Marathon Palladium Project Environmental Impact Statement Addendum

VOLUME 1 OF 2

1.0 Background and Introduction

Prepared for:

GENERATIONPGM

Prepared by:

Stantec

Ecometrix Environmental INTELLIGENCE

NORTHERN BIOSCIENCE ECOLOGICAL CONSULTING

Knight Piésold CONSULTING

Date: January 7, 2021

Environmental Assessment by Review Panel under CEAA 2012

Reference Number 54755

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Abbreviations

AIRs	Additional Information Requests
ANFO	Ammonium-Nitrate Fuel Oil
B	Billion
BEV	Battery Electric Vehicles
CAAQs	Canadian Ambient Air Quality Standards
CEAA, 2012	*Canadian Environmental Assessment Act, 2012*
CIAR	Canadian Impact Assessment Registry
CP1	Collection Pond 1
Cu	Copper
EA Act	*Environmental Assessment Act*
EA	Environmental Assessment
ECA	Environmental Compliance Approval
EDS	Environmental Design Storm
EIS	Environmental Impact Statement
EMS	Environmental Management System
FCEV	Fuel Cell Electric Vehicle
GDP	Gross Domestic Profit
GHG	Greenhouse Gases
GenPGM	Generation PGM Inc.
ha	Hectare
HDPE	High Density Polyethylene

IAA	*Impact Assessment Act*
IAAC	Impact Assessment Agency of Canada
ICE	Internal Combustion Engines
IJC	International Joint Commission
IRs	Information Requests
JV	Joint Venture
kg	Kilogram
kV	Kilovolt
L	Litre
M	Million
M2W Line	Terrace Bay-Manitouwadge transmission line
masl	Metres above sea level
MECP	Ministry of the Environment, Conservation and Parks
MNRF	Ministry of Natural Resources and Forestry
MRSA	Mine Rock Storage Area
MTO	Ministry of Transportation
MW	Megawatt
MVA	Mega Volt Amp
NPP	Navigation Protection Program
NRCan	Natural Resources Canada
O. Reg.	Ontario Regulation
P_{100}	100% Passing (maximum material size)
P_{80}	80% Passing (size range comprising 80% of material)

PAG	Potentially Acid Generating
PGM	Platinum Group Metals
PSMF	Process Solids Management Facility
PTTW	Permit to Take Water
ROM	Run of Mill
SAG	Semi-Autonomous Grinding
SIDs	Supporting Information Documents
SIRs	Supplemental Information Requests
SME	Site Mixed Emulsion
SWM	Stormwater Management
ToR	Terms of Reference
TSX	Toronto Stock Exchange
USG	US Gallon
VA	Voluntary Agreement
VEC	Valued Ecosystem Component
WMP	Water Management Pond
WTP	Water Treatment Plant
w/w	percent concentration weight / weight

1.0 BACKGROUND AND INTRODUCTION

Generation PGM Inc. (GenPGM) proposes to develop the Marathon Palladium Project (the "Project"), which is a platinum group metals (PGM) and copper (Cu) mine and milling operation near the Town of Marathon, Ontario. The Project is being assessed in accordance with the *Canadian Environmental Assessment Act* (CEAA, 2012) and Ontario's *Environmental Assessment Act* (EA Act) through a Joint Review Panel (the Panel) pursuant to the *Canada-Ontario Agreement on Environmental Assessment Cooperation* (2004).

This EIS Addendum has been prepared in consideration of the *Guidelines for the Preparation of an Environmental Impact Statement – Marathon Platinum Group Metals and Copper Mine Project* (EIS Guidelines) (Canadian Environmental Assessment Agency and Ontario Ministry of the Environment, 2011).

Stillwater Canada Inc. (Stillwater), the original Proponent of the Project, had prepared and submitted an Environmental Impact Statement (EIS) and supporting documents in 2012[1] to assess the potential effects of the Project. Following a review of this information and subsequent responses to information requests, the Panel (in 2013) determined that sufficient information was available to proceed to a public hearing. However, prior to the hearing, the process was put on hold by Stillwater and ultimately postponed in 2014. Since 2014, the Project has been acquired by GenPGM and the Panel review process to assess the potential effects of the Project has resumed.

This report is prepared as an addendum to the 2012 EIS that verifies and/or updates the original assessment of environmental effects for the Project, as input to the Panel process. This report relies on and updates the original effects assessment from the original EIS (2012) and responses to the information requests (IRs), additional information requests (AIRs), and supplemental information requests (SIRs) submitted to the Panel. The update is provided in response to relevant 'changes' that have occurred since the original assessment was completed where such changes may alter previous conclusions, including:

- 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
- Changes to the Project, including refinements to project components and activities implemented by GenPGM

[1] Stillwater Canada Inc. (2012). Marathon PGM-Cu Project Environmental Impact Statement, Main Report and Supplemental Information Documents 1 through 31 (CIAR #224, 226 and 227).

To update the effects assessment, a series of baseline update reports were prepared for each Valued Ecosystem Component (VEC) (under separate cover) and submitted to the Impact Assessment Agency of Canada (IAAC) on November 13, 2020 (CIAR #722). A series of technical effects assessment reports are also being prepared to incorporate the changes noted above to verify previous conclusions and to support the preparation of this EIS Addendum.

To retain consistency with the information previously provided for this Project, this EIS Addendum has generally been organized similar to the EIS (Stillwater, 2012) and in accordance with the EIS Guidelines (2011), and has been divided into two separate volumes for the purposes of submission to the Panel, as follows:

EIS Addendum Volume 1

- Chapter 1: Background and Introduction: Provides an introduction to the EIS Addendum report, identifies how guiding EA principles have been incorporated into the assessment, identifies updates to the Proponent, summarizes the legal framework, and provides a description of the Project, including a summary of project changes that have been proposed by GenPGM.
- Chapter 2: Project Scoping: Provides an update on the general factors considered in the assessment, including the scope of factors used to characterize residual environmental effects, as well as a description of the VECs and the spatial and temporal boundaries within which the assessment has been conducted.
- Chapter 3: Project Alternatives: Provides an update on the 'alternatives to' and 'alternative means' for the Project, including consideration of potential environmental effects of additional alternatives and/or design changes implemented relative to those discussed in the EIS.
- Chapter 4: Environmental Setting: Provides an overview of the physical, biological, and social environmental setting within which the Project is proposed, including an update to the characterization of the various components of the environment based on the results of the baseline update studies.

EIS Addendum Volume 2

- Chapter 5: Consultation and Engagement: Provides an update on consultation and engagement activities and outcomes with Indigenous communities, agencies, municipalities, and the public since 2014.
- Chapter 6: Assessment of Potential Effects: Provides an update and/or verification of the significance of residual environmental effects in consideration of updates to baseline conditions, significance thresholds and Project refinements. This includes the assessment of potential cumulative effects, the effects of accidents and malfunctions, and the effects of the environment on the Project and the capacity of renewable resources.
- Chapter 7: Environmental Management System: Provides an update on the proposed Environmental Management System (EMS) for the Project, including programs to manage waste,

emergencies, and follow-up and monitoring activities at the site, as well as efforts for decommissioning and closure of the mine.

- Chapter 8: Table of Commitments: Provides an updated list of commitments, including mitigation measures to be implemented by GenPGM, should the Project proceed based on commitments made in the EIS, various IR responses and any new commitments resulting from the EIS Addendum.
- Chapter 9: Assessment Summary and Conclusions: Provides a summary of the EIS Addendum, including the scope of the assessment, project interactions, residual effects, mitigation measures, follow-up programs, and overall conclusions on the determination of the significance of residual environmental effects of the Project.

The updated effects assessment reports will be provided as appendices to EIS Addendum Volume 2 as Supporting Information Documents (SIDs).

To support the previous determination of sufficiency, and to demonstrate what additional information has been provided through this EIS Addendum, an updated Table of Concordance will be provided as an appendix to EIS Addendum Volume 2, which will identify where specific information exists within the EIS Addendum to address relevant sections of the EIS Guidelines.

This report is provided in partial fulfillment of GenPGM's response to the information requested by the Panel in their January 21, 2014 letter (CIAR #682) seeking an updated feasibility study and the implications of the update to the EIS. Additional information will be provided under separate cover to address this request.

1.1 GUIDING PRINCIPLES

This EIS Addendum follows the guiding principles established by the EIS Guidelines that were incorporated into the assessment documents in the original EIS (2012). It uses the environmental assessment process as a planning tool to establish and evaluate alternatives, identify potential environmental effects, propose measures to avoid and mitigate potential effects, and to document consultation activities. The 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 assessment incorporates traditional and local knowledge, held by individuals and communities, to inform existing conditions, influence Project design, and understand potential effects. It integrates principles of sustainable development by considering biodiversity, resource capacity and long-term environment, social and economic viability. These principles form the framework used to assess the Project.

1.2 THE PROJECT PROPONENT

1.2.1 Contact Information

Generation PGM Inc. (GenPGM), a direct subsidiary of Generation Mining Ltd., is the proponent of the Project. The address for the proponent is:

(Registered Office Address)
GENERATION PGM INC.
100 King Street West
Suite 7010, PO Box 70
Toronto, Ontario, M5X 1B1, Canada

(Project Office Address)
GENERATION PGM INC.
90 Peninsula Road
P.O. Box 1508
Marathon, Ontario, P0T 2E0, Canada

Email: comments@genpgm.com

Internet: http://www.genmining.com

The Chief Executive Officer of GenPGM is **Mr. Jamie Levy**.

For the purposes of the environmental assessment process, the primary contacts at GenPGM are:

Mr. Drew Anwyll
Chief Operating Officer
Generation PGM Inc.
danwyll@genpgm.com

Ms. Tabatha LeBlanc
Manager of Sustainability
Generation PGM Inc.
tleblanc@genpgm.com

1.2.2 Development, Operation and Management of the Project

1.2.2.1 Responsible Legal Entity

The name of the legal entity that will develop, operate and manage the Project is Generation PGM Inc. (GenPGM).

Generation Mining Limited ("Generation Mining") was incorporated under the *Business Corporations Act* (Ontario) on January 11, 2018. Generation Mining is a public company listed on the Toronto Stock Exchange ("TSX") and trades under the ticker symbol "GENM". Generation Mining owns 100% of the outstanding shares of GenPGM.

GenPGM entered into a Joint Venture Agreement with Stillwater Canada Inc. on July 10, 2019 ("Marathon JV Agreement") with respect to the Marathon Project. Pursuant to the Marathon JV Agreement, GenPGM is the current operator of the Project and, as current operator, is the legal entity that will develop, operate and manage the Project.

1.2.2.2 Corporate Structure of Generation PGM Inc.

GenPGM is a wholly-owned subsidiary of Generation Mining. Generation Mining is a development stage company focused on the Marathon Property. Generation Mining acquired its interest in the Marathon Property in July 2019 through the Marathon JV Agreement with Stillwater. Generation Mining has earned an 80% interest in the Marathon joint venture.

1.2.2.3 Management Structure of Generation PGM Inc.

The business and affairs of GenPGM are supervised by the Board of Directors of its parent Company, Generation Mining. Generation Mining's board consists of seven members. Reporting to the board of Generation Mining is the President and Chief Executive Officer. Reporting to the CEO is the Chief Operation Officer, Chief Financial Officer, and the Vice President of Exploration.

The business affairs of the Marathon JV are supervised by a management committee consisting of two appointees by GenPGM and two appointees of Stillwater. The Chairman of the management committee is nominated by GenPGM, the current operator.

The Generation Mining management team and its board of directors and the Marathon Joint venture management committee are committed to responsible corporate governance practices. The Officers are accountable for directly overseeing the exploration, permitting, design, construction, operation, closure and decommissioning of the Marathon Project.

The management and monitoring of environmental liabilities and occupational hazards during all phases of the Project life cycle will comply with all relevant federal and provincial legislation, regulations, and project approvals, as well as GenPGM policies and management programs applicable to corporate environmental and safety management processes.

The Company will have in place appropriate insurance and liability coverage relevant to the Project and as required by the *Ontario Mining Act* including, but not limited to, the following:

- General Liability
- Commercial Automotive
- Worker's Compensation & Employers Liability
- Employee Practice Liability
- General Property
- Director & Officer
- Financial Assurance as required
- Others as required.

1.2.2.4 Health and Safety

GenPGM will develop and implement an effective health and safety management system with the objective of eliminating hazards or exposures which may result in personal injury or illness. GenPGM will support and sustain these systems by providing progressive safety leadership built on performance standards and personal accountability modelled by a leadership focus on safety. The system will be continually updated throughout the life of the Project to ensure ongoing compliance with current and future regulatory standards. The GenPGM leadership team is committed to open communication to foster and sustain a culture of employee engagement, involvement and ownership.

GenPGM is committed to developing and operating the Project while ensuring the health and safety of our employees, contractors, suppliers, and visitors, with the goal of safe production and a workplace that is free from injury and fatality. To accomplish this, GenPGM will:

- Implement industry best practices and standards, including providing leadership and necessary resources to achieve a safe and healthy workplace
- Achieve full compliance with all relevant legislation and regulations, meeting or exceeding all applicable requirements of the Occupational Health and Safety Act
- Deliver clear communication and transparency to both internal and external stakeholders relating to Generation's Health and Safety performance
- Ensure that potentially hazardous agents and conditions are identified and managed safely through reasonable and practical measures
- Implement procedures to investigate all serious accidents and near miss incidents and to take corrective action when necessary

- Require each employee to follow established work practices and procedures, comply with all government laws and regulations, and avoid exposing themselves, other employees, or visitors to undue risk
- Ensure oversight from the Board and Executive leadership of our Health and Safety performance, striving for continuous improvement
- Promote a corporate culture of health and safety accountability through proactive education, instruction, information, and supervision
- Ensure oversight from the Board and Executive leadership of our health and safety standards, striving for continuous improvement of our performance and activities

Exploration, development, and operation intrinsically involve risk. By working together and committing to this approach, the goal of achieving zero accidents in the workplace and enhancing the well-being of all of GenPGM's staff and stakeholders can be realized.

1.2.2.5 Environmental Management Policy and Systems

GenPGM has an environmental policy and is developing an Environmental Management System (EMS) consistent with the results of the EIS Addendum. The EMS will be continually updated throughout the Project life to ensure ongoing compliance with current and future regulatory standards. The GenPGM Environmental Policy contains the following core values:

> *Generation PGM is committed to conducting our activities in a manner that protects the environment. We understand that mining activities have an impact on the environment and recognize that mitigation efforts and effective environmental management are critical to a successful future. Our aim is to minimize, mitigate, and where possible, eliminate impacts to the environment.*

To accomplish this, GenPGM will:

- Build and operate facilities that are carefully designed to minimize environmental impacts
- Implement environmental best practices and comply with all legislation and regulations that apply to our activities
- Engage with stakeholders, including local communities, to ensure sustainable management of water and natural resources for the benefit of all local users
- Select appropriate technologies that support environmentally responsible practices and processes
- Use energy and other natural resources as efficiently as possible
- Minimize our use of water and control our impacts on water quality through safe, efficient, and sustainable use, reuse, management, treatment, and discharge of water

- Achieve high quality waste management and recycling by avoiding the release of substances which are damaging to the environment, promoting recycling, and adopting the use of environmentally friendly products
- Plan for mine closure and undertake progressive reclamation related to our activities to achieve long-term land use objectives
- Protect and conserve biodiversity and the natural environment as far as practically possible, particularly for sensitive or protected areas
- Provide sufficient resources, personnel, and training so that all employees, contractors, and visitors are aware of and able to fulfil their environmental responsibilities
- Achieve full compliance with all relevant environmental legislation and regulations
- Commit to protecting the environment and minimizing or mitigating negative impacts of our activities
- Ensure oversight from the Board and Executive leadership of our environmental performance, striving for continuous improvement of our performance and activities
- Deliver clear communication and transparency to both internal and external stakeholders regarding our environmental performance

This policy will apply to the entire GenPGM workforce. Integrating biodiversity, conservation and environmental considerations into all stages of the Project will support achievement of a successful and sustainable future.

1.2.3 Environmental and Socio-economic Performance on Past and On-going Projects

Although GenPGM is a newer corporation, its senior management team has extensive experience developing programs and providing corporate direction for companies recognized for their environmental and social performance. The broad collection of knowledge and experiences have been applied to establish a progressive approach to the health, safety and environmental issues, working cooperatively to support and strengthen local communities. This commitment is evident in activities that range from exploration, annual training programs and project design, as GenPGM seeks input from land users, alters workplans to eliminate or mitigate impact to people and nature, finds opportunities for joint training to build skills in local communities, sponsors communities to participate in onsite monitoring, and partners with researchers to utilize the newest technologies to reduce disturbance.

Some examples of GenPGM's environmental initiatives include:

- Best Environmental Practices - going well beyond regulatory compliance, setting high standards for all of our activities focused on protection of natural resources. Training our field crews and contractors to monitor for species at risk, nesting birds and reducing their impacts to work in unison with nature.

- Innovation - utilizing new technologies and initiatives to advance environmental and social responsiveness; including, use of trail cameras and audio records to determine presence of terrestrial wildlife prior to development of workplans, interim reclamation design for exploration activities, reducing and recycling water consumption for exploration drilling and use of geophysical techniques to reduce surface disturbance such as gravity, passive seismic, electromagnetics and induced polarization to identify and refine exploration targets.
- Industry Standard and Environmental Effectiveness - with exemplary environmental management, innovative technologies, and forward-thinking initiatives; monitoring programs have confirmed effectiveness of management strategies and regulatory compliance.

GenPGM continuously strives to establish and maintain collaborative community relationships. Similar to GenPGM's predecessor, it works to ensure that exploration and other work plans are shared with local residents and stakeholders to provide an opportunity to address socio-economic and environmental issues in an interactive and cooperative way. Whether it's boots on the ground exploration, diamond drilling, or Project design, GenPGM regularly meets with communities to discuss workplans, modify plans based on feedback, and follows up with communities on work program outcomes. GenPGM believes that successful and sustainable relationships are created through respectful and long-term collaborative partnerships. Key elements include:

- Social Accountability – community working committees have been established, to allow for cooperation with the community and public participation in the oversight of our exploration programs and project development. These cooperative relationships build trust between participants through open communication and a process that enhances transparency.
- Collaborative Community Relationships – in which GenPGM's development plans are shared and discussed, providing the opportunity to address the socio-economic impact in a collaborative way.
- Charitable Giving and Educational Support – support for community projects, cultural events, emergency services, youth activities, and education. GenPGM and its predecessor have regularly sponsored joint training initiatives to enhance skills of local community members and has been a sponsor of Outland Youth Employment camps that provides Indigenous youth with jobs, education, and training in the forestry and natural resources sectors.

GenPGM will ensure its activities are socially and environmentally responsible, building from standards established by the Mining Association of Canada, the International Council on Mining and Metals, and the Ontario Mining Association for water conservation, energy consumption, reduction of Greenhouse Gas emissions, metal recycling, and the preservation of biodiversity.

1.2.4 Indigenous Engagement Policy

GenPGM adopted a formal Indigenous engagement policy that reads:

> *Generation PGM recognizes the importance of building and maintaining positive, long-term, mutually beneficial relationships with Indigenous governments and communities. Indigenous Peoples are critical partners to Generation, and we believe in forging relationships that are based on mutual respect, transparency, and trust.*

Generation PGM acknowledges the unique legal and constitutional rights of Indigenous Peoples and strives to understand and respect their culture, history, beliefs, and traditions. We will:

- Respect the rights of Indigenous Peoples and acknowledge their right to maintain their culture, identity, traditions, and customs
- Build respectful relationships through meaningful engagement and collaborative processes that are achieved through consulting in a timely, collaborative, and culturally-appropriate manner
- Work to obtain the consent of Indigenous communities our activities related to the Project and any future changes that are likely to have significant impacts on affected indigenous communities
- Seek to agree on and document engagement and consultation plans with potentially impacted Indigenous communities and ensure early, inclusive, transparent, respectful, and meaningful dialogue
- Maximize social and economic benefits and opportunities, including business development, employment, training, and community investment by working proactively with Indigenous communities
- Undertake our activities in an environmentally responsible way to protect the long-term integrity and use of the land
- Clearly communicate and be transparent as we engage with Indigenous communities
- Ensure oversight from the Board and Executive leadership as we engage and partner with Indigenous communities

Partnerships with Indigenous governments and communities should be founded on a basis of shared accountability. Effective partnerships will support the successful development of self-defined community goals that can leave a positive and long-lasting legacy.

1.2.5 Key Personnel Engaged in Developing the EIS Addendum

The EIS Addendum has been prepared through the collaborative efforts of GenPGM and its Project Team of consultants (scientists, engineers, planners, and other experts) to inform the Panel, Indigenous Communities, and other project stakeholders (i.e., agency / municipal staff, interested parties and members of the public) about the Project and potential environmental effects. GenPGM retained Stantec Consulting Ltd. (Stantec) to lead and coordinate the completion of the EIS Addendum for the Project

under CEAA, 2012. Technical work to update existing baseline conditions, assess potential environment effects of the Project, and inform the completion of the EIS Addendum was completed by Stantec, Ecometrix Inc. (Ecometrix), Northern Bioscience and Knight Piésold. The design of the mine, including refinements to the original project layout, phasing, and determination of activities, was informed by G Mining and Knight Piésold.

The names and roles of the key individuals involved in the preparation of the EIS Addendum and their professional affiliation are provided in Table 1.2-1 and

Table 1.2-2. *Curricula vitae* for key personnel involved in the EIS Addendum will be provided in Volume 2 of the EIS Addendum.

