 Road from which there is access to the Pic River and other travel corridors used to access areas for traditional wildlife, fish and plant harvesting. Compensation for the loss of access, economic benefits of trapping, and use of a portion of BN Community Trapline within the SSA 	<ul style="list-style-type: none"> Developing an access protocol allows for escorted access through the site, when safety permits Allowing for continued access of Camp 19 Road provides access to the Pic River Providing compensation for the loss of access to the BN trapline provides alternative means through training and support for the loss of access to Trap Lines Implementing management and follow-up and monitoring programs outline the proposed mitigation techniques to be employed, as well as the trigger, thresholds and feedback methods 	<ul style="list-style-type: none"> For safety and security reasons, resource and recreational activities will be restricted near Project activities. GenPGM will engage with local resource users regarding the overlap of the Project with hunting, trapping, and fishing areas in the SSA. The Project is likely to result in sensory disturbances which can affect the overall experience of resource users (i.e., hunters, trappers, outfitters, and fishers) within the SSA and LSA, as the remoteness is a large part of the draw and 	<p><u>General Construction and Operations Management</u></p> <ul style="list-style-type: none"> Confirm Project footprint is consistent with SSA. <p><u>Atmospheric Environment Monitoring Program</u></p> <ul style="list-style-type: none"> Nuisance sensory effects (e.g., noise and odor) will be monitored in accordance with changes in air quality and noise levels. 	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and refinement of the Closure Plan <p>*See changes in air quality and changes in noise level</p>	<p>Additional mitigation measures will be determined based on the scenario and will be developed in collaboration with pertinent agencies and stakeholders. Alternatives may include:</p> <ul style="list-style-type: none"> Review and refinement of the Closure Plan Identifying and establishing alternate access to areas of the community trapline Additional contribution to the Harvester Training Fund <p>*See changes in air quality and changes in noise level</p>	<p>Atmospheric Environment Follow-up and Monitoring Plan</p> <p>Country Food Follow-up and Monitoring Plan</p> <p>Access Management Plan</p> <p>Reclamation and Closure Plan</p> <p>General Construction and Operations Management (compliance monitoring)</p>

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> • Where practicable, design site and place buildings situated in topographically low areas, blended with surrounding height of land and vegetative buffers with forested areas to break lines of sight to reduce visibility of site infrastructure from viewpoints in LSA • Incorporate BN's Travel Route Mapping Survey (2019) information into Project design and mitigation measures, to extent practical. • Consult with Indigenous peoples and in particular BN to discuss the concepts developed for closure and seek further information, opinion, and guidance. • Harvester Training Fund. An endowment fund where interest supports annual harvester and trapline training programs. • Implement Follow-up Monitoring and Environmental Management Plans on that have significance to Indigenous communities. <p>*See Change to Wildlife, Fish, Vegetation, and Land and Resource Uses</p>	<p>to track and further refine mitigations.</p>	<p>appeal of these activities</p>				
<p>Changes to Indigenous Health – including change to drinking water and country foods</p>						

Mitigation Measures	Purpose of Mitigation	Residual Effect	Description of type of Monitoring including Location, Frequency Duration, Source/ Parameters	Trigger for Additional Mitigation (i.e., Observed Effect Requiring Further Mitigation)	What additional mitigation measures are technically and economically feasible for adaptive management?	Applicable Environmental Management Plan or other Plans ¹
<ul style="list-style-type: none"> *See changes to HH exposure for water and country food 		*See changes to HH exposure for water and country food	*See changes to HH exposure for water and country food	*See changes to HH exposure for water and country food	*See changes to HH exposure for water and country food	*See changes to HH exposure for water and country food



BIIGTIGONG
NISHNAABEG

GENERATIONPGM

Biigtigong Nishnaabeg First Nation – Generation PGM Commitments **May 11, 2022**

Undertaking 31 Commitments

Closure Plan

The Closure Plan is a mandatory legal requirement before the project proceeds. It must be approved by the Ontario Ministry of Energy, Northern Development, Mines, Natural Resources and Forestry in accordance with O. Reg 240/00. GenPGM commits to obtain Biigtigong Nishnaabeg's consent with respect to its final Closure Plan.

Specific Undertakings:

1. GenPGM commits to obtain Biigtigong Nishnaabeg's consent to the closure plan as expressed in a Band Council Resolution.
2. GenPGM commits, on an ongoing basis, to review feasible closure plan alternatives with Biigtigong Nishnaabeg.

Discharge from Pit

Specific Undertakings:

1. During operations, GenPGM commits to use the water collection system for the Process Solids Management Facility (PSMF) to allow water to move south from the Pit to be managed within the PSMF.

Maintenance of Stream 6 (Angler Creek) System

GenPGM recognizes that flow reduction to Stream 6/Angler Creek would occur upon the construction of the PSMF, and flow reduction would be offset through the Fisheries Offsetting and Compensation Plan, however traditional and cultural use of Stream 6/Angler Creek by Biigtigong Nishnaabeg could be impacted during the operations Phase of the Project.

Specific Undertakings:

1. GenPGM commits to assess, with Biigtigong Nishnaabeg technically and economically feasible supplemental flow options for Stream 6/Angler Creek during the operations Phase of the Project. Where economically feasible, GenPGM commits to minimize disruptions to Stream 6/Angler Creek during the operations Phase of the Project.
2. GenPGM commits to offsetting the flow reduction and impact to fish and fish habitat in Stream 6/Angler Creek in the Fisheries Offsetting and Compensation Plan.
3. GenPGM commits to developing and implementing a monitoring program with Biigtigong Nishnaabeg for Stream 6/Angler Creek prior to the start of construction to monitor the impact of changes to the watershed, if any, on (a) fish and fish habitat and other aquatic life in Angler Creek/Stream 6, as well as (b) other traditional and cultural uses of Stream 6/Angler Creek by Biigtigong Nishnaabeg.

Water Quality Monitoring Plans and Programs

Specific Undertakings:

1. GenPGM commits to develop and implement, in conjunction with Biigtigong Nishnaabeg, a site-wide water management plan that provides an integrated framework to manage water quality that includes provision for water management practices for each of the primary site aspects, as well as areas of the site where there is contact water. The overarching goal of the plan is to maintain care and control of water during all mine phases for the purpose of protecting downstream uses (habitats, aquatic biota, use by people and preservation of Aboriginal rights). GenPGM's environmental monitoring programs will have specific components related to mercury and phosphorus.
2. GenPGM will engage with Biigtigong Nishnaabeg in the design and implementation of the mercury monitoring plan and other site-wide water management plans and programs.
3. GenPGM commits to obtaining Biigtigong Nishnaabeg's approval of mercury monitoring plans.
4. GenPGM commits to develop and implement, in conjunction with Biigtigong Nishnaabeg, focused monitoring programs on waterbodies such as the Biigtig Zibi (Pic River) extending downstream of the Project site to the mouth of Lake Superior, the outlet of Hare Creek at Port Munro and Stream 6 (Angler Creek) and the outlet at Sturdee Cove that have significance to Indigenous communities. These programs will include the collection of surface water, sediment, benthic invertebrates, and fish tissue samples as well as monitoring for mercury, phosphorus, and other indicators of eutrophication, as well as toxicity testing for mill reagents prior to effluent discharge to receiving water bodies. GenPGM will establish reference areas on the Biigtig Zibi (Pic River) and other areas, upstream of the Project, for use in a comparative analysis of results. GenPGM will engage Biigtigong Nishnaabeg in the design and implementation of the water quality monitoring programs and commits to obtaining Biigtigong Nishnaabeg's approval of its proposed monitoring plans and programs.

5. GenPGM commits, at all phases of Life of Mine, to implement best practices to prevent mercury methylation, such as stripping organic soils in advance of flooding an area.
6. GenPGM commits, at all phases of Life of Mine, to collect additional up-to-date data to adequately characterize impacts to water quality, water resources and fish and fish habitat, specifically for the Biigtig Zibi (Pic River), and sub watershed 101. GenPGM will also monitor watersheds 102, and 103, which are largely overprinted by MRSA.
7. GenPGM commits, at all phases of Life of Mine, to collect and update as necessary, a separate pit lake water quality model for each pit lake which considers various scenarios of rate of pit lake infilling, as well as the how other contact water inputs from the site could affect the pit lake models.
8. GenPGM commits, at all phases of Life of Mine, to undertake best efforts to avoid the temporary storage of type 2 waste rock. Where temporary storage is absolutely necessary due to emergency or risk to human health, GenPGM will ensure that type 2 waste rock requiring temporary storage has a storage location with sufficient capacity for the volume of material and that the water management pond has sufficient capacity for the volume of leachate to be collected.
9. GenPGM commits, at all phases of Life of Mine, to engage with and support Biigtigong Nishnaabeg 's water quality and aquatic monitoring efforts, including the development of adaptive management measures and associated triggers.

Fish and Fish Habitat Compensation and Offsetting

Specific Undertakings:

10. GenPGM commits to engage and provide reasonable support to Biigtigong Nishnaabeg in designing community programs for fish and fish habitat offsetting as part of the Fish and Fish Habitat Offsetting and Compensation Plan and commits to supporting a Biigtigong Nishnaabeg Fish Hatchery program.

Accidents and Malfunctions

Specific Undertakings:

1. GenPGM commits to establish an Independent Tailings Review Board and engage Biigtigong Nishnaabeg in this effort.
2. GenPGM commits to sharing the Engineer of Record Dam Breach Assessment with Biigtigong Nishnaabeg.

End Land Use Planning

Specific Undertakings:

1. GenPGM commits to engage Biigtigong Nishnaabeg in end land use planning for the Project site and will ensure the site is designed to support habitats and species of interest to Biigtigong Nishnaabeg.

