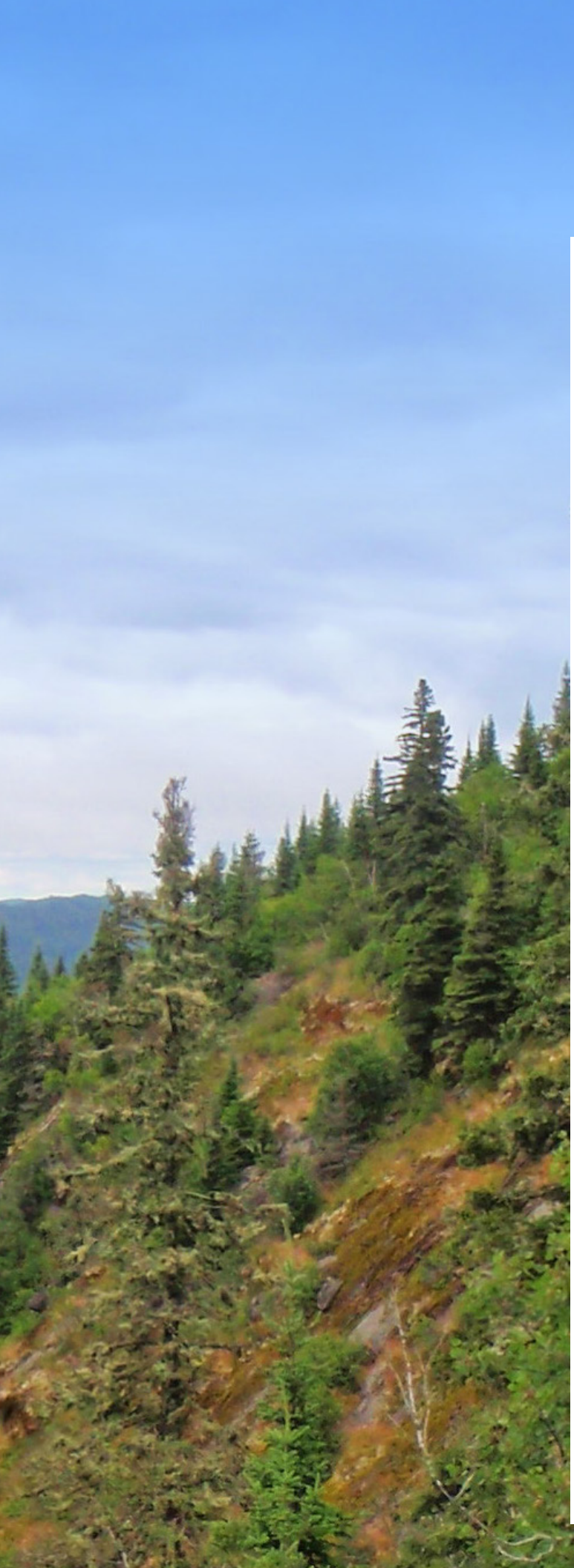


Marathon Palladium Project Environmental Impact Statement Addendum

VOLUME 2 OF 2

6.2.2 Acoustic Environment

Prepared for:

GENERATIONPGM

Prepared by:

Stantec

Ecometrix Environmental INTELLIGENCE

NORTHERN BIOSCIENCE ECOLOGICAL CONSULTING

Knight Piésold CONSULTING

Date: April 2021
Environmental Assessment by Review Panel under CEAA 2012
Reference Number 54755

Table of Contents

LIST OF TABLES

LIST OF FIGURES

Abbreviations

%HA	percent highly annoyed
AIR	Additional information request
CADNA/A	Computer Aided Noise Abatement
CIAR	Canadian Impact Assessment Registry
dB	decibel
dBA	A-weighted decibels
dBAI	A-weighted sound pressure level of an impulsive sound measured with a sound level meter set to "impulse" response
EIS	Environmental Impact Statement
EMMP	Environmental Monitoring and Management Plan
FHWA	US Federal Highway Administration
GenPGM	Generation PGM Inc.
HC	Health Canada
IR	Information Request
kV	KiloVolt
L_d	Daytime equivalent sound level
L_{dn}	day-night average sound level
L_{eq}	equivalent continuous sound level
L_{LM}	Logarithmic Mean Impulse Sound Level
L_n	Nighttime equivalent sound level
LSA	Local Study Area

LU 131	Noise Assessment Criteria in Land Use Planning
M2W line	Terrace Bay-Manitouwadge transmission line
MECP	Ontario Ministry of the Environment, Conservation and Parks
MOE Blasting	MECP Blast Analysis Method
MRSA	Mine Rock Storage Area
MTO	Ministry of Transportation
N/A	Not appplicable
NPC 104	Adjustments for Intermittency and Tonality
NPC 119	Blasting
NPC 205	Sound Level Limits for Stationary Sources in Class 1 & 2 Areas
NPC 300	Stationary and Transportation Source – Approval and Planning
NSRs	noise sensitive receptors
ORNAMENT	Ontario Road Noise Analysis Method for Environment and Transportation
PORs	Points of Reception
PPV	peak particle velocity
PSMF	Process Solids Management Facility
ROM	Run of Mill
RSA	Regional Study Area
SIR	Supplemental Information Request
SSA	Site Study Area
TLRU	Traditional Land Resource Use
TNM	Traffic Noise Model
US EPA	United States Environmental Protection Agency

VEC	Valued Ecosystem Component
WHO	World Health Organization

6.2.2 Acoustic Environment