Table 1.2-1: Key Individuals within GenPGM Involved in the Preparation of the EIS Addendum

Name	Affiliation	Role(s)
Jamie Levy	Chief Executive Officer, GenPGM	Executive sponsor, overall responsibility for the EIS and development of the Project
Drew Anwyll, P.Eng.	Chief Operating Officer, GenPGM	Lead responsible for updates to the mine design and feasibility study
Tabatha LeBlanc BSc. EP	Manager of Sustainability, GenPGM	Responsible for the environmental aspects for the Project and consultation / engagement
John McBride P.Geo.	Senior Project Geologist, GenPGM	Geological Site Contact
Steve Haggerty P.Eng.	Managing Director, Haggerty Technical Services	Metallurgy, process plant / pilot plant
Ruben Wallin M.Eng., P.Eng.	Principal Consultant, WESC Inc.	Independent consultant, supporting feasibility study and development of the environmental assessment

Table 1.2-2: Key EA Project Team Individuals Involved in the Preparation of the EIS Addendum

Name	Affiliation	Role(s)
Chris Powell, M.A.	Stantec Consulting Ltd.	Lead Author - EIS Addendum
Piero Amodeo, B.A.	Stantec Consulting Ltd.	EIS Addendum Independent Review
Paula Sdao, P.Eng.	Stantec Consulting Ltd.	EIS Addendum Project Manager and Quality Review
Brian Fraser, M.Sc.	EcoMetrix Inc.	Lead Author - Alternatives Assessment Lead Author - Cumulative Effects Assessment Lead Author - EIS 2012

Table 1.2-2: Key EA Project Team Individuals Involved in the Preparation of the EIS Addendum

Name	Affiliation	Role(s)
Technical Discipline Leads		
Greg Crooks, P.Eng.	Stantec Consulting Ltd.	Lead Author - Atmospheric
Frank Babic, P.Eng., INCE	Stantec Consulting Ltd.	Lead Author - Acoustic
Michelle Fraser, M.Sc., P.Geo.	Stantec Consulting Ltd.	Lead Author - Hydrogeology
Sheldon Smith, MES, P.Geo.	Stantec Consulting Ltd.	Lead Author - Hydrology
Mark Shrimpton, M.A.	Stantec Consulting Ltd.	Lead Author - Socio-economics
Meaghan Rivard, M.A., CAHP	Stantec Consulting Ltd.	Lead Author - Cultural / Built Heritage
Colin Varley, M.A., RPA	Stantec Consulting Ltd.	Lead Author - Archaeology
Brian Fraser, M.Sc.	EcoMetrix Inc.	Lead Author - Water Quality
Ron Nicholson, Ph.D.	EcoMetrix Inc.	Lead Author - Mine Waste Geochemistry
Janeen Tang, M.E.S., P.Eng.	EcoMetrix Inc.	Lead Author - Human Health
Jason Dietrich, M.SC., CPESC-IT	EcoMetrix Inc.	Lead Author - Aquatics, Fish and Fish Habitat
Rob Foster, Ph.D.	Northern Bioscience	Lead Author - Terrestrial Environment
Craig Hall, P. Eng.	Knight Piésold	Lead Author - Process Solids and Mine Rock Management and Alternatives Lead Author - Water Balance

In addition to the above, G Mining Services has informed the details regarding mine design and extraction schedule as work proceeds on an update to the feasibility study.

1.3 LEGAL FRAMEWORK AND ROLE OF GOVERNMENT

1.3.1 Environmental Assessment Framework

The Project is being assessed in accordance with CEAA, 2012 and the EA Act through a Joint Review Panel pursuant to the Canada-Ontario Agreement on Environmental Assessment Cooperation (2004).

1.3.1.1 Federal Environmental Assessment

Correspondence between IAAC and GenPGM confirms that the Project will proceed under CEAA, 2012 (CIAR #690 and 691).

The Project initially commenced in 2010 under the Canadian Environmental Assessment Act (CIAR #1) and was referred to a review panel on October 7, 2010 (CIAR #2). On July 6, 2012, the former Canadian Environmental Assessment Act was repealed by CEAA, 2012. In accordance with subsection 126(1) of the new Act, existing projects were to proceed under the process established by CEAA, 2012. This was formalized for the Project through the Amended Agreement to Establish a Joint Review Panel (CIAR #264).

On August 28, 2019, the Impact Assessment Act (IAA) came into force, replacing CEAA, 2012. The IAA contains transition provisions that apply to projects undergoing an environmental assessment under CEAA, 2012. Specifically, subsection 183 (1) of the IAA permits projects that have already been referred to a review panel to continue under the CEAA, 2012 process. The transition policies also contain provisions that give proponents the opportunity to transition to the IAA process (subsection 183(2)). On September 27, 2019, GenPGM confirmed that the Project would remain under the CEAA, 2012 process (CIAR #691).

1.3.1.2 Provincial Environmental Assessment

As stated in the original EIS (2012), an Environmental Assessment (EA) is not typically carried out for mining projects in their entirety as they are not subject to the EA Act. However, ancillary components of the Project may be subject to the EA Act, including:

- The 115 kV transmission line – Environmental Screening Process under the Electricity Projects Regulation (O. Reg. 116/01)
- Modifications to the existing Trans-Canada Highway (Highway 17) and Camp 19 Road/Peninsula Road intersection – MTO Class EA
- Disposition of Crown rights of resources for mining activities - MNRF Class EA for Resource Stewardship and Facility Development

The EA Act includes provisions that allow for a proponent to voluntarily agree to undertake an EA. Stillwater entered into a Voluntary Agreement (VA) for the assessment of the entire Project under the EA Act (CIAR #64). This agreement continues to be valid as it applied to any successor of Stillwater (i.e. GenPGM). The VA allows for the entirety of the Project to be subject to the EA Act, which allows for the federal and provincial environmental assessments to be coordinated, thus ensuring no duplication of process.

1.3.1.3 Co-ordination of the Environmental Assessment Process and Activities

The agreement to establish a Joint Review Panel was released on August 9, 2011 (CIAR #146) and amended August 3, 2012 (CIAR #264). On October 9, 2020, a Draft Amended Agreement to Re-establish a Joint Review Panel for the Project was issued for public comment (CIAR #694). At the time of publication of this report (Volume 1 of the EIS Addendum), a finalized agreement has not been released.

The agreement between the Minister of the Environment and Climate Change, Canada and the Minister of the Environment, Conservation and Parks, Ontario sets the framework to ensure that the Joint Panel Review Process satisfies the requirements of CEAA, 2012 and the EA Act. It directs the Panel to review the EIS and updated studies and reports and to engage federal and provincial departments and ministries to obtain specialist information and knowledge as it relates to the Project. The agreement further outlines the decision-making process for the federal and provincial Ministers. This agreement harmonizes the federal and provincial EA requirements.

1.3.1.4 Joint Review Panel

A Draft Joint Review Panel Terms of Reference (ToR) for the Project was issued on October 9, 2020 (CIAR #694) as part of the Draft Amended Agreement to Re-establish a Joint Review Panel for the Project. The Draft ToR outlines the responsibilities of the Joint Review Panel and the Joint Panel Review Process. Once finalized, the Amended ToR will replace the original ToR issued on August 9, 2011 (amended 2012). At present, the draft contemplates the following revisions:

- Establishes a modified process and associated timelines that recognizes that an EIS Addendum will be provided by GenPGM (including the approval of a 90-day timeline extension by the Minister of Environment and Climate Change)
- Incorporates current practices as it relates to Indigenous consultation and engagement
- Acknowledges the uncertainty associated with the current COVID-19 pandemic and the potential need for alternative means of consultation and hearing procedures
- Incorporates legislative changes
- Includes updated information regarding the Proponent

The ToR is a procedural document and is not expected to affect the completion of the EIS Addendum, other than recognizing that an EIS Addendum will be prepared. However, should any further amendments to the ToR have implications for the completion of the EIS Addendum, these will be addressed in EIS Addendum Volume 2.

1.3.1.5 Public Registry

The provincial and federal governments maintain an online registry to find information and records related to EAs. The Canadian Impact Assessment Registry (CIAR) file number for the Project is 54755 and the current internet address for related information is:

https://iaac-aeic.gc.ca/050/evaluations/proj/54755

The provincial EA reference number is 11010 and the internet address for related information is:

https://www.ontario.ca/page/marathon-platinum-group-metals-and-copper-mine-project

1.3.2 Role of Government

As outlined in the Draft Amended Agreement to Re-establish a Joint Panel Review for the Marathon Palladium Project (CIAR #694), both federal and provincial Ministers have decision-making responsibilities. The federal Minister of Environment and Climate Change will issue a decision statement in a manner consistent with CEAA, 2012. Should the Minister determine that the Project is likely to cause significant adverse environmental effects, the Project shall be referred to the Governor in Council to determine whether such effects are justified in these circumstances. Similarly, the provincial Minister of the Environment, Conservation and Parks may give approval for the Project to proceed, to proceed with conditions, or to not grant approval for the Project to proceed.

Should the Project be approved to proceed, GenPGM will obtain the necessary federal and provincial regulatory authorizations and permits as part of the Project's detailed design phase. These approvals are discussed in Section 1.3.4 of this report.

1.3.3 Planning Context for the Environmental Assessment Process

A list of key agreements, conventions, policies and guidelines was provided in Section 1.3.3 of the original EIS (2012). To reflect the changes to these guiding documents and to provide further clarity, a summary of changes to key documents that have occurred since 2012, including new agreements, policies and guidelines that are relevant to the Project, are summarized below in Table 1.3-1. This list was generated based on a review of documents previously listed in the original EIS (2012) and was informed by input from IAAC on October 19, 2020 and the Ministry of the Environment, Conservation and Parks (MECP) on October 29, 2020.

Table 1.3-1: Principal Agreements, Conventions Policies and Guidelines

Key Agreements, Conventions, Policies and Guidelines	Considerations
Code of Practice: Preparing and Reviewing Environmental Assessments in Ontario (MECP, 2014)	Updated version of *Code of Practice: Preparing and Reviewing Environmental Assessments in Ontario* (MECP, 2009).
Guidance: "Need for", "Purpose of", "Alternatives to" and "Alternative means" (IAAC, 2020)*	Replaces the *Addressing 'Need for', 'Purpose of', 'Alternatives to' and 'Alternative Means' under the Canadian Environmental Assessment Act* (CEAA,1998).
Public Participation in Impact Assessment (IAAC, 2020)*	Replaces the *Canadian Environmental Assessment Agency's Public Participation Guide* (May 2008).
Guidance for Evaluating Human Health Impacts in Environmental Assessment: Human Health Risk Assessment (Health Canada, 2019)	Replaces the *Useful Information for Environmental Assessments* (Health Canada, 2010).

Table 1.3-1: Principal Agreements, Conventions Policies and Guidelines

Key Agreements, Conventions, Policies and Guidelines	Considerations
Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise (Health Canada, 2017)	New guidance issued by Health Canada to replace interim guidelines released previously in 2011 and 2016. This document provides generic guidance on predicting health risks related to levels and/or types of sound predicted in federal environmental assessments (EAs) of proposed major resource and infrastructure projects (such as mines, dams, pipelines and other projects).
Guidance for Evaluating Human Health Impacts in Environmental Assessment: Drinking and Recreational Water Quality (Health Canada, 2016)	This document provides generic guidance on predicting health risks of water quality in federal environmental assessments (EAs) of proposed major resource and infrastructure projects (such as mines, dams, pipelines and other projects).
Guidance for Evaluating Human Health Impacts in Environmental Assessments: Country Foods (Health Canada, 2017)	This document provides generic guidance on predicting health risks of contamination of country foods, such as fruit, fish, seafood and game in federal environmental assessments (EAs) of proposed major resource and infrastructure projects (such as mines, dams, pipelines and other projects).
Technical Guidance for Assessing Physical and Cultural Heritage or any Structure, Site or Thing (Canadian Environmental Assessment Agency, 2015)	Replaces the *Reference Guide: Assessing Environmental Effects on Physical and Cultural Heritage Resources* (1996).
Interim Technical Guidance: Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 (Canadian Environmental Assessment Agency, 2018)	Replaces *Addressing Cumulative Environmental Effects under the Canadian Environmental Assessment Act* (Canadian Environmental Assessment Agency, 2007).
Guidelines for the Assessment of Alternatives for Mine Waste Disposal (Environment and Climate Change Canada, 2016)	Replaces the *Guidelines for the Assessment of Alternatives for Mine Waste Disposal* (2011).
Considering Climate Change in the Environmental Assessment Process (MECP, 2017) (updated May 2019)	This document is a companion to the Codes of Practice (MECP, 2014) and sets out the ministry's expectations for considering climate change in the preparation, execution and documentation of environmental assessment studies.
Policy Context: Considering Environmental Obligations and Commitments in Respect of Climate Change under the Impact Assessment Act (IAAC, 2020)*	Replaces *Incorporating Climate Change Considerations in Environmental Assessment: General Guidance for Practitioners* (Canadian Environmental Assessment Agency, 2003).
Strategic Assessment of Climate Change (Environment and Climate Change Canada, Revised October 20, 2020)*	This strategic assessment outlines the information needed when assessing greenhouse gas and climate change, with the goal of achieve net zero emissions for any project extending beyond 2050.
Metal and Diamond Mining Effluent Regulations	Current version of the *Metal and Diamond Mining Effluent Regulations* issued pursuant to the *Fisheries Act*.

Table 1.3-1: Principal Agreements, Conventions Policies and Guidelines

Key Agreements, Conventions, Policies and Guidelines	Considerations
(Environment and Climate Change Canada, 2020)	
Great Lakes Water Quality Agreement (IJC, 1978, amended 2012)	In 2012 the agreement was amended. It continues to provide objectives and guidelines for Canada and the United States to co-operatively restore and protect the Great Lakes. The objectives focus not only water quality, but the Great Lakes as a resource for drinking water, recreation and as a food source.
Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (2014, draft 2019)	In 2014 the agreement was renewed with five priorities: protecting waters; improving wetlands, beaches and coastal areas; protecting habitats and species; enhancing understanding and adaptation; and promoting innovation and engaging communities. The Governments of Canada and Ontario are in the process of finalizing a new agreement. A draft of which was released in 2019 that identified five key priorities: protecting waters; improving coastal areas; enhancing understanding and adaptation; and enhancing communities. The agreement continues to establish the principles for the provincial and federal government to collaboratively restore and protect the Great Lakes Basin to help meet Canada's obligations under the Great Lakes Water Quality Agreement.
Canada-Ontario Agreement on Environmental Assessment Cooperation (COA, 2004)	This agreement has not changed and continues to outline a framework for the federal and provincial governments to work collaboratively while exercising their respective powers and duties with respect to the environmental assessment process. While originally based on the Canadian Environmental Assessment Act, it has continued to be applicable to projects under CEAA, 2012.
Fish and Fish Habitat Protection Policy Statement (August 2019)	Replaces the *Federal Policy for the Management of Fish* (1986). In 2019, the Department of Fisheries and Oceans Canada (DFO) released this policy document to explain the fish and fish habitat protection provisions of the amended *Fisheries Act*. The policy statement establishes the framework for the conservation and protection of fish and fish habitat, including the process for the harmful alteration, disruption or destruction of fish habitat.
Range Management Policy in Support of Woodland Caribou Conservation and Recovery (2019)	This policy outlines the Range management Approach to support the conservation goals for Caribou.
Management Plan for the Peregrine Falcon anatum / tundrius *(Falco peregrinus anatum/tundrius)* in Canada [Proposed] (2015)	Replaces the Peregrine Falcon (Falco peregrinus) Habitat Management (1987), this document outlines a plan to ensure that the Peregrine Falcon anatum/tundrius population is self-sustaining through the implementation broad strategies and conservation measures.
Guide for Crown Land Use planning (2016, amended 2019)	This guide consolidates many of the resources that were historically used in the planning of Crown Lands. It outlines the Crown land use planning process including the context, requirements, and designated uses of Crown land. This replaces the Ontario Area Specific Crown Land Use Policy (2007).
Crown Land Use Policy Atlas	Formerly the Ontario's Living Legacy Land Use Strategy, this online tool contains the area-specific land use policy for Crown lands. The SSA is predominantly designated General Use, with a small portion along the Pic River outside the Town of Marathon boundary being designated Enhanced Management Area – Recreation.

Table 1.3-1: Principal Agreements, Conventions Policies and Guidelines

Key Agreements, Conventions, Policies and Guidelines	Considerations
Provincial Policy Statement (PPS) (2020)	Several updates to the PPS have occurred since completion of the EIS (2012), the most recent of which occurred in 2020. The PPS outlines the Province of Ontario's overarching policies for land use planning.
Canadian Ambient Air Quality Standards (CAAQs) (2020)	These are a set of standards intended to manage air quality across Canada. They are updated every five years, with 2020 being the most recent updated.
* Note: Some documents listed above have been prepared by IAAC to inform projects being assessed under the new *Impact Assessment Act*. These documents have been identified by IAAC as updates to previous guidance documents and have been referenced in completing this EIS Addendum under CEAA, 2012, as appropriate.	

Other discipline-specific guidelines, standards, and criteria have also been amended since the original submission of the EIS (2012) and subsequent information request responses by Stillwater (2013 to 2014). Relevant documents have been considered and will be identified in Chapter 6 of the EIS Addendum (Volume 2) and supporting effects assessment reports, which will be included in Volume 2. Those listed above reflect general agreements, conventions policies and guidelines pertaining to environmental assessment.

1.3.3.1 Municipal Planning Perspective

The Town of Marathon undertook updates to their Official Plan and Zoning By-Law in 2015 and 2016, respectively. The land use designation and zoning for the mine remains rural. *Planning Act* applications will be required to amend the Zoning By-Law and to enter into a site plan agreement.

1.3.4 Regulatory Approvals

A list of potential federal, provincial, and municipal approvals, permits, and/or authorizations required for the Project to move forward beyond the environmental assessment phase was provided in Section 1.3.3.2 of the original EIS (2012). To reflect regulatory changes since 2012 and to provide further clarity, an updated list of key approvals is provided in Table 1.3-2 (federal approvals),Table 1.3-3 (provincial approvals), and Table 1.3-4 (municipal approvals).

Table 1.3-2: Potential Federal Approvals, Permits and/or Authorizations for the Project

Approval/ Permit/ Authorization	Rationale
Authorization for Works Affecting Fish Habitat Legislation: *Fisheries Act* Responsible Agency: Department of Fisheries and Oceans	Project development may result in serious harm to fish and fish habitat for which offsetting measures are required.
Metal and Diamond Mining Effluent Regulations Legislation: *Fisheries Act* – Metal and Diamond Mining Effluent Regulations Responsible Agency: Environment Canada	Watercourses (or portions thereof) that are frequented by fish will be used for long-term storage of process solids and/or mine rock and or discharge from such facilities.
Navigation Protection Program (NPP) Approval Legislation: *Canadian Navigable Waters Protection Act* Responsible Agency: Transport Canada	The development of mine-related infrastructure including the open pits, Mine Rock Storage Area (MRSA), Process Solids Management Facility (PSMF) and site road network may require approval under the NPP.
Licence for a Factory and Magazine for Explosives Legislation: *The Explosives Act* Responsible Agency: Natural Resources Canada	The proposed development includes facilities to manufacture and store nitrogen-based explosives that will be used for the purpose of excavating the ore body.

Table 1.3-3: Potential Provincial Approvals, Permits and/or Authorizations for the Project

Approval/ Permit/ Authorization	Rationale
Closure Plan approval in accordance with Schedule 2 of O. Reg. 240/00 Legislation: *Mining Act* Responsible Agency: Ministry of Energy, Northern Development and Mines	An approved Schedule 2 Closure Plan is required for mine site prior to beginning operations.
Domestic Processing Exemption Legislation: *Mining Act* Responsible Agency: Ministry of Energy, Northern Development and Mines	An exemption under Section 91 of the Mining Act would be required in the event that ore was processed outside of Canada.
Environmental Compliance Approval (ECA) Legislation: *Environmental Protection Act* Responsible Agency: Ministry of the Environment, Conservation and Parks	An ECA is required for stationary source emissions, discharges and waste related to the Project, including air emissions, noise emissions, effluent discharges to water, stormwater management (SWM) and waste disposal/transportation.
Permit to Take Water (PTTW) Legislation: *Ontario Water Resources Act* Responsible Agency: Ministry of the Environment, Conservation and Parks	A PTTW is required for instances where groundwater or surface water is taken at a rate of 50,000 L/d, or more. As it pertains to the proposed development a permit to take water may be needed for dewatering of the open pits and for the development of groundwater well(s) for the supply of potable water.