Socio-Economic Impacts

Specific Undertakings:

1. GenPGM commits to develop, in collaboration with Biigtigong Nishnaabeg, a socio-economic management and monitoring plan (SEMMP) to measure and mitigate the socio-economic impacts of the Project on Biigtigong Nishnaabeg.

Traplines and Access to Territory

Specific Undertakings:

1. GenPGM commits to provide reasonable support to Biigtigong Nishnaabeg to secure a replacement for the community Trapline TR-022.
2. GenPGM commits to engage with Biigtigong Nishnaabeg to support the proposed Crown accommodation measure and Crown funding to "Create a bypass road (Gaffhook Lake Access), with access controlled by Biigtigong" (CIAR# [1083](#), PDF 57).

Moose, Caribou and Other Species of Importance

Specific Undertakings:

1. GenPGM commits to engage with Biigtigong Nishnaabeg to determine and implement monitoring and mitigation effects for potential effects to species of high importance to Biigtigong Nishnaabeg.
2. GenPGM commits to engage in consultation with Biigtigong Nishnaabeg to revise current off-site caribou mitigations to consider the current landscape, and cultural proposals from Biigtigong Nishnaabeg.

Social Services, Safety and Health

Specific Undertakings:

1. GenPGM commits to engage with Biigtigong Nishnaabeg to support the following proposed Crown accommodation measure "Support and funding of a social service plan and targeted health services plan" (CIAR# [1083](#), PDF 80) for Biigtigong Nishnaabeg members who are employed through the Project.
2. GenPGM commits to engage with Biigtigong Nishnaabeg to identify solutions to the impacts of the Project on community infrastructure and social services to help minimize negative impacts.
3. GenPGM commits to develop, in collaboration with Biigtigong Nishnaabeg, a mandatory, cultural competency training for all mine workers that will include content on Residential Schools, the Truth and Reconciliation Commission, Missing and Murdered Indigenous Women and Girls, and Indigenous rights, including Biigtigong Nishnaabeg's asserted exclusive Aboriginal title rights.

4. GenPGM commits to develop and implement, in collaboration with Biigtigong Nishnaabeg, workplace policies and procedures to address and minimize risks associated with related sexual harassment, violence, harassment and discrimination.
5. GenPGM commits to engage with Biigtigong Nishnaabeg and the Town of Marathon to jointly create a coordinated Emergency Response Plan relating to the Project.
6. GenPGM commits to develop, in consultation with Biigtigong Nishnaabeg, and other relevant authorities as may be determined by GenPGM and Biigtigong Nishnaabeg, a sampling program to assess concentrations of contaminants of potential concern in country foods to monitor for future human health assessments.
7. GenPGM commits to develop, in consultation with Biigtigong Nishnaabeg, and other relevant authorities as may be determined by GenPGM and Biigtigong Nishnaabeg from time to time, a follow-up program to verify the accuracy of the effects assessments predictions as they pertain to adverse environmental effects on human health caused by changes in concentrations of contaminants of potential concern in country foods, based on completed baseline testing and additional monitoring.
8. GenPGM commits to, in collaboration with Biigtigong Nishnaabeg, develop and implement country foods monitoring program.
9. GenPGM commits to include the soils and terrain, vegetation, wildlife and fish, and fish habitat monitoring programs to monitor the potential impacts of the Project on human health and establish rigorous baselines for metal concentrations in foods and medicines of importance to Biigtigong Nishnaabeg.

APPENDIX 3: JOINT REVIEW PANEL PROCESS TIMELINE

Date	Steps in the EIS Review Process
February 26, 2010	Stillwater Canada Inc. submitted a project description to the Agency on February 26, 2010.
August 9, 2011	The federal Minister of the Environment and Ontario's Minister of the Environment announced the establishment of a three-member joint review panel for the environmental assessment of the proposed Project under the <i>Canadian Environmental Assessment Act, 1992</i> .
October 12-13, 2011	The Panel conducts an aerial and ground tour site visit including of the proposed project and surrounding area.
June 29, 2012	Stillwater Canada Inc. submitted its Environmental Impact Statement (EIS) to the Panel.
July 6, 2012	The Canadian Environmental Assessment Agency informed the Panel that the <i>Canadian Environmental Assessment Act, 2012</i> (CEAA 2012) had come into force.
July 11, 2012 to July 30, 2012	Stillwater submitted supporting documents to its EIS to the Panel.
July 27, 2012	The Panel commenced a 90-day public comment period on the EIS.
August 3, 2012	The Panel received notification of amendments to its Terms of Reference as a result of CEAA 2012.
December 17, 2013	The Panel announced that the EIS, including its supplementary information, was sufficient to proceed to public hearing.
December 17, 2013	The Panel released a notice of public hearing to begin on February 20, 2014.
January 30, 2014	Stillwater requested that the Panel suspend the environmental assessment process until further notice to allow for the completion of a feasibility study.
January 31, 2014	The Panel wrote to Stillwater requesting additional information regarding the feasibility study, pausing the regulatory clock.
October 31, 2014	The environmental assessment was placed on hold and the Panel was disbanded.
August 12, 2019	The Agency notifies GenPGM of coming into force of the <i>Impact Assessment Act</i> and indicates that the Project would continue under CEAA 2012 unless GenPGM requests otherwise.

Date	Steps in the EIS Review Process
September 27, 2019	GenPGM confirms it will continue the assessment of the Project under the process established under CEAA 2012.
July 13, 2020	GenPGM indicated to the Agency they would like to restart the environmental assessment under CEAA 2012.
November 16, 2020	The federal Minister of Environment and Climate Change and the provincial Minister of the Environment, Conservation and Parks for Ontario, established a three-member joint review panel for the environmental assessment of the proposed Project under the CEAA 2012.
April 16, 2021	The Panel received the complete EIS Addendum from GenPGM.
February 3, 2021	The Panel received its amended Terms of Reference.
April 19, 2021	The Panel announced the receipt of the EIS Addendum from GenPGM and started a 70-day public comment period to give participants an opportunity to submit their views on the sufficiency and technical merit of the EIS Addendum.
September 13 and 15, 2021	The Panel conducted a ground tour site visit of the Project site and surrounding area.
September 16, 2021	The Panel attended a confidential pre-hearing session with Biigtigong Nishnaabeg to obtain additional information with respect to their culture and how the Project may affect them.
October 22, 2021	The Panel issued a summary of its site visit.
December 7, 2021	The Panel announced that the information provided, including the EIS, EIS Addendum, and additional information, was sufficient to proceed to public hearing.
December 7, 2021	The Panel released a notice of a virtual public hearing to begin on February 15, 2022.
January 5, 2022	The Panel released a notice of change of start date for the public hearing. Due to rising cases of COVID-19 in Ontario, the start date of the virtual hearing was changed to March 14, 2022.
March 14 – April 8, 2022	The Panel held its public hearing for the Project.
May 18 – May 19, 2022	The Panel held its closing remarks for the hearing.

Date	Steps in the EIS Review Process
May 19, 2022	The Panel closed the record.
August 2, 2022	The Panel submitted its report to the provincial and federal Ministers of the Environment.

**APPENDIX 4: AMENDED AND RESTATED AGREEMENT
TO REESTABLISH A JOINT REVIEW PANEL
FOR THE MARATHON PALLADIUM PROJECT**

Between

The Minister of the Environment, Canada

- and -

The Minister of the Environment, Conservation and Parks, Ontario

PREAMBLE

WHEREAS this is a project-specific agreement pursuant to subsection 40(1) of the *Canadian Environmental Assessment Act, 2012* (CEAA 2012); and

WHEREAS the Minister of the Environment, Canada (the “**federal Minister of the Environment**”) has statutory responsibilities pursuant to CEAA 2012; and

WHEREAS the Minister of the Environment, Conservation and Parks, Ontario (the “**provincial Minister of the Environment**”) has statutory responsibilities pursuant to the Ontario *Environmental Assessment Act* (EAA); and

WHEREAS Generation PGM Inc. is proposing to construct and operate a platinum group metals and copper mine in Marathon, Ontario, titled the Marathon Palladium Project (the “Project”), which is subject to environmental assessment requirements under both the CEAA 2012 and the EAA; and

WHEREAS in 2011, the former federal Minister of the Environment referred the Project, under the name “Marathon Platinum Groups Metals and Copper Mine Project” and proposed by Stillwater Canada Inc., to a review panel in accordance with section 29 of the *Canadian Environmental Assessment Act*, S.C. 1992,c,37; and

WHEREAS in 2014 the former proponent, Stillwater Canada Inc., requested that the Joint Review Panel suspend the environmental assessment process, including the public hearing, until further notice; and

WHEREAS in 2019 Generation PGM Inc. and Stillwater Canada Inc. entered into a joint venture arrangement, pursuant to which Generation PGM Inc. acquired interest in the Project and is currently the designated operator with authority to represent the joint venture in respect of the Joint Review Panel; and

WHEREAS Generation PGM Inc. has requested that the review panel process commenced in 2011, be re-established; and

WHEREAS under section 3.1 of the EAA, the provincial Minister of the Environment has the authority to harmonize with Canada to facilitate the effective operation of the requirements of both jurisdictions; and

WHEREAS the provincial Minister of the Environment has determined that the Joint Review Panel process will assess the Project in a manner equivalent to the requirements of the EAA; and

WHEREAS the federal Minister of the Environment and the provincial Minister of the Environment have determined that a Joint Review Panel of the Project will avoid unnecessary duplication, delays and confusion that could arise from individual reviews by each government; and

WHEREAS the federal Minister of the Environment determined that a Joint Review Panel should be re-established pursuant to paragraph 40(1) of the CEAA 2012 to consider the Project; and

WHEREAS CEAA 2012 has been repealed and the *Impact Assessment Act* has come into force; and

WHEREAS pursuant to subsection 181(1) of the *Impact Assessment Act*, the assessment by the Joint Review Panel commenced under CEAA 2012 is continued under CEAA 2012 as if the Act has not been repealed; and

WHEREAS the environmental assessment provides an effective means of integrating environmental factors into planning and decision-making processes in a manner that promotes sustainable development to achieve or maintain a healthy environment and a healthy economy;

THEREFORE, the federal Minister of the Environment thereby reestablishes a Joint Review Panel for the Project in accordance with CEAA 2012, and with the provisions of this Agreement and the Terms of Reference attached as an Appendix to this Agreement ("The Terms of Reference").

