Marathon Palladium Project Environmental Impact Statement Addendum

VOLUME 1 OF 2

3.0 Project Alternatives

Prepared for:

GENERATIONPGM

Prepared by:

Stantec

Ecometrix | Environmental INTELLIGENCE

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Knight Piésold CONSULTING

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Abbreviations

ARD	Acid Rock Drainage
BN	Biigtigong Nishnaabeg
CIAR	Canadian Impact Assessment Registry
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
GDP	Gross Domestic Product
GenPGM	Generation PGM
HONI	Hydro One Networks Inc.
IESO	Independent Electricity Systems Operator
IR	Information Request
KP	Knight Piésold Ltd.
masl	Metres above sea level
MAA	Multiple Accounts Analysis
ML	Metal Leaching
MNRF	Ministry of Natural Resources and Forestry
MRSA	Mine Rock Storage Area
non-PAG	Non-Acid Generating
PAG	Potential Acid Generating
PGM	Platinum Group Metals

PMFN	Pic Mobert First Nation (Netmizaaggamig Nishnaabeg)
PPFN	Pays Plat First Nation (Pawgwasheeng First Nation)
PSMF	Process Solids Management Facility
ROM	Run of Mine
SID	Supporting Information Document
TS	Transformer Station
WMP	Water Management Pond

3.0 PROJECT ALTERNATIVES

The majority of the planning phase for the Project was completed from 2009 to 2014 through consultation, presentation of options and alternatives assessment; a current evaluation of Project alternatives is presented below. This Chapter includes a brief updated evaluation of the "Alternatives To" the Project and an updated assessment of "Alternative Means" where new alternatives have been identified since 2014.

Both assessments have been updated relative to the assessments provided in the original EIS (2012) and subsequent responses to information requests (IR) in consideration of refinements to specific aspects of Project design and execution considered by GenPGM. Where no change has been made to the approach or design of the Project, the original assessments in the EIS (2012) and IR responses should be referenced, with notable reference to the following:

- IR 4.2.3 – Analysis of Alternative Means (CIAR #456)
- IR 4.2.4 – Road Access and Discharge Pipeline Options (CIAR #406)
- IR 4.3.1 – Alternatives to Mine Waste Disposal (CIAR #467)
- IR5.1 – Assessment of Alternatives (Rail Load Out) (CIAR #441)
- IR6.2 – Assessment of Alternatives (Transmission Line) (CIAR #371)
- SIR1 – Assessment of Alternative Rail Load-out Locations and Rail Shunting Noise Criteria (CIAR #580)

In regard to the "Alternatives To" assessment, the analysis has been updated to incorporate GenPGM's perspectives as the Proponent of the Project.

With specific reference to the "Alternative Means" assessment, the updated evaluation focuses on project components for which alternatives have been identified or for which changes have been made relative to the Project design presented in the original EIS (2012) and corresponding responses to IRs. Consistent with the approach taken in the original EIS (2012) and response to IR 4.2.3, refinements of site infrastructure locations, outside of the main components of the Project whose location is either fixed (i.e. open pits) or was previously addressed through an assessment of alternatives (i.e., MRSA, PSMF), are not considered alternative means of carrying out the Project and, therefore, no formal evaluation is considered. Specific refinements to the design of the Project and rationale for such refinements are identified and described in Section 1.6 of this report.

3.1 ALTERNATIVES TO THE PROJECT

The original EIS (2012), including responses to IRs, explored two potential Project alternatives - proceeding with the Project as proposed and the Do Nothing alternative that represents the status quo. While refinements to the design of the Project have been implemented, the Project remains essentially the same palladium and copper mine located north of Camp 19 Road outside of the Town of Marathon as

originally proposed. In accordance with the EIS guidelines for this Project, the assessment of "Alternatives To" the Project is presented from the Proponent's perspective.

The purpose of and need for the Project is described in Section 1.4of this report. In brief, GenPGM has identified that there is a business case that supports the Project based on market demand for PGMs, the critical role of PGMs and copper in technologies that will be instrumental in the transition towards renewable energy, and the Project fit within GenPGM's corporate objectives.

The principal advantages and benefits associated with proceeding with the Project, in addition to providing needed resources for the global palladium market (among others) are socio-economic in nature, within the context of the economic activity that would be generated by the Project, including, but not limited to, training opportunities, direct and indirect job creation and business opportunities, increased household income, increased GDP, and increased tax revenue for governments. Such positive effects would be felt locally, where unemployment rates are above the provincial average and recent nearby mine closures have increased the supply of a qualified workforce. Additional positive effects would be felt at the provincial and national levels (i.e., supply of raw ore material to support existing smelters, resolving gap in global supply of palladium resources). Potential benefits are anticipated to be realized by both Indigenous and non-Indigenous individuals and communities alike. Accrued benefits would be realized over the life of the Project.

Should the Project not proceed, such advantages/benefits would not accrue as the result of the Do Nothing alternative, since it represents the status quo. While potential adverse effects on the environment may be avoided under this scenario, the extent and significance of which will be assessed in Chapter 6 of the EIS Addendum (Volume 2), failing to proceed with the Project would result in unrealized benefits and use of an existing resource for which global demand exists. It is noted however, that the Do Nothing alternative does not meet the purpose of the Project as stated by GenPGM (see Section 1.4.2).

In consideration of the above, proceeding with the Project remains the preferred alternative and the Do Nothing alternative can be discarded from the Proponent's perspective because it does not meet the purpose of the Project.

3.2 ALTERNATIVE MEANS OF CARRYING OUT THE PROJECT

Alternative means of carrying out a project are technically and economically feasible and reasonable ways for a project to be implemented. This could include, for example, alternative locations for infrastructure, routes for Project components, methods of development and implementation, and mitigation measures.

The updated alternative means of carrying out the Project, relative to the previous project design, considers technically and economically feasible alternatives for the following:

- Alternative site access road
- Alternative transmission line route
- Alternative mine waste storage

As noted in the original EIS (2012) (see Section 3.2.2.9.2), and Section 1.9 of the response to IR 4.2.3 (CIAR #456), options for locating the majority of mine infrastructure facilities are dictated to a great extent by the elements of the proposed development whose positions are more or less fixed (e.g., the open pits) or whose siting is of greater priority (e.g., the PSMF and MRSA). Section 1.6 of this report provides a list of the design changes with rationale for each, including relocation of some components, changed dimensions, and greater extraction rates, that GenPGM has made as it has advanced the project feasibility study. Efforts were made to reduce the overall footprint of the Project as the design process has progressed, and consideration of environmental mitigation strategies through design have been integrated where possible. From GenPGM's perspective, the process has been one of optimization and fine tuning, as opposed to the consideration of alternatives that would fundamentally change the nature of the development or unnecessarily expand the site footprint which has already undergone extensive planning and consultation from 2009 to 20014. Moreover, changes that have been proposed that may affect the assessment of potential project-related effects will be considered in Chapter 6 of the EIS Addendum (Volume 2). As such, refinements of site infrastructure locations are not alternative means of carrying out the project and, therefore, no formal evaluation is considered herein.

3.2.1 Alternatives Means Assessment Framework

Alternatives were assessed by comparing selected evaluation criteria representing biophysical environment factors, socio-economic factors, consideration associated with Indigenous peoples and land and resource uses, technical factors and cost factors. For each evaluation criterion, a further set of indicators was developed. The evaluation criteria and associated indicators used to assess Project-related alternatives are set out in Table 3.2-1. A rating scheme was used as a method by which to compare the alternative means. The rating scheme identifies the alternative means as "preferred", "acceptable", or "unacceptable", in relation to the evaluation criteria. Generally, something was deemed "preferred" where a benefit was derived from implementing the alternative. A rating of "acceptable" was assigned where no substantial change in an indicator was expected, after the application of Project-related mitigation measures. Something was deemed "unacceptable" where it would be unfeasible or would result in an unacceptably negative outcome. The rating scheme is explained in Table 3.2-2.

The alternative means assessment was based on the following premises:

1. all evaluation criteria were considered important to Project success
2. an alternative means should generally be rated as "acceptable" in all cases to be advanced to conceptual design
3. an "unacceptable" rating for any evaluation criteria would generally render the alternative unacceptable

With reference to premise 3, it is conceivable that a rating of "unacceptable" for an individual evaluation criterion would not render the overall rating of the alternative unacceptable under exceptional circumstances. In this case, it is assumed that the net benefit provided by the alternative as it concerns the other evaluation criteria substantially outweighs the "unacceptable" rating for the single criterion.

Table 3.2-1: Alternatives Means Assessment Evaluation Criteria and Evaluation Criteria Indicators

Evaluation Criteria		Evaluation Criteria Indicator	
Criteria	**Criteria Rationale**	**Indicator**	**Indicator Rationale**
Biophysical Environment Factors	The Project will interact with the biophysical environment and potential effects of the Project on the biophysical environment are assessed as part of the environmental assessment process. The biophysical environment comprises surface water and groundwater, the terrestrial environment, and the atmospheric environment.	Surface Water	A greater hydrological footprint implies a greater potential for water resources and aquatic habitats to be potentially affected.
		Groundwater	A greater hydrogeological footprint implies a greater potential for water resources and aquatic habitats to be affected.
		Fisheries Resources	Adverse effects to fisheries resources where appropriate compensation cannot be provided should be reduced.
		Air Quality	Adverse effects on air quality should be reduced.
		Acoustic	Adverse effects of noise should be reduced.
		Vegetation	Removal or reduction in vegetation should be reduced where possible/practicable.
		Wildlife	Removal or reduction in wildlife habitat or direct effects on wildlife should be reduced where possible/practicable.
		Species at Risk	Removal or reduction in species at risk habitat or direct effects on species at risk should be reduced where possible/practicable.
Socio-economic Environment Factors	The Project will interact with the socio-economic environment and potential effects of the Project on the socio-economic environment are assessed as part of the environmental assessment process. The socio-economic environment includes economic factors (e.g., employment, contribution to the local, regional and national GDP and tax bases), human health, land and resource uses, archaeology, and cultural and heritage features.	Economic factors	Alternatives that provide the most positive economic benefits on local, regional and national scales are preferred.
		Human Health	Alternatives with less potential risk to human health are preferred.
		Land and Resource Uses	Alternatives that do not negatively affect land and resources uses are preferred.
		Archaeology and Cultural Heritage features	Alternatives that do not negatively affect archaeological and cultural heritage features are preferred.