Table 1.3-3: Potential Provincial Approvals, Permits and/or Authorizations for the Project

Approval/ Permit/ Authorization	Rationale
Crown Land Work Permit Legislation: *Public Lands Act* Responsible Agency: Ministry of Natural Resources and Forestry	A work permit is required for mine-related construction on Crown Land, including dams, drainage channels, roads, culverts and bridges, and for dredging and filling of shore lands.
***Lakes and Rivers Improvement Act* Permit** Legislation: *Lakes and Rivers Improvement Act* Responsible Agency: Ministry of Natural Resources and Forestry	A permit will be required for the construction of dams, water crossings, and diversion channels or enclosures.
***Endangered Species Act* Permit** Legislation: *Endangered Species Act* Responsible Agency: Ministry of Natural Resources and Forestry	A permit may be required if species at risk or its protected habitat may be affected by the development of the Project. The potential effect of the Project on Woodland Caribou habitat has been assessed in this regard.
Aggregate Licence or Permit Legislation: *Aggregate Resources Act* Responsible Agency: Ministry of Natural Resources and Forestry	A licence may be required for the purposes of obtaining aggregate that is needed to develop mine site infrastructure from borrow areas around the development footprint. GenPGM has a licensed aggregate quarry adjacent to the SSA.
Encroachment Permit Legislation: *Public Transportation and Highway Improvement Act* Responsible Agency: Ministry of Transportation	An encroachment permit would be required for construction of transmission line over or under Provincial Highway or within the highway right-of-way. A permit would also be required for any work within the highway right-of-way, including improvements to the highway itself required for the Project, specifically at the Highway 17 – site access road intersection.
Building and Land Use Permits Legislation: *Public Transportation and Highway Improvement Act* Responsible Agency: Ministry of Transportation	Permits will be required for any development or construction within 45 m of the right-of-way limit of the highway and 395 m of the centre point of the intersection of a side road (such as the site access road) with Highway 17.
Sign Permit Legislation: *Public Transportation and Highway Improvement Act* Responsible Agency: Ministry of Transportation	A permit will be required for any sign erected within 400 m of the limit of the highway.
Licence to Operate a Bulk Storage Plant Legislation: *Technical Standards and Safety Act* Responsible Agency: Technical Standards and Safety Authority	A licence will be required for the purpose of operating a private bulk fuel storage and distribution system in the SSA.
Pre-development review and approval Legislation: *Occupational Health and Safety Act* Responsible Agency: Ontario Ministry of Labour	The Ministry of Labour will subject the proponent to a safety and procedures review prior to the installation of portable crushing, screening or associated washing equipment.

Table 1.3-4: Potential Municipal Approvals, Permits and/or Authorizations for the Project

Approval/ Permit/ Authorization	Rationale
Zoning By-law Amendment and Site Plan Agreement Legislation: *Planning Act* Responsible Agency: Town of Marathon	The Zoning By-law will need to be amended and a Site Plan agreement will need to be executed to permit mining operations
Sewage Treatment System Permit Legislation: *Ontario Building Code* Responsible Agency: Thunder Bay District Health Unit/ Town of Marathon	A permit to construct an on-site private septic sewage system <10,000 L/day will be required
Building Permit Legislation: *Ontario Building Code* Responsible Agency: Town of Marathon	A permit will be required for the construction of any Project buildings

1.4 NEED FOR AND PURPOSE OF THE PROJECT

1.4.1 Rationale for the Project

1.4.1.1 Generation PGM – Corporate Objectives

GenPGM is a wholly owned subsidiary of Generation Mining, and is focused on developing the Project in Northwestern Ontario. The Project is a proposed open pit mining operation to produce Platinum Group Metals (PGMs) and copper.

PGMs, including palladium, platinum, and rhodium, are rare and precious metals essential in automotive catalysts to convert harmful air pollutants into relatively harmless emissions; they are also used in various other applications. In recent years, as governments around the world have introduced more stringent vehicle exhaust emission regulations, palladium and rhodium have faced critical supply shortages.

In automobiles with gasoline-powered internal combustion engines (ICE), palladium-rich auto-catalysts convert up to 98% of the noxious gases into harmless byproducts as follows:

- carbon monoxide, which can be fatal to breathe, is converted to carbon dioxide
- nitrous oxide, which is 300 times more potent than carbon dioxide as a greenhouse gas, is converted to the benign nitrogen gas
- unburned fuel gases, which contain a number of toxic substances, are converted to carbon dioxide and water

Diesel-powered cars, trucks and generators use a platinum-rich catalytic converter to scrub emissions.

Copper, another product of the Project, is a key element necessary for the expansion of electric and fuel-cell vehicles and is expected by many to face critical supply shortages in the near future as that developing industry begins to expand into the mainstream. Electric cars do not use PGMs but require more copper than ICE or diesel automobiles.

A large proportion of both PGMs and copper supply worldwide is sourced from countries with well-known geopolitical and/or developmental issues, making uninterrupted supply from these regions something that cannot be taken for granted.

GenPGM is a Toronto-based company listed on the Toronto Stock Exchange and is managed by an experienced group of mining professionals with extensive global and Canadian experience developing new mines. This management's stated goal is to supply metals to the economy that will be required for cleaner air and to reduce greenhouse gases. GenPGM owns 80% of the Project, and will be the operator. The remaining 20% is owned by Sibanye Stillwater Ltd., a South African-based mining company that is the one of the largest PGM producers in the world.

1.4.1.2 The Case for PGMs

PGMs are used for numerous commercial and industrial applications including, but not limited to, the following (in approximate order of usage) (SWC, 2011):

- Autocatalysts - Autocatalysts (i.e., catalytic converters) are by far the largest user of PGMs; autocatalysts convert up to 98% of hydrocarbons, carbon monoxide and oxides of nitrogen produced in the exhaust from gasoline engines into carbon dioxide, nitrogen gas and water vapour.
- Jewelry - Platinum and palladium alloys have long been used in jewelry to make white gold, although in recent years high prices have weakened palladium demand in this category. Platinum's use in jewelry is second only to autocatalysts.
- Chemical - Palladium is an important part of the refining of nitric acid, and has important uses in developing raw materials for synthetic rubber and nylon.
- Electronics - Palladium and palladium have a number of electronic applications. For example, palladium's chemical stability and electrical conductivity make it an effective and durable alternative to gold for plating in electronic components.
- Dentistry - Palladium-based alloys are used in dentistry for dental crowns and bridges. Palladium metal is also compatible with human tissue and is used, in a radioactive form, in the medical industry for the treatment of cancer.
- Medicine - Palladium-103, a radioactive isotope of palladium, is seeing promising applications in the treatment of prostate cancer. A newly emerging added area of research is potential use in the treatment of breast cancer.
- Fuel Cells - Palladium- and platinum-based alloys are actively being researched for applications in fuel cell technology, an area of future promise for the metal, though current consumption is low.

- Petroleum Refining - Small amounts of platinum are used in various petroleum refining processes.
- Water Treatment - Palladium is a unique and important catalyst being studied for use in removing a number of toxic and carcinogenic substances from groundwater, although at current prices it is not used in significant amounts.
- Hydrogen Purification - Platinum is considered critical for producing green hydrogen for electric fuel cell automobiles. Palladium has the ability to help filter hydrogen from other gases resulting in an ultra-pure hydrogen gas.

Based on 2019 data, total world-wide demand for palladium and platinum were 11,447,000 oz and 8,459,000 oz, respectively. Relative demand by end-use in 2019 for platinum and palladium is shown on Figure 1.4-1.

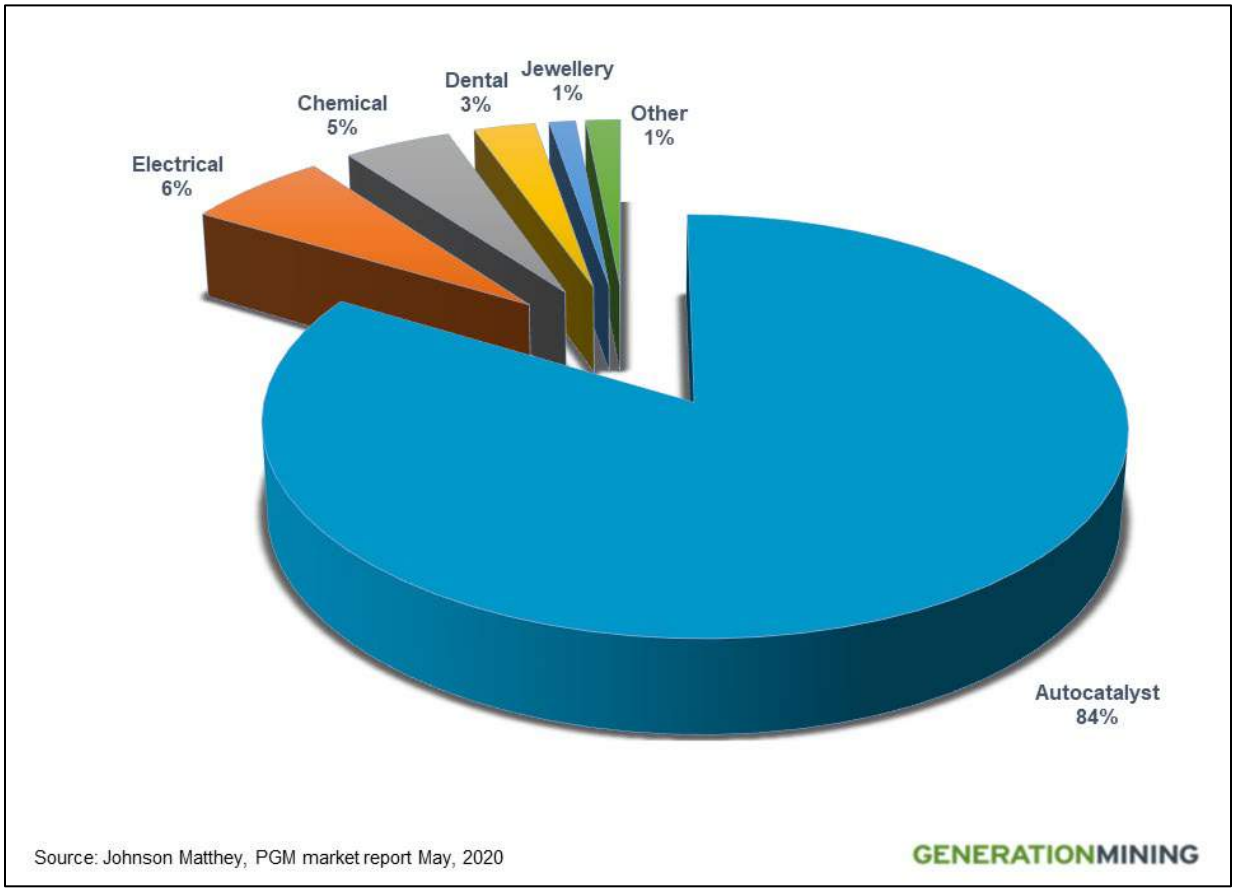
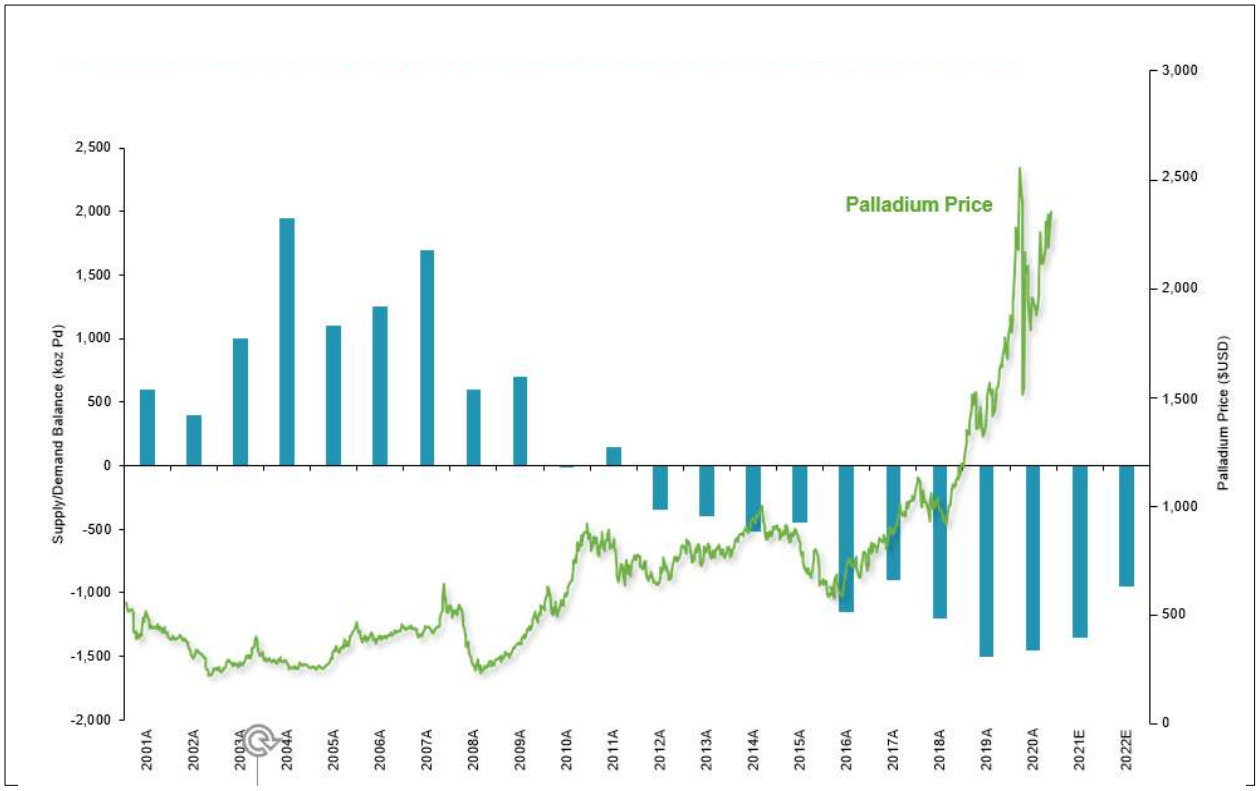


Figure 1.4-1: Relative Palladium Demand by End Use in 2019

According to Johnson Matthey (2020), currently 54% of the world's palladium and platinum supply comes from several mining companies in South Africa, while another 28% comes from a single company in Russia (note: Russia accounts for 42% of the world's palladium). Other producers include the United States and Canada (10%) and Zimbabwe (6%). The palladium supply is constrained in South Africa because it is mainly a byproduct of platinum mines. Furthermore, operational challenges, such as electricity shortages, faced by South African producers have caused production levels to stagnate since 2006. In Russia, palladium has long been a by-product of nickel mines in Siberia. The Russian mining company that produces palladium has announced a 10-year plan to increase production but is facing billions of dollars in expenditures to carry this out (Seeking Alpha, 2020).

As a result of ever more stringent emission standards, the palladium mined and recycled supply has been in a deficit since 2011 (see Figure 1.4-2). Recycling of jewelry and autocatalysts have made up most of the balance of that deficit, which has been increasing in double digit percentages annually in recent years. However, it has not been enough to totally make up the deficit. Moreover, that deficit has largely been made up by Russian government inventory and depletion of stocks held for investment purposes. Both of these sources are thought to be significantly depleted, which has caused the palladium price to more than triple since 2016 (Johnson Matthey, 2019).



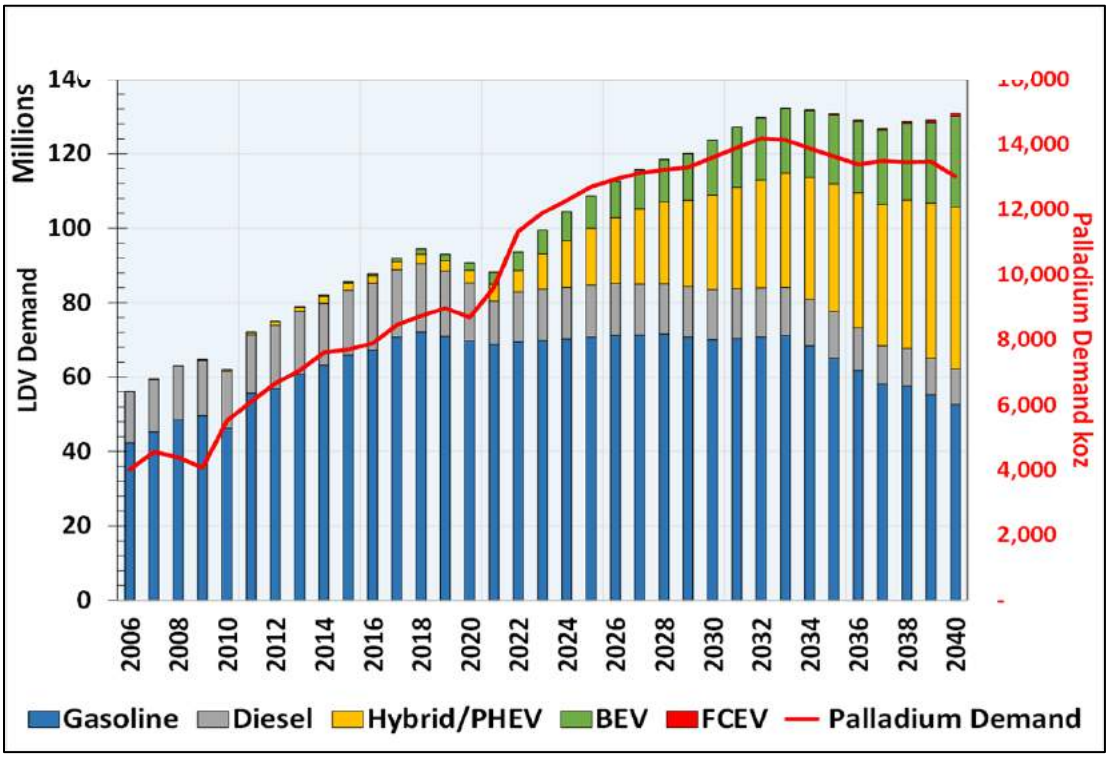
Source: adapted from Metals Focus, 2011-2020

Figure 1.4-2: Worldwide Palladium Price, Supply & Demand Balance - History & Forecast

Palladium volumes are expected to continue to increase in the automobile manufacturing sector. The deficits from 2011-2019 have been exacerbated by new emission standards in the European Union and China starting in 2017, which have required lower emissions (and therefore higher palladium loadings) per automobile each year through 2023, bringing the standard to the levels already required in the United States and Canada. Those increases are expected to be increased further after that, and countries such as India and Brazil are considering similar regulations (Metals Focus, 2020). There is the possibility of substituting some of the palladium with platinum, but such a shift is wrought with technical issues and the fact that platinum does not work as well.

As part of the worldwide rollout of vehicle electrification, it is expected by many analysts that, for the next 20 years, hybrid automobiles will be more popular than electric vehicles (see Figure 1.4-3). Palladium loadings in hybrid vehicles are even higher than in traditional ICE powered automobiles and are expected to exert further pressure on supply.

The precise future of world automobile demand is uncertain, as different studies show many different scenarios. However, the trend has been upward for most of the last 100 years, with occasional pull-back, such as the 2008 recession and the 2020 pandemic. Also uncertain is what will power future automobiles. Although many countries have been pushing for the adoption of battery electric vehicles (BEV) for more than a decade, they made up only 2.5% of worldwide automobile sales in 2019 (Inside EVs, 2020).



Source: Precious Metals Commodity Management LLC, 2020

Figure 1.4-3: Historical and Projected Vehicle Fuel-type Mix (2006-2040)

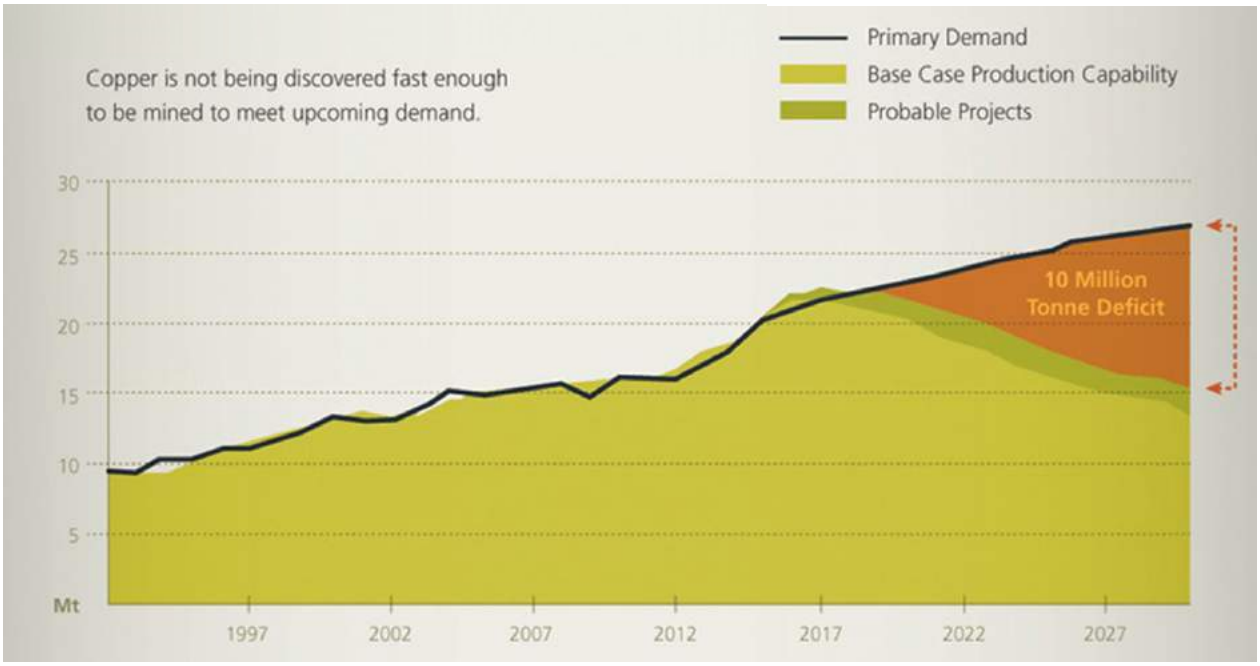
Another type of automobile that is considered clean are Fuel Cell Electric Vehicles (FCEV) powered by hydrogen fuel cells. While many analysts feel these will ultimately power the automobile industry, the technology is currently constrained due to the requirement of at least 30 grams of platinum per automobile. Additional platinum is also required in the hydrogen manufacturing process. World mined platinum production is currently only sufficient for 6 M automobiles annually, while sales in 2019 were 74.9 M vehicles globally (Statistica, 2020).