1. DEFINITIONS

For the purpose of this Agreement and of the Terms of Reference,

"Agency" means the Impact Assessment Agency of Canada or its predecessor, the Canadian Environmental Assessment Agency.

"CEAA 2012" refers to the *Canadian Environmental Assessment Act, 2012*, S.C. 2012, c. 19.

"Environment" means,

- (a) air, land or water,
- (b) plant and animal life, including human life,

- (c) the social, economic and cultural conditions that influence the life of humans or a community,
- (d) any building, structure, machine or other device or thing made by humans,
- (e) any solid, liquid, gas, odour, heat, sound, vibration or radiation resulting directly or indirectly from human activities, or
- (f) any part or combination of the foregoing and the interrelationships between any two or more of them.

“**EAA**” refers to the *Environmental Assessment Act*, R.S.O. 1990, Chapter E. 18.

“**EIS Addendum**” means the 2020/2021 update to the Environmental Impact Statement prepared by the Proponent for submission to the Joint Review Panel in accordance with the requirements of the information request issued by the former Joint Review Panel on January 31, 2014.

“**EIS Guidelines**” means the direction provided to Stillwater Canada Inc. by the former federal Minister of the Environment in August 2011, which must be addressed in the Proponent’s Environmental Impact Statement and EIS Addendum to be prepared for the Joint Review Panel.

“**Environmental Impact Statement**” or “**EIS**” means the environmental impact statement report prepared by the Proponent for submission to the Joint Review Panel.

“**Environmental Effect**” means

- (a) any change that the Project may cause in the environment; and
- (b) any change to the Project that may be caused by the environment, whether any such change or effect occurs within or outside Canada.

“**Impact Assessment Act**” means *Impact Assessment Act*, S.C. 2019, c. 28.

“**Joint Review Panel**” means the body re-established by the federal Minister of the Environment under CEAA 2012 to be a review panel established under an agreement entered into under this Act and which meets the requirements of CEAA 2012 and the EAA, the members of which are appointed by the federal Minister of the Environment, based on the recommendations of both the Agency, on behalf of Canada, and the Ministry, on behalf of Ontario.

“**Ministry**” means the Ontario Ministry of the Environment, Conservation and Parks.

“**Party**” means either signatory to this Agreement.

“**Precautionary Principle**” recognizes that, where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

“Project” means the project described in Part 1 of the Terms of Reference.

“Proponent” means the person that proposes to carry out the Project.

“Public Registry” means the Canadian Impact Assessment Registry established under section 78 of CEAA 2012 and continued under section 104 of the *Impact Assessment Act* that will be maintained by the Agency during the course of the review in consultation with the Ministry.

“Report” means the report produced by the Joint Review Panel, which contains the Joint Panel's rationale, conclusions and recommendations, with respect to the environmental assessment of the Project. This report will serve as recommendations to both the provincial Minister of the Environment and the federal Minister of the Environment.

“Sustainable Development” means development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.

2. BACKGROUND

- 2.1. On October 7, 2010, the former federal Minister of the Environment referred the Project to an environmental assessment by a review panel on the basis that the proposed Project may cause significant adverse Environmental Effects.
- 2.2. The Agency and the Ministry prepared draft EIS guidelines that were subject to a 60-day public comment period. Following the close of the public comment period and in consideration of comments received, final EIS guidelines were approved by the federal Minister of the Environment and issued to the proponent on August 9, 2011.
- 2.3. On July 21, 2011, the Joint Review Panel was appointed in collaboration with Ontario. With the coming into force of CEAA 2012 on July 6, 2012, the Joint Review Panel was provided 390 days to conduct the environmental assessment for the Project, including holding a public hearing and submitting its report.
- 2.4. The Joint Review Panel received the EIS from the Proponent in July 2012. Following multiple requests for additional information and public comment periods, the Joint Review Panel announced on December 17, 2013, that it had sufficient information to proceed to a public hearing.
- 2.5. On January 30, 2014, the Proponent wrote to the Joint Review Panel and advised that it had been working on updating the feasibility study for the Project. As a result, the Proponent requested that the Joint Review Panel suspend the environmental assessment process, including the public hearing, until further notice to allow for the completion of the feasibility study.

- 2.6. On January 31, 2014, the Joint Review Panel wrote to the Proponent and requested additional information regarding how the update to the feasibility study would affect the predicted Environmental Effects of the Project. This request for information paused the regulatory clock at 209 days elapsed.
- 2.7. In October 2014, at the request of the Proponent, the environmental assessment was placed on hold and the Joint Review Panel was disbanded.
- 2.8. On July 13, 2020, the Proponent advised the Agency that it would like to resume the environmental assessment for the Project, and that it intends to submit the EIS Addendum to the Joint Review Panel in early 2021.
- 2.9. On October 5, 2020, the federal Minister of the Environment extended the time limit for the Joint Review Panel to complete its review by 90 days. The Joint Review Panel, once established, will have 271 days to complete the assessment and submit its report.

3. ESTABLISHMENT OF THE JOINT REVIEW PANEL

- 3.1. A Joint Review Panel is hereby re-established for the purposes of conducting an environmental assessment of the Project pursuant to sections 43 and 44 of CEAA 2012.
- 3.2. The provincial Minister of the Environment considers that the requirements of the Joint Review Panel process, including the Terms of Reference and EIS Guidelines, to be equivalent to the requirements of the EAA.

4. RECONSTITUTION OF THE JOINT REVIEW PANEL

- 4.1. The Joint Review Panel shall consist of three members, one of whom shall be the chairperson.
- 4.2. The Agency and the Ministry will jointly recommend a list of three candidates and will agree on the recommendation of one candidate to be the chairperson.
- 4.3. The federal Minister of the Environment will appoint the members of the Joint Review Panel, including the chairperson.
- 4.4. At least one member of the Joint Review Panel will have experience with the EAA and at least one member will have experience with CEAA 2012. The members shall have knowledge or experience relevant to the anticipated Environmental Effects of the Project.
- 4.5. The Joint Review Panel members shall be unbiased and free from any conflict of interest relative to the Project.
- 4.6. In the event that a Joint Review Panel member resigns or is unable to continue to work, the remaining members shall constitute the Joint Review Panel, unless the

Parties determine otherwise. In such circumstances, the Parties may choose to replace the Joint Review Panel member in accordance with the processes set out in articles 4.2 and 4.3.

- 4.7. Once re-established, the Agency and the Ministry will arrange to coordinate the announcements of the Joint Review Panel of the Project by both Parties.

5. CONDUCT OF ASSESSMENT BY THE JOINT REVIEW PANEL

- 5.1. The Joint Review Panel shall conduct its review in a manner that discharges the requirements set out in CEAA 2012 and the requirements of the harmonization order made under subsection 3.1(2) of the EAA by the provincial Minister of the Environment. The Joint Review Panel shall also conduct its review in a manner that discharges the requirements set out in the Terms of Reference.
- 5.2. The Terms of Reference will be established and approved by the federal Minister of the Environment and the provincial Minister of the Environment.
- 5.3. The Joint Review Panel may request clarification of its Terms of Reference by sending a letter setting out the request and signed by the chairperson to the President of the Agency and the Assistant Deputy Minister of Environmental Assessment and Permissions Division of the Ministry. Upon receiving a request for clarification from the Joint Review Panel, the President of the Agency, on behalf of the federal Minister of Environment, and the Assistant Deputy Minister of the Environmental Assessment and Permissions Division of the Ministry, on behalf of the provincial Minister of the Environment, are authorized jointly to provide to the Joint Review Panel such clarification. Should clarification be requested, the President and the Assistant Deputy Minister shall use best efforts to ensure a joint response is provided to the Joint Review Panel's letter within 14 calendar days. The Joint Review Panel shall continue with the review to the extent possible while waiting for the response in order to adhere to the time periods of the original Terms of Reference. The Joint Review Panel shall notify the public of any clarifications to its Terms of Reference.
- 5.4. The Joint Review Panel may seek an amendment to the Terms of Reference by sending a letter setting out the request and signed by the chairperson to the President of the Agency and the Assistant Deputy Minister of the Environmental Assessment and Permissions Division of the Ministry. In seeking an amendment, the Joint Review Panel may recommend to the Parties whether a public comment period on the proposed amendment is warranted. The President of the Agency, on behalf of the federal Minister of the Environment, and the Assistant Deputy Minister of the Environmental Assessment and Permissions Division of the Ministry, on behalf of the provincial Minister of the Environment, are authorized to jointly consider the request and, if appropriate, amend the Terms of Reference. Should an amendment be requested, the Agency's President and the Assistant Deputy Minister of the Environmental Assessment and Permissions Division of the Ministry shall use best efforts to ensure a joint response is provided to the Joint Review

Panel's letter within 14 days. In the case where a Joint Review Panel has been established, the Joint Review Panel shall continue with the review to the extent possible while waiting for the response in order to adhere to the time lines of the original Terms of Reference. Any amendments to the Terms of Reference shall be posted on the Public Registry.