Table 3.2-1: Alternatives Means Assessment Evaluation Criteria and Evaluation Criteria Indicators

Evaluation Criteria		Evaluation Criteria Indicator	
Indigenous Considerations	The Project site falls within an area covered by the Robinson-Superior Treaty and in which Indigenous groups are present. According to Biigtigong Nishnaabeg First Nation (BN), they are not signatories to the Robinson-Superior Treaty and have filed a Statement of Claim in Ontario related to exclusive Indigenous title over lands which includes the Project Site. While Pic Mobert First Nation (PMFN) (Netmizaaggamig Nishnaabeg) has acknowledged these claims by BN, Pays Plat First Nation (PPFN) (Pawgwasheeng First Nation) and Métis communities assert aboriginal rights and interests at the Project site, including spiritual, cultural, socio-economic, harvesting and other traditional practices. Project has the potential to affect Indigenous land uses for traditional purposes such as gathering country foods and Indigenous archaeological and cultural and heritage features. The EA process must consider Indigenous interests.	Indigenous traditional land uses	Alternatives that do not affect Indigenous traditional land uses are preferred.
		Indigenous Archaeological and Cultural Heritage features	Alternatives that do not adversely affect Indigenous archaeological and cultural and heritage features are preferred.
Technical Factors	The implementation of a mining Project is a complex undertaking. It is most desirable to limit complexity in design, construction, operation and decommissioning to the extent practicable.	Complexity of design	Simple or straightforward designs relying on tested and proven technologies are preferred.
		Complexity of construction	Simple or straightforward construction activities using standard and proven techniques are preferred.
		Complexity of operation	Simple or straightforward operational procedures using available standard operating procedures are preferred.
		Amenability to decommissioning/reclamation	Alternatives that are more amenable to decommissioning and/or reclamation are preferred.
Cost Factors	Each aspect of the Project has cost implications. The Project can only proceed if it is economically feasible to do so. Life-of-mine costs relate to capital costs, operational costs, and closure costs.	Capital costs	Lower capital costs are preferred to reduce the pre-production costs and influence the project economic viability.
		Operating costs	Lower operational costs are preferred to maintain project economics.
		Closure costs	Lower closure and post-closure costs are preferred to reduce long term liabilities.

Table 3.2-2: Alternative Means Assessment Evaluation Criteria Rating Scheme

Evaluation Criteria	Evaluation Criteria Ratings
Biophysical Environment Factors	• Preferred - negligible adverse effects to the biophysical environment without mitigation • Acceptable – negligible or low adverse effects to the biophysical environment with mitigation • Unacceptable - likely to cause substantial adverse effects to the biophysical environment that cannot reasonably be mitigated
Socio-economic Environment Factors	• Preferred - negligible adverse effects to the socio-economic environment without mitigation • Acceptable – negligible or low adverse effects to the socio-economic environment with mitigation • Unacceptable - likely to cause substantial adverse socio-economic effects that cannot reasonably be mitigated
Indigenous Considerations	• Preferred - negligible adverse effects to Indigenous groups without mitigation • Acceptable – negligible or low adverse effects to Indigenous groups with mitigation • Unacceptable - likely to cause substantial adverse effects to Indigenous groups that cannot reasonably be mitigated
Technical Factors	• Preferred - predictably effective with contingencies if the alternative does not perform as expected • Acceptable - appears effective based on modelling/predicted results; contingencies are available if the alternative fails to perform as expected • Unacceptable - effectiveness appears questionable or relies on unproven technologies
Cost Factors	• Preferred - facilitates the most favourable return on investment • Acceptable - facilitates an acceptable return on investment • Unacceptable - cannot be financially supported by the Project

3.2.2 Site Access Road

3.2.2.1 Alternatives Considered

Site access road alternatives were originally assessed in the alternative means assessment provided in Section 3.2.2.1 of the original EIS (2012) and in response to IR 4.2.4 (CIAR #406), including Option 1 (use of the existing site road network (Camp 19 Road)) and Option 2 (development of a new site access road). Based on the analysis presented in the original EIS (2012) and response to IR 4.2.4, the

construction of the new site access road was originally “preferred” and therefore proposed for the Project. That option was “preferred" for three of the five individual rating criteria, although use of the existing road was deemed acceptable as it was rated "acceptable" for each criterion.

In light of changes to the configuration of the mine/mill site footprint (see Section 1.6), GenPGM has identified a third alternative in the form of a revised site access road alignment (Option 3) located slightly west of Option 2 (see Figure 3.2-1). The new road alignment would be similar in that it includes the development of a new road segment extending north from the Camp 19 Road; however, the new road segment would begin approximately 500 m closer to the Highway 17 junction than was previously envisioned. The principal reason for contemplating this alternative road corridor is that this new alignment would align more directly with the location of the more centralized Process Plant in the reconfigured mine plan. Following Option 1 or 2 would bring traffic onto the site approximately 300 m east of the Process Plant, just south of the South Pit, and therefore would require additional construction to reach the Plant Site, as well as to access other project site components. In consideration of the revised access road alignment, an updated alternatives assessment is provided below comparing the new proposed alignment (Option 3) and the original proposed alignment (Option 2) using the assessment framework described above. The evaluation of the potential impacts below considers the following mitigation measures, which are common to both alternatives:

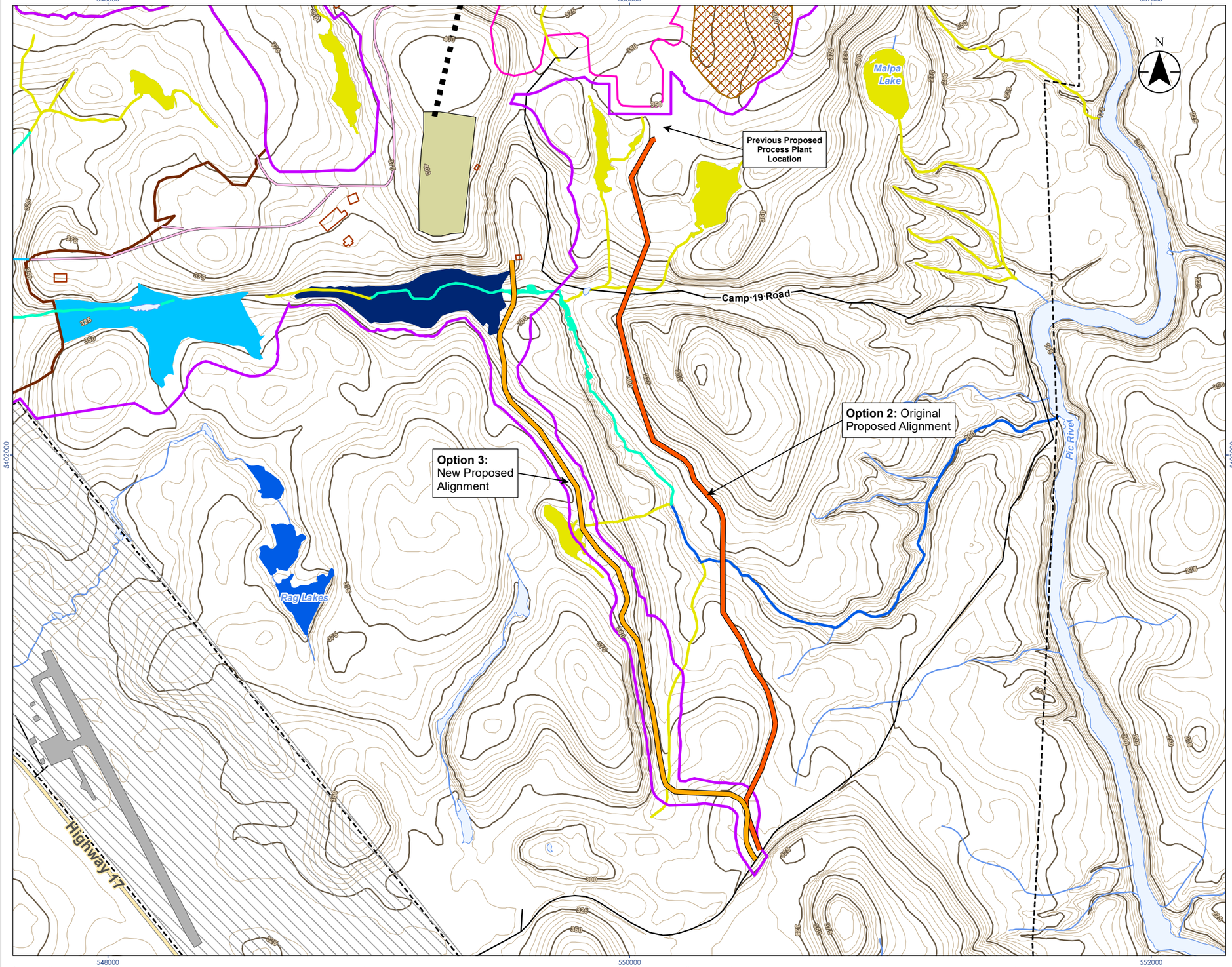
- Stream crossings would be constructed in accordance with applicable regulatory requirements to protect fish habitat
- Fugitive dust emissions from the road surface would be mitigated via standard practices, such as the application of calcium chloride or water
- Land clearing activities would be completed outside the nesting season

For reference, basic features associated with the two roads are highlighted below. It is noted that vehicles travelling on either site access road option would be highway-type vehicles and will require a road with a desired grade of not more than 6-8% for safe travel during the winter months.

- Option 2: Original Proposed Alignment
    - Origin – Approximately 2.3 km from Highway 17 Junction on north side of Camp 19 Road
    - Length – Approximately 3.0 km ending 300 m east of the Process Plant
    - Elevations and Grade – Leaves the Camp 19 Road at elevation 295 masl and arrives east of the Plant Site at elevation 345 masl. Grades of less than 8% along entire length; 750 m road length at 8%
    - Stream Crossings - Two crossings are required – one crossing of a non-fish bearing tributary of Stream 1 and one crossing of a cold / cool water mid-reach of Stream 1
    - Existing Terrestrial Habitat – Rock knob geography with mix of white birch and balsam fir dominated forest communities
- Option 3: New Proposed Alignment
    - Origin – Approximately 2.2 km from Highway 17 Junction on north side of Camp 19 Road

- Length – Approximately 2.8 km terminating just south of Process Plant
- Elevations and Grade – Leaves the Camp 19 Road at elevation 290 masl and arrives just south of the Plant Site at elevation 305 masl. Grades of less than 8% along entire length
- Stream Crossings – Three crossings are required – two crossings of non-fish bearing headwaters of Stream 1 and one stream crossing of a cool / warm water tributary of Stream 1.
- Existing Terrestrial Habitat – Rock knob geography with mix of white birch and balsam fir dominated forest communities

The location of the originally proposed alignment (Option 2) and the new proposed alignment (Option 3) for the site access road are provided on Figure 3.2-1.



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Legend

- Project Footprint 2020
- Option 3: New Proposed Alignment
- Option 2: Original Proposed Alignment
- Project Boundary (MLAS, MENDM Changed 2017)
- Topographic Contour (5 m Intervals)
- Topographic Contour (25 m Intervals)
- Highway
- Topographic Contour (5 m Intervals)
- Topographic Contour (25 m Intervals)
- Watercourse
- Airport (Property Boundary)
- Airport Infrastructure
- Waterbody
- Cool/ Warm Water Fish
- Cold/ Cool Water Fish
- No Fish

Proposed Project Components 2020

- Conveyor
- Discharge Line
- Haul Road
- Building/ Facility Footprint
- Stormwater Management Pond
- Open Pit
- Overburden Stockpile
- Process Soilds Manadement Facility (PSMF)
- Process Plant Area
- Water Management Pond

0 0.5 1 km

1:15,000 (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.
3.2-1

Title
Alternative Site Access Road Alignments for the Marathon Palladium Project

3.2.2.2 Biophysical Environment Factors

A greater interaction with fisheries resources is expected with the original proposed alignment (Option 2) than with the new preferred alignment (Option 3). The most notable consideration in this regard is related to the location of the mid-reach Stream 1 crossings that would be required. Any watercourse crossing along each alignment would be implemented following appropriate DFO and MNRF operational statements, guidance and protocols so as to maintain water conveyance and permit fish passage; the extent of the interaction with resident fish and fish habitat differs. The mid-reach Stream 1 crossing for Option 2 is in an area that provides habitat for all life history stages and functions for resident Brook Trout. In contrast, the Stream 1 crossing for Option 3 is located farther upstream in an area identified as supporting cool / warm fish (i.e., upstream of Brook Trout populations that have been identified on more downstream reaches).