1.4.1.3 The Case for Copper

Copper is one of the oldest metals mined by humans. It is estimated that about 80% of the copper that has been mined over the centuries is still in circulation. Over the years, the uses for copper have multiplied, largely due to its unique combination of properties. Copper can be shaped into a variety of forms, such as wire or thin sheets, and is a highly efficient heat and electrical conductor.

Electrical uses of copper, including power transmission and generation, building wiring, telecommunication, and electrical and electronic products, account for about three quarters of total copper use. Building construction is the single largest market, followed by electronics and electronic products, transportation, industrial machinery, and consumer and general products. Copper by-products from manufacturing and obsolete copper products are readily recycled and contribute significantly to copper supply. New uses are also constantly appearing as technology advances, whether in communications, computers or medicine. Its extensive use in “green” technologies, such as solar cells, wind power, water-heating panels and electric vehicles, ensures that copper will continue to play a key role in our sustainable future.

World copper production over the period 1992 to the present, and projected through to 2030, is presented on Figure 1.4-4. Over this period, copper consumption has increased from about 12 M tonnes to about 24.4 M tonnes. Mine supply in 2019 was about 20.5 M tonnes, with the remaining supply mostly made up from recycling (International Copper Study Group, 2020). Much of this increase has been the result of an explosion in demand for electronics and the development of significant middle classes in countries such as China, India and Indonesia (and with that, household electricity, internet, refrigeration, automobiles and other appliances).



Source: Precious Metals Commodity Management LLC, 2020

Figure 1.4-4: Historical and Projected Worldwide Copper Production and Deficit

Although few people dispute that electric cars will continue to increase their market share relative to ICE vehicles, the industry faces a number of hurdles, one of which is the lack of worldwide mine capacity to provide a number of metals critical to electric cars: nickel, copper, cobalt and lithium. A typical ICE automobile uses about 20 kg of copper, while an electric car can require 80 kg. One hundred percent adoption of electric vehicles worldwide would require a 25% increase in world copper production (Precious Metal Commodity Management LLC, 2020), which would be very difficult for the industry to achieve given that copper production is expected to decline over the next decade due to mine exhaustion and lack of new mine development. It can frequently take 10 years or more to explore, design, permit and construct a new mine. Another constraint holding back the complete electrification of the auto fleet is that the power grids in most countries will have to be expanded to accommodate a wide roll-out of electric cars. Glencore, an international mining, smelting and commodity trading company, estimated that world copper stocks will have to increase two and a half times by 2050, mainly due to use in electronics and electric cars (Financial Times, 2019).

1.4.1.4 Changing Silver Market

Silver is expected to make up a minor component of metal production from the Project. Most silver has long been used in jewelry, investment and industrial uses. In more recent years approximately 10% of the world's silver has been consumed in solar panels. As solar power increases in demand, some analysts conclude silver supplies will not be adequate to meet demand (Precious Metal Commodity Management LLC, 2020).

1.4.1.5 Automobile Production in Canada

Canada is currently the ninth-largest auto-producing nation in the world, and fourth largest auto exporter by value, producing 2.4 M vehicles and exporting $48.8 billion worth of vehicles in 2016. Automotive manufacturing is one of Canada's largest industrial sectors, accounting for 10% of manufacturing GDP and 23% of manufacturing trade. Canada produces passenger vehicles, trucks and buses, auto parts and systems, truck bodies and trailers, as well as tires. The auto industry directly employs more than 125,000 people in vehicle assembly and auto parts manufacturing, and another 380,000 in distribution and aftermarket sales and service.

These automobiles need a wide variety of metals, many of which will be produced by the Project. While these metals can currently be sourced internationally, potential future issues, such as sanctions, military conflicts, trade disputes, export taxes and other unknown factors, could materially disrupt supply of these metals.

1.4.1.6 The Mining Sector in Canada and Ontario

Canada is known worldwide as one of the safest jurisdictions in the mining industry. It is considered safe in terms of protecting the environment, worker safety, property security, employee rights, fair wages and more recently, Indigenous relations. Countries and companies from around the world come to Canada to learn how Canadians do things in mining.

1.4.1.6.1 Mining in Canada

In 2018, Canada's mining industry contributed $97 billion, or 5%, to Canada's total nominal GDP. The industry's direct and indirect employment exceeds 620,000 jobs, accounting for one in every 30 jobs in Canada. Proportionally, the mining industry is the largest private sector employer of Indigenous peoples, providing over 16,600 jobs to community members in 2018. Richly endowed with natural resources, Canada ranks among the top five countries in the global production of 15 minerals and metals, many of which are integral to the low carbon technology needed for a greener future. Valued at $105 billion in 2018, mineral exports accounted for 19% of Canada's total domestic exports. According to the Natural Resource Governance Institute, in 2018, extractive sector companies reported payments of more than $10.4 billion to Canadian governments (Mining Association of Canada, 2019).

1.4.1.6.2 Mining in Ontario

Mining is a key contributor to Ontario's economy. Though the number fluctuates with commodity price changes, mining in Ontario produces revenues of around $10 billion per year. Ultimately, Ontario's mineral production, including indirect and induced impacts, provides for more than $12 billion in Canadian GDP and creates 78,800 jobs.

The impact of mining goes beyond mineral extraction and processing. Mining is linked to many other industries and sectors in the economy, including transportation, construction, equipment manufacturing,

environmental management, geological services, education and research, among others. Mining is also the largest private sector employer of Indigenous Peoples. The industry provides a major boost to the financial sector; the Toronto Stock Exchange (TSX) is the leading global mining exchange, listing more of the world's public mining companies and raising more mining equity capital than any other exchange (Ontario Mining Association, 2020).

The provincial government has recognized the importance of the mining industry, specifically in the north, in its Growth Plan for Northern Ontario (2011). The 25-year Plan guides provincial decision-making and investment now and in the future and aims to strengthen the economy of Northern Ontario by:

- diversifying the region's traditional resource-based industries
- stimulating new investment and entrepreneurship
- nurturing new and emerging sectors with high growth potential

The Plan's policies are built upon six themes that each contribute to the region’s long-term sustainability and prosperity: economy, people, communities, aboriginal peoples, infrastructure and environment.

The Plan specifically identifies the minerals sector and mining supply and services as a priority economic sector. As such, efforts by the Province, industry and, where appropriate, other partners, to grow and diversify the minerals and mining supply and services sectors are recommended to include:

- marketing that showcases Ontario as a global leader in environmentally sustainable mineral development and stewardship
- creating new value-added resource sector opportunities through research, development and application of advanced processing and manufacturing technologies
- expanding the mining supply and services industry, increasing exports, and supporting particular areas of competitive advantage including deep mining techniques and clean technologies
- improving timeliness and clarity in regulatory processes, supported by a one-window, coordinated process for approvals
- expanding geoscience mapping and data collection and public access to resource information to expedite the discovery and development of new minerals and other resources
- investing in research and innovation that improves the efficiency of industry operations, with an emphasis on extraction and exploration technologies, environmental technologies, and mine closure and rehabilitation processes
- enabling new mining opportunities
- facilitating partnerships among communities and industry to optimize community employment and benefits
- facilitating the entry of new participants and entrepreneurs, including Indigenous businesses, co-operatives and commercial developers

1.4.1.7 Generation PGM and the Marathon Palladium Project

GenPGM identified the Project for several reasons as outlined above. The acquisition of the Project was consistent with GenPGM's corporate objectives for growth and consistent with its priority for focusing on potential opportunities in stable geopolitical environments, in particular North America, that have a mature and well-serviced mineral development sector.

Based on an evaluation of available information, GenPGM came to the conclusion that, from their perspective, there was a "need or rationale" to move forward with the Project and therefore has done so.

1.4.2 Overall Purpose of the Project

The purpose of the Project from the proponent's perspective is:

> *To fill a business opportunity, consistent with Generation Mining's overall corporate strategy, through the development of resources containing metals needed for improving the world's environment, in a timely manner and in a stable jurisdiction, and that brings economic benefits to local and regional communities and First Nations and Métis, while having no significant long-term adverse effects on the natural and socio-economic environments.*

A description of each project phase, component and activity is described in Section 1.5 of this report.

1.4.3 Purpose of Project-Related Activities and Facilities

The Project will be implemented in phases and will involve various Project-related facilities, each with its own specific purpose or objective. The three principal phases of the Project include:

- Phase I - Site Preparation and Construction: to prepare the Project site for subsequent construction and build the physical infrastructure and associated structures necessary to bring the proposed mine into production
- Phase II – Operations: to extract and process selected minerals from the ore body
- Phase III – Decommissioning and Post-Closure: to reclaim land within the Project footprint to permit future use by resident biota and for traditional and other land-use activities

A further description of these phases, and the project components and activities anticipated in each, is provided in Section 1.5 of this report.

A number of key Project components (largely facilities or physical structures) will be constructed as part of the Project. A list of the key major facilities and a description of their purpose are identified in Table 1.4-1, with further details describing each component of the Project provided in Sections 1.5.4 and 1.5.5 of this report.

Table 1.4-1: Major Project Infrastructure for Mining Operations

Facility	Purpose
Open Pits	Areas from which the PGM-copper ore is excavated
Ore Stockpile	Area to provide a storage area for ore that is to be processed in the Process Plant
Crusher	Facility to reduce the large pieces of rock excavated from the open pits to a size that can be sent to the Process Plant
Mine Rock Storage Area (MRSA)	Area to provide a location in which mine rock, which is 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
Process Plant	Facility to generate a marketable mineral product (i.e., a concentrate) from crushed ore
Process Solids Management Facility (PSMF)	Facility to store the non-marketable solids generated following the extraction of the economic minerals from the ore
Water Management System	System to collect and manage contact water at the site, including water from the open pits, MRSA, PSMF, and SWM Pond
Water Treatment Plant	Facility to remove contaminants of concern to meet applicable water quality criteria
Explosives Magazine and SME Facility	Facilities to store boosters, detonators and site mix emulsion (SME) products used to blast (fragment) ore and mine rock in the open pits
Aggregate Plant	Facility to reduce excavated mine rock into aggregate material for construction of site facilities and to support operating activities
Site Access Road	Road to provide safe and direct access between the Project site and public road network
Transmission Line	Infrastructure to provide electrical power to the Project site from the existing power grid
Ancillary Structures and Facilities	Other facilities and structures required to support mining and ore processing activities
Concentrate Rail Load-Out Facility	To facilitate the shipment of concentrate to a third-party mineral processor

While not an exhaustive list of project components, this list identifies and describes the purpose of the key areas, facilities and structures proposed as part of the Project for the extraction and processing of the ore body.

1.5 PROJECT DESCRIPTION

Section 1.4.3 of the original EIS (2012) described the Project based on the conceptual mine design and associated infrastructure and activities. Further details regarding the Project components were provided in responses to the various IRs.

Based on refinements made to the preliminary design of the Project, this section provides an updated description of the Project components and activities proposed by GenPGM for use in assessing the potential environmental effects of the Project. Further details about individual components of the Project

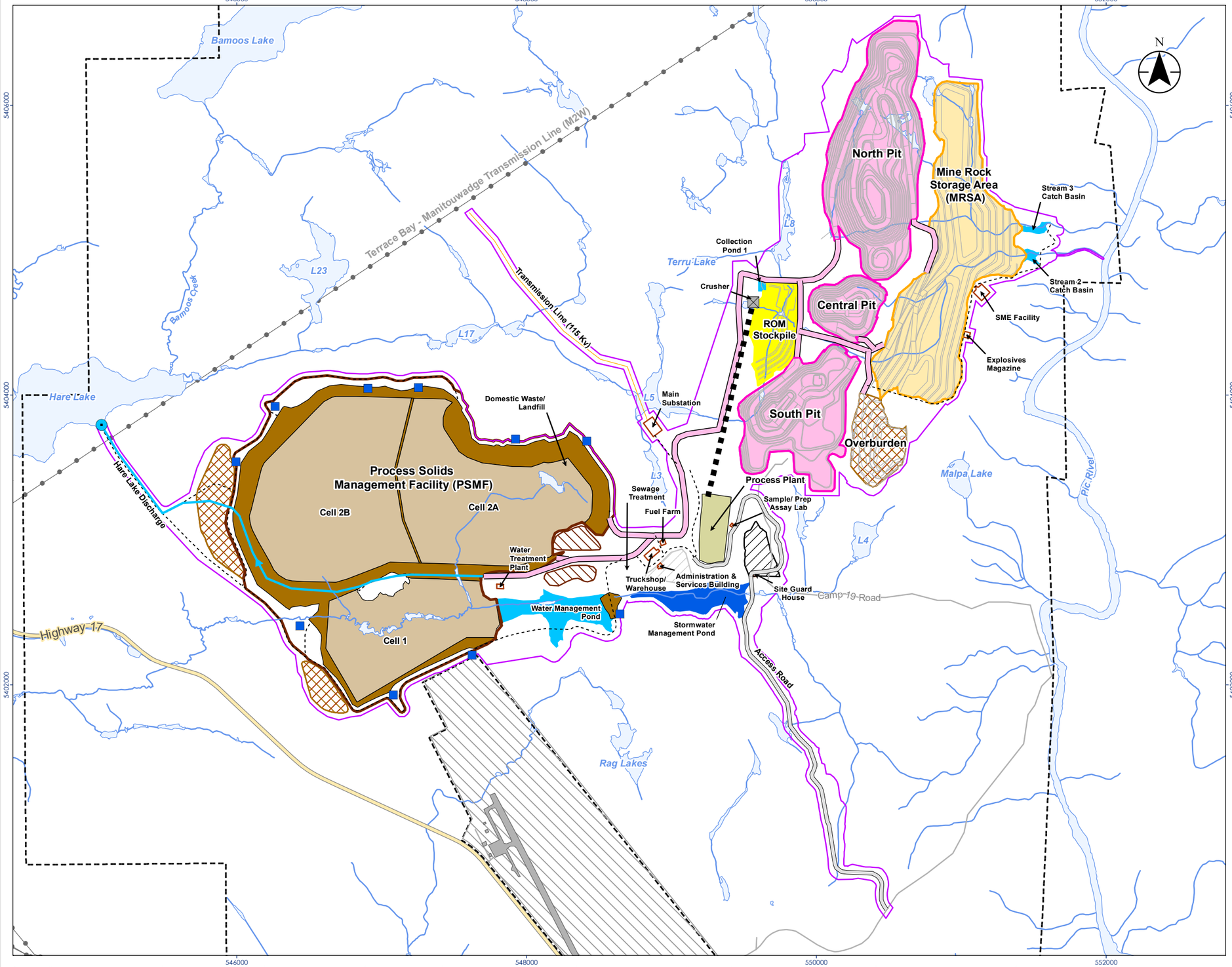
will be refined following completion of the feasibility study and as the Project progresses through detailed design following EA approval in concordance with the concepts presented herein.

Modifications to the design of the mine site reflect advancements in mining practice, improved operational efficiencies, refinements to work areas to better fit with the surrounding terrain, and efforts to reduce and contain the spatial extent of potential effects. Notable modifications to the design and rationale for the proposed refinements are discussed in Section 1.6 of this report.

1.5.1 Overview

The Project is based on the development of an open pit mining and milling operation located approximately 10 km north of the Town of Marathon, Ontario. The general layout of the components of the Project, including the mining operations, the transmission line corridor and access road, is provided in a refined version of the Site Plan (Figure 1.5-1).

Three open pits (i.e. North, Central and South) are proposed to be mined. Ore will be extracted from the pits and processed (crushed, ground, concentrated) at an on-site processing facility (Process Plant). Ore will be transported from the pits to the Process Plant via haul trucks and a conveyor system. A series of internal roads will be established to facilitate the movement of mine rock and other materials around the site. Final concentrates will be moved from the mine site to an off-site third-party facility for subsequent metal extraction and separation.



Stantec

Legend

- Site Study Area Boundary
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Hydro Line
- Watercourse
- Airport (Property Boundary)
- Airport Infrastructure
- Waterbody

Proposed Project Components

- Crusher
- Discharge Location
- Seepage Collection Basin
- Access Road
- Conveyor
- Discharge Line
- Haul Road
- Site Road
- Transmission Line (115 Kv)
- **Aggregate Site** (Aggregate Plant, Concrete Batch Plant, Diesel Generator)
- Building/ Facility Footprint
- Stormwater Management Pond
- Laydown Area
- Mine Rock Storage Area (MRSA)
- Open Pit
- Overburden Stockpile
- Process Soilds Manadement Facility (PSMF)
- PSMF Cell
- PSMF Embankment
- **Process Plant Area** (Bulk Reagent Storage, Live Ore Stockpile, Process Plant, Propane Storage Area, Concentrate Storage Building, Diesel Generators)
- ROM Stockpile
- Soil Stockpile
- Water Management Pond

0 0.5 1 km

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

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Mine plan as illustrated on this drawing is approximate and for illustrative purposes. Design details were provided by G Mining and Knight Piesold.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2021-01-05

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
1.5-1

Title
General Site Layout

1.5.2 Project Phases

The timing of activities and installation of Project components will occur in sequence to allow for the efficient extraction of materials. The Project will be implemented in three phases, as follows:

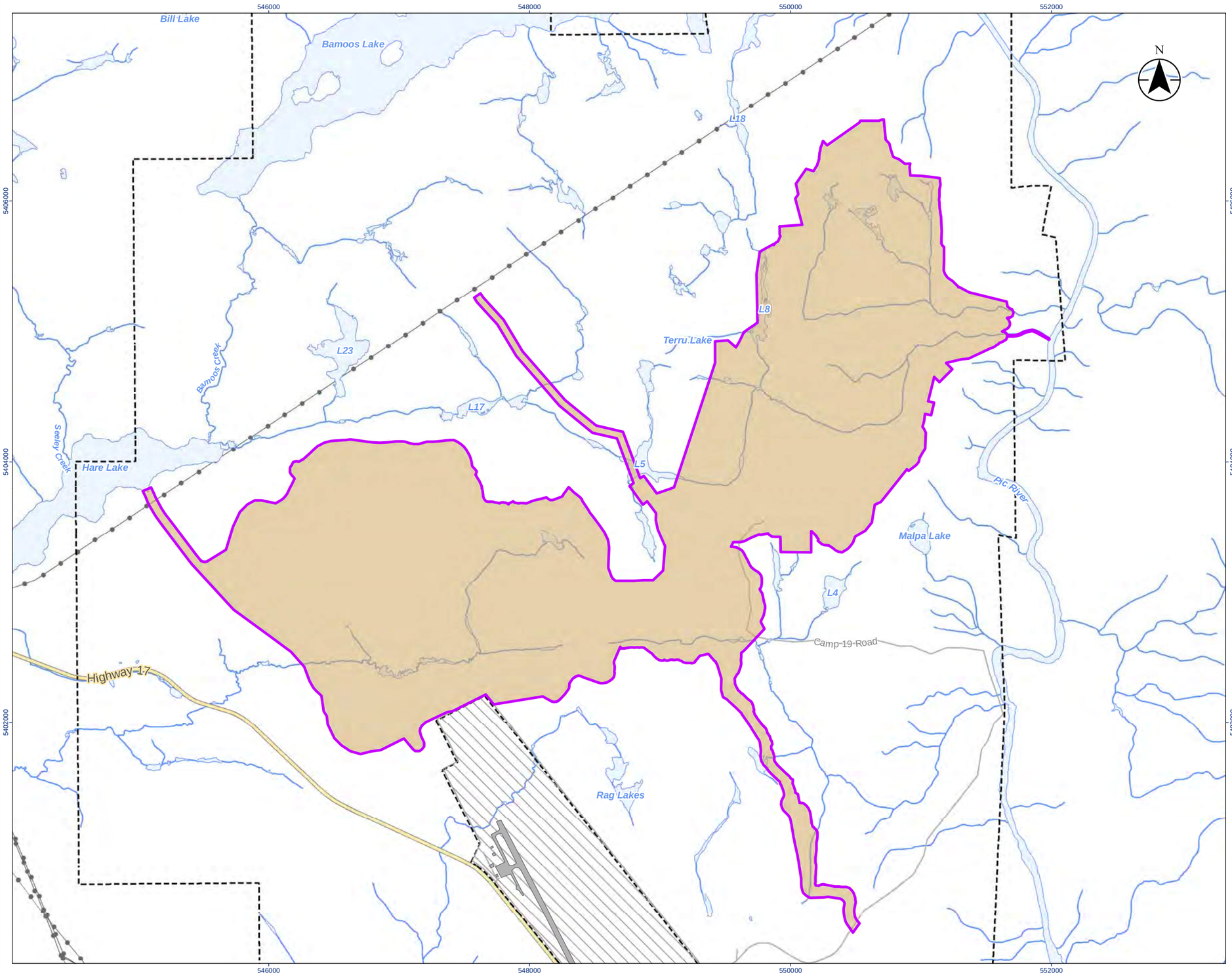
- Phase I – Site Preparation and Construction
- Phase II – Operations
- Phase III – Decommissioning and Closure

The phasing of Project activities is generally consistent with the project phases described in the original EIS (2012), although the site preparation and construction activities have been grouped together in this EIS Addendum since many of these activities may occur simultaneously. The primary activities associated with each of the phases are described below.

1.5.2.1 Phase I - Site Preparation and Construction

In order to bring the mine into operation and production, a number of activities are necessary to prepare the Project site. The commencement of Phase 1 is the site preparation, which consists of the following key activities: clearing, grubbing and stripping; grading; drilling and blasting; excavating; development of the road network (including potential upgrades to the Highway 17 and Camp 19 Road intersection); development of the electrical power transmission corridor; preparation of construction surfaces; installation of concrete batch plant; development of the MRSA; water management system; development of the PSMF; waste management; and environmental management and monitoring.