- 5.5. The Joint Review Panel will assess the EIS and EIS Addendum submitted by the Proponent as well as information obtained during the review in accordance with sections 43 and 44 of CEAA 2012 and the Terms of Reference.
- 5.6. The Joint Review Panel hearings shall be public and the review will provide opportunities for timely and meaningful public participation.
- 5.7. The Joint Review Panel shall have all the powers and duties of a panel described in section 45 of CEAA 2012 and those set out in the Terms of Reference.

6. SECRETARIAT

- 6.1. Administrative, technical and procedural support requested by the Joint Review Panel shall be provided by a Secretariat. The Secretariat may include staff from the Agency and Ontario ministries. The Agency and the Ministry shall identify co-managers who will attend hearings, and work together to manage the Secretariat in a coherent manner.
- 6.2. The Secretariat will support the Joint Review Panel and will be structured so as to allow the Joint Review Panel to conduct its review in an efficient and cost-effective manner.
- 6.3. The Secretariat will be structured to avoid any real or perceived conflict of interest.

7. RECORD OF JOINT REVIEW

- 7.1. A Public Registry will be maintained by the Agency in consultation with the Ministry during the course of the review in a manner that provides for convenient public access, and for the purposes of compliance with sections 78 to 81 of CEAA 2012.
- 7.2. The Public Registry shall also serve as the Ministry's public record. The internet component of the Public Registry will be linked to the Ministry's on-line Environmental Assessment Projects database.
- 7.3. Subject to subsections 45(4), and 45(5) and section 81 of CEAA 2012, the Public Registry will include all records produced, collected, received or submitted relating to the environmental assessment of the Project.

8. OTHER FEDERAL AND PROVINCIAL GOVERNMENT DEPARTMENTS AND MINISTRIES

- 8.1. The Joint Review Panel may request federal authorities and provincial authorities having specialist information or knowledge with respect to the Project to make that information or knowledge available to the Joint Review Panel in a manner acceptable to the Joint Review Panel.

9. REVIEW OF THE EIS AND EIS ADDENDUM, AND REPORT

- 9.1. The Joint Review Panel will review the information that is on the public record specific to the Project, including the EIS submitted in 2012, the EIS Addendum and the submission of any additional studies provided by the Proponent.
- 9.2. Upon the submission of the EIS Addendum by the Proponent, the Joint Review Panel will assess the EIS Addendum and any additional studies according to EIS Guidelines and the Terms of Reference. Once the Joint Review Panel is satisfied that sufficient information has been obtained, the Joint Review Panel will provide a public notice and hold a public hearing in accordance with the Terms of Reference.
- 9.3. The Joint Review Panel will prepare a report, which will be submitted to the federal Minister of the Environment and the provincial Minister of the Environment at the earliest possible date and within the overall time limit established under CEEA 2012.
- 9.4. The Joint Review Panel must consider any requests made by Indigenous groups to have the report summary translated into their Indigenous language(s). If the Joint Review Panel agrees with such a request, it must recommend to the Agency that such translations be provided by the Agency in a timely manner.
- 9.5. Upon receiving the report submitted by the Joint Review Panel, the federal Minister of the Environment will advise Indigenous groups, government bodies, the public and other interested parties that the report is available on the Public Registry and a copy will be provided to the Ministry.
- 9.6. The Agency will be responsible for the translation of documents such as public notifications, news releases and the report, into both of the official languages of Canada. The Agency will use all reasonable efforts to expedite the translation of the report following its submission by the Joint Review Panel.

10. DECISION-MAKING PROCESSES

- 10.1. The Parties will coordinate the timing of the release of the federal Minister of the Environment's environmental assessment decision statement and the announcement of the decision of the provincial Minister of the Environment to the greatest extent possible.

Federal Decision Making Process

- 10.2. Upon submission of the Joint Review Panel Report, the federal Minister of the Environment shall, in a manner consistent with CEAA 2012, issue an environmental assessment decision statement. In issuing the environmental assessment decision statement, the federal Minister of the Environment shall consider the consultation undertaken with Indigenous groups, including consultation on the Joint Review Panel's Report.
- 10.3. In accordance with clause 43(1)(f) of CEAA 2012, the Joint Review Panel may be required by the federal Minister of the Environment or the provincial Minister of Environment to clarify any of the conclusions and recommendations set out in its report with respect to the environmental assessment.
- 10.4. If the federal Minister of the Environment decides that the project is likely to cause significant adverse Environmental Effects, the Minister must refer to the Governor in Council the matter of whether those effects are justified in the circumstances.
- 10.5. The decision statement issued by the federal Minister of the Environment will be posted on the Public Registry.

Provincial Decision Making Process

- 10.6. Articles 10.7 to 10.9 describe the provincial decision-making process as set out in the harmonization order respecting the Project made pursuant to subsection 3.1 (2) of the EAA and shall be deemed to be amended to reflect any amendments that may be made to the harmonization order respecting the content of those articles.
- 10.7. The provincial Minister of the Environment, with the approval of the Lieutenant Governor in Council, may:
 - (a) Give approval to proceed with the Project in accordance with the Joint Review Panel Report.
 - (b) Give approval to proceed with the Project subject to such conditions as the Minister considers necessary and in particular requiring or specifying:
 - (i) The methods and phasing of the carrying out of the Project,
 - (ii) The works or actions to prevent, mitigate or remedy effects of the Project on the Environment,
 - (iii) Such research, investigations, studies and monitoring programs related to the Project and reports thereof, as the Minister considers necessary,
 - (iv) Such changes in the Project the Minister considers necessary,
 - (v) That the Proponent enter into one or more agreements related to the Project with any person, with respect to such matters as the Minister considers necessary,

- (vi) That the Proponent complies with all or any of the provisions of the Report that may be incorporated by reference in the approval,
 - (vii) The period of time during which the Project or any part thereof shall be commenced or carried out; or
- (c) Refuse to give approval to proceed with the Project.

10.8 The provincial Minister of the Environment shall consider the following matters when making the decision in article 10.7:

- (a) the purpose of the EAA;
- (b) the Joint Review Panel's Report; and
- (c) such other matters as the Minister considers relevant to his or her decision.

10.9 The provincial Minister of the Environment shall notify the Proponent of his or her decision and shall give the Proponent written reasons for it. The provincial Minister of the Environment shall also provide a copy of the decision to the federal Minister of the Environment and the decision shall be published in the Public Registry.

11. PARTICIPANT FUNDING

11.1. Participant funding for the participation in the environmental assessment will be provided by the Agency pursuant to the federal Participant Funding Program and will be administered by the Agency.

12. COST SHARING

12.1. The cost sharing provisions of this agreement will only take effect commencing on the date of the establishment of the Joint Review Panel.

12.2. In consultation with the Ministry, the Agency will develop a budget estimate of expenses prior to the initiation of the Joint Review Panel's activities.

12.3. The Agency will recover all applicable expenses relating to the review from the Proponent pursuant to section 59 of CEAA 2012 and the *Cost Recovery Regulations, 2012*.

12.4. Any expenses not subject to *Cost Recovery Regulations, 2012* shall be shared jointly by the Parties, except for those specified in articles 12.5 and 12.6.

12.5. The Agency shall be fully responsible for the following costs:

- Salaries, benefits, and travel-related expenses associated with the review incurred by the Joint Review Panel Secretariat staff employed by Canada;
- Salaries, benefits and travel-related expenses associated with the review incurred by the Joint Review Panel Secretariat staff working on assignment with the Agency;
- All costs associated with the federal Participant Funding Program;

- Translation of records and documents, and language translation and interpretation services and facilities related to the evidence of applicants, participants and local interveners as required by the Joint Review Panel; and
- Costs associated with the Public Registry established pursuant to section 78 of CEAA 2012 and maintained under the *Impact Assessment Act*.

12.6. The Ministry shall be fully responsible for the following costs:

- Salaries, benefits, and travel-related expenses associated with the review incurred by any Joint Review Panel Secretariat staff employed by Ontario that are not on assignment with the Agency; and
- Costs associated with the maintenance of the Ministry's on-line environmental assessment projects webpage (<https://www.ontario.ca/page/marathon-platinum-group-metals-and-copper-mine-project>).

12.7. The Agency, in consultation with the Ministry, will retain independent legal counsel for the Joint Review Panel. The costs of the Joint Review Panel's legal counsel will be jointly shared by the Agency and the Ministry.

12.8. Any expenses not included in the *Cost Recovery Regulations, 2012* or in this Agreement will need prior approval of both the Agency and the Ministry if they are to be equally shared.

12.9. The Joint Review Panel will have due regard to economy and efficiency when incurring costs during the conduct of the environmental assessment.

13. INVOICING

13.1. The Agency will be responsible for advancing funds for the payment of the shareable costs.

13.2. The Agency will inform the Ministry on a quarterly basis about the expenses incurred for the Project.

13.3. Following the submission of the report, the Agency will issue a final invoice to the Ministry for the amounts owed under this Agreement. The invoice will cover all shareable costs to be paid by the Ministry.

13.4. The final invoice will be accompanied by a summary description of the costs paid by the Agency, the costs recovered, and the net costs that are to be shared by the Ministry and the Agency. Detailed information about incurred costs will be retained by the Agency and made available upon request.

13.5. Subject to compliance with the above requirements, the Ministry will pay to the Agency the amount stated as being owed to it in the invoice within sixty 60 days of having received such invoice.

14. AMENDING THIS AGREEMENT

- 14.1. This Agreement comes into force upon its execution by both Parties.
- 14.2. This Agreement can be amended at any time with mutual consent of both Parties. Amendments to the Terms of Reference shall follow the procedure outlined in article 5.4. The Parties shall determine whether a public comment period is necessary on any proposed amendments to the Agreement.
- 14.3. Either Party may terminate this Agreement prior to the completion of the joint review by providing written notice to the other party a minimum of 30 days in advance of the intended termination date.
- 14.4. If the written notice detailed in article 14.3. is provided, the Parties will seek to resolve differences of opinion in the interpretation and application of this Agreement at a working level, through good faith reasonable efforts.