The magnitude (as surface area) of physical disturbance associated with land clearing needed to develop either new road segment is similar. The preferred Option 3 is likely to have less impact on species at risk habitat than the previous Option 2 given that the new alignment is proposed to follow along a ridge which is less preferred by Canada Warbler than the valley (Option 2). In both cases, land clearing activities would be expected to occur outside the nesting season so as not to disrupt migratory birds.

Neither road option would affect groundwater quality in the area. Potential air quality effects associated with the use of either road option are the same (i.e., fugitive dust emissions) and can be mitigated with standard practices. Fugitive dust emissions from road sources on-site were modelled as part of the air quality impact assessment in the original EIS (2012) and will be updated as part of the EIS Addendum (Volume 2). Potential acoustic impacts associated with the use of either road option are the same as well (i.e., noise from truck traffic). Option 3 is located farther west than Option 2, which reduces the separation from potential receptors identified along Highway 17, albeit road noise from Highway 17 is expected to be greater than from the mine traffic.

As a result of the above, Option 3 is preferred for this criterion, based on the ability to reduce impacts on fish and fish habitat, specifically Brook Trout.

3.2.2.3 Socio-economic Environment Factors

No specific potential economic and human health related differences between the two site access road alternatives have been identified and both would rate as “acceptable” from this perspective.

Safe travel for all potential users along the shared portion of the Camp 19 Road between Highway 17 and the new site access road is an important consideration and a management plan will be developed for traffic safety. Neither proposed road alignment option is distinguishable from the other in that regard since both require site access from the Camp 19 Road.

Access to the Project site will be limited in order to maintain security at the mine and to protect public safety. Therefore, some of the potential land and resource uses will be limited during construction and operation into the closure phase until such time as access is deemed safe. Both alternatives would allow continued access of the eastern section of the Camp 19 Road beyond the intersection of Camp 19 Road

and the proposed new road segment, which provides direct access to the Pic River and locations from which boats can be launched.

Based on archaeological surveys on the Project site and information provided by local Indigenous communities, no archaeological and cultural and heritage features would be affected by the development of the new road segment in either alignment option.

3.2.2.4 Indigenous Considerations

No specific potential differences between the two site access road alternatives have been identified as it concerns Indigenous considerations and both would rate as acceptable from this perspective.

The development of the mine will restrict potential Indigenous uses (e.g., animal harvesting and country food gathering) on the Project site (Site Study Area) for a period of time, regardless of which site access road route is utilized. Indigenous peoples expressed the desire for continued use of the existing road to access the Pic River. The development of the new road segment would allow continued use of the portion of the existing road (beyond its intersection with either Option 2 or 3) to access the Pic River without the need to share it with mine-related traffic. As indicated above, this section of the Camp 19 Road provides direct access to the Pic River and locations from which boats can be launched.

Based on archaeological surveys on the Project site and information provided by local Indigenous communities, no archaeological or cultural and heritage features would be affected by the development of the new road segment in either alignment option.

The Pic River itself is considered an important natural feature by local Indigenous groups, in particular BN, who expressed these sentiments directly to GenPGM. Development of either new road segment would keep heavy equipment traffic away from the river (relative to Option 1), thereby mitigating the possibility of an accidental heavy equipment vehicle loss into the river.

3.2.2.5 Technical Factors

Both alternatives are technically feasible from the perspective of design, construction and operations and would service the Site.

Option 3 provides a more direct route to the Process Plant, given the updated site plan, and is therefore preferred from that perspective.

Option 3 will require one additional crossing (i.e., culvert) than the Option 2; however, the constructability of the Stream 1 crossing for Option 3 is improved, as it requires considerably less fill than the crossing associated with the original preferred alignment (Option 2). The crossing for the new proposed alignment is located farther upstream in Subwatershed 101 and the span and depth of the crossing is a fraction of that relative to the crossing needed for Option 2, which is located in the mid-reach of Subwatershed 101. The new proposed alignment is therefore preferred from that perspective.

It has been estimated that the reclamation effort associated with the two alternatives would be similar. The nature of these efforts (e.g., road decommissioning) would be determined during detailed mine closure planning and would respect and attempt to balance public, Indigenous group and government desires as it pertains to future land and resource uses.

3.2.2.6 Cost Factors

Construction of the two road alignment options will primarily involve land clearing, excavation of soil/overburden, and aggregate fill placement. Fill placement will be less for Option 3 than Option 2 and, as a result, construction costs are assumed to be less for Option 3 than that of the Original Proposed Alignment (Option 2).

From an operational perspective, the costs associated with Option 2 are expected to be incrementally higher than the transportation costs associated with Option 3, based on road length and, therefore, Option 3 is preferred from that perspective.

As indicated above, it has been estimated that the reclamation effort, and the costs associated with the two alternatives would be similar and that specific decommissioning/reclamation options would be determined during detailed mine closure planning.

3.2.2.7 Conclusion

Based on the analysis outlined above, the preferred alternative is the construction of the new proposed alignment of the site access road (Option 3). This option was “preferred" for three of the five individual rating criteria above. Use of the original preferred alignment (Option 2) was still deemed acceptable as it was rated as "acceptable" for each criterion.

3.2.3 Transmission Line

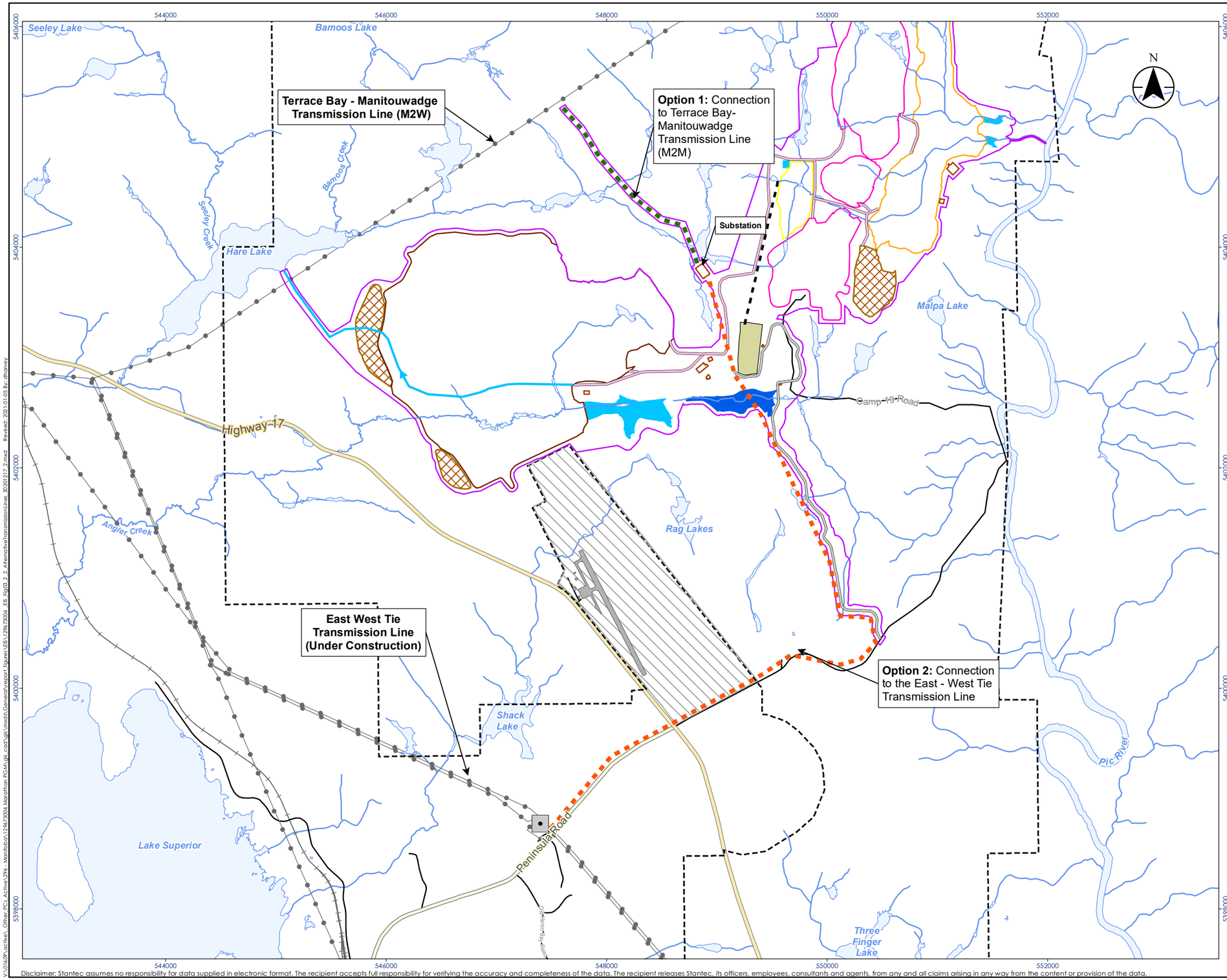
3.2.3.1 Alternatives Considered

It is noted that the originally proposed electrical power supply for the Project was a new transmission line connection to the existing Terrace Bay-Manitouwadge transmission line (M2W Line). In response to IR 6.2 (CIAR #371), a cursory level assessment was completed to discount the use of diesel generators as the primary source of power for the Project. A new transmission line connecting to the M2W line was identified as the proposed source for the Project, and it was acknowledged at the time that the (then) proposed East-West Tie would further ensure adequate and secure power supply to the Project.

With completion of the East-West Tie transmission line west of Highway 17, consideration for an alternate transmission line route and connection to the East-West Tie has been considered. For the purposes of updating the alternatives assessment, an assessment of the following two alternatives has been presented below:

- Option 1: Connection to Terrace Bay-Manitouwadge Transmission Line (M2W)
- Option 2: Connection to the East–West Tie Transmission Line

For reference, while Option 1 would consist of a new transmission corridor running north from the Project to the Terrace Bay-Manitouwadge Transmission Line, Option 2 would consist of a new transmission corridor running south from the Project along the proposed site access road and Camp 19 Road to a location near the Marathon Transformer Station (see Figure 3.2-2).



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Legend

- Project Footprint 2020
- Option 1: Connection to Terrace Bay-Manitouwadge Transmission Line (M2M)
- Option 2: Connection to the East - West Tie Transmission Line
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Major Road
- Hydro Line
- Railway
- Watercourse
- Marathon Transformer Station
- Airport (Property Boundary)
- Airport Infrastructure
- Waterbody

Proposed Project Components 2020

- Access Road
- Conveyor
- Discharge Line
- Haul Road
- 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

1:35,000 (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.
3.2-2

Title
Alternative Transmission Line Corridor Alignments

3.2.3.2 Biophysical Environment Factors

Option 1 would require a new corridor to be established, while Option 2 would run parallel to the site access road and Camp 19 Road. Detailed routing of a new corridor could avoid sensitive habitat; however, it would create additional edge habitat and interrupt undisturbed habitat. Because Option 2 would be within an existing corridor, adverse changes to the biophysical environmental are reduced. As such, Option 2 is “preferred” for this criterion.