The approximate footprint of the areas that will be developed (cleared) to accommodate the mine and related infrastructure is shown on Figure 1.5-2. There may be areas within this footprint where vegetation may not be removed (i.e, buffer surrounding Lake L-8); however, for the purposes of the assessment, it has been assumed that the full extent of the SSA will be cleared.



Stantec

Legend

- Site Study Area
- Approximate Area to be Cleared to Accomodate Site Development[3]
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Hydro Line
- Watercourse
- Airport (Property Boundary)
- Airport Infrastructure
- Waterbody

0 0.5 1 km

1:30,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. There may be areas within this footprint where vegetation may not be removed (i.e, buffer surrounding Lake L-8); however, for the purposes of the assessment, it has been assumed that the full extent of the SSA will be cleared.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2021-01-04

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
1.5-2

Title
Approximate Area to be Cleared to Accomodate Site Development

As Phase 1 progresses, the focus then turns from site preparation to constructing the buildings and facilities necessary to bring the proposed mine into production. All of the site infrastructure necessary to operate the mine will be completed and commissioned by the end of this phase.

The site preparation and construction activities were described in the original EIS (2012) and are summarized in Table 1.5-1. Further details on the key mine buildings and facilities are described in Section 1.5.4 of this report, with information on key maintenance, administration and on-site support facilities described in Section 1.5.5 of this report. Additional key off-site support infrastructure is described in Section 1.5.6 of this report.

Site preparation and construction is estimated to be completed over an 18 to 24 month period. The work schedule will likely vary over this period according to the nature of the work that is being completed at any one time but work will largely progress 7 days per week, with two shifts per day. It is estimated that as many as 90 passenger vehicles will be entering the mine site for the day shift and 60 will enter the mine site for the night shift. The majority of the traffic will be workers travelling to and from the site at the start and end of their shifts, with some general freight and equipment transport vehicles accessing the site throughout the day. Most of the truck traffic will be restricted to Highway 17 and the Camp 19 Road.

Power during construction will be provided by diesel generators (see Section 1.5.4.12) and/or a power distribution line may be connected to the existing powerline located along the Camp 19 road to support site preparation and construction activities until such time as the 115 kV electrical transmission line is completed.

Waste generated on-site during this phase will be managed as described in Table 1.5-1.

The initital work force during site preparation and construction will average approximately 450 to 550 workers. A temporary construction camp, operated by a third-party, will be built to accommodate the workforce during the site preparation and construction phase of the project. Additional accommodations such as local hotels and rental accommodations may be used to house workers during this phase. The location of the construction camp has not been confirmed, but it is anticipated to be within the vicinity of the Project and the Town of Marathon.

Table 1.5-1: Summary of Key Site Preparation and Construction Phase Activities

Activity	Description
Clearing	Clearing consists of the removal and disposal of vegetation such as trees, brush, shrubs and other foliage. Trees will be felled, skidded and piled in the cut area Timber on site falls within the Pic Forest and is currently managed under Nawiinginokiima Forest Management Corporation. Merchantable timber from these areas will be salvaged and marketed, assuming market conditions permit. Unsalvageable cuttings may be disposed of by chipping and piling, and other beneficial uses of slash and non-merchantable timber may be investigated. Clearing will occur to facilitate development of the open pits, Process Plant area, MRSA, PSMF, roads, explosives manufacturing and storage facilities and transmission line corridor.
Grubbing	Grubbing is the removal of roots, stumps, embedded logs and debris. Stumps may be removed with machinery and/or heavy equipment. To the extent possible grub material will be stockpiled with the overburden and subsequently used as biomass following construction to restore disturbed areas. No grubbing is expected within the area along the transmission line corridor that is outside the footprint of other site infrastructure.
Stripping	Stripping involves the removal of topsoil and other organic materials. To the extent possible, the topsoil stripped and will 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. No stripping is expected for roads or the transmission line corridor.
Grading	Grading involves the removal and placement of overburden, which will be accomplished using a bulldozer, excavator or scraper. Graded material will be stored temporarily in one of the previously cleared areas. If suitable for reuse, the excavated materials will be placed in areas requiring fill (i.e., during road and plant site construction). If not suitable for reuse, due to permeability or high moisture content, the material may be placed in an overburden stockpile for reclamation purposes.
Drilling and blasting	Drilling and blasting will occur in order to develop the open pits and to prepare the Process Plant Area. Blasting will also be required for road and dam construction. Blast holes will be drilled using conventional drills. Explosives will range from pre-packaged design to ammonium-nitrate fuel oil (ANFO) and/or site mixed emulsion (SME) explosive based products for large blasts.
Excavating and pre-stripping	During the first years of site development, mine rock will be excavated from the open pits and surrounding area in preparation for of the commencement of mining operations. Hydraulic shovels or front-end loaders will be used to load excavated rock onto haul trucks. This rock will be hauled for immediate use in infrastructure development or temporarily stored in one of the previously cleared areas. Type 1 mine rock will be used for dam and road construction, and/or pads and other infrastructure-related development. A crusher will be used to reduce mine rock to aggregate of various sizes for use in construction. Any Type 2 material that is identified via testing in the Assay Lab will be segregated in a dedicated area adjacent to the pits for temporary management of Type 2 material so that its drainage will be contained and managed, as required.
Development of the site road network	Although improvements have already been made at Highway 17 and Camp 19 intersection, additional improvements maybe necessary at this intersection (see Section 1.5.4.11). A new site access road will be constructed and the site road network will be developed. The new site access road will join the Camp 19 Road via an old cut line and will extend to the Process Plant (see Section 1.5.4.11). The site road network will link site facilities to accommodate the movement of mine rock, process solids, employees around the site.

Table 1.5-1: Summary of Key Site Preparation and Construction Phase Activities

Activity	Description
Development of the electrical transmission corridor	A new 115 kV overhead transmission line will be constructed to link the M2W Line to the site. An approximate 30 m wide corridor will be developed. The corridor is shown on Figure 1.5-1. More information pertaining to the new 115 kV overhead transmission line is provided in Section 1.5.4.12 of this report.
Preparation of construction surfaces	Reclaimed graded material, as well as fill obtained from the existing aggregate pit or mine rock that is crushed and screened, will be hauled and consolidated at construction locations to establish building surfaces. Temporary construction support facilities, such as a construction office, laydown areas and temporary maintenance shop, will be constructed onsite within the proposed aggregate site to service machinery used during the site preparation and construction phase.
Concrete batch plant	The Concrete Batch Plant will be located in a separate area to the east of the Process Plant at the Aggregate Site. The Concrete Batch Plant will produce concrete to build infrastructure during the site preparation and construction phases and will be decommissioned thereafter.
Development of the MRSA	The basic infrastructure of the MRSA will be developed during the early stages of Phase I so that the area is ready to begin accepting material at the onset of operations. Most of the Type 1 mine rock generated through excavating and pre-stripping will be used to construct roads, laydown areas and pads for infrastructure. Any Type 2 rock identified via testing in an Assay Lab during this Phase will be stockpiled in an area adjacent to the pits so that runoff from this material will be contained and managed, as required, and will be relocated to PSMF once it can begin accepting material. More information pertaining to the MRSA is provided in Section 1.5.4.5 of this report.
Water Management System	The basic infrastructure of the water management system will be developed during the early stages of Phase I so that runoff from disturbed areas can be appropriately managed. More information pertaining to the Water Management System is provided in Section 1.5.4.8 of this report.
Development of the PSMF	The basic infrastructure of the PSMF will be developed during the early stages of Phase I so that the area is ready to begin accepting material at the onset of operations. More information pertaining to the PSMF is provided in Section 1.5.4.6 of this report.
Waste management	Most waste generated during this phase will be recyclable. Scrap metal, wood, paper and cardboard, where not reusable, will be segregated and trucked off-site to appropriate facilities. Solid non-hazardous wastes generated will be collected in temporary collection areas (areas that have been disturbed by clearing) and subsequently trucked off site to a licensed disposal site. Hazardous waste will be collected, stored on site temporarily as appropriate and trucked off-site to appropriate licensed facilities. Grey water and sewage from temporary bathroom facilities will be collected in above ground storage containers. These biological wastes will be transported by a provincially licenced company to an approved facility.
Construction and installation of Mine Infrastructure	Other components of the mine site will be installed and / or constructed during this phase of the Project to support the operating mine, including, but not limited to, the crusher, conveyor system, processing facilities, maintenance and administration buildings, and other on-site supporting infrastructure. Mine equipment will also be mobilized to the site. More information pertaining to the mine infrastructure is provided in Sections 1.5.4 and 1.5.5 of this report.

1.5.2.2 Phase II - Operations

The operations phase includes the production of copper, PGM and other concentrates through extraction and processing of selected minerals from the ore body. Process Plant throughput during operations will average 25,200 tonnes per day. The operating life of the mine is estimated to be 12.7 years.

The operations phase will be a 7-day per week operation, which will include two shifts per day. It is estimated that 90 passenger vehicles will be entering the mine site for the day shift and 60 passenger vehicles will enter the mine site for the night shift. The majority of the traffic will be workers travelling to and from the site at the start and end of their shifts, with some general freight and equipment transport vehicles accessing the site throughout the day. The passenger vehicle and freight traffic will be primarily restricted to Highway 17 and Camp 19 Road. The shift changes will likely occur during periods of the day that are outside of the regular work or school days, early in the morning or later in the evening so any increase in traffic in Marathon may not be apparent to the residents. Although employees may drive their personal vehicles to the communities, the contractors or employer will provide a crew bus, where appropriate to the mine site.

During operations, the work force will comprise approximately 375 workers. The Accommodations Complex (see Section 1.5.6.1) will continue to house the portion of the workforce that is not derived from the local/regional catchment (estimated to be equivalent to about a 100 km one way commute).

Key mine components and/or activities associated with the Project are listed below and described further in Section 1.5.4:

- open pits
- ore handling
- Process Plant
- concentrate handling, storage, and transport
- mine rock management
- process solids management
- water supply
- water management
- water discharge and treatment plants
- pipelines
- site road network and access
- power supply and distribution
- explosives storage and production
- aggregate supply

- waste management

Key maintenance, administration and on-site support facilities are listed below and described in Section 1.5.5:

- fuel farm
- truck shop and warehouse
- aggregate plant
- bulk reagent storage and hazmat building
- assay lab
- administration and services building
- propane storage area
- concentrate storage building

Additional off-site support infrastructure that may or may not be proposed as part of the Project, which for the purposes of the effects assessment have been included, are listed below and are described in Section 1.5.6:

- a concentrate handling and rail-load facility
- assay lab
- an employee Accommodations Complex

1.5.2.3 Phase III - Decommissioning and Closure

Conceptually, the closure phase includes activities that are designed to reclaim land within the Project footprint to permit future use by resident biota and for traditional and other land-use activities, which includes decommissioning and closure of the Project site in a manner that reduces the potential impacts on the social and natural environment and, to the extent possible, returns the site to an end use that is supported by Indigenous peoples, the public and government.

The timetable for closure of the site includes contingency for both short-term and long-term activities.

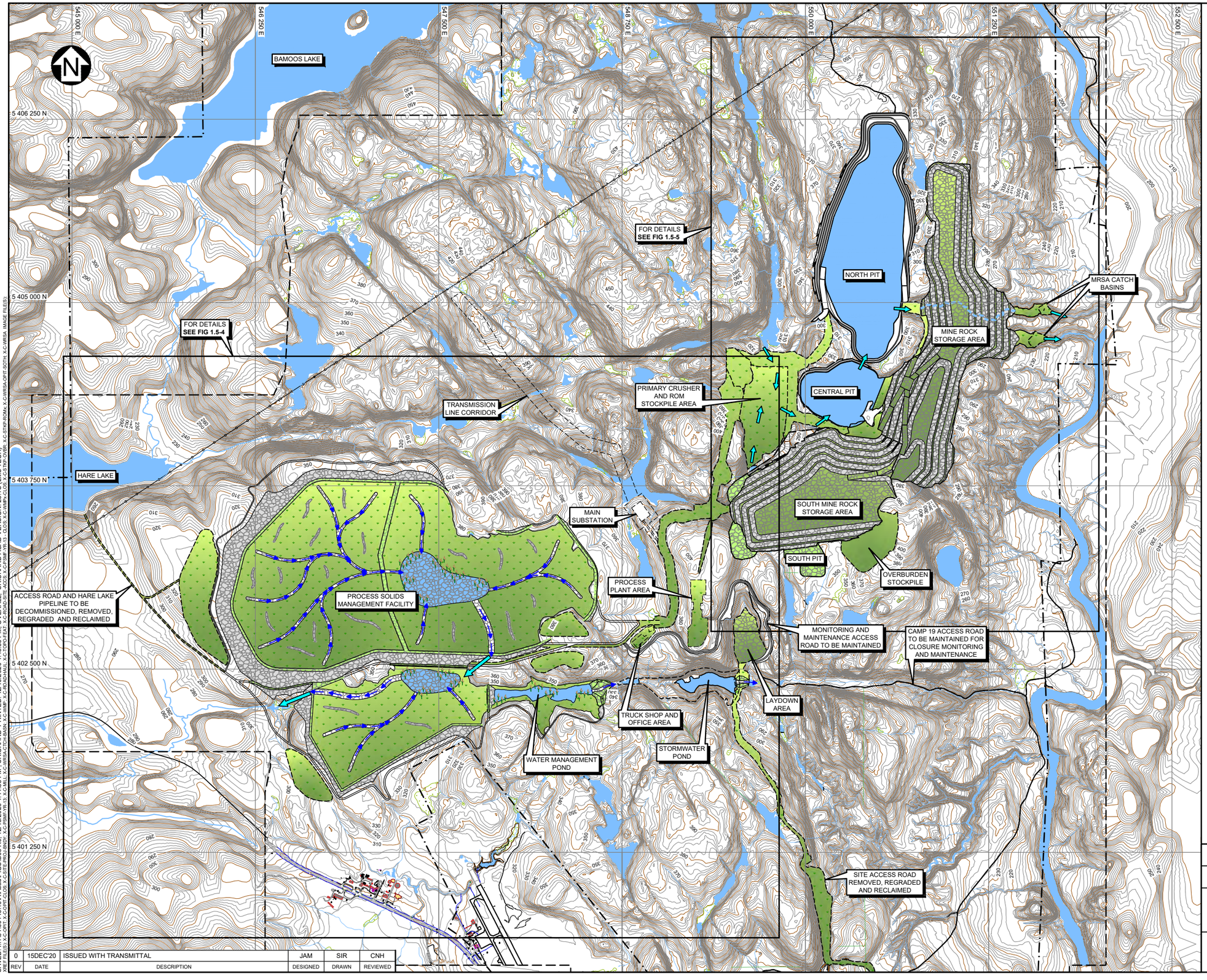
While the site will be reclaimed on an on-going basis to the extent practical during all previous phases, the most intense period of decommissioning of site infrastructure will occur immediately following the cessation of operations. At this time, as much of the site infrastructure will be removed as possible, while still providing sufficient resources to engage in ongoing closure and post-closure activities. The specific activities that will 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 surface into the pits for permanent storage
- regrading and stabilization of any stockpiles that are left on surface for the long term
- reclamation of the PSMF, MRSA, Process Plant area and other developed areas

Comments on specific elements of the closure activities listed above are provided below.

A combination of approaches are planned to be used to rehabilitate the open pits. The South and Central pits that have been utilized for mine rock storage or for process solids storage will be capped with Type 1 mine rock cover. Stream channels and fish habitat will be created in the SWM Pond and the PSMF Water Management Pond (WMP) areas that will be configured and flooded. New drainage channels will be established so that water will drain from the South and Central Pits into the North Pit. An outlet stream will be created on the eastern side of the North Pit to drain into Subwatershed 103. The North Pit will take many years to fill completely and, therefore, precautions will be taken to prevent inadvertent access to the pit. To this end, a boulder barrier or fencing will be constructed around the perimeter of the North Pit and warning signs will be posted. In the long-term, the North Pit will overflow in a planned and predicted manner, in its northeast corner with water draining into Subwatershed 103 and eventually into the Pic River (Figure 1.5-3, Figure 1.5-4, and Figure 1.5-5). The closure of the PSMF will include re-grading and the creation of channels to restore the natural drainage patterns in Subwatershed 106 and revegetation.



LEGEND:

- WATER
- WETLAND
- RECLAIMED ROCKFILL (CREST AND BENCHES)
- ROCKFILL SLOPE
- RECLAIMED AREA
- PROJECT BOUNDARY
- LIMIT OF DETAILED TOPOGRAPHY
- CLOSURE WATER FLOW DIRECTION
- ROCKFILL WIND BREAK
- CLOSURE SWALE AND WATER FLOW DIRECTION
- ACCESS ROAD - MAINTAINED
- ACCESS ROAD - RECLAIMED

NOTES:

1. COORDINATE GRID IS UTM (NAD27) ZONE 16 N AND IS IN METRES.
2. CONTOUR INTERVAL IS 2 METRES. DETAILED TOPOGRAPHY BASED ON NORDMIN PROJECT BASEMAP (JULY 4, 2011). REGIONAL CONTOURS ARE BASED ON LAND INFORMATION ONTARIO (OCTOBER, 2011).
3. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
4. SITE STUDY AREA PROVIDED BY STANTEC (NOVEMBER 26, 2020).

FOR INFORMATION ONLY

SCALE A: 250 125 0 250 500 750 1000 1250 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	15DEC'20	ISSUED WITH TRANSMITTAL	JAM	SIR	CNH

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

CONCEPTUAL CLOSURE PLAN

Knight Piésold CONSULTING

P/A NO. NB101-446/10 | REF NO. NB20-01081

FIGURE 1.5-3 | REV 0

5 404 500 N
5 403 750 N
5 403 000 N
5 402 250 N
5 401 500 N
545 250 E
546 000 E
546 750 E
547 500 E
548 250 E
549 000 E
549 750 E

PRIMARY CRUSHER TO BE REMOVED, REGRADED, AND RECLAIMED
WATER COURSE WITHIN ROM STOCKPILE AREA TO BE RESTORED
TRANSMISSION LINE TO BE DECOMMISSIONED AND REMOVED
ROM STOCKPILE TO BE REMOVED, REGRADED, AND RECLAIMED
DRAINAGE CHANNELS TO BE LINED WITH MINE ROCK FOR EROSION PROTECTION AND TO PROMOTE INFILTRATION
CLOSURE SWALE
WETLAND AREA TO BE LINED WITH MINE ROCK TO PROMOTE INFILTRATION
SOUTH MINE ROCK STORAGE AREA
MAIN SUBSTATION TO BE DECOMMISSIONED AND REMOVED
SURFACE SOIL STOCKPILE TO BE REMOVED AT CLOSURE AND RECLAIMED
HAUL ROAD REMOVED AND RECLAIMED
CELL 2A
PROCESS PLANT AREA
WETLAND AREA TO BE ESTABLISHED
ACCESS ROADS TO BE MAINTAINED
CELL 2B
SURFACE SOIL STOCKPILE TO BE REMOVED AT CLOSURE AND RECLAIMED
MONITORING AND MAINTENANCE ACCESS ROAD TO BE MAINTAINED
ACCESS ROAD AND HARE LAKE PIPELINE TO BE DECOMMISSIONED, REMOVED, REGRADED AND RECLAIMED
ROCKFILL WIND BREAK
LAYDOWN AREA
CLOSURE SWALE
TRUCK SHOP AND OFFICE AREA
WETLAND AREA TO BE ESTABLISHED
ACCESS ROAD TO BE MAINTAINED, WIDTH TO BE REDUCED
WATER BODY TO BE ESTABLISHED IN STORM WATER MANAGEMENT POND AREA
WATER BODY TO BE ESTABLISHED IN WATER MANAGEMENT POND AREA
CELL 1
WETLAND AREA TO BE LINED WITH MINE ROCK TO PROMOTE INFILTRATION
DRAINAGE TO STREAM 6 TO BE ESTABLISHED VIA CLOSURE SWALE
ACCESS ROADS TO BE MAINTAINED FOR MONITORING AND MAINTENANCE
SITE ACCESS ROAD TO BE REMOVED, REGRADED AND RECLAIMED
SURFACE SOIL STOCKPILE TO BE REMOVED AT CLOSURE AND RECLAIMED

LEGEND:

- WATER
- WETLAND
- RECLAIMED ROCKFILL (CREST AND BENCHES)
- ROCKFILL SLOPE
- RECLAIMED AREA
- PROJECT BOUNDARY
- LIMIT OF DETAILED TOPOGRAPHY
- CLOSURE WATER FLOW DIRECTION
- ROCKFILL WIND BREAK
- CLOSURE SWALE AND WATER FLOW DIRECTION
- ACCESS ROAD - MAINTAINED
- ACCESS ROAD - RECLAIMED

NOTES:

1. COORDINATE GRID IS UTM (NAD27) ZONE 16 N AND IS IN METRES.
2. CONTOUR INTERVAL IS 2 METRES. DETAILED TOPOGRAPHY BASED ON NORDMIN PROJECT BASEMAP (JULY 4, 2011). REGIONAL CONTOURS ARE BASED ON LAND INFORMATION ONTARIO (OCTOBER, 2011).
3. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
4. SITE STUDY AREA PROVIDED BY STANTEC (NOVEMBER 26, 2020).