15. SIGNATURES

Whereas the parties hereto have put their signatures

<Original signed by>

<Original signed by>

✓

The Honourable Jonathan Wilkinson
Minister of the Environment, Canada

The Honourable Jeff Yurek
Minister of the Environment, Ontario

January 13, 2021

January 28, 2021

Date

Date

Terms of Reference for the Joint Review Panel

1. DESCRIPTION OF THE PROJECT

1.1. Generation PGM Inc. proposes to develop and operate the Marathon Palladium Project ("Project") approximately 10 kilometres north of the Town of Marathon. This Project involves the establishment and operation of an open pit mine and mill for the purpose of extracting and processing ore containing copper and platinum group metals and including, but not limited to, any ancillary activities and the activities outlined below:

- the construction and/or use of equipment, buildings and structures;
- the establishment, construction and operation of tailing impoundment areas, explosives factory and magazine facilities, waste rock storage areas, water management facilities, transmission lines, temporary and emergency generation facilities, and activities to mitigate Environmental Effects;
- the decommissioning, closure and abandonment of the mine and mine-related infrastructure; and
- the establishment, construction and/or modification and use of transportation infrastructure including access roads, highways and/or rail lines to support the above-mentioned activities and the transport of final mine concentrate(s).

1.2. The scope of Project shall include all components of the Project as proposed by the Proponent.

2. FACTORS TO BE CONSIDERED IN THE ENVIRONMENTAL ASSESSMENT

2.1. The Joint Review Panel will conduct an assessment of the Environmental Effects of the Project referred to in the Description of the Project (Part I) in a manner consistent with the requirements of CEAA 2012 and the EAA.

2.2. The assessment by the Joint Review Panel will include a consideration of subsection 6.1(2) of the EAA and section 19 of CEAA 2012, including the following factors:

- a. the purpose of the Project;
- b. the rationale or need for the Project;
- c. alternatives to the Project (including the "do nothing" alternative), the Environmental Effects of such alternatives to, and the advantages and disadvantages to the environment of such alternatives to;
- d. alternative means of carrying out the Project that are technically and economically feasible, the Environmental Effects of any such alternative means, and the advantages and disadvantages to the Environment of such alternative means;
- e. the significance of the Environmental Effects, including the following:

- malfunctions or accidents that may occur in connection with the Project; and
 - any cumulative Environmental Effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out;
- f. measures that are technically and economically feasible and that would mitigate any significant adverse Environmental Effects of the Project
 - g. measures to enhance any beneficial Environmental Effects;
 - h. the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future;
 - i. extent to which biological diversity (e.g. ecosystems and/or species diversity) is affected by the Project, including any listed wildlife species, its critical habitat or the residences of individuals of that species as those terms are defined in subsection 2(1) of the federal *Species at Risk Act*, as well as any impact it may have on a provincially threatened or endangered species and/or its protected habitat;
 - j. extent of application of the precautionary principle to the Project;
 - k. the requirements of the follow-up program in respect of the Project;
 - l. description of the consultation undertaken by the Proponent with the public and Indigenous groups during the preparation of the EIS and EIS Addendum;
 - m. comments from the public and Indigenous groups that are received during the review;
 - n. Indigenous traditional knowledge, the current use of lands and resources for traditional purposes by Indigenous persons, and physical and cultural heritage; and
 - o. community knowledge, including Indigenous community knowledge.
- 2.3. The description of the factors to be considered in the environmental assessment include those outlined in the document "Guidelines for the Preparation of the Environmental Impact Statement: Marathon Platinum Group Metals and Copper Mine Project", as finalized by the former federal Minister of the Environment on August 9, 2011.
- 2.4. The Joint Review Panel is mandated to invite information from Indigenous groups related to the nature and scope of potential or established Aboriginal and Treaty rights in the area of the Project, as well as information on the potential adverse Environmental Effects that the Project may have on potential or established Aboriginal and Treaty rights.
- 2.5. The Joint Review Panel will accept:
- (a) information presented by Indigenous persons or groups regarding the location, extent and exercise of potential or established Aboriginal or Treaty rights that may be affected by the project; and
 - (b) information presented by participants in the review panel process that relates to any potential adverse Environmental Effects of the Project on potential or

established Aboriginal or Treaty rights and related interests. Information received by the Review Panel may also be relevant to its assessment of the Environmental Effects of the Project, including those Environmental Effects that might adversely impact potential or established Aboriginal or Treaty rights. Relevant information could include but is not limited to:

- i. impacts on uses of lands and resources by Indigenous peoples;
- ii. impacts on hunting, marine, riverine and terrestrial harvesting including fishing, gathering and other traditional uses of land (e.g., use of sacred sites) in addition to related effects on lifestyle, culture, health, socio-economic conditions and quality of life of Indigenous peoples;
- iii. alterations to access to areas used by Indigenous peoples for traditional and cultural purposes; and
- iv. the ability of future generations to pursue traditional activities or lifestyle; and

(d) information presented by participants in the review panel process concerning measures proposed to mitigate and/or avoid any identified adverse impacts on potential or established Aboriginal or Treaty rights and interests.

2.6. The Joint Review Panel will use the information collected pursuant to article 2.4 of the Terms of Reference to make recommendations, which relate to the manner in which the Environmental Effects of the Project may adversely impact potential or established Aboriginal and Treaty rights.

2.7. The Joint Review Panel is not mandated to make any determinations as to:

- a. the validity of potential or established Aboriginal and Treaty rights asserted by Indigenous groups or the strength of their claimed rights;
- b. the scope of the Crown's duty to consult Indigenous groups; and
- c. whether the Crown has met its duty to consult Indigenous groups and, where appropriate, accommodate their interests in respect of the potential adverse Environmental Effects of the Project on their rights, recognized and affirmed in section 35 of the *Constitution Act, 1982*.
- d. whether the Project would be an infringement of potential or established Aboriginal or Treaty rights; and
- e. any matter of Treaty interpretation.

2.8. As the Joint Review Panel is not mandated to make any determinations as to the validity of potential or established Aboriginal and Treaty rights, for the purposes of its report, it shall document the potential or established Aboriginal and Treaty rights and consider the adverse Environmental Effects of the Project on the exercise of Aboriginal and Treaty rights described by the Indigenous groups.

2.9. All information obtained by the Joint Review Panel for the environmental assessment of the Project shall be made publicly available, unless the Joint Review Panel determines that sections 45(4) or 45(5) of CEEA 2012 apply to the information provided by a participant.

3. ENVIRONMENTAL ASSESSMENT PROCESS

The main steps for the restart of the environmental assessment process will be as follows:

- 3.1. The Joint Review Panel will review the information on the public record of the Project, including the EIS submitted in 2012 and supplemental information, the EIS Addendum and additional studies submitted by the Proponent.
- 3.2. The Joint Review Panel will require the Proponent to submit its EIS Addendum in accordance with the requirements of the information request issued by the former Joint Review Panel on January 31, 2014, and in accordance with the requirements of the EIS Guidelines.
- 3.3. Once submitted to the Joint Review Panel, the EIS Addendum will be placed on the Public Registry and will be made available for public comment for a minimum of 60 days. The Joint Review Panel will request written comments from Indigenous groups, the public, governments and other interested parties on the sufficiency of the information as measured against the EIS Guidelines and on the technical merit of the information, which may include requests for further information from the Proponent.
- 3.4. Within 30 days of the completion of the public review of the EIS Addendum, the Joint Review Panel, taking into consideration the comments and any information requests received and its own review of the EIS Addendum, will determine if the EIS and the EIS Addendum contains sufficient information to proceed to a public hearing. If the Joint Review Panel determines that the EIS and EIS Addendum contains sufficient information to proceed to public hearing, it will schedule and announce the hearing in accordance with the procedures set out in the Terms of Reference.
- 3.5. If the Joint Review Panel determines that the EIS and EIS Addendum are not sufficient to proceed to a public hearing, it will issue a deficiency statement requesting additional information or studies, which the Proponent will provide. At the same time, the Joint Review Panel will place the deficiency statement on the Public Registry and make it available to the public.
- 3.6. The additional information or studies provided by the Proponent will be placed on the Public Registry and made available to the public. The Joint Review Panel will determine the need for a public comment period on any additional information provided by the Proponent in response to deficiencies identified by the Joint Review Panel.
- 3.7. Upon completion of the public review of the additional information or studies, the Joint Review Panel, taking into consideration any comments and any information requests received and its own review of the additional information, will determine within 30 days if the EIS and EIS Addendum, supplemented by the additional information or studies, is sufficient to proceed to public hearing. The procedures described in articles 3.4 through 3.6 of the Terms of Reference will apply until the

Joint Review Panel determines it has sufficient information to proceed to public hearing.

Announcement of Public Hearing

- 3.8. Once the Joint Review Panel determines that the EIS and EIS Addendum contain sufficient information to proceed to a public hearing, it will announce the public hearing. The Joint Review Panel shall provide a minimum of 45 days' notice of the start of the public hearing. In scheduling the public hearing, the Joint Review Panel will take into account the timing of traditional activities in Indigenous and local communities when setting the time and location of the public hearing, where possible.
- 3.9. The former Joint Review Panel issued procedures for the conduct of the public hearing. The Joint Review Panel may amend the hearing procedures, and if amended, it shall make the amended procedures subject to a public comment period. The public hearing will provide the Proponent, federal, provincial and municipal governments, Indigenous groups and members of the public with an opportunity to present their views on the Project and to question information that has been provided by other participants.
- 3.10. The Joint Review Panel will endeavour to hold the public hearing in the community(ies) in closest proximity to the proposed Project, including Indigenous community(ies), to provide convenient public access for potentially affected Indigenous persons and groups and the public. The Joint Review Panel will use its best efforts to complete the public hearing within 30 days.
- 3.11. In the event hearings cannot be held in a public space (e.g. COVID-19 or other public health restrictions), the Joint Review Panel will hold an electronic public hearing using a videoconferencing platform. The electronic hearing will generally follow the same procedures as an in-person hearing.
- 3.12. The public hearing shall be open to the public, unless the Joint Review Panel determines that subsection 45(3) of CEEA 2012 applies to the information provided by a participant.