3.2.3.3 Socio-economic Environmental Factors

No specific potential socio-economic related differences between the two transmission line alternatives have been identified and both would rate as “acceptable” for this criterion.

3.2.3.4 Indigenous Considerations

No specific potential differences between the two transmission line alternatives have been identified as it concerns Indigenous considerations and both would rate as “acceptable” from this perspective. Based on information provided by local Indigenous communities, no archaeological or cultural and heritage features are known that would be affected by the development of the transmission line in either alignment option.

3.2.3.5 Technical Factors

Both alternatives are technically feasible from the perspective of design, construction and operations and would service the Site. A more linear corridor is generally preferred to minimize the number of bends in the transmission line that would otherwise require added structural supports. Property access and avoidance of existing infrastructure, such as utilities, drainage, and other existing electrical lines, are also preferred.

Option 1 follows a relatively straight pathway between the Project and its connection with the M2W line, while Option 2 would follow a less direct route along existing and proposed roadways to meander around the airport and across Highway 17. Option 2 would require multiple 90º bends in the transmission line to follow the roadways.

A new corridor across existing forested areas is required to construct Option 1, which would require vegetation clearing and appropriate access to be provided for construction equipment. While Option 2 would also require vegetation clearing, parallel road access for construction and maintenance would already exist via the site access road and Camp 19 Road. Since Option 2 would follow existing roadways, the potential interaction with existing infrastructure (i.e., existing electrical lines, roadways, driveways, drainage or other infrastructure) is greater and may require access to properties that are outside of the care and control of GenPGM.

The availability of a connection point within the existing Marathon Transformer Station (TS) (which would be required for Option 2) is unknown at this time. It is anticipated that additional land may be needed either within the footprint of, or adjacent to, the Marathon TS to construct an appropriate connection. While an agreement with the Independent Electricity System Operator (IESO) and Hydro One Networks Inc. (HONI) are required in both cases, a system impact assessment was completed for Option 1 in 2013. Further, more flexibility exists for GenPGM to identify an appropriate connection location for the M2W line (Option 1) given their existing surface rights in the area than for a connection to the East-West Tie (Option 2).

Both alternatives are considered technically feasible options (subject to confirmation by IESO / HONI) for which potential technical constraints can be overcome, albeit the ability to connect to the East-West Tie is uncertain at this time; however, as a result of a straighter corridor, ability to avoid potential interaction to existing infrastructure, and availability of land within the care and control of GenPGM, Option 1 is “preferred” for this criterion.

3.2.3.6 Cost Factors

A shorter transmission line is preferred to minimize construction costs and energy losses during operation. Both options require a substation to convert power for use at the mine site. Both alternatives would incur similar costs for vegetation clearing and a per km cost for construction.

Option 1 is approximately 2.2 km in length, less than one third the length of Option 2 (approximately 7.4 km long), although access for construction of Option 2 will be readily available from the existing/proposed roads. Nonetheless, construction costs are estimated to be greater for Option 2 given that this alignment is more than three times the length of Option 1.

It has been estimated that the reclamation effort would be similar for both options; however, the costs associated with Option 2 would be greater than for Option 1 due to the difference in length. Specific decommissioning/reclamation options would be determined during detailed mine closure planning.

Based on the above, Option 1 is “preferred” for this criterion.

3.2.3.7 Conclusion

Based on the analysis outlined above, the preferred alternative remains as Option 1: Connection to the Terrace Bay-Manitouwadge Transmission Line. This option was “preferred" for two of the five individual rating criteria and is considered similar for an additional two of the five criteria. While a connection to the East-West Tie Transmission Line following the existing/proposed roadways would be “acceptable”, and would avoid the creation of a new transmission line corridor through the existing forested area (i.e., reduced impacts to habitat), the original transmission line alternative (Option 1) was deemed to be the preferred alternative based on its shorter length, straighter orientation, and technical feasibility (i.e., availability of property and potential to avoid interaction with existing infrastructure). Further, given the uncertainty associated with being able to connect to the East-West Tie (i.e., where a system impact

assessment through IESO has been completed for Option 1 but not Option 2), confirming Option 2 as a technically feasible alternative is uncertain at this time.

3.2.4 Assessment of Alternatives For Mine Waste Storage

The selection of a preferred alternative for mine waste storage required detailed study and conceptual modelling given its environmental and economic importance and specific regulatory requirements; it was originally conducted separately using slightly different methods, which are described below and are consistent with Environment and Climate Change Canada (ECCC) guidance on mine waste disposal.

3.2.4.1 Assessment Framework

Knight Piésold Ltd. (KP) developed an alternatives assessment for the storage of the by-products of the mining (mine rock) and milling processes (process solids) as part of the original EIS (2012) (Knight Piésold, 2012 [SID #11], CIAR #227). Additional information and analyses concerning the alternatives assessment was provided in response to IR 4.3.1 (CIAR #467), IR 4.3.2 (CIAR #440) and IR 4.3.3 (CIAR #420). The assessment evaluated potential storage locations, both permanent and temporary, for mine rock, process solids and low-grade ore within the Project site boundary, as well as the strategy of segregating Type 1 (non-acid general (non-PAG)) and Type 2 (potentially acid generating (PAG)) materials. The response to IR 4.3.1 specifically reconsidered the evaluation of MRSA locations and mine rock segregation in more detail within the context of the overall mine rock storage strategy described in the original project description.

The alternatives assessment for permanent mine waste stockpiles was conducted via a multiple accounts analysis (MAA) following Environment Canada's *Guidelines for the Assessment of Alternatives for Mine Waste Disposal (May 2011).* The assessment approach is consistent with the current version (December 2016) of the guidelines, and considered the following evaluation criteria (or accounts):

- environmental factors (including water quality and impacts to fisheries, flora and fauna)
- socio-economic factors (including effects to the population with respect to human health, resource and recreational uses and Indigenous land uses)
- technical factors (including complexity of design, construction and operating considerations)
- cost factors (including life of mine costs)

A comparative assessment was also completed to evaluate the proposed temporary stockpile locations associated with Type 2 mine rock and ore. The MAA alternatives analysis was not completed on the temporary stockpiles, as they do not represent permanent mine waste storage alternatives. An active ore stockpile (run of mine (ROM) Stockpile) will be maintained adjacent to the Primary Crusher. The ROM stockpile is required for operational flexibility and is expected to vary in size throughout the operational phase. Key criteria for the temporary ore stockpile was that the stockpile be located close to the Primary Crusher and pit areas and that the runoff from the stockpiles could be managed with the runoff water management at the pit and Primary Crusher areas.

GenPGM reviewed the aforementioned assessment and associated supporting materials to support refinements to the mine design and plan. Based on this review, no fundamental changes to the mine waste management plan are proposed as it considers the permanent storage of mine-related wastes. The mine waste storage facilities, including the MRSA and PSMF, will be generally positioned as proposed in the original EIS (2012) and the strategy of segregating Type 1 and Type 2 materials will be integrated into the mine operations. Minor differences between the original and updated project descriptions are noted in Section 1.6 of this report and are highlighted below for reference. The differences reflect ongoing optimization of the mine design and plan, and do not materially alter the decision-making process with respect to the overall strategy for mine waste management. Any influence that such changes to the project description has on the assessment of potential project-related effects will be captured in Chapter 6 of the EIS Addendum (Volume 2).

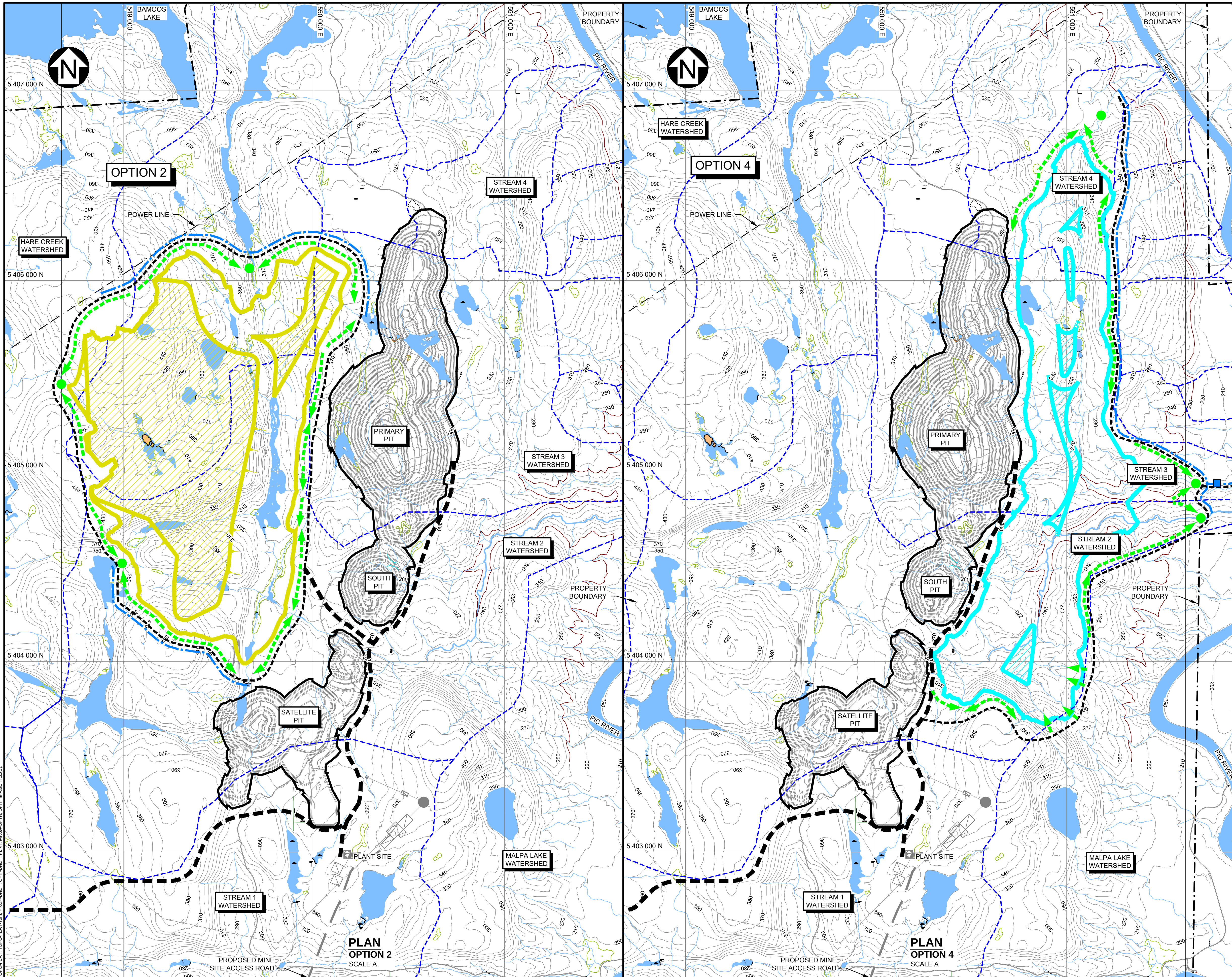
3.2.4.2 Mine Rock Storage

3.2.4.2.1 Type 1 Mine Rock Storage

Eight candidate sites (Options 1 to 8) were considered within the original MRSA evaluation. An initial screening assessment of the candidate sites eliminated four locations primarily due to issues related to insufficient storage capacity, difficulties related to runoff water management, and relatively long-haul distances between the open pits and the potential storage area. The remaining four candidate sites were evaluated in more detail utilizing the assessment criteria listed above. The four candidate sites assessed were as follows:

- Option 2 - west of the open pits, within Subwatersheds 106, 104 and 102
- Option 4 - east of the open pits, within Subwatersheds 104, 103 and 102
- Option 6 – south of the previous Plant Site location, within Subwatershed 101 and the Malpa Lake Subwatershed
- Option 8 – two stockpiles as per Option 2 (west of the open pits, within Subwatersheds 106, 104 and 102) and Option 4 (east of the open pits, within Subwatersheds 104, 103 and 102)

Figure 3.2-3 and Figure 3.2-4, which were adapted from Figures 4.3.1-4 and 4.3.1-5 of IR 4.3.1 (CIAR #467), illustrate the conceptual locations of Type 1 MRSA. While individual Project components may differ from the current Project design, these figures are being provided here for reference and to highlight the options considered with respect to MRSA locations.