FOR INFORMATION ONLY

SCALE A: 150 75 0 250 500 750 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	15DEC'20	ISSUED WITH TRANSMITTAL	JAM	SIR	CNH

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

PSMF AND PLANT SITE CONCEPTUAL CLOSURE PLAN

Knight Piésold CONSULTING

P/A NO. NB101-446/10 | REF NO. NB20-01081

FIGURE 1.5-4 | REV 0

SAVED: I:\1101\044\610\A\acad\FIGS\B03 R0, 12/15/2020 10:40:12 AM, SRICHARD, PRINTED: 12/15/2020 10:57:56 AM, PSMF, SRICHARD ACAD VERSION: 23.1S (LMS TECH)
XREF FILE(S): XC-OPIT-CLOS, XC-SITE-PROJ-BNDY, XC-PSMF-YR-13, XC-MILL, XC-WRSA-CTCH-BASIN, XC-WMP, XC-RD-HAUL, XC-TOPO-FEAT, XC-ROAD-SITE-ACCS, XC-PSMF-YR-13, CLOS, XC-WMP-CLOS, XC-SITE-PROJ-BNDY, XC-PSMF-YR-13, XC-MILL, XC-WRSA-CTCH-BASIN, XC-WMP, XC-RD-HAUL, XC-TOPO-FEAT, XC-ROAD-SITE-ACCS, XC-PSMF-YR-13, CLOS, XC-WMP-CLOS, XC-OPIT, XC-OPIT-CLOS, XC-SITE-PROJ-BNDY, XC-PSMF-YR-13, XC-OVBR, XC-STKP-ROMx, XC-CWRSA-OPIT-SOTH, XC-WRSA, IMAGE FILE(S):

SAVED: I:\1\01\00446\10\A\Acad\FIGS\B03 R0, 12/15/2020 10:40:12 AM , SRICHARD PRINTED: 12/15/2020 10:59:26 AM, MRSA, SRICHARD ACAD VERSION: 23.1S (LMS TECH) ACAD VERSION: 23.1S (LMS TECH)
XREF FILE(S): X-C-OPIT; X-C-OPIT-CLOS; X-C-SITE-PROJ-BNDY; X-C-PSMF-YR-13; X-C-MILL; X-C-WRSA-CTCH-BASN; X-C-WMP; X-C-ROAD-HAUL; X-C-TOPO-FEAT; X-C-ROAD-SITE-ACCS; X-C-PSMF-YR-13 - CLOS; X-C-WMPx-CLOS; X-C-STKP-OVBR; X-C-STKP-ROMx; X-C-WRSA-OPIT-SOTH; X-C-WRSA IMAGE FILE(S):

549 500 E
550 000 E
550 500 E
551 000 E
551 500 E
5 406 500 N
5 406 000 N
5 405 500 N
5 405 000 N
5 404 500 N
5 404 000 N
5 403 500 N
5 403 000 N

NORTH PIT (WATER EL. 262 m)
HAUL ROAD REMOVED, REGRADED, AND RECLAIMED
PRIMARY CRUSHER TO BE REMOVED, REGRAGED, AND RECLAIMED
DROP STRUCTURE BETWEEN CENTRAL PIT AND SOUTH PIT (EL. 271 m)
MINE ROCK STORAGE AREA
MRSA CATCH BASINS TO BE BREACHED, REGRADED AND RECLAMED. LOCAL STREAM BED TO BE RESTORED
CENTRAL PIT (WATER EL. 271 m)
INFLOW SWALE TO SOUTH PIT (EL. 271 m)
DRAINAGE CUTOFF (EL. 272 m)
WATER COURSE WITHIN ROM STOCKPILE AREA TO BE RESTORED
ROM STOCKPILE TO BE REMOVED, REGRADED, AND RECLAIMED
DRAINAGE CUTOFF (EL. 272 m)
SOUTH MINE ROCK STORAGE AREA
IN-PIT WATER LEVEL (EL. 271 m)
SOUTH PIT
SOUTH PIT
OVERBURDEN STOCKPILE (TO BE REMOVED AND RECLAIMED)
MONITORING AND MAINTENANCE ACCESS ROAD TO BE MAINTAINED

LEGEND:

- WATER
- RECLAIMED ROCKFILL (CREST AND BENCHES)
- ROCKFILL SLOPE
- RECLAIMED AREA
- PROJECT BOUNDARY
- DRAINAGE CUT-OFF
- IN-PIT WATER LEVEL
- CLOSURE WATER FLOW DIRECTION

NOTES:

1. COORDINATE GRID IS UTM (NAD27) ZONE 16 N AND IS IN METRES.
2. CONTOUR INTERVAL IS 2 METRES. DETAILED TOPOGRAPHY BASED ON NORDMIN PROJECT BASEMAP (JULY 4, 2011). REGIONAL CONTOURS ARE BASED ON LAND INFORMATION ONTARIO (OCTOBER, 2011).
3. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
4. SITE STUDY AREA PROVIDED BY STANTEC (NOVEMBER 26, 2020).

FOR INFORMATION ONLY

100 50 0 100 200 300 400 500 m
SCALE A

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED
0	15DEC'20	ISSUED WITH TRANSMITTAL	JAM	SIR	CNH

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

MRSA AND OPEN PIT CONCEPTUAL CLOSURE PLAN

Knight Piésold CONSULTING

P/A NO. NB101-446/10
REF NO. NB20-01081

FIGURE 1.5-5
REV 0

Closure of the MRSA will be based on the requirements as set out by the *Ontario Mining Act, Regulation 240/00*. The primary objectives for the MRSA closure plan include:

- ensuring slope stability
- ensuring run-off drainage control on and around the MRSA is maintained
- pursuing reclamation strategies that are consistent with or promote post-closure land use

Reclamation of the MRSA will be proactive. Horizontal surfaces will be covered with available overburden and/or topsoil previously stockpiled for reclamation and subsequently revegetated using native seed. Once it has been demonstrated that water draining the MRSA meets applicable regulatory requirements, the water collection system will be dismantled, and natural flows will be returned to the two subwatersheds draining the MRSA.

Following decommissioning and closure of the mine, various activities will continue at the site to monitor progress of site restoration and stabilization following cessation of mine activities and implementation of the closure plan. A phase-specific monitoring plan will be developed (see Chapter 7, EIS Addendum Volume 2). The plan will include specific programs that focus on evaluating the physical integrity of permanent man-made structures (e.g., dams 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 will be developed during detailed closure planning based on the results of the effects assessment and outcome of the EA process. A draft Conceptual Closure Plan was prepared and included as a supporting document to the original EIS (see SID#18, CIAR #232). An update to this Closure Plan will be completed to reflect the refinements to the design of the mine site in accordance with the approach described above.

1.5.3 Mineral Resource Estimate

A public Mineral Resource Estimate for the Project dated January 8, 2010 was prepared by Micon International Ltd (MICON, 2010). The Mineral Resource Estimate reported a total Measured and Indicated Mineral Resource Estimate of 114.8 M tonnes and an Inferred Mineral Resource Estimate of 6.2 M tonnes, for a total 121 M tonnes (CIAR #227).

An updated Mineral Resource Estimate for the Project effective January 6, 2020 was prepared by P&E Mining Consultants Inc. (P&E, 2020). The Mineral Resource Estimate reported a total Measured and Indicated Mineral Resource Estimate of 179.2 M tonnes and an Inferred Mineral Resource Estimate of 0.7 M tonnes, for a total 179.9 M tonnes.

A feasibility study is in progress and is expected to be completed in early 2021. This study will serve to verify the Mineral Resource Estimate prepared by P&E Mining Consultants Inc. (2020) and confirm the economic viability of the Project.

1.5.4 Mine Development Components and Activities

The following sections provide a description of the components and activities associated with the Project based on the conceptual design for the purposes of the environmental assessment. Additional information will be provided by the feasibility study and detailed design to inform Project permitting and environmental management programs.

1.5.4.1 Open Pits

The Marathon Palladium ore body is hosted within the eastern portion of the Coldwell Complex along a north-south axis over a distance of about 3 km. To access and mine the ore body, GenPGM proposes to develop three open pits: North Pit, Central Pit and South Pit (see Figure 1.5-1). The conceptual dimensions and surface areas of the pits at the cessation of mining operations are provided in Table 1.5-2.

Table 1.5-2: Conceptual Dimensions and Surface Areas of the Open Pits

Open Pit	Open Pit Dimensions					
	North-South Axis (m)	East-West Axis (m)	Surface Area (ha)	Depth (m)	Bottom Elevation (masl)	Volume ($1x10^6$ m^3)
North Pit	1,800	700	85	300	10	106
Central Pit	450	500	20	120	150	12
South Pit	1,100	800	55	200	140	31

*All measurements are considered approximate at the cessation of mining operations and subject to refinement during detailed design and approval processes.

The open pit design provides for:

- minimum safety factors of 1.3:1 on pit walls
- bench heights of approximately 10 m in rock
- use of safety berms

Access ramps to the pits will have widths that vary from 22 m for single lane ramps to 35 m for double lane ramps with maximum grades of 10%. Inter-ramp design slope angles in rock will be maintained at a maximum of 55 degrees. Slopes with weathered bedrock will be reviewed separately to ensure proper factors of safety in consideration of rock conditions and characteristics.

The pits will be excavated by blasting using a site mixed emulsion (SME) explosive. An ammonium-nitrate fuel oil (ANFO) explosive may also be used. Blasted ore and mine rock will be handled in the pits by mining shovels and large wheel loaders in combination with high-capacity haul trucks. Smaller capacity

haul trucks may also be used to support the main fleet. Run of mine ore will be hauled from the open pits to the Crusher, located west of the central pit (see Figure 1.5-1).

Grade control will be undertaken to identify the ore from the mine rock. Samples will be taken from blast holes and analyzed at the Assay Lab to determine ore and mine rock boundaries within blasted material prior to mining in the pits. Samples of mine rock will also be analyzed for total sulphur content to determine if the rock is non-Potentially Acid Generation (PAG) (Type 1) or PAG (Type 2), which will determine how mine rock will be classified and managed. Type 1 mine rock will be directed to the MRSA for permanent storage, though some will be crushed and used for dam construction and as aggregate for site infrastructure and operational needs. Type 2 mine rock will be placed in the PSMF and South Pit (once mined), as well as in the Central Pit closer to the end of the mining operations. Mine rock management is discussed in Section 1.5.4.5 of this report.

The conceptual plan for pit development is to mine the North Pit throughout the life of the project with mining of the Central and South Pits to occur at various times to supplement ore production from the North Pit. The mining plan will serve to optimize the economics of the Project, as well as provide the opportunity to blend various ore types, which will enhance the operation of the Process Plant. By the end of Year 6, the South Pit will be mined out and will be available for storage of mine rock and Type 2 material.

1.5.4.2 Ore Handling

As noted, the run of mine ore will be hauled from the open pits directly to the Crusher or placed on the Run of Mill (ROM) Stockpile pad. The crusher building will be an enclosed structure with a dust collection system. Rock will be crushed using a gyratory crusher to a P_{80} of 134 mm and a P_{100} of 347 mm.

Crushed ore will be transported from the short transition conveyor onto a covered 1.4 km long overland conveyor feeding a covered coarse ore stockpile. The coarse ore stockpile will have a live capacity of 25,000 tonnes, 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 will then be reclaimed from the stockpile by one of two parallel apron feeders and discharged onto a 150 m long semi-autonomous grinding (SAG) mill feed conveyor. The Project will employ a conventional two-step grinding and flotation process to produce a PGM-copper concentrate from the ore. In addition, low intensity magnetic separation may be applied on the flotation tailings to produce a bi-product magnetite-vanadium concentrate, as well as on the PGM-copper concentrate to produce a magnetic low copper, high iron-nickel concentrate. The proposed mineral extraction process is conceptually described in Section 1.5.4.3 of this report.

1.5.4.3 Process Plant

Minerals will be recovered from the ore and processed into concentrate in the Process Plant (previously referred to in the original EIS (2012) as the Concentrator Building, or Mill), which is located between the

South Pit and the PSMF. The average daily feed rate will be approximately 25,200 tonnes. The conceptual mill process flow diagram is shown on Figure 1.5-6. Ore will be processed into concentrate following a conventional two-step process grinding and flotation process. GenPGM has been able to refine this conventional approach by completing bench scale and pilot plant testing that has incorporated the latest in fine grinding technology combined with cleaner and scavenger flotation methods to improve metal recoveries. Increasing the rate of metal recovery serves to maximize the use of the resource to the extent possible and enhances the overall economics of the Project.

Crushed ore will enter the Process Plant via the SAG mill feed conveyor, which discharges to the grinding circuit. The grinding circuit consists of a single SAG mill equipped with internal discharge grates followed by a vibrating screen. Oversize material will be recycled through a pebble crusher and returned to the SAG mill along with new crushed ore. Material that meets the minimum size requirements will be discharged from the SAG mill and will flow, by gravity, to a primary cyclone feed pump box. The primary cyclone feed pump will feed the primary cyclopack where the coarse fraction will return by gravity to the ball mill. Cyclone overflow at P_{80} of 106 microns will be discharged to the flotation feed, which will enter the flotation circuit.

The flotation circuit will include a rougher flotation bank, followed by rougher concentrate regrinding, and first through third cleaners operating in closed circuit to produce a final PGM-copper concentrate. Rougher tailings will be subjected to cycloning to capture the coarse fraction of the material along with the associated PGM minerals, followed by regrinding of the coarse fraction to a P80 of 38 microns. The re-ground tailings coarse fraction will then be directed to a PGM scavenger circuit to yield a PGM scavenger concentrate that will be fed along with the rougher concentrate to the rougher concentrate regrind mill.

The primary reagents that are planned for use in the flotation process to produce the PGM-copper concentrate include:

- Potassium amyl xanthate (PAX), a strong flotation copper-PGM collection
- Isoamyl dithiophosphate (AERO 3501), a selective PGM-copper promoter collector

  Methyl isobutyl carbinol (MIBC), an industrially applied frother
- Carboxymethylcellulose (CMC), a silicate depressant may be applied intermittently to reject and control magnesium silicate content in the PGM-copper concentrate
- Crushed calcium oxide (CaO), which will be slaked in the Process Plant for flotation circuit pH control to suppress iron sulphides in the process.

The rougher tailings fine fraction and PGM scavenger tailings will be combined to create a low-sulphur flotation tailings and dewatered to 55-60% solids in the tailings thickener prior to being discharged to the PSMF. This low-sulphur tailings material, referred to as Type 1, is anticipated to account for approximately 85% of the tailings from the Process Plant and has been determined to be non-PAG. First cleaner tailings, containing silicates and iron sulphides rejected from the flotation circuit, will be discharged into a designated area within the PSMF or to the Central Pit. These tailings, referred to as

Type 2, are estimated to account for up to 15% or the tailings from the Process Plant and have been determined to be PAG.

The PGM-copper concentrate will be thickened to 50-60% w/w (percent concentration weight/weight) solids in a concentrate thickener and then subjected to pressure filtration producing a filtered concentrate at a nominal 8-11% w/w moisture for transport off-site to a 3rd party smelter. In addition to producing the PGM-copper concentrate, low intensity magnetic separation is being considered on the Type 1 tailings to produce a magnetite concentrate, as well as on the PGM-copper concentrate to produce a low copper, high iron-nickel concentrate. The production of these concentrates will be dependent on the results of future concentrate market studies.

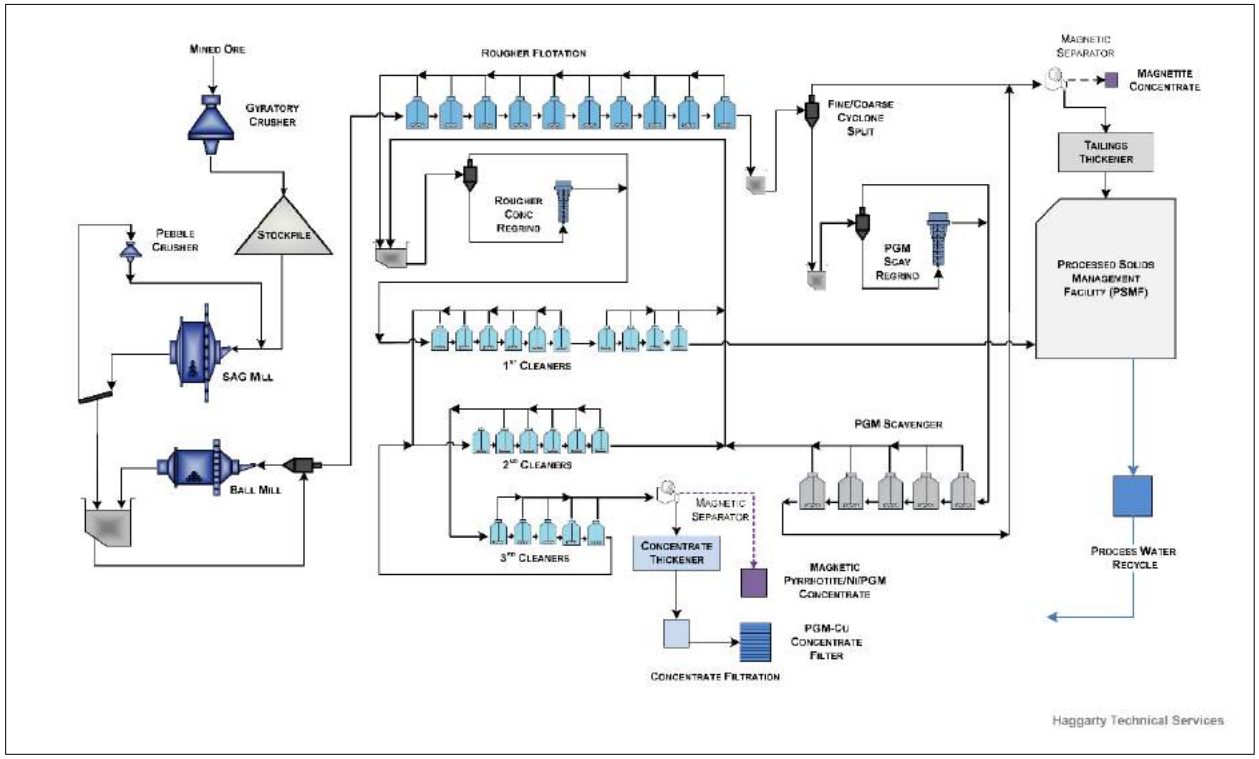


Figure 1.5-6: Conceptual Mill Process Flow Diagram

1.5.4.4 Concentrate Handling, Storage and Transportation

Concentrate will be loaded into transport trucks in the Process Plant to ensure that dust generated during loading is contained and to facilitate clean-up of material. The load-out area will be located on the ground floor of the Process Plant and will be a truck drive-through facility. Loading will only occur after the area is isolated. After filling, the trucks will be covered for transport. Concentrate will be transported off-site to an existing third-party facility for further processing. It is estimated that about ten truckloads of PGM-copper concentrate will be transported off-site on a daily basis. In addition, up to an additional estimated 30

truckloads of concentrate may leave the site on a daily basis depending on the market conditions for the magnetite or low copper, high iron-nickel concentrates which may also be produced.

A Concentrate Storage Building will be constructed at the Process Plant Area. The building will be used in the event that there is a short term (days) interruption of concentrate transport off site, so that the Process Plant can continue to operate.

Two options are being considered for concentrate delivery to an existing third-party facility for further processing:

- construction of a concentrate rail load-out facility either in the Town of Marathon (i.e., as identified on Figure 1.4-12 of the original EIS (2012)) or within the general area (not yet defined), with material transported from the site to the facility by transport truck then by train to a third-party processing facility
- direct delivery of concentrate material via transport truck from the site to a third-party processing facility

It is anticipated that a potential rail load-out facility would be situated on an existing rail siding in close proximity to the CP rail line. Various rail siding locations are under consideration but have not yet been confirmed. The infrastructure necessary to develop the facility and the manner in which the facility would operate (independent of location) is described in Section 1.5.6.3 of this report.

1.5.4.5 Mine Rock Management

Type 1 mine rock is defined as rock with less than 0.18% sulphur (by weight), which has been assessed to be non-PAG (Ecometrix, 2020). Type 2 mine rock is defined as mine rock with greater than 0.18% sulphur (by weight), which has been assessed to be PAG (Ecometrix, 2020). Based on the sulphur values of the mine rock, it has been estimated that about 37 M tonnes of Type 2 mine rock will be excavated during mine life.

Type 1 mine rock that is not crushed and used for dam construction or as aggregate for site infrastructure will be directed to the MRSA for permanent storage. Type 2 mine rock will be stored within the PSMF, the South and Central Pit.

The MRSA is located to the east of the open pits and has capacity to store the Type 1 mine rock produced over the planned 12.7 year mine life. The MRSA will be constructed with an overall slope of approximately 2.2H:1V, with 30 m tall benches with mid slopes at 2H:1V and 10 m wide mid-slope benches. The stockpile slopes will provide long-term stability and allow for concurrent reclamation. Preliminary design criteria incorporated into the MRSA included the codes and standards of *Ontario Mining Act, Regulation 240/00*.

During operations, Type 2 mine rock will either be placed in the PSMF and progressively covered by process solids or stored in the South Pit or the Central Pit. Following mine closure, all of the Type 2 mine rock stored in the PSMF will remain below water. The Type 2 mine rock stored in the pits will become

submerged as the pits fill with water. In both cases, the storage of Type 2 mine rock under saturated conditions will effectively prevent the development of acid drainage in the long-term.

1.5.4.6 Process Solids Management

An estimated 78 M m^3 of process solids will be generated over the life of the mine. The Process Plant will produce two types of process solids, referred to as Type 1 and Type 2. Type 1 process solids are anticipated to account for approximately 85% of the tailings from the Process Plant and have been determined to be non-PAG. Type 2 process solids are estimated to account for up to 15% of the tailings from the Process Plant and have been determined to be PAG. Type 1 process solids will be discharged into the PSMF. Type 2 process solids will be discharged into a designated area within the PSMF, or during the last few years of operation into the Central Pit.