Specialist Advisors to the Joint Review Panel

- 3.13. The Joint Review Panel may request specialist or expert information or knowledge with respect to the Project from federal and/or provincial authorities in possession of such information or knowledge. As per article 8.1 of the Joint Review Panel Agreement, any information or knowledge provided by federal and/or provincial authorities would be placed on the Public Registry.
- 3.14. The Joint Review Panel may also retain the services of non-governmental experts to provide advice on certain subjects within the Joint Review Panel's Terms of Reference.

3.15. Should the Joint Review Panel retain the services of non-governmental experts, the names of the experts retained and any documents obtained or created by the experts and that are submitted to the Joint Review Panel will be placed on the Public Registry, subject to the provisions in section 45 of CEAA 2012. This excludes any information subject to solicitor-client privilege.

Joint Review Panel Report

3.16. Following the completion of the public hearing, the Joint Review Panel will prepare and submit to the federal Minister of Environment and the provincial Minister of the Environment a Report including, but not limited to, a description of the Joint Review Panel process, the rationale, conclusions and recommendations of the Joint Review Panel relating to the environmental assessment of the Project, including any recommended mitigation measures and follow-up programs and a summary of information received by participants.

3.17. For the purposes of the federal Minister of the Environment, the Report shall include:

- an identification of those conclusions that relate to the Environmental Effects to be taken into account under section 5 of CEAA 2012; and
- an identification of recommended mitigation measures and follow-up programs that relate to the Environmental Effects to be taken into account under section 5 of CEAA 2012, including, as appropriate, any commitments identified by the Proponent in the EIS and EIS Addendum or during the joint review panel process.

3.18. For the purposes of the provincial Minister of the Environment, the Report shall include:

- all the commitments identified by the Proponent in its EIS and EIS Addendum, as well as any other commitments identified by the Proponent during the assessment by the Joint Review Panel; and
- recommendations as to whether the Project should be given approval to proceed, or be refused, taking into consideration the Proponent's EIS and EIS Addendum and any other information obtained during the assessment by the Joint Review Panel.

3.19. If the report of the Joint Review Panel recommends that the Project be given approval to proceed by the provincial Minister of the Environment, the Joint Review Panel may also recommend any conditions necessary to carry out the Project in a manner that provides for the protection, conservation and wise management of the Environment. The Joint Review Panel shall provide reasons for its recommendations in the report.

3.20. For the purposes of the of CEAA 2012, where, taking into account the implementation of any mitigation measures, the Joint Review Panel concludes that the Project is likely to cause significant adverse Environmental Effects, the Joint

Review Panel shall obtain and include in its report information with respect to the justifiability of any significant adverse Environmental Effects.

- 3.21. The Report shall reflect the views of each member of the Joint Review Panel.
- 3.22. The Joint Review Panel will submit its report to the federal and provincial Ministers at the earliest possible date, and within the overall time limit established under CEEA 2012.
- 3.23. The federal and/or the provincial Minister may require the Joint Review Panel to clarify any of the conclusions and recommendations set out in the report.

4. TIMELINES

- 4.1. Subject to articles 2.3 to 2.8 of the Terms of Reference, the Joint Review Panel shall complete its mandate and submit its final report to the federal and provincial Ministers within 271 days from the submission by the Proponent of the EIS Addendum to the Joint Review Panel.
- 4.2. The time between the issuance by the Joint Review Panel of any request for additional information or studies as per article 3.6 and the submission of that requested information by the Proponent is not included in the timeline referred to in article 4.1 of the Terms of Reference.
- 4.3. As may be required in order to meet the timeline referred to in article 4.1 of the Terms of Reference, the Panel may, notwithstanding article 5.4 of the Joint Review Panel Agreement, modify any timelines referred to in article 3 of the Terms of Reference. The Panel shall notify the federal and provincial Ministers and the public of any such modification.

APPENDIX 5: HEARING PARTICIPANTS¹ AND REVIEW PANEL SECRETARIAT

JOINT REVIEW PANEL AND SECRETARIAT

Joint Review Panel

Debra Sikora (Panel Chair)	Laurie Bruce	Gay Drescher
----------------------------	--------------	--------------

Counsel

Gavin Fitch

Secretariat

Candace Anderson	Dominic McRae	Audrey Rooney
Carys Burgess	Jason Patchell	Jillian Smith
Youssef Kalogo	Robert Purdon	Isabelle Turcotte
Kierney Leach	Sophie Régimbald	Tracy Utting
Élyse Maisonneuve-Campbell	Shelley Rolland-Poruks	

GENERATION PGM INC.

Counsel

Jeremy Barretto
Meghan Rourke

Witnesses

Drew Anwyll (GenPGM)	Brian Fraser (Ecometrix)	John McBride (GenPGM)
Frank Babic (Stantec)	Michelle Fraser (Stantec)	Cathryn Moffett (GenPGM)
Frank Bohlken (Stantec)	Dr. David Good (consultant)	Dr. Ron Nicholson (Ecometrix)
Sean Capstick (Golders)	Craig Hall (Knight Piésold)	Jon Pounder (Stantec)
Gregory Crooks (Stantec)	Dr. Don Hart (Ecometrix)	Sheldon Smith (Stantec)
Sheila Daniel (Wood)	George Hegmann (Stantec)	Colin Varley (Stantec)
Jeremy Dart (GenPGM)	Hilary Janes (Stantec)	Christine Walsh (Stantec)
Kristin Drewes (InterGroup)	Dale Klodnicki (Wood/ Stantec)	
Dr. Robert Foster (Northern Bioscience)	Tabatha Leblanc (GenPGM)	

¹ Participants listed are individuals who were identified as present at the virtual hearing in the transcripts.

BIIGTIGONG NISHNAABEG

Counsel

Alain Bartleman

Witnesses

Debbie Boucher

Jody Duncan

JoAnne Michano

David Carruthers

Todd Kiersten

Lisa Michano-Courchene

Simone Desmoulin

Donald Michano

Chris Wedeles

Paul Driben

Chief Duncan Michano

Tracy Zanini

JACKFISH METIS

Witness

Jon MacDonald

GINOOGAMING FIRST NATION

Witness

Peter Rasevych

PAYS PLAT FIRST NATION

Counsel

Suraj Dave

Witnesses

Sebastien Belmar

Debbie King

Chief David P. Mushquash

Raymond Goodchild

METIS NATION OF ONTARIO

Witnesses

Alexandra Kosmides

Tim Sinclair

Victoria Stinson

MICHIPICOTEN FIRST NATION

Witnesses

Dr. Dean Fitzgerald

Dr. Lynn McCarty

THUNDER BAY CHAMBER OF COMMERCE

Witness

Charla Robinson

THUNDER BAY COMMUNITY ECONOMIC DEVELOPMENT COMMISSION INC.

Witness

Eric Zakrewski

TOWN OF MARATHON

Witnesses

Mayor Rick Dumas

Daryl Skworchinski

CITIZENS FOR RESPONSIBLE INDUSTRY IN NORTHERN ONTARIO

Witnesses

Sara Libman

Dr. Kevin Morin

Dr. Sarah Newbery

ENVIRONMENT NORTH

Counsel

Kerrie Blaise

Witness

Dr. Karen Peterson

MININGWATCH CANADA

Witnesses

Jamie Kneen
Dr. Joan Kuyek

NORTHWATCH

Witness

Brennain Lloyd

GOVERNMENT OF CANADA

Impact Assessment Agency of Canada

Jason Boisvert Luc Desroches Philip Seeto

Environment and Climate Change Canada

Lesley Carpenter
Robert Clavering

Fisheries and Oceans Canada

Brandi Mogge Laura Phalen Adam St. Clair

Health Canada

Dr. Umme Akhtar	Kitty Ma	Dr. Dae Young Lee
Sue-Jin An	Dr. David Michaud	Frédéric Valcin
Dr. Stephen Keith	Luc Pelletier	
Luigi Lorusso	Aurelia Thevenot	

Natural Resources Canada

Dr. Mélissa Bunn	Laurence Davidson	Marie-Ève Lenghan
Jennifer Cole	Dr. Richard Goulet	
Laura Darby	Dr. Michel Houlé	