LEGEND:

- WATER
- OPTION 2
- OPTION 4
- PROPERTY BOUNDARY
- POWER LINE
- WATERSHED DIVIDE (BY OTHERS)
- RUNOFF WATER FLOW DIRECTION
- COLLECTION / MONITORING POINTS
- PROPOSED HAUL ROAD
- PROPOSED ACCESS ROAD
- WATER MANAGEMENT PIPELINE
- WATER TREATMENT PLANT
- PROPOSED SITE ACCESS ROAD

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS ON CANADA DEPARTMENT OF NATURAL RESOURCES (2009).
2. COORDINATE GRID IS UTM (NAD27) ZONE 16N AND IS IN METRES.
3. INFRASTRUCTURE BASED ON INFORMATION PROVIDED BY STILLWATER CANADA INC.
4. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
5. MARATHON PGM-Cu PROPERTY BOUNDARIES PROVIDED BY STILLWATER CANADA INC. (NOVEMBER 28 2011) .
6. FIGURE PREPARED IN 2013 FOR IR 4.3.1 RESPONSE. PROJECT COMPONENTS ILLUSTRATED ARE BASED ON 2013 PROEJCT DESIGN.

SCALE A 200 100 0 200 400 600 800 1000 m

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

ALTERNATIVE TYPE 1 MRSA LOCATIONS - OPTIONS 2 AND 4

Knight Piésold CONSULTING

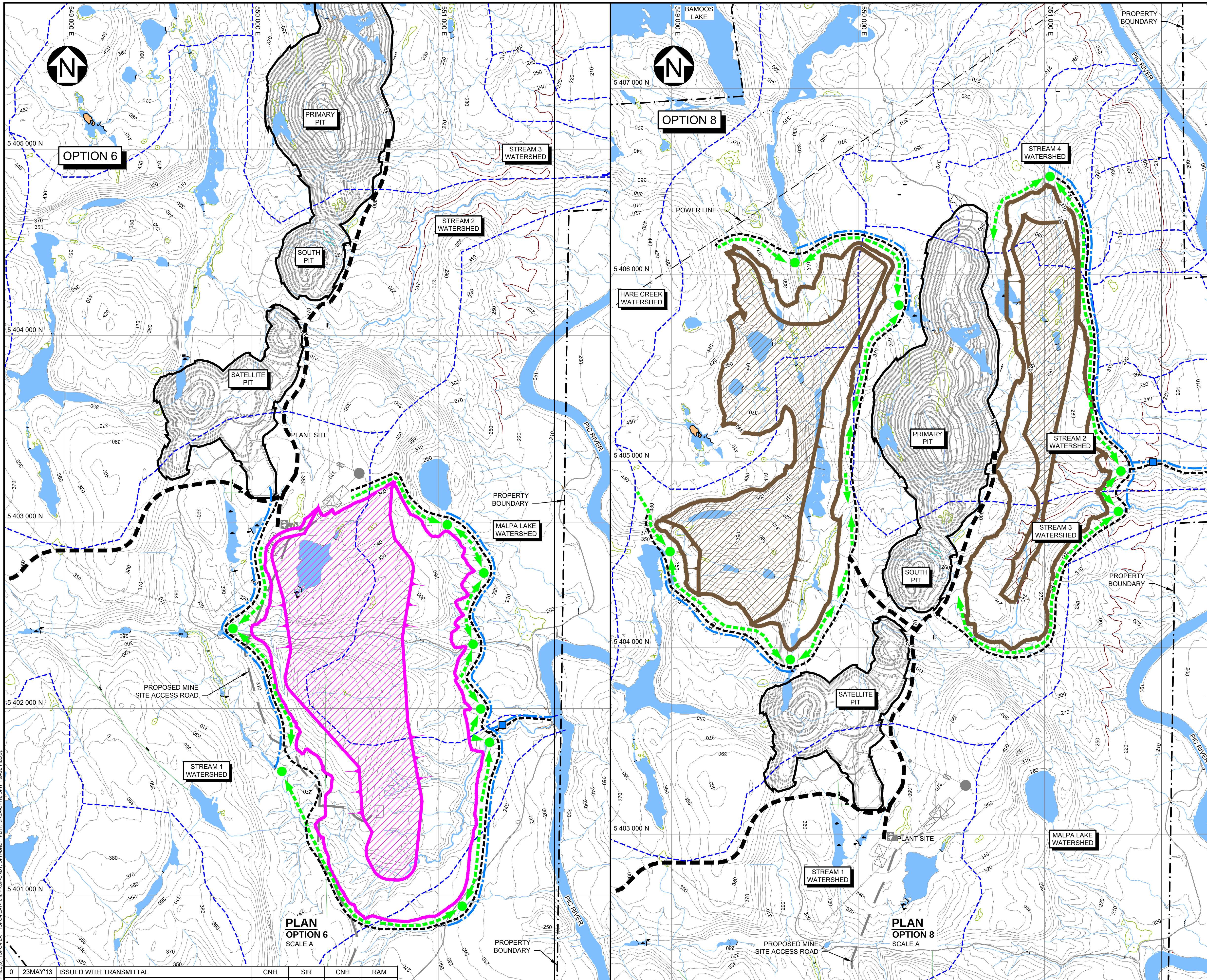
P/A NO.	REF NO.
NB101-446/5	NB13-00319

FIGURE 3.2-3 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	23MAY'13	ISSUED WITH TRANMITTAL	CNH	SIR	CNH	RAM

SAVED: I:\101\00446\05\A\Acad\FIGS\B11_r0, 5/23/2013 11:53:21 AM, NLIBERTY PRINTED: 5/23/2013 11:37:06 PM, OPTN 2-4, NLIBERTY

Revised December 2020



REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	23MAY'13	ISSUED WITH TRANSMITTAL	CNH	SIR	CNH	RAM

LEGEND:

- WATER
- OPTION 6
- OPTION 8
- PROPERTY BOUNDARY
- POWER LINE
- WATERSHED DIVIDE (BY OTHERS)
- RUNOFF WATER FLOW DIRECTION
- COLLECTION / MONITORING POINTS
- PROPOSED HAUL ROAD
- PROPOSED ACCESS ROAD
- WATER MANAGEMENT PIPELINE
- WATER TREATMENT PLANT
- PROPOSED SITE ACCESS ROAD

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS ON CANADA DEPARTMENT OF NATURAL RESOURCES (2009).
2. COORDINATE GRID IS UTM (NAD27) ZONE 16N AND IS IN METRES.
3. INFRASTRUCTURE BASED ON INFORMATION PROVIDED BY STILLWATER CANADA INC.
4. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
5. MARATHON PGM-Cu PROPERTY BOUNDARIES PROVIDED BY STILLWATER CANADA INC. (NOVEMBER 28 2011) .
6. FIGURE PREPARED IN 2013 FOR IR 4.3.1 RESPONSE. PROJECT COMPONENTS ILLUSTRATED ARE BASED ON 2013 PROEJCT DESIGN.

SCALE A 200 100 0 200 400 600 800 1000 m

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

ALTERNATIVE TYPE 1 MRSA LOCATIONS - OPTIONS 6 AND 8

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-446/5	NB13-00319

FIGURE 3.2-4 REV 0

Revised December 2020

The results of this assessment indicated that the MRSA located along the east side of the open pits (Option 4) was the preferred MRSA option for the Project. Option 4 received the highest scores for each of the evaluation criteria. As it pertained to environmental factors, Option 4 was preferred due to more straightforward water management requirements and relatively low impact to fish communities. As it pertained to socio-economic factors, Option 4 was rated highest primarily due to better indicator scores for human health. As it pertained to technical factors, the main reason Option 4 ranked highest was related to the fact that a lower number of runoff collection and monitoring locations is required for water management (i.e., it provides for simpler design, construction and operation related to water management). Finally, on cost factors, Option 4 scored better than the other alternatives due to lower initial capital costs, associated with simpler water management infrastructure requirements, and lower closure costs, associated with the need for a lesser amount of reclamation.

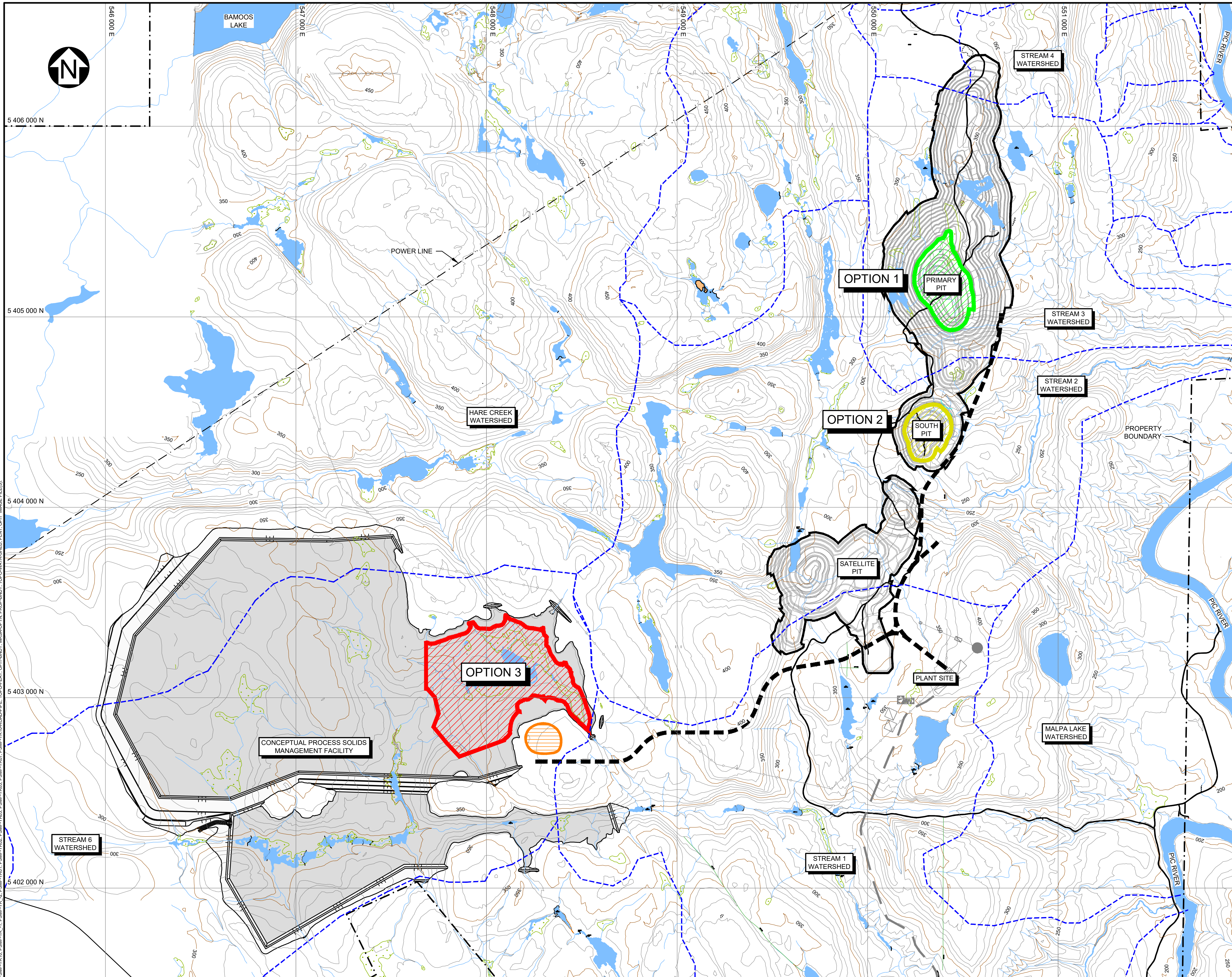
It is noted that Option 4 retained the highest scores for all of the accounts in consideration of the sensitivity analysis, and that its ranking as the preferred option was unaffected by setting all weightings equal to 1 suggesting that the assigned weighting factors did not bias the assessment. By revising the footprint of the MRSA to avoid alterations (i.e., clearing, storage of mine rock, alteration to drainage) within Subwatershed 104, potential impacts on the Pic River have been reduced even further relative to Option 4 based on the refined design.