The PSMF is located west of the Process Plant and will be created through the downstream construction of rockfill dams using Type 1 mine rock. The dams will be raised in stages to provide sufficient storage capacity for process solids and site water management. The final elevation of the dams will range from 343 masl to 380 masl. The PSMF embankments will be constructed with upstream and downstream slopes of approximately 2H:1V and a minimum crest width of 8.0 m. The design utilizes site topography to minimize the size of the dams. The final embankment heights will vary between 52 m and 80 m above grade and foundation widths are between approximately 140 m and 330 m. The embankments will include specific rock fill zones with finer material towards the upstream portion of the embankment and coarser material towards the downstream portion of embankment. The zoned construction will result in an embankment that is not susceptible to internal erosion or piping and resistant to downstream erosion.

The dams will include a high density polyethene (HDPE) liner keyed into bedrock via a concrete plinth to minimize seepage from the facility. Removal of overburden and higher permeability bedrock, placement of slush grout on the prepared bedrock surface and/or injection grouting of deeper permeable bedrock zones will be completed as required by site conditions to further reduce the potential for seepage from the facility. Seepage collection basins will be constructed along the toe of the dams to intercept seepage and pump it back to the facility. Monitoring stations located downstream of the PSMF will be used to verify the effectiveness of the collection basins.

The PSMF includes two cells (Cell 1 and Cell 2), which will be separated by a lined embankment. Cell 2 is divided by an internal rockfill dyke, into Cells 2A and 2B, to optimize process solids management and storage. During the initial years of operation, Type 1 process solids will be deposited into Cell 1 and Type 2 process solids will be deposited into Cell 2A. Later during the mine life, Type 1 process solids will be deposited into Cell 2A and Cell 2B, with Type 2 process solids being deposited into Cell 2A. The process solids management strategy envisages Type 1 process solids being used as cover material for Type 2 process solids to prevent the onset of acid generation during both operations and following closure. Type 2 material will not be included in Cell 1 or Cell 2B.

Cell 1 and Cell 2 have been designed to store approximately 14 M m^3 and 64 M m^3 of process solids, respectively. Approximately 4 M m^3 of Type 2 tailings will be stored in the Central Pit during the last three years of operation.

Excess water that accumulates in the PSMF will be routed to the WMP. The WMP will provide water to the Process Plant. Excess water in the WMP will be treated, as required, and then discharged to Hare Lake.

1.5.4.7 Water Supply

Potable Water

Potable water will be supplied to the site by a groundwater well and/or supplemented as required by a bulk water supplier. Groundwater will be pumped to the surface, stored and treated to ensure compliance with Ontario Drinking Water Quality Standards, and supplied to the site as needed through the associated water distribution infrastructure. If required, a provincial permit to take water (PTTW) will be obtained for water taking. The permitting process is designed to ensure there are no adverse effects from the water taking.

Process Water

The WMP will provide process water to the Process Plant, with excess water in the pond to be treated and then discharged to Hare Lake as required. Development of the PSMF embankments and construction of the water management system for the site, including the MRSA, will occur during the site preparation and construction phase. This should provide sufficient water from natural runoff to fill the WMP. Approximately 1.4 M m^3 of water will be stored in the WMP 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 m^3/day of reclaim water may be required to process an average mill throughput of 25,200 tonnes/day.

It is possible that some supplemental water may need to be collected from a local water source to initially fill the WMP to the required volume or to supplement the process water supply. The first choice to supply supplemental water is Hare Lake. In the rare instance where water flow is too low in the Hare Lake system, supplemental process water may be obtained from the Pic River. The Pic River is the biggest surface water system in the direct vicinity of the Project site and drains an area of approximately 4,300 km^2. In either instance, a pumping and pipeline system would be used to bring water to the WMP, and subsequently to the Process Plant. A provincial PTTW would be required. The permitting process is designed to ensure there are no adverse effects from the water taking.

1.5.4.8 Water Management

Detailed water balance and water management information for the PSMF, Open Pits, WMP, MRSA and SWM Pond will be provided by Knight Piésold (2020) as part of the EIS Addendum (Volume 2). The various water management constraints to be incorporated into the water balance models, including minimum operating pond volumes, maximum operating pond volumes, the Environmental Design Storm (EDS), and freeboard requirements, will be described by Knight Piésold (2020) as part of the EIS

Addendum (Volume 2). Detailed site hydrology data are provided in the Environmental Hydrology Updated Baseline Report (Stantec, 2020).

The PSMF will consist of two storage cells (Cell 1 and Cell 2) and the separate WMP. The storage cells will provide permanent and secure storage for process solids from the Process Plant. Excess water (i.e. process water and precipitation) that accumulates in PSMF Cells 1 and 2 will be routed to the WMP. The WMP will be established at the east end of Cell 1 within the PSMF and will be operated as the primary contact WMP for the site and the process water source for the Process Plant. The pond will be constructed during the site preparation and construction phase and will initially be utilized as a storage pond for construction dewatering.

Contact water from the Project site, including water from the Open Pits, MRSA, Process Plant, PSMF and SWM Pond, will be transferred to the WMP. During operations, water will be reclaimed from the WMP to the Process Plant on a continuous basis. The recycling of water from the WMP to the Process Plant has been maximized to limit the need for additional fresh water from other sources. Overflow from the WMP can be managed within Cell 1 of the PSMF to provide additional operational flexibility. Excess water will be transferred from the WMP to a water treatment plant (WTP), treated as required, and discharged to Hare Lake.

Contact water from the MRSA located along the east side of the open pits will be collected in catch basins established in Subwatershed 102 (Stream 2 Catch Basin) and Subwatershed 103 (Stream 3 Catch Basin). The catch basins will be constructed prior to initial development of the open pits and the MRSA. Water collected in the catch basins will be collected and pumped to the WMP via the MRSA collection basin pipelines. The collection system will be sized to manage the EDS, which is based on a 1 in 25 year rainfall event. In the event that the EDS is exceeded, water will be routed from the MRSA catch basins via the catch basin overflow spillways to the Pic River. The overflow spillways have been sized to convey the 1 in 100 year rainfall event.

Surface water runoff and groundwater inflow reporting to the open pits will be transferred to Collection Pond 1 (CP1) located adjacent to the ROM stockpile. Water collected in CP1 will be routed to the WMP via the water transfer pipelines. Water levels in waterbody L-8 located to the northeast of the open pits will also be managed by pumping to CP1. Contact water from CP1 may be used for dust suppression on the mine haul roads.

Runoff from the Process Plant area, Truckshop / Warehouse area, Laydown area and the Aggregate Plant area will be collected in the SWM Pond. Water collected in the SWM Pond will be routed to the WMP or directly to the WTP via the water transfer pipelines. The SMW Pond will also provide tertiary containment for the Process Plant area and associated pipelines (i.e., process solids and reclaim water pipelines) and Fuel Farm, ensuring that Subwatershed 101 and the Pic River will be protected in the case of an unplanned event.

1.5.4.9 Water Treatment and Discharge

As discussed in Section 1.5.4.8, contact water from the site and stormwater runoff will be collected and routed to the WMP or SWM Pond, respectively. A WTP will be located between Cell 1 and Cell 2A within the PSMF footprint. Excess water in the WMP and / or the SWM Pond will be routed to the WTP prior to discharge to Hare Lake. Water treatment will be undertaken to ensure applicable receiving water quality criteria are met in Hare Lake. Under average conditions, discharge rates to Hare Lake are expected to be relatively low during the operations phase and would largely occur during the spring freshet. During construction and the first year of operation, it is estimated that less than 0.3 M m^3 of water will be discharged to Hare Lake on an annual basis.

1.5.4.10 Water Pipelines

A series of pipelines will be developed on the site to serve several different functions. The pipeline systems include:

Discharge Pipelines

- Hare Lake discharge pipeline (from WTP to Hare Lake)

Pipelines Internal to the Mine Site

- water reclaim pipeline (from WMP to Process Plant)
- PSMF water management pipelines (including water transfer from the storage cells to the WMP and water transfer for the Seepage Collection Basins)
- water transfer pipelines (including open pit dewatering pipelines and transfer system from CP1 to the WMP)
- SWM Pond pipelines
- MRSA collection basin pipelines
- process solids pipelines
- potable water distribution system
- sewage and grey water systems
- fire hydrant water supply system

The pipelines will be sized and constructed as appropriate based on function and as determined through the detailed design process. For the most part, pipelines are anticipated to be installed above ground due to ground conditions at the site as well as to facilitate operation and maintenance. Above ground pipelines will generally be HDPE or steel, as determined by the detailed design process.

1.5.4.11 Site Road Network and Access

Road access to the mine site will be provided along Camp 19 Road from an existing intersection at Highway 17, opposite Peninsula Road. A security building and gate will be located at the entrance to the mine site, immediately north of the Subwatershed 101 crossing. The security building and gate will be staffed 24 hours a day, providing restricted access to the site.

Since the original EIS (2012), upgrades to Camp 19 Road and its intersection with Highway 17 were completed. Additional upgrades may be necessary to accommodate mine-related traffic, which will include brushing, installation/upgrades to culverts, and construction of an appropriate gravel roadbed.

If needed, the configuration of the Highway 17 and Camp 19 Road intersection will be modified to provide for greater turning radii and a right turn taper to accommodate the larger-sized vehicular traffic. These upgrades would maintain current or acceptable levels of service, based on traffic type and intensity predictions related to the development of the mine. No additional turning lanes, alterations to existing signals, or changes to existing drainage would be required. The conceptual re-configuration of this intersection, which will be confirmed through discussions with the Ministry of Transportation (MTO), is shown on Figure 1.5-7.

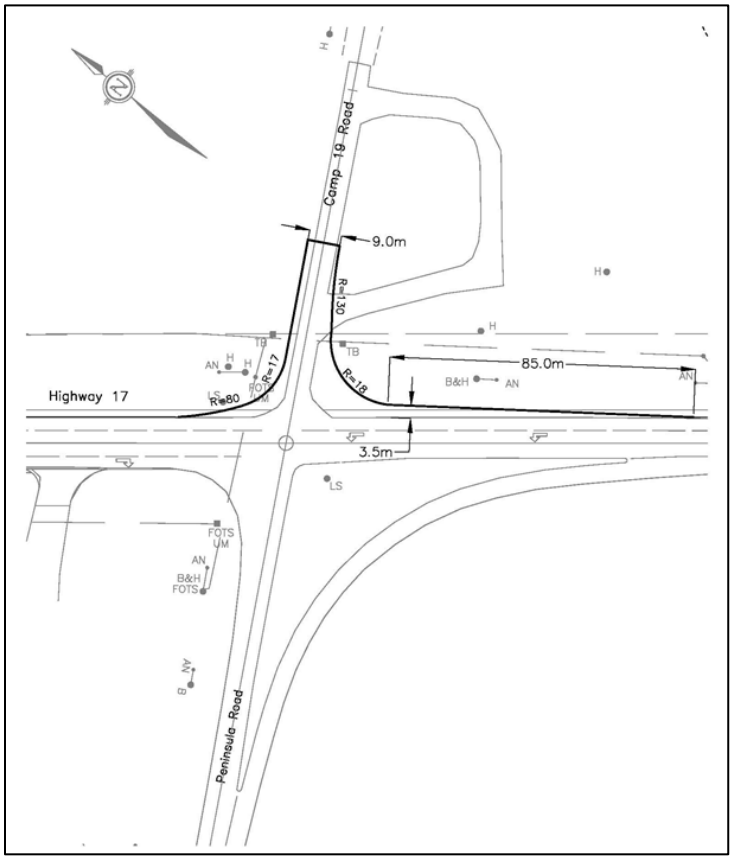


Figure 1.5-7: Proposed Configuration of the Camp 19 Road – Hwy 17 Intersection

A new section of road will be developed that links the Camp 19 Road to the mine site, which follows a revised alignment from the one proposed in the original EIS (2012). This new road section runs north, off the Camp 19 Road about 2.2 km from Highway 17. The road corridor is anticipated to be 30 m wide. Roadbed material will consist of Type 1 mine rock that has been crushed and screened to appropriate sizes using portable on-site crushing and screening equipment. Culvert design, installation and maintenance will follow and conform to appropriate DFO and MNRF operational statements, guidance, and protocols.

Several roads will be developed within the mine site to provide safe and ready access to all mine infrastructure, with conceptual locations identified on Figure 1.5-1. The proposed mine site roads include:

- a series of mine haul roads that extend from the pits to the Crusher, ROM Stockpile, PSMF and Truck Shop / Warehouse area
- PSMF and Hare Lake access roads, extending from the site access road at the Process Plant past the administration and services offices, the truck shop, around the WMP south of the PSMF up to Hare Lake and around to the north side of the PSMF. An additional road will be constructed between Cells 1 and 2 of the PSMF
- an access road along the toe of the MRSA that connects to the explosives magazines, SME Facility and MRSA retention ponds to the haul road at the overburden stockpile south of the MRSA
- a road from the Administration and Services Offices to the electrical substation

All roads will be constructed of gravel sourced from the mine site and on-site aggregate plant.

1.5.4.12 Power Supply and Distribution

The electrical power for the mine site is planned to be provided by a new 2.2 km 115-kV overhead transmission line connection to the existing Terrace Bay-Manitouwadge transmission line (M2W Line) owned and operated by Hydro One Networks Inc. that runs north of the Project. The new line will run from the existing transmission corridor to a transformer substation located north of the Process Plant between the South Pit and PSMF (see Figure 1.5-1). Power will be stepped down at the substation for subsequent distribution to site infrastructure through switch gear that will also be located within the substation footprint. Smaller dry cell transformers will also be required in all end-run distribution. The width of the transmission corridor will be approximately 30 m.

During operations, peak electrical demand is estimated to be approximately 60 MW. This demand can be supplied by the M2W Line. The conditions for connection to the M2W Line will be defined by the Independent Electricity System Operator.

Five 1 MW diesel generators will be installed on site, with four located adjacent to the Process Plant and one located at the Aggregate Site (see Figure 1.5-1). These diesel generators will be used to supply continuous duty power to the site during the site preparation and construction phases until the new transmission line is completed. The generators will remain in place during operations to supply emergency power in the event of a power failure.

In addition to the diesel generators, a power distribution line may be connected to the existing powerline located along the Camp 19 road to support site preparation and construction activities.

1.5.4.13 Explosives Storage and Production

Initially, a finished bulk emulsion product will be transported by truck to a temporary on-site transfer facility. The facility will store and distribute the product to bulk a repump truck, which will then be used to deliver the product to blastholes. Two surface magazines will be installed at the site for the storage of boosters and detonators. This process is expected to be used during the site preparation phase of the project.

The temporary transfer facility will subsequently be replaced by a permanent facility that utilizes Site Mixed Emulsion (SME) technology. The SME technology eliminates the need for a conventional emulsion manufacturing facility through the use of specially designed bulk delivery vehicles, which provide mobile emulsion manufacturing capability. This allows the emulsion to be manufactured in the pits (on the bench) and delivered directly to the blastholes, eliminating the need to store finished product at the facility. This allows the SME facility (where raw materials will be handled) to be located closer to mine infrastructure than a conventional emulsion manufacturing facility.

The temporary transfer facility, the SME facility, and the surface magazines will be located east of the MRSA and placed in areas to respect the nearest inhabited building, airstrip, hydro lines, roads and blast sites in accordance with the guidelines set out in the *Quantity-Distance Principles User's Manual published by the Explosives Regulatory Division of NRCan* (NRCan, 1995).

1.5.4.14 Aggregate and Rock Fill Supply

It is anticipated that aggregate and rock fill needed for site preparation and construction purposes will primarily come from on-site sources. This includes overburden removed during stripping, as well as Type 1 mine rock that is excavated from the pit areas during pre-production mining. Portable crushing and screening plants will be used to generate the desired aggregate and rock fill types (sizes) from on-site sources. It may be necessary to supplement the on-site sources with off-site materials that are available regionally from licensed sources.

1.5.4.15 Waste Management

Waste materials will be generated during construction activities and operation of the Project. All wastes will be disposed of in accordance with provincial regulations.

Recyclable Material

To the extent possible, all materials used on the mine site will be re-used or recycled to minimize the amount of waste needing disposal. Recyclable materials such as scrap metal, wood, paper and cardboard that are not reusable will be segregated and trucked off site to appropriate facilities.

Organic and Solid Waste

Organic and non-recyclable solid non-hazardous waste collected at the mine site will be disposed of within the landfill situated in the PSMF.

Hazardous Wastes

Various hazardous wastes will be generated through on-site activities, including various assay lab and mill reagents, lubricants, oils and grease products. There will be no polychlorinated biphenyls (PCB) or underground hydrocarbon storage tanks on site. Hazardous wastes will be collected, stored on site temporarily, as appropriate, and trucked off site to appropriately licensed facilities.

Sewage Treatment

Sewage will be treated by means of an on-site membrane bioreactor and/or will be collected for off-site disposal at an existing, approved sewage disposal facility.

1.5.5 Maintenance, Administration and On-Site Support Facilities

Various on-site facilities will support the development and operation of the mine, including the Administration and Services Building, Fuel Farm, Truck Shop, Warehouse, Concrete Batch Plant, Hazmat Building, Propane Storage Area and Concentrate Storage Shed. The locations of these facilities are shown on Figure 1.5-1, and the role of each as it pertains to the Project is discussed below.

1.5.5.1 Fuel Farm

The primary fuel storage area or Fuel Farm will be located to the west of the Process Plant adjacent to the Truck Shop / Warehouse area. Fuel will be stored in above ground vertical or horizontal bulk tanks. These storage tanks will be outfitted with secondary containment and provided with protection to guard against the potential for damage resulting from a collision with mobile equipment. The storage and distribution areas will include lined aprons and or will be fitted with catchments to contain fuel that might inadvertently be spilled during equipment fueling. The Fuel Farm will have sufficient capacity to provide a Project phase-specific inventory without re-supply, in the event of supply disruptions. Table 1.5-3 identifies the fuel storage capacity during each of the Project phases.

Table 1.5-3: Fuel Farm Storage Capacity

Project Phase	Fuel Storage Capacity (L)
Phase 1 – Site Preparation and Construction	225,000
Phase 2 – Operations	500,000
Phase 3 – Decommissioning and Closure	75,000

In addition, portable double-walled temporary storage tanks (or "day tanks") will be located at strategic locations on site to support construction and mining activities.

All fuel storage and dispensing equipment will comply with applicable legislation, including the *Technical Standards and Safety Act* (2000) and National Fire Protection Agency standards and STI-F-921 requirements.

1.5.5.2 Truck Shop and Warehouse

The Truck Shop (formerly referred to as the Bucket Shop and Heavy Repair Facility in the original EIS (2012)) will be located to the east of the PSMF and north of the Administrative and Services Building. The Truck Shop will provide for repair and maintenance of heavy and light mobile equipment and components of fixed equipment. The Warehouse will be attached to the Truck Shop to support the timely and efficient maintenance of equipment.

1.5.5.3 Aggregate Plant

The Aggregate Plant will be a permanent facility which will be located at the Aggregate Site for the duration of the Project. The Aggregate Plant will produce road, stemming and dam construction material required during the operations phase from Type 1 mine rock.

1.5.5.4 Bulk Reagent Storage Building

A Bulk Reagent Storage Building will be constructed at the Process Plant Area. Reagents coming onto the site for the Process Plant, WTP, and Assay Lab, will be delivered to, stored in and distributed from the building. The building will also include an area for the temporary storage of hazardous materials generated at the site, prior to transport by a licensed hazardous materials contractor to an approved off-site disposal facility.

1.5.5.5 Assay Lab

An Assay Lab may be located within the Process Plant Area to provide five primary functions:

- to provide the means to segregate mine rock from ore in the pits
- to provide the means to segregate Type 1 from Type 2 mine rock

- to provide ore grade control for the mining operation
- to provide process analysis to optimize the performance of the Process Plant
- to provide environmental analysis to support the operation of the site environmental management infrastructure

An alternate arrangement is also contemplated, whereby an assay lab would instead be constructed and operated by a third party at an off-site location (see Section 1.5.6.2). While final details on the assay lab have not yet been confirmed, the on-site location of an assay lab has been identified in the area of the Process Plant (see Figure 1.5-1) for the purposes of the assessment and consideration of Project effects.

1.5.5.6 Administrative and Services Building

The Administrative and Services Building (formerly referred to as the Mine Services Complex in the original EIS (2012)) will be located to the west of the Process Plant, south of the Truck Shop / Warehouse area. The complex comprises a single structure that includes the administration and engineering offices, first-aid station, meeting and training rooms, mine dry, and security office.

1.5.5.7 Propane Storage Area

During operations, it is anticipated that two 30,000 USG propane tanks will be located in the vicinity of the Process Plant area. The specific location of this component will be confirmed during detailed design. The tanks will be installed on a concrete or steel foundation in a fenced-in area. Two electric water bath vaporizers will be installed to ensure an adequate amount of propane gas is available during the heating season.

The installation will not have a cylinder refill station; however, storage of cylinders for propane operated forklifts will also be provided in this area. The tanks and equipment will be owned by the mine, and will be filled by a licensed propane distributor.

Compressed natural gas supply and storage is currently being contemplated in the Town of Marathon. If this opportunity does proceed, consideration can be made to utilize or supplement propane on-site with this alternative.

1.5.5.8 Concentrate Storage Building

The Concentrate Storage Building will be located at the Process Plant Area. The building will be built on a concrete base and have the capacity to hold approximately 5,000 tonnes of concentrate. A wheeled loader will be used to access the building. The Concentrate Storage Building will allow additional storage of concentrate to mitigate any potential delays that could arise in concentrate transport.