Parks Canada

Heather Cherry
Christine Drake

Eri Hiraga
Dr. Lucy Patterson

Daniel Pouliot
Joanne Tuckwell

Transport Canada

Courtney Bice

GOVERNMENT OF ONTARIO

Ministry of the Environment, Conservation and Parks

Brianne Brothers
Alisdair Brown

Brooke Campbell-Paterson
Jacynth Gilliam-Price

Lindsay McColm
Guowang Qiu

Ministry of Heritage, Sport, Tourism and Culture Industries

Laura Romeo

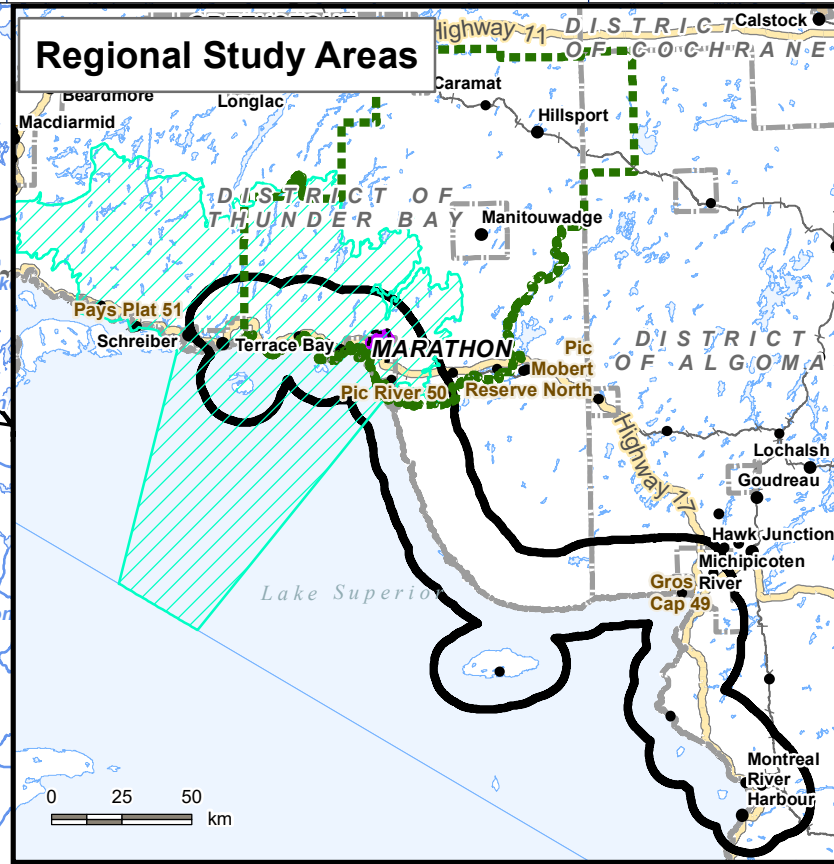
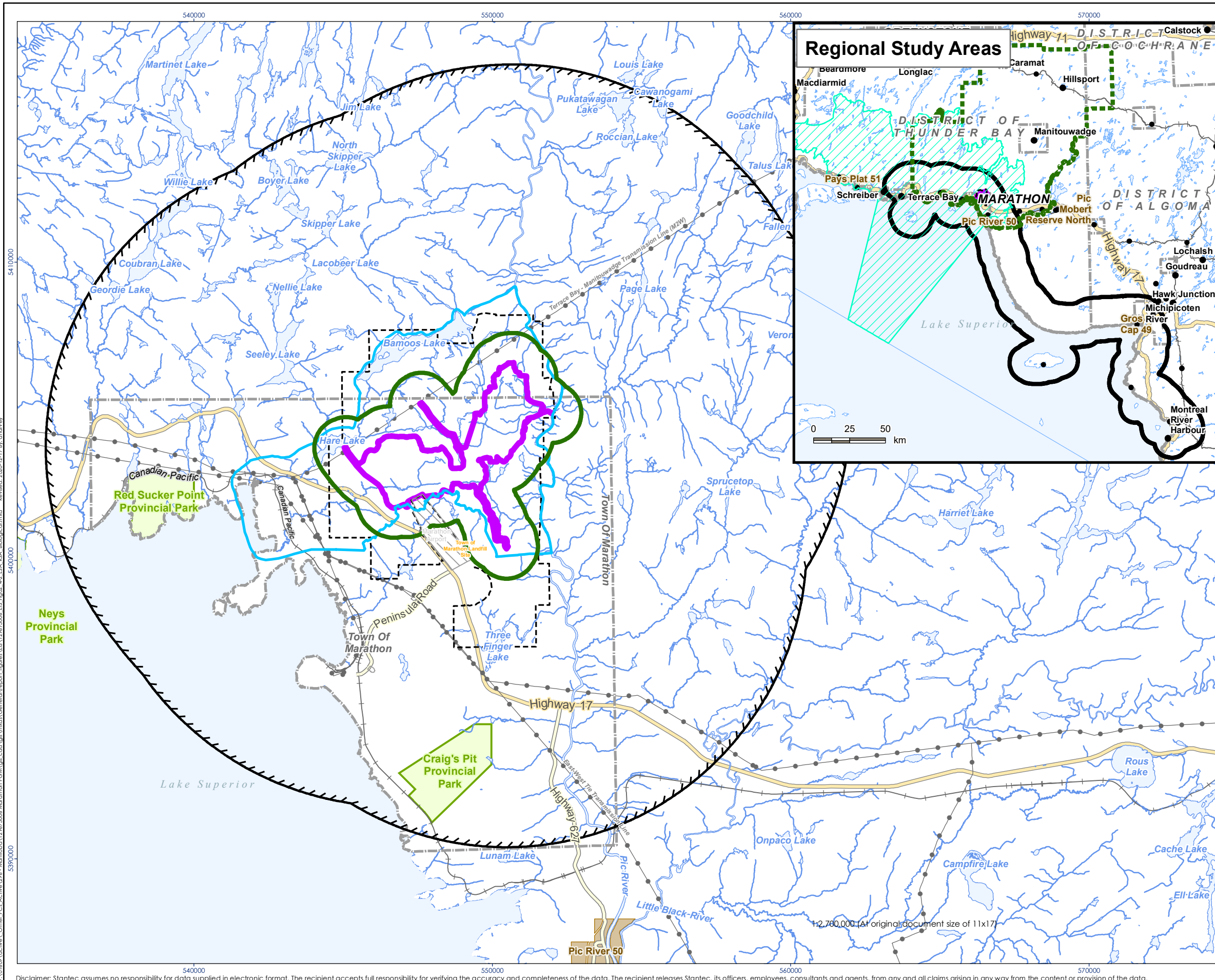
Ministry of Northern Development, Mines and Natural Resources

Tim Cano
Laura Darby

Andrea Hanson
Colin Hovi

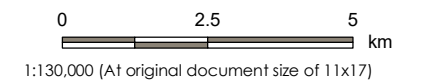
Raymond McCarthy
Andrea Osala-Schaaf

APPENDIX 6: LOCAL AND REGIONAL STUDY AREAS FOR EACH OF THE VALUED ECOSYSTEM COMPONENTS



Legend

- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Highway
- Major Road
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- First Nations Reserve
- Municipal Boundary, Lower Tier
- Provincial Park
- Waterbody
- Caribou, LSA
- Caribou, RSA
- Fish, LSA
- Vegetation and Wildlife, LSA
- Forest Dependant, RSA
- Non-Forest Dependant, RSA



- Notes**
- Coordinate System: NAD 1983 UTM Zone 14N
 - 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

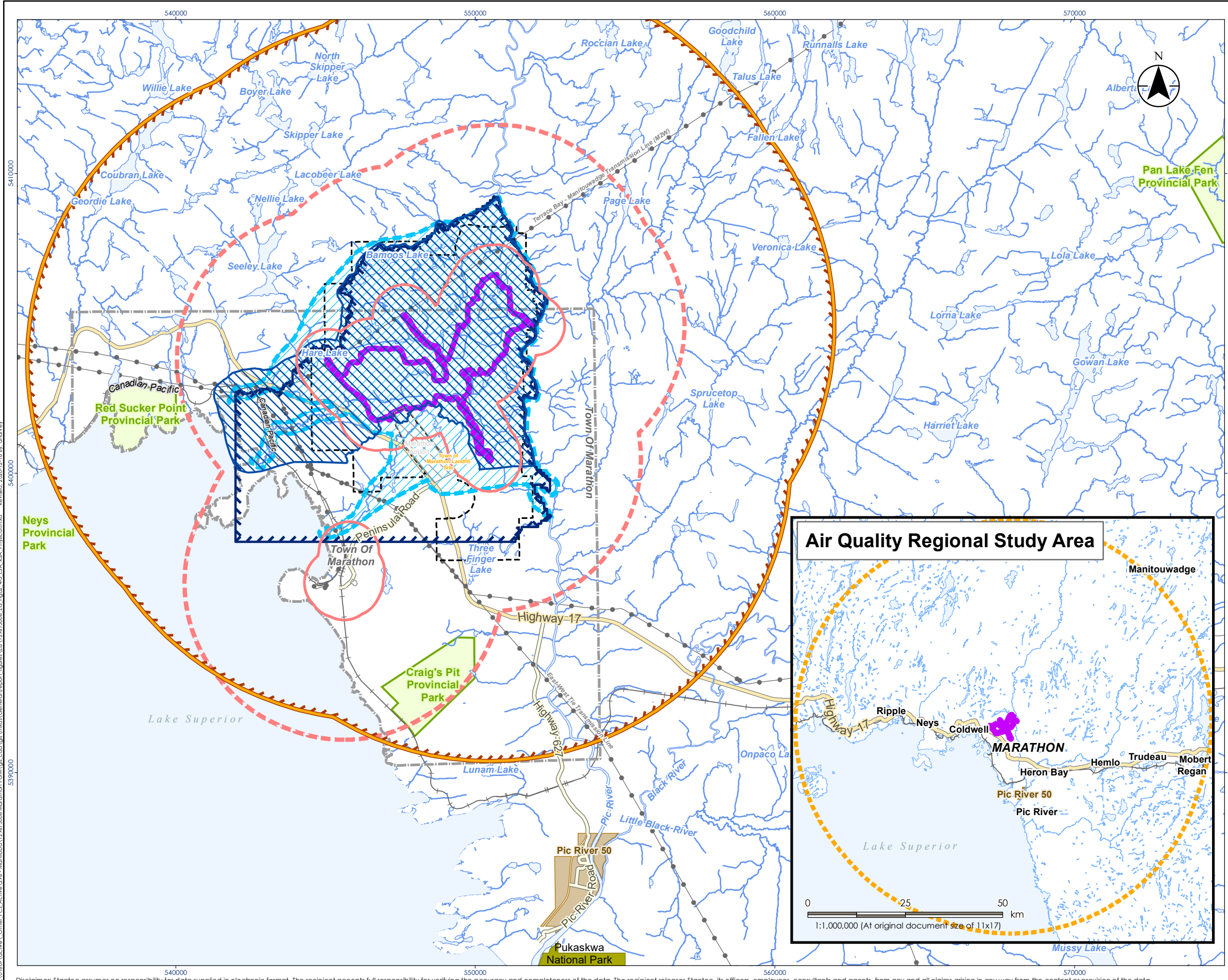
Client/Project: GENERATION PGM INC.
 MARATHON PALLADIUM PROJECT