3.2.4.2.2 Type 2 Mine Rock Permanent Storage

Originally, three permanent Type 2 MRSA options were identified and evaluated as part of the alternatives assessment:

- Option 1 – base of the primary open pit (now identified as the North Pit)
- Option 2 – base of the south open pit (now identified as the Central Pit)
- Option 3 – within the PSMF

Figure 3.2-5, which was adapted from Figure 4.3.1-6 of IR 4.3.1 (CIAR #497), illustrates the conceptual location options of Type 2 Mine Rock Storage. While individual Project components may differ from the current Project design, this figure is provided here for reference and to highlight the options considered with respect to Type 2 Mine Rock Storage Locations.



LEGEND:

- WATER
- PROCESSED SOLIDS / SUPERNATANT POND
- OPTION 1
- OPTION 2
- OPTION 3
- PROPERTY BOUNDARY
- POWER LINE
- WATERSHED DIVIDE (BY OTHERS)
- HAUL ROAD
- EXISTING ACCESS ROAD
- PROPOSED SITE ACCESS ROAD

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS ON CANADA DEPARTMENT OF NATURAL RESOURCES (2009).
2. COORDINATE GRID IS UTM (NAD27) ZONE 16N AND IS IN METRES.
3. INFRASTRUCTURE BASED ON INFORMATION PROVIDED BY STILLWATER CANADA INC.
4. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
5. MARATHON PGM-Cu PROPERTY BOUNDARIES PROVIDED BY STILLWATER CANADA INC. (NOVEMBER 28 2011) .
6. FIGURE PREPARED IN 2013 FOR IR 4.3.1 RESPONSE. PROJECT COMPONENTS ILLUSTRATED ARE BASED ON 2013 PROEJCT DESIGN.

SCALE A 200 100 0 200 400 600 800 1000 m

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	23MAY'13	ISSUED WITH TRANSMITTAL	CNH	SIR/NWL	CNH	RAM

SAVED: I:\101\00446\05\A\acad\FIGS\B12_r0, 5/23/2013 11:55:25 AM, NLIBERTY PRINTED: 5/23/2013 1:38:35 PM, Layout1, NLIBERTY

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

Alternative Type 2 Mine Rock Storage Locations

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-446/5	NB13-00319

FIGURE 3.2-5 REV 0

The overall strategy associated with each alternative is to store the Type 2 mine rock below a water cover over the long term to mitigate risks associated with the conditions that would promote acid rock drainage (ARD) and associated metal leaching (ML).

The results of the permanent Type 2 MAA indicated that all of the alternatives scored similarly, and all options would be suitable, although Option 3 (storage area in PSMF) was preferred as its overall rating score was higher than the other two options. The outcome of the MAA was unaffected by the sensitivity analysis.

A revised storage plan for Type 2 mine rock has been proposed as part of the updated mine plan that is consistent with the original MAA in that it focuses on storage within the PSMF and the mined-out Open Pits. In the revised plan, Type 2 mine rock will be deposited in the PSMF for the first seven years of operations, and then in the South Pit and Central Pit for the remaining years of operations. The Type 2 mine rock storage plan has been developed as part of the integrated mine waste management strategy for the updated mine plan. The revised mine waste management strategy removes the need for temporary Type 2 mine rock stockpiles by storing additional Type 2 mine rock in the PSMF during the first seven years of operations. This approach minimizes the amount of PAG material exposed to atmospheric conditions during the mine operating period and removes the need to double handle material thereby reducing the greenhouse gas emissions associated with the Project.

3.2.4.2.3 Type 2 Ore Temporary Storage

In the original EIS (2012) and in response to IR 4.3.1, a comparative assessment was completed to evaluate proposed temporary stockpile locations associated with Type 2 mine rock and ore, with key evaluation criteria associated with proximity to the primary crusher (closer/shorter haul distance being preferred) and ease of runoff management (within the pit or Plant Site drainage being preferred). At that time, it was envisioned that multiple stockpiles would be needed to accommodate the expected tonnage and, therefore, potential stockpile locations were deemed to be suitable or not suitable.

Seven options were identified as follows:

- Option A - northwest side of the primary open pit (now identified as the North Pit)
- Option B - east side of the primary open pit in the footprint of the MRSA
- Option C - southeast of the primary open pit
- Option D - north of the primary open pit
- Option E - west of the satellite open pits (now identified as the South Pit)
- Option F - east of the satellite open pits
- Option G - within the primary open pit (north end)

The temporary storage of Type 2 mine rock is no longer required with the updated mine plan; however, temporary ore stockpiles are proposed. The original assessment of alternative locations remains relevant.

Figure 3.2-6, which was adapted from Figure 4.3.1-7 of IR 4.3.1 (CIAR #467), illustrates the conceptual location of temporary ore storage. While individual Project components may differ from the current Project design, this figure is being provided here for reference and to highlight the options considered with respect to the temporary Type 2 locations.

SAVED: I:\1\01\00446\05\A\Acad\FIGS\B14_r0 , 5/23/2013 11:53:57 AM , NLIBERTY PRINTED: 5/23/2013 1:39:46 PM, MINE ROCK & ORE STOCK TYPE 2 , NLIBERTY
XREF FILE(S): TOPO-FEAT; OPIT; MRSA-OPTN; PLNT; MRSA-YR11; OPIT-BNDY; PSMF-YR_-1; PSMF-YR_-2; PSMF-YR01; PSMF-YR02; PSMF-YR03; PSMF-YR05; PSMF-YR07; PSMF-YR10 IMAGE FILE(S):

548 750 E
549 500 E
550 250 E
551 000 E
551 750 E

5 406 750 N
5 406 000 N
5 405 250 N
5 404 500 N
5 403 750 N
5 403 000 N
5 402 250 N

PROPERTY BOUNDARY
POWER LINE
PIC RIVER
HARE CREEK WATERSHED
OPTION D
STREAM 4 WATERSHED
OPTION A
OPTION G
OPTION B
OPTION 2 TYPE 1 MRSA
OPTION 4 TYPE 1 MRSA
PRIMARY PIT
STREAM 3 WATERSHED
OPTION C
STREAM 2 WATERSHED
SOUTH PIT
OPTION E
SATELLITE PIT
OPTION F
MALPA LAKE WATERSHED
PROPERTY BOUNDARY
CONCEPTUAL PROCESS SOLIDS MANAGEMENT FACILITY
PLANT
STREAM 1 WATERSHED

PLAN
SCALE A

150 75 0 250 500 750 m
SCALE A

LEGEND:

- WATER
- OPTION A
- OPTION B
- OPTION C
- OPTION D
- OPTION E
- OPTION F
- OPTION G
- PROPERTY BOUNDARY
- POWER LINE
- WATERSHED DIVIDE (BY OTHERS)
- TYPE 1 MRSA
- RUNOFF WATER FLOW DIRECTION
- POTENTIAL COLLECTION
- EXISTING ACCESS ROAD
- PROPOSED SITE ACCESS ROAD

NOTES:

1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHTS ON CANADA DEPARTMENT OF NATURAL RESOURCES (2009).
2. COORDINATE GRID IS UTM (NAD27) ZONE 16N AND IS IN METRES.
3. INFRASTRUCTURE BASED ON INFORMATION PROVIDED BY STILLWATER CANADA INC.
4. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 5 METRES.
5. MARATHON PGM-Cu PROPERTY BOUNDARIES PROVIDED BY STILLWATER CANADA INC. (NOVEMBER 28 2011).
6. FIGURE PREPARED IN 2013 FOR IR 4.3.1 RESPONSE. PROJECT COMPONENTS ILLUSTRATED ARE BASED ON 2013 PROEJCT DESIGN.

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	23MAY'13	ISSUED WITH LETTER	CNH	SIR	CNH	RAM

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

Alternative Temporary Type 2 Ore Storage Locations

Knight Piésold CONSULTING

P/A NO. NB101-446/5
REF NO. NB13-00319

FIGURE 3.2-6
REV 0

Originally, five of the seven options (Options A, C, E, F and G) were identified as suitable temporary Type 2 mine rock and ore stockpiles. In each of these options, surface runoff associated with the proposed stockpiles is within the catchment area of the open pits and, therefore, it can be readily managed. Option B was considered unsuitable as it would require the development of additional stockpile-specific water management infrastructure. In addition, this stockpile would also reduce the available storage in the MRSA. Option D was deemed unsuitable as runoff water would flow towards the Pic River and, as such, would require the development of additional, stockpile-specific water management infrastructure.