1.5.6 Off-Site Support Infrastructure for Mine Development and Operations

Additional off-site support infrastructure may or may not be proposed as part of the Project. In most cases, these services or facilities will be owned and/or operated by third parties and not by GenPGM. The potential off-site support infrastructure associated with the Project includes the following:

- an Accommodations Complex for employees
- an Assay Lab
- a Concentrate Rail Load-out Facility

1.5.6.1 Accommodations Complex

The construction of an Accommodations Complex is being considered, with a proposed capacity for approximately 100 people. The complex is anticipated as a pre-engineered, wood-framed two-storey structure, comprised of individual modular units, with shared bathroom, shower facilities, and common areas. A potential site for the complex has not yet been confirmed, although it is expected to be located within the general area of the Town of Marathon. It is currently envisaged that the Accommodation Complex would be operated by a third party to be available during construction and operation of the mine and would be available for continued use following the end of the Project.

1.5.6.2 Assay Lab

If constructed off site, a third-party assay lab will be constructed in the vicinity of the Town of Marathon. This lab would be constructed and operated to provide the same key services as the on-site assay lab discussed in Section 1.5.5.6.

The Assay Lab may be located on-site, but only if a third-party location is not established in time to meet the needs of the Project. For the purposes of the assessment, the location of an assay lab has been sited at the Process Plant Area and will be considered in the assessment of Project effects.

1.5.6.3 Concentrate Rail Load-Out Facility

Concentrate produced at the Process Plant will be transported to an off-site facility for further processing. As discussed in Section 1.5.4.4 of this report, one option for transporting the concentrate is through the construction of a Concentrate Rail Load-Out Facility along the Canadian Pacific or Canadian National Railway rail lines. This facility would be located either within the Town of Marathon or at an alternate location. Material would be transported from the site to the Concentrate Rail Load-Out Facility by transport truck, followed by transport by train to a third-party processing facility. The infrastructure necessary to develop a facility at any location is similar and is described below.

The Concentrate Rail Load Out Facility will be enclosed and constructed on a concrete floor slab. Any concentrate not loaded onto rail cars will be stored within two separate concrete walled bunkers, each providing 2,000 tonnes capacity, equivalent to approximately one week of concentrate production at the site.

Concentrate will be unloaded from the transport trucks within the building. A wheel loader will transfer the concentrate directly into rail cars or into a chute that feeds a transfer conveyor that will extend outward to the rail siding. The transfer conveyor will then feed a shuttle conveyor enabling the filling of two rail cars, with an approximate capacity of 95 tonnes each, without repositioning the rail cars on the siding. The rate of filling to the rail cars will be approximately 400 tonnes per hour which provides a means to complete the load-out of concentrate into rail cars on a five day per week, day shift only basis. The higher load out rate provides a means to limit the idle time required for a locomotive to be connected to and moving rail cars on the siding for load out.

The Concentrate Rail Load Out Facility could include a dust collection system, if required to meet applicable criteria, to ensure that the emptying of transport trucks onto the concrete floor slab, and movement of concentrate from the floor slab to either the transfer chute or into the concentrate storage bunkers will all be completed under a negative suction environment. This will ensure dust emissions are appropriately controlled. A floor collection sump will be included in the facility. Any concentrate collected in the sump will be removed using a vacuum truck and transported to the Process Plant for re-processing.

1.5.7 Project Schedule

The anticipated Project schedule is provided in the Gantt Chart below (see Figure 1.5-8). The commencement of project activities is dependent upon several factors, including timelines for EA approval and receipt of all applicable permits and approvals. It is expected that it will take approximately 2 years to commission the Process Plant, from the time site preparation commences. The operations phase is anticipated to last 12.7 years, with an additional 2 years planned for site decommissioning. This will be followed by monitoring during the closure phase until environmental conditions stabilize, for a total time for decommission and closure phase of approximately 45 years.

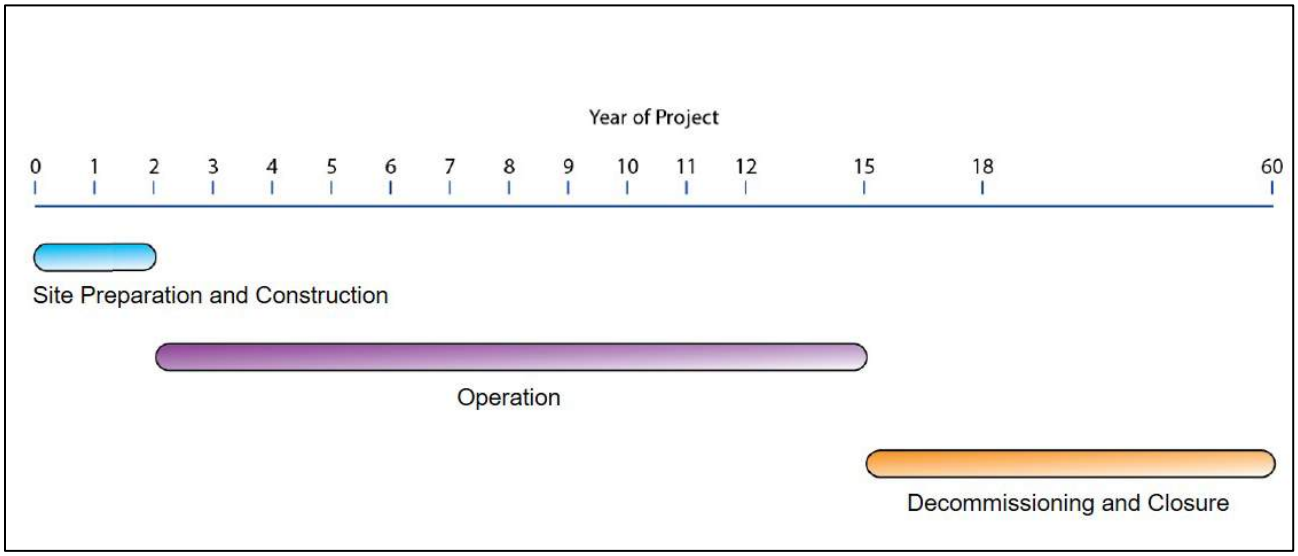


Figure 1.5-8: Project Development Schedule

1.6 PROJECT DESIGN CHANGES

Although most of the planning phase for major Project components was completed from 2009 to 2014 through alternatives assessment and consultation, GenPGM has implemented a series of refinements to the Project, including mine design, project activities, and external locations/processes in order to improve the efficiency of mining operations, address changes to mining practices, and to reduce potential effects to the environment. Many of these refinements were also informed through the comments received during consultation and engagement activities for the Project. The following is a list of the key changes and refinements to the design of the Project:

- Open Pits – The Open Pits have been reconfigured from a primary pit and five satellite pits into three pits, now referred to as the North, Central, and South Pits. This change enhances Project economics and improves the overall operational efficiency of the mine. The general location and overall footprint of the pits remain relatively consistent to the prior designs (as outlined in the original EIS (2012)), remaining along the eastern portion of the Coldwell Complex.
- MRSA – The overall size of the MRSA has been reduced by proposing to store mine rock within the open pits during later stages of the mine life. As well, the MRSA footprint has been revised to store the mine rock in only two subwatersheds (102 and 103), thus avoiding alterations (i.e., clearing, storage of mine rock, alteration to drainage) within Subwatershed 108 as previously proposed. This refinement of the Project design addresses concerns expressed by Indigenous communities and the public that the Project needs to be developed in a manner that is protective of the Pic River watershed.
- PSMF – While the footprint of the PSMF is just slightly larger than previously proposed, the reconfiguration of the PSMF has resulted in the optimization of the storage of Type 2 process

solids and mine rock and reduced the amount of contact water in Cell 1 and Cell 2 via the incorporation of the WMP. Cell 2 of the PSMF has been split into Cells 2A and 2B to better facilitate the storage of Type 2 materials covered by Type 1 process solids in order to prevent acid drainage from occurring during operations and closure. Consistent with good operating practice, the pond volume within the PSMF cells has been reduced to increase the settled density of the process solids (improved storage efficiency) and reduce the consequences of a hypothetical failure (reduced fluid volume that could be potentially released).

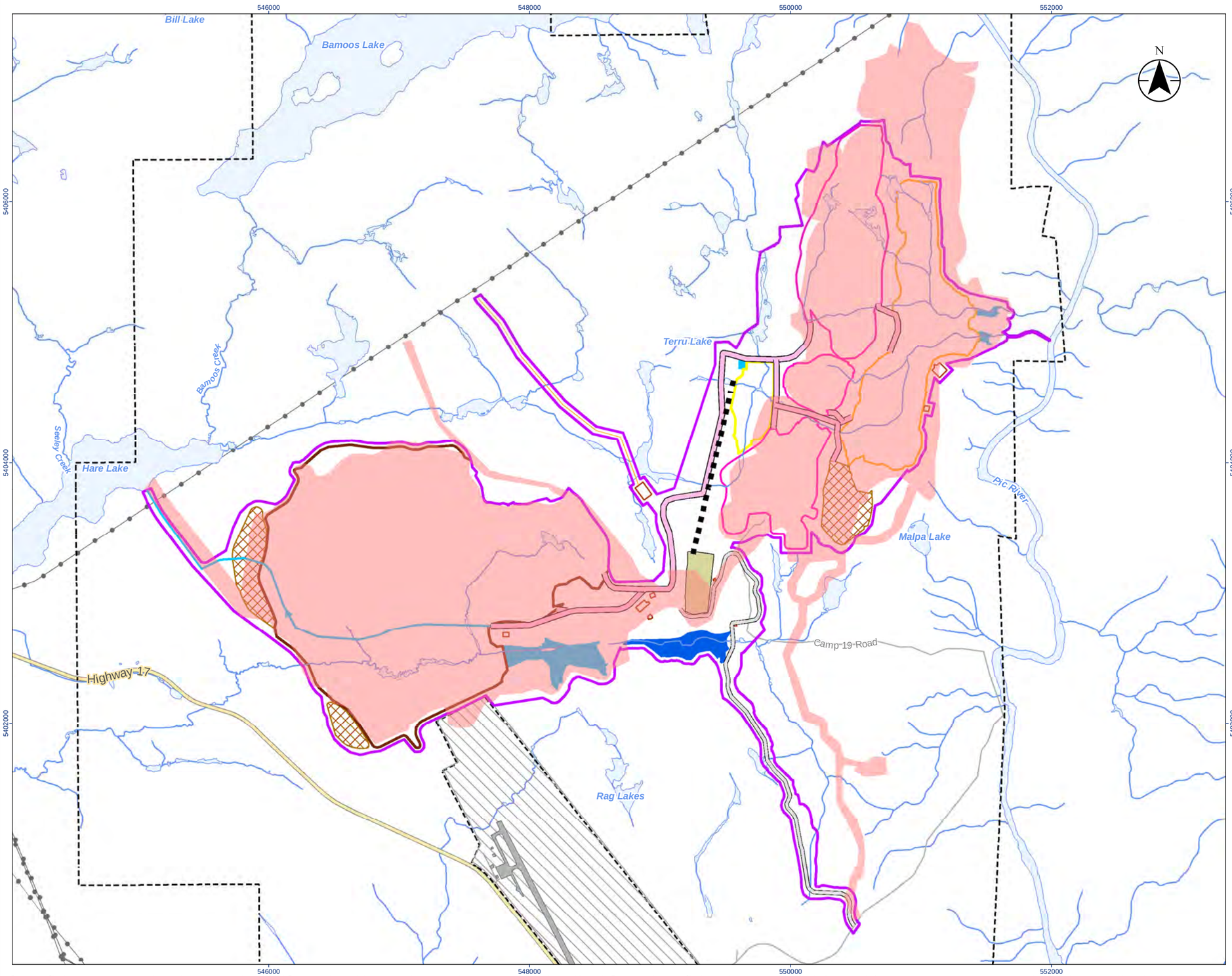
- Process Plant – The location of the Process Plant has been shifted westward and is now more centrally located within the Project site, providing a more efficient operation. Further, changes to the Process Plant operation have been made to improve metallurgical recovery, reduce the plant footprint, create the potential to produce other concentrates (in addition to the PGM-copper concentrate), and to improve environmental management at the site, including:
- Use of chemical additives to minimize the generation of dust from the PSMF
- Addition of a thickener for the Type 1 process solids, which will result in improved storage efficiencies and less contact water in the PSMF
- Access Road – A new access road alignment has been established to increase separation from the Pic River, based on feedback received from Indigenous communities, and to better align with the revised location of the Process Plant. This realignment also allows for the addition of the SMW Pond, which will collect runoff from the Process Plant Area, Truck Shop / Warehouse area, Laydown area and Aggregate site. The SMW Pond will also provide tertiary containment for the Process Plant Area and associated pipelines (process solids and reclaim water pipelines), ensuring that Subwatershed 101 and the Pic River will be protected in the case of an unplanned event.
- Explosives – The technology used to produce emulsion explosives at the site has been changed, resulting in a modified storage and manufacturing facility, as production can now occur within the pits via the use of specialized bulk delivery vehicles. This allows for the safer use of explosives on site, as the emulsion explosive is now created within the pit, just prior to filling of the blasthole.
- Crusher Location – The crusher location has been moved to the west side of the open pits, to reduce the length of on-site haulage routes, thereby reducing fuel usage and GHG emissions over the life of the Project, as well as simplifying the management of contact water and eliminating the potential for runoff to the Pic River.
- Aggregate Plant Site – The aggregate plant and batch (concrete) plant will be located within a depression to the east of the Process Plant, which reduces potential acoustic impacts and facilitates the management of stormwater runoff.
- Transmission Line – The alignment of the transmission line has been refined to optimize the location and shorten the overall length of the corridor required to connect to the existing M2W transmission line.
- Hare Lake Discharge Corridor – The alignment of the discharge pipeline from the WTP to Hare Lake was relocated to the upstream side of the PSMF perimeter road located in Subwatershed

105. The containment provided by the perimeter road will protect Subwatershed 106 if an unplanned event were to occur.

- Mine Schedule – The mining schedule has been revised to allow for the North Pit to remain operational for the life of the mine and for mining of the South Pit to be completed within the first six years of operation, followed by mining of the Central Pit. Sequential mining of the South and Central Pits allows for the storage of Type 2 materials and Type 1 mine rock within the pits as part of routine operations (eliminates rehandling of material), thus improving Project economics and facilitating mine closure.

A comparison of the footprint of the original site plan (CIAR #200) and the revised site plan for the Project is provided as Figure 1.6-1, which illustrates the overall impact of the changes (additions, removals) to the overall footprint of the Project. The revised footprint of the Project is approximately 1,100 ha, relative to the original footprint of 900 ha.

In addition to physical changes to the mine design, there are several process-related changes that are detailed in Table 1.6-1.



Stantec

Legend

- Project Footprint 2020
- Project Footprint 2014
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Hydro Line
- Watercourse
- Airport (Property Boundary)
- Airport Infrastructure
- Waterbody

Proposed Project Components 2020

- Access Road
- Conveyor
- Discharge Line
- Haul Road
- Transmission Line (115 Kv)
- Building/ Facility Footprint
- Stormwater Management Pond
- Mine Rock Storage Area (MRSA)
- Open Pit
- Overburden Stockpile
- Process Soilds Manadement Facility (PSMF)
- Process Plant Area
- ROM Stockpile
- Water Management Pond

0 0.5 1 km

1:30,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3, Mine plan as illustrated on this drawing is approximate and for illustrative purposes. Design details were provided by G Mining and Knight Piesold.

Project Location
Marathon

129673006 REVA
Prepared by DH on 2021-01-04

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
1.6-1

Title
Comparison of Project Footprints (2014 and 2020)

Table 1.6-1: Project Process Changes

Topic	2013 Project	2020 Project[1]	Rationale
General Items			
Mineral Resource Estimate (measured, indicated, inferred)	121.0 M tonnes	179.9 M tonnes	Higher commodity prices, Project optimization and improved project efficiencies.
Construction Workforce	400 people	450 to 550 (average) people	Updated planning estimates.
Operations Workforce	365 people	375 people	Updated planning estimates.
Mine Life	11.5 years	12.7 years	Updated mine schedule based on Project optimization.
Construction Timeline	2 years	2 years	Site preparation and construction phase combined for 2020 Project, however overall timeline has not changed.
Workforce Distribution Operations General	~35% hired from local area, 65% hired from outside local area (travelling or moving into the area to work at mine site)	Assumed 80-90% of workforce will be from regional catchment	Updated planning estimates.
Capital Costs	$14 M of pre-production capital costs $425 M project capital costs $143.5 M sustain capital costs (approx. $12M/yr.)	$431 M project capital costs $277 M sustaining capital cost	Inflation and revised Project design
Operating Costs	$1.22 B total life of mine (approx. $100M/yr)	$1.71 B total life of mine (approx. $122M/yr)	Inflation and revised Project design
Pits			
Pit wall minimum safety factor	1.2:1	1.3:1	Improved safety factor
Bench height	12 m	10 m	Revised mining plan
Ore Processing			
Crushed Ore Stockpile	110,000 tonnes	75,000 tonnes	Smaller crushed ore stockpile based on Project optimization.

Table 1.6-1: Project Process Changes

Topic	2013 Project	2020 Project[1]	Rationale
Process Plant Throughput (Average)	22,000 tonnes per day	25,200 tonnes/day (average)	Increased Process Plant throughput based on Project optimization.
Concentrate Management			
Concentrate Storage Shed	6,000 tonnes capacity	5,000 tonnes capacity	Reduced storage capacity determined to be sufficient (optimized) for the Project.
GHG reductions	Primary crusher and infrastructure primarily located East of Open Pits	Primary crusher and infrastructure centralized and moved west of Open Pits Removal of Type 2 stockpiles and reduced handing of material	Centralization of infrastructure and improvements to haul truck routes reduces travel distances, thereby reducing fuel consumption and GHG emission.
Mine Rock and MRSA			
Total mine rock	288 M tonnes	326 M tonnes	Revised mining plan based on Project optimization.
Percentage of Type 1 Mine Rock	85-90%	85-90%	No change
Volume Type 2 Mine Rock	20 M tonnes	37 M tonnes	Updated estimate based on additional mine rock sampling and a lower (more conservative) total percent sulphur cut-off for PAG mine rock (Type 2)
Drainage Areas Affected by MRSA	Subwatersheds 102, 103, and 108	Subwatersheds 102 and 103 (removed from Subwatershed 108)	Addresses concerns expressed by Indigenous communities and the public that the Project needs to be developed in a manner that is protective of the Pic River watershed.
Type 2 Mine Rock Storage	Temporarily stockpiled on the surface, then placed in open pits and covered with water or Type 1 mine rock	Placed in the PSMF or the South or Central Pits during operations. Mine rock in the PSMF will be covered by Type 1 process solids (saturated). Mine rock in the pits will be covered by water.	Improved efficiency of mining operations (reduced handling of material). Facilitates mine closure.

Table 1.6-1: Project Process Changes

Topic	2013 Project	2020 Project[1]	Rationale
Process Solids and PSMF			
PSMF Storage Capacity	61 M m^3	78 M m^3	PSMF design updated to accommodate increased mine production and segregation and storage of Type 2 process solids and Type 2 mine rock
Percent of Type 1 Process Solids	85-90%	85-90%	No change
Percent of Type 2 Process Solids	10-15%	10-15%	No change
Type 2 Process Solid Storage	Stored in PSMF or Satellite pits and covered with water or Type 1 process solids	Stored in PSMF and Central Pit and covered by Type 1 process solids (saturated) or covered by water, respectively.	Revised mine plan
PSMF Configuration	Cell 1 = 5 M m^3 Cell 2 = 45 M m^3	Cell 1 = 14 M m^3 Cell 2A + 2B = 64 M m^3	PSMF design updated to accommodate increased mine production and segregation and storage of Type 2 process solids and Type 2 mine rock
Water Management Pond (WMP)	Contact water managed in the PSMF (cell 2) and reclaimed	Manage process water from the PSMF and site contact water	PMSF design revised to minimize contact water stored / managed in Cells 1 and 2.
Stormwater Management (SWM) Pond	Stormwater runoff routed to PSMF, treated as necessary and discharged to Hare Lake	SWM Pond included to manage stormwater runoff water from Process Plant area and the Aggregate Plant area. Pumped to the WMP or treated as necessary, and discharged to Hare Lake.	Manage stormwater runoff from the Process Plant area, Truckshop / Warehouse area, Laydown area and the Aggregate Plant area. Provide tertiary containment for the Process Plant area and associated pipelines (i.e., process solids and reclaim water pipelines) and Fuel Farm, ensuring that Subwatershed 101 and the Pic River will be protected in the case of an unplanned event.
Dam Height	330 to 375 masl	343 to 380 masl	Increase in PSMF storage capacity required to accommodate increase in mine production (process solids and Type 2 mine rock)

Table 1.6-1: Project Process Changes

Topic	2013 Project	2020 Project[1]	Rationale
Water Management			
Process Water (water required for commissioning and operation of the Process Plant)	1.3 M m^3	1.4 M m^3	Slight increase as a result of the optimization of the WMP within the PSMF.
Process Plant Reclamation water usage	23,000 – 26,400 m^3/day	Up to 25,000 m^3/day	Thickening of Type 1 process solids prior to discharge results in a lower reclaim water requirement.

[1] Values presented for the 2020 Project are indicative of the pending 2021 Feasibility study technical report and/or as outlined in the 2020 PEA technical report.

*Note: All values are considered approximate and are based on conceptual design completed for the purposes of the environmental assessment. Some values may be revised at the detailed design stage of the Project.

As a result of the refinements to the Project, several benefits have been realized over the previous mine design proposed in the original EIS (2012), including: improved overall economics; improved management of water on-site; reduced greenhouse gas and carbon footprint; and reduced footprint of the mine infrastructure within the Pic River watershed.

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