Figure No.: **2.4-2**

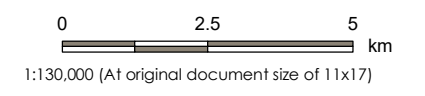
Title: **Local and Regional Study Areas- Biological**

V:\01609\active\Other_PCs_Active\296 - Mariboo\129673006 Marathon PGM\GIS\cad\gls\mxd\General\report_figures\ES\129673006_EIS_Fig02_42_LSA_RSA_Biological.mxd Revised: 2020-12-17 By: dhanvey

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



- 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
 - First Nations Reserve
 - Provincial Park
 - Waterbody
 - Acoustic LSA
 - Acoustic RSA
 - Atmospheric LSA
 - Atmospheric RSA
 - Hydrology LSA
 - Hydrology RSA
 - Hydrogeology LSA/ RSA
 - Soils LSA/ RSA
 - Surface Water LSA



- Notes
- Coordinate System: NAD 1983 UTM Zone 14N
 - 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

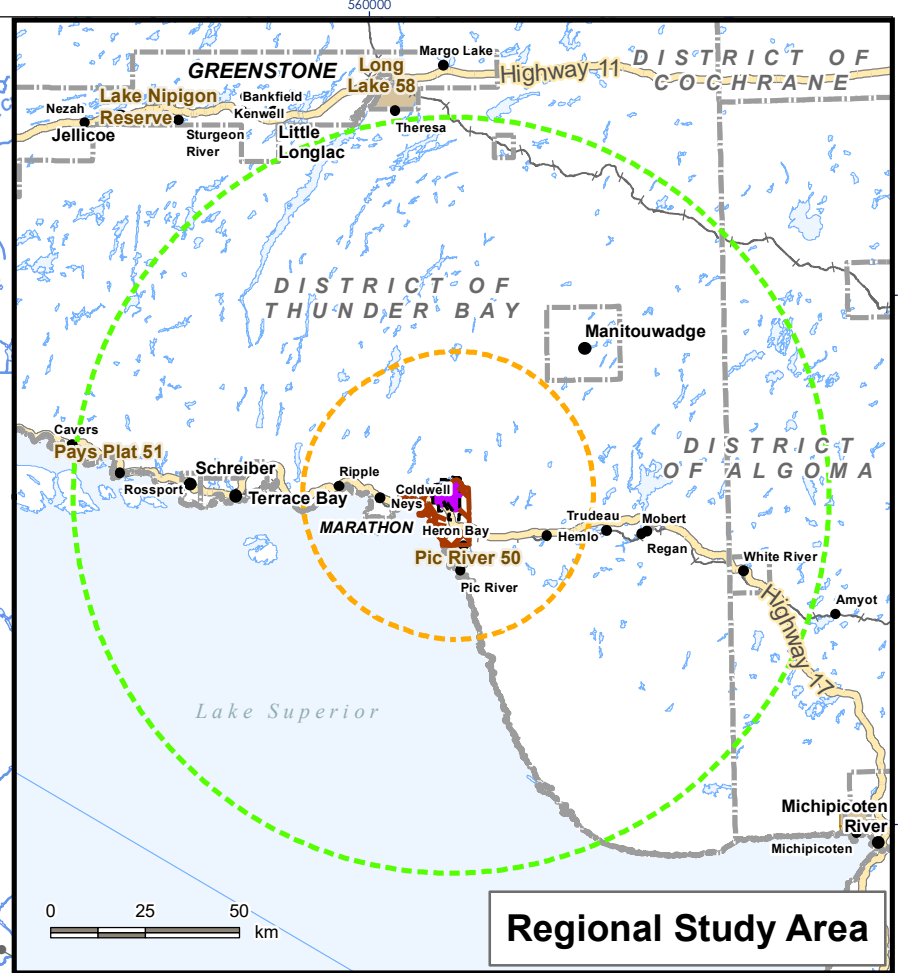
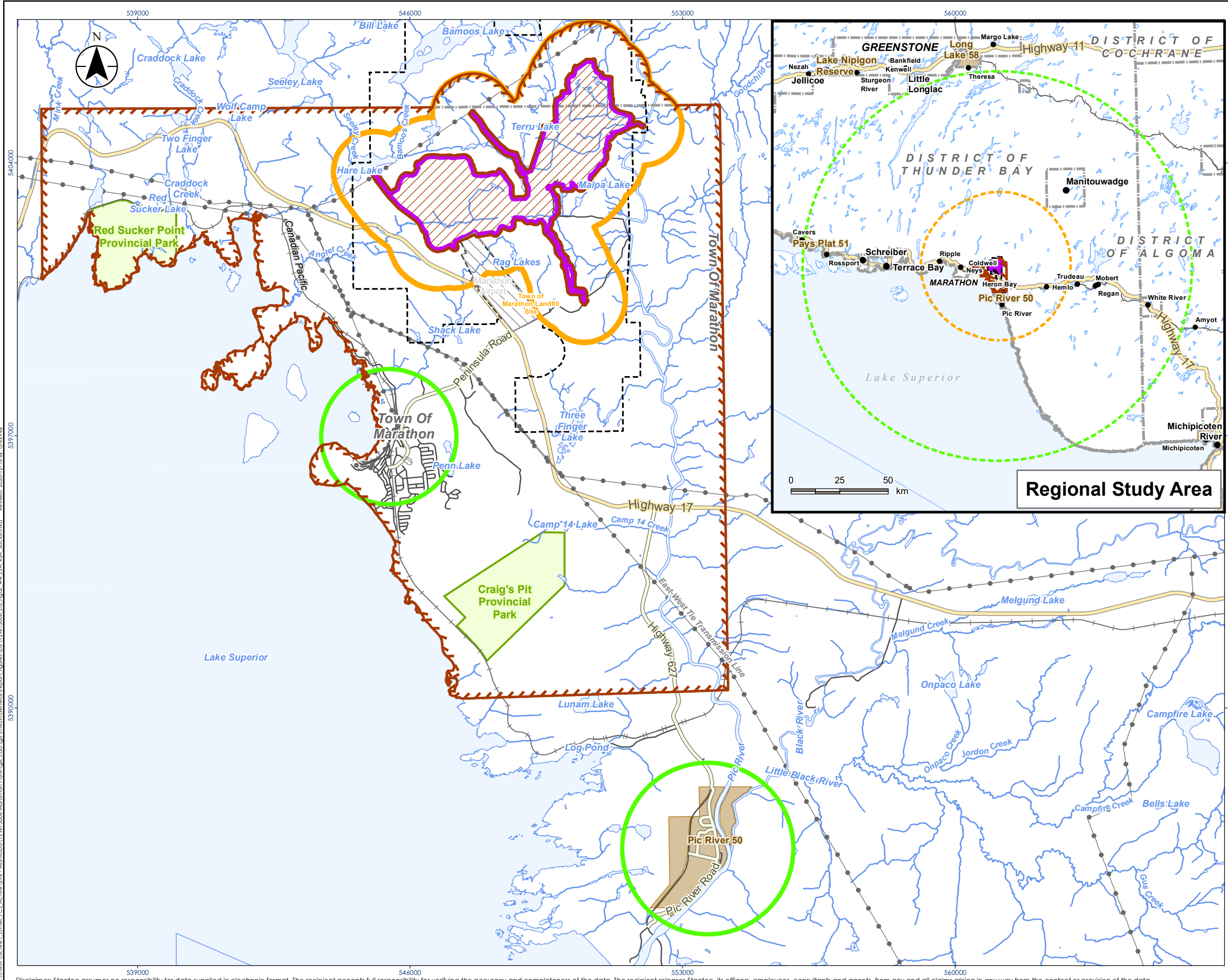
Client/Project:
 GENERATION PGM INC.
 MARATHON PALLADIUM PROJECT

Figure No.
2.4-3

Title
Local and Regional Study Areas- Physical

V:\0169\active\Other_PCs_Active\294 - Mariboo\129673006 Marathon PGM\GIS\cad\gdb\mxd\General\report_figures\ES\129673006_EIS_Fig02_43_LSA_RSA_Physical.mxd Revised: 2020-12-18 By: chavvy

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.



Legend

- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Highway
- Major Road
- Minor Road
- Hydro Line
- Railway
- Watercourse
- Airport (Property Boundary)
- First Nations Reserve
- Municipal Boundary, Lower Tier
- Provincial Park
- Waterbody
- Heritage LSA
- Heritage RSA
- Land and Resource Use LSA
- Land and Resource Use RSA
- Socio-ec LSA
- Socio-ec RSA

0 1 2 km
1:100,000 (At original document size of 11x17)

Notes
 1. Coordinate System: NAD 1983 UTM Zone 14N
 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. **2.4-4**

Title: **Local and Regional Study Areas- Social**

V:\016\9\active\Other_PCs_Active\294 - Mariboo\129673006 Marathon PGM\GIS\code\gdb\mxd\General\report_figures\ES\129673006_EIS_Fig02_44_LSA_RSA_Social.mxd Revised: 2020-12-18 By: dhaney

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.