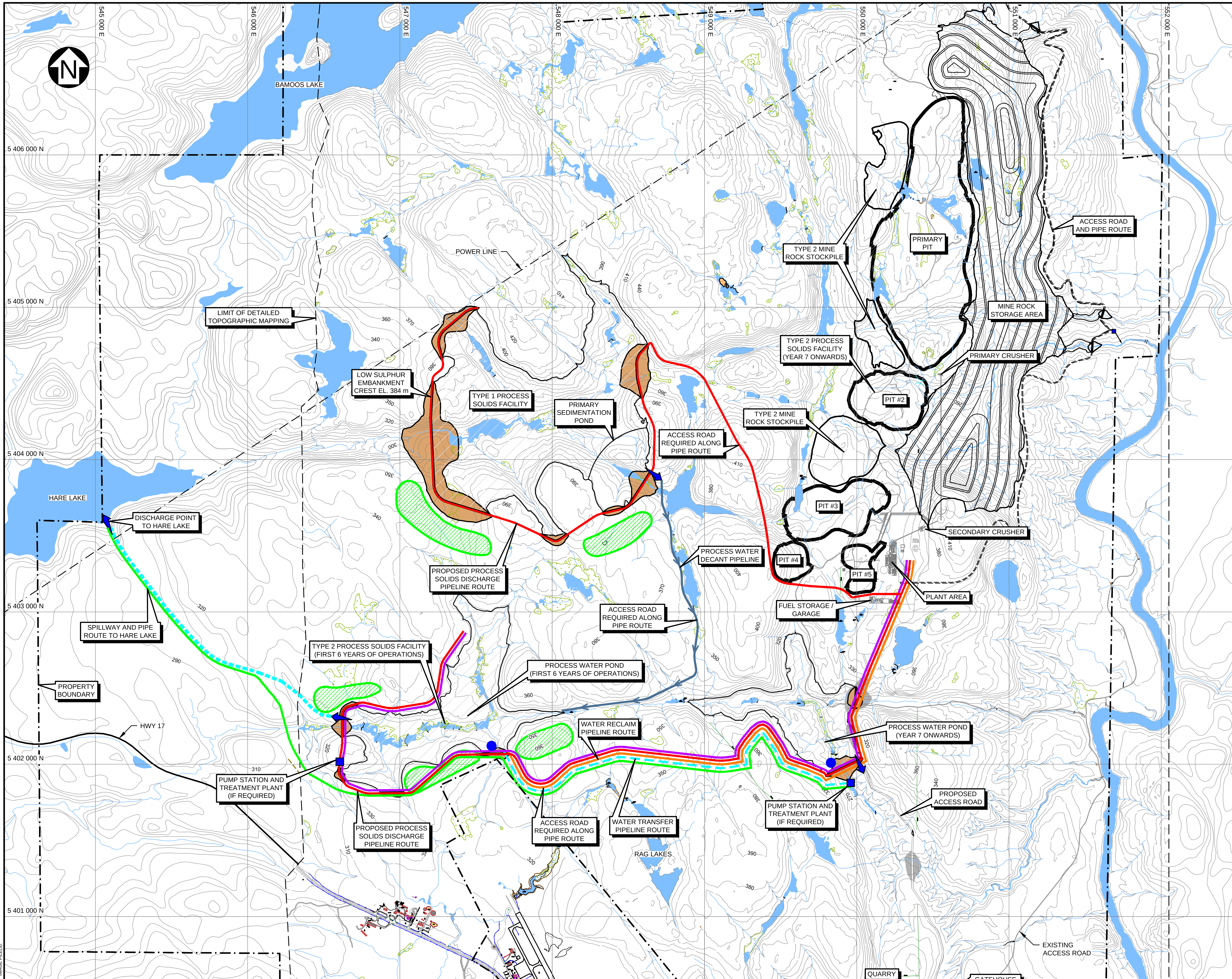
The current mine plan and materials management schedule includes for one temporary ore stockpile location adjacent to the Crusher; however, the temporary storage of Type 2 mine rock is no longer required with the updated mine plan. The ore stockpile is located west of the Central open pit in the new site configuration, wholly within the catchment area reporting to the open pits. This location generally corresponds to Option E as presented in the response to IR 4.3.1, although the stockpile footprint and storage capacity are both larger than originally proposed. The Option E location was deemed suitable as a temporary stockpile location at that time principally because of the proximity of the stockpile for material handling and the ease with which runoff from the stockpile can be managed, and those reasons remain relevant for the current mine plan. This temporary stockpile will store a combination of high- and low-grade ore. The maximum tonnage of the stockpile, equal to about $15x10^6$ tonnes, is expected to occur in Year 7 of mining operations. All low-grade ore is included in the production profile and will be processed during life of mine. It is unlikely but possible that relatively small quantities of Type 1 and/or Type 2 mine rock would remain in the stockpile at the cessation of mine operations. If this is the case, the remaining material would be relocated into the Central or North pits for long-term storage. This is particularly relevant for the Type 2 mine rock and in keeping with the overall long-term mine waste management strategy of storing PAG material in a saturated state to mitigate potential ARD and associated ML.

3.2.4.3 Process Solids Storage

In the *PSMF and MRSA Alternatives Assessment Report* (SID #11) (CIAR #227), Knight Piésold (2012) evaluated three potential storage options for the PSMF, all of which were located west of the ore body (open pits). The detailed assessment utilized the same evaluation criteria identified above. The options were designated as:

- South Option PSMF
- Improved Option 3 PSMF
- Combined Storage Area PSMF

Figure 3.2-7, Figure 3.2-8, and Figure 3.2-9, which were adapted from Figures 4.6, 4.8, and 4.9 of SID #11 (CIAR #227), illustrate the conceptual locations of the PSMF options. While individual Project components may differ from the current Project design, these figures are being provided here for reference and to highlight the options considered with respect to PSMF locations.



LEGEND:

- WATER
- EMBANKMENT
- LANDFILL
- PROCESS SOLIDS/WATER
- RECLAIM WATER PIPELINE
- TYPE 1 PROCESS SOLIDS DELIVERY PIPELINE
- TYPE 2 PROCESS SOLIDS DELIVERY PIPELINE
- EXCESS WATER DISCHARGE PIPELINE
- SPILLWAY
- SPILLWAY / DISCHARGE LOCATION
- PROPOSED PUMP STATION /WATER TREATMENT PLANT
- RECLAIM BARGE/PUMP
- SURFACE SOIL STOCKPILES
- PROPOSED PROCESS WATER DECANT PIPELINE
- PROPERTY BOUNDARY

NOTES:

1. COORDINATE GRID IS UTM (NAD27) ZONE 16N AND IS IN METRES.
2. PLAN BASED ON INFORMATION PROVIDED BY STILLWATER CANADA INC.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
4. EMBANKMENT LOCATIONS FROM AMEC (2009).
5. ACCESS ROAD CONSTRUCTION REQUIRED ALONG PROPOSED PIPE ROUTES.
6. MARATHON PGM-Cu PROPERTY BOUNDARIES PROVIDED BY STILLWATER CANADA INC. (NOVEMBER 28 2011).

SCALE A 250 125 0 250 500 750 1000 1250 m

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

Alternative PSMF Location - South Option

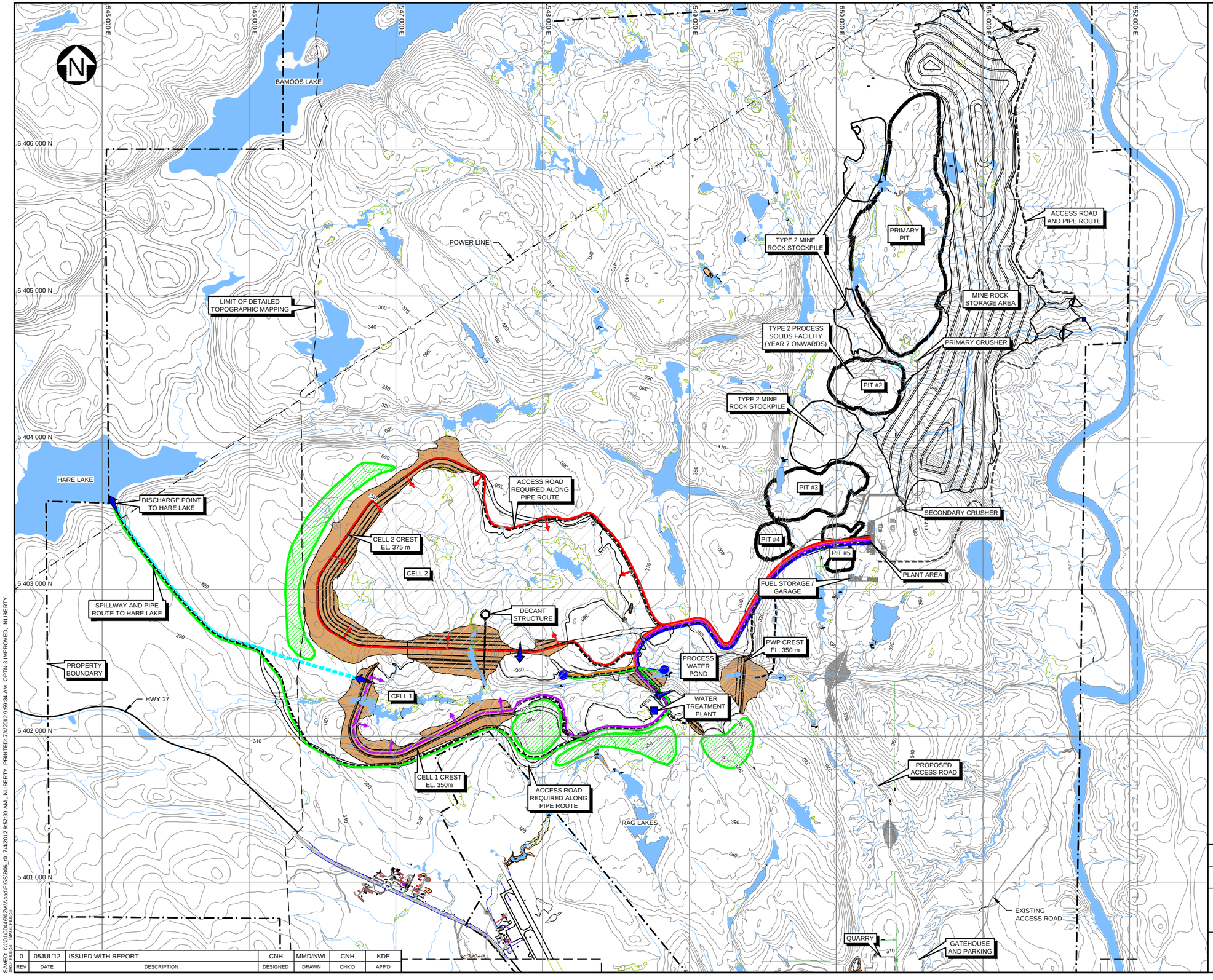
Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-446/2	1

FIGURE 3.2-7 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	05JUL'12	ISSUED WITH REPORT	CNH	MMD/NWL	CNH	KDE

SAVED: I:\101\00446\02\A\Acad\FIGS\B06_r0 , 7/4/2012 9:52:39 AM , NLIBERTY PRINTED: 7/4/2012 9:55:14 AM, SOUTH OPTN, NLIBERTY
XREF FILE(S): IMAGE FILE(S):



LEGEND:

- WATER
- EMBANKMENT
- LANDFILL
- PROCESS SOLIDS/WATER
- RECLAIM WATER PIPELINE
- TYPE 1 PROCESS SOLIDS DELIVERY PIPELINE
- TYPE 2 PROCESS SOLIDS DELIVERY PIPELINE
- EXCESS WATER DISCHARGE PIPELINE
- SPILLWAY
- SPILLWAY / DISCHARGE LOCATION
- PROPOSED PUMP STATION /WATER TREATMENT PLANT
- RECLAIM BARGE/PUMP
- SURFACE SOIL STOCKPILES
- TYPE 1 PROCESS SOLIDS DISCHARGE POINT
- TYPE 2 PROCESS SOLIDS DISCHARGE POINT
- PROPERTY BOUNDARY

NOTES:

1. COORDINATE GRID IS UTM (NAD27) ZONE 16N AND IS IN METRES.
2. PLAN BASED ON INFORMATION PROVIDED BY STILLWATER CANADA INC.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
4. EMBANKMENT LOCATIONS FROM ECOMETRIX (2010).
5. ACCESS ROAD CONSTRUCTION REQUIRED ALONG PROPOSED PIPE ROUTES.
6. MARATHON PGM-Cu PROPERTY BOUNDARIES PROVIDED BY STILLWATER CANADA INC. (NOVEMBER 28 2011).

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

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	05JUL'12	ISSUED WITH REPORT	CNH	MMD/NWL	CNH	KDE

GENERATION PGM INC.

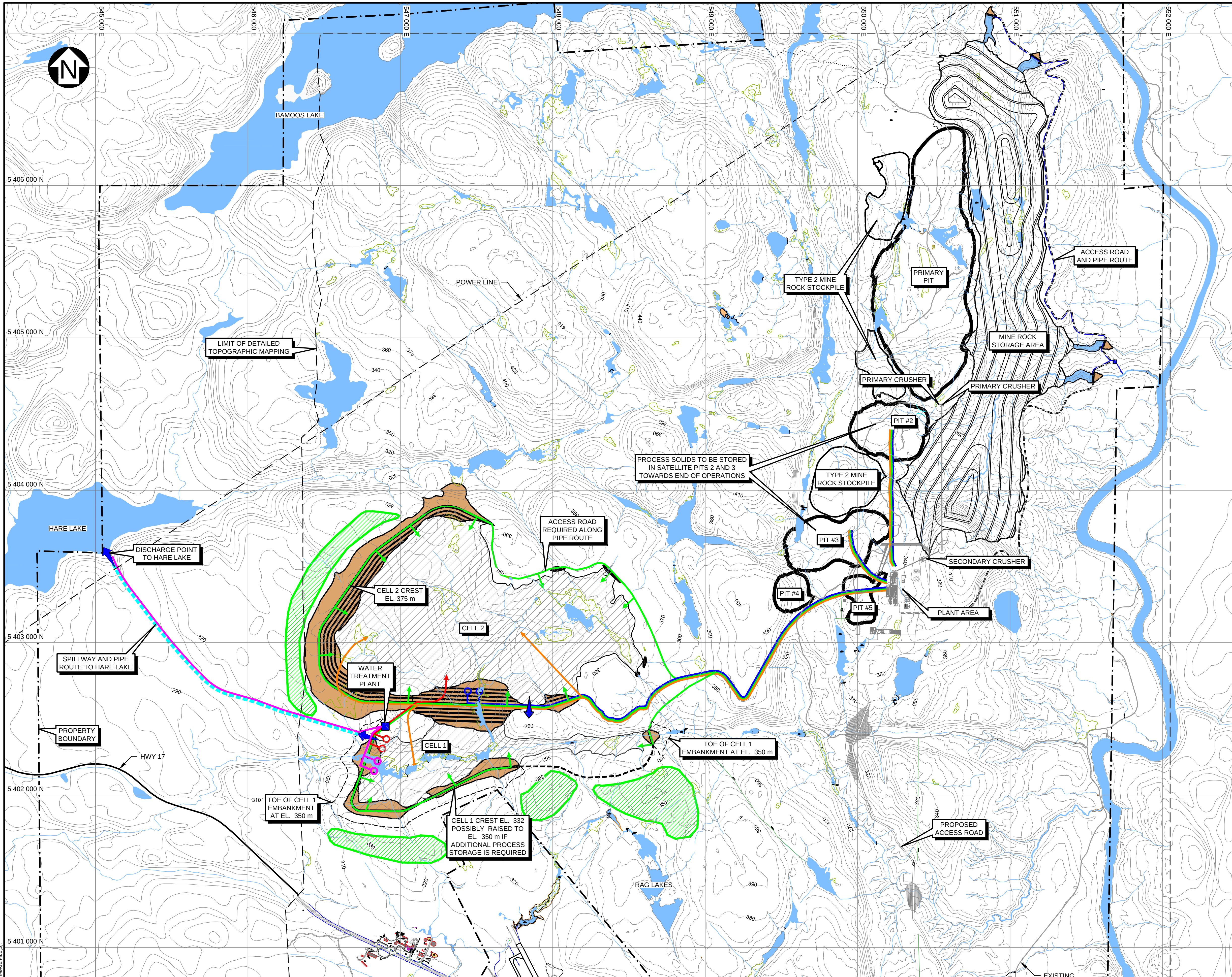
MARATHON PALLADIUM PROJECT

Alternative PSMF Location - Improved Option 3

Knight Piésold CONSULTING

P/A NO. NB101-446/2 | REF NO. 1

FIGURE 3.2-8 | REV 0



LEGEND:

- WATER
- PROPOSED LANDFILL
- EMBANKMENT
- PROCESS SOLIDS/WATER
- SURFACE SOIL STOCKPILE
- PROPERTY BOUNDARY
- ROAD
- TYPE 1 PROCESS SOLIDS PIPELINE
- TYPE 2 PROCESS SOLIDS PIPELINE
- RECLAIM WATER PIPELINE
- WATER TRANSFER PIPELINE
- EXCESS WATER DISCHARGE PIPELINE
- SPILLWAY TO HARE LAKE
- WATER TREATMENT PLANT
- TYPE 1 PROCESS SOLIDS DISCHARGE POINT
- TYPE 2 PROCESS SOLIDS DISCHARGE POINT
- SPILLWAY / DISCHARGE LOCATION

NOTES:

1. COORDINATE GRID IS UTM (NAD27) ZONE 16N AND IS IN METRES.
2. PLAN BASED ON INFORMATION PROVIDED BY STILLWATER CANADA INC.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 10 METRES.
4. ACCESS ROAD CONSTRUCTION REQUIRED ALONG PROPOSED PIPE ROUTES.
5. MARATHON PGM-Cu PROPERTY BOUNDARIES PROVIDED BY STILLWATER CANADA INC. (NOVEMBER 28 2011).

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

GENERATION PGM INC.

MARATHON PALLADIUM PROJECT

Alternative PSMF Location - Combined Option

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB101-446/2	1

FIGURE 3.2-9 REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	05JUL'12	ISSUED WITH REPORT	CNH	SIR	CNH	KDE

SAVED: I:\1\01\00446\02\A\Acad\FIGS\B34_r0 , 7/4/2012 9:52:11 AM , NLIBERTY PRINTED: 7/4/2012 9:53:59 AM, Layout 1, NLIBERTY
XREF FILE(S): IMAGE FILE(S):

The results of the assessment indicated that the Combined Storage Area PSMF - a multi-cell PSMF approximately 350 ha in size largely limited to Subwatershed 106, was the preferred PSMF option for the Project. This option had the highest rating scores for both environmental and socio-economic evaluation criteria, which offset the moderate ratings it received in relation to technical and cost factors.

As it pertained to environmental factors, Combined Storage Area PSMF ranked higher than the South Option and Improved Option 3 because it comprises a smaller footprint and has less effect on fish communities. As it pertained to socio-economic factors, Combined Storage Area PSMF scored higher than the other alternatives as it has lower potential for dust generation and is located entirely on GenPGM property. As it pertained to technical factors, Improved Option 3 was rated highest due to the lower material volumes required to raise its embankments (dams), although any of the three alternatives were deemed technically feasible. As it pertained to cost factors, Improved Option 3 was rated ahead of the other alternatives due to the lower initial and ongoing capital costs associated with the embankment construction. Neither the Combined Storage Area PSMF nor the South Option was deemed to be cost-prohibitive.

The Combined Storage Area PSMF has been further optimized for the updated mine plan. The PSMF will consist of two storage cells (Cell 1 and Cell 2) and a separate Water Management Pond (WMP) at the east side of Cell 1. The WMP has been included in the PSMF arrangement to reduce the amount of water that is managed within the PSMF. Cell 2 will be divided by an internal rockfill dyke into Cells 2A and 2B to optimize tailings management and storage. The storage strategy will confine the Type 2 (PAG) process solids and mine rock to the east side of Cell 2 where the PAG material will remain saturated in perpetuity. Dividing Cell 2 into two storage cells also reduces the footprint of the PSMF during the first two years of operation. The PSMF arrangement is illustrated on Figure 3.2-6.

The updated PSMF arrangement will provide storage for up to 120 M tonnes of process solids and up to 30 M tonnes of Type 2 (PAG) mine rock. Type 2 (PAG) process solids will be deposited in the Central Pit during the last three years of operations. The waste management strategy allows for all Type 2 (PAG) material to be encapsulated by Type 1 (non-PAG) material.

The previous PSMF arrangement included for approximately 53 M tonnes of process solids storage and 1 M tons of Type 2 (PAG) mine rock. The increased storage capacity within the PSMF footprint has been achieved by raising the Cell 1 and Cell 2 embankments to crest El. 343 masl and 380 masl, respectively. The footprint of the PSMF remains generally the same as previously evaluated in the alternatives assessment provided in the original EIS (2012), albeit slightly larger to accommodate the increased mine rock expected to be generated during operations.

3.3 CONCLUSION

In the updated evaluation of “Alternatives To” the Project, GenPGM (as the Proponent) has confirmed their commitment to proceed with the Project based on the purpose of and need for the Project as described in Section 1.4.1.2 of this report and a recognition that the various advantages and benefits associated with proceeding with the Project would not be realized without the Project.

In terms of “Alternative Means” for carrying out the Project, the updated assessment has focused on project components for which alternatives have been identified or for which changes have been made relative to the Project design presented in the original EIS (2012) and corresponding responses to IRs.

An alternate alignment for the proposed site access road based on aligning more directly with the location of the more centralized Process Plant in the reconfigured mine plan proved to be preferred for its reduced potential impacts on fish and SAR, reduced number of watercourse crossings and corresponding culverts, and reduced costs relative to the originally proposed alignment. However, both alternative alignments were considered acceptable.

While an alternate potential connection location and corresponding alignment for the proposed transmission line was identified, the original proposed connection to the Terrace Bay-Manitouwadge transmission line (M2W Line) was preferred over a potential connection to the East-West Tie. The shorter length, straighter orientation, and technical feasibility (i.e., availability of property and potential to avoid interaction with existing infrastructure) of the proposed transmission line is preferred over an alternate connection to the East-West Tie. However, both alternative connection locations and corresponding alignments were considered acceptable, although the connection to the East-West Tie would be more costly, requiring additional design and agreements to construct the transmission line on properties outside of the care and control of GenPGM.

The proposed waste storage strategy for the Project remains consistent with preferred alternatives identified in the alternatives assessment developed for the original EIS. Type 1 mine rock would be stored in the Option 4 location along the east side of the open pits. Type 2 mine rock would be stored in the base of the South Pit (Option 2) and within the PSMF (Option 3). One temporary ore stockpile would be maintained adjacent to the Primary Crusher west of the Central open pit (similar location as Option E). The Combined Storage Area PSMF would provide storage for all of the Type 1 process solids and most of the Type 2 process solids. Type 2 process solids would be deposited to the Central Pit during the last 3 years of operations. The mine waste storage strategy allows for all Type 2 (PAG) material to be encapsulated by Type 1 (non-PAG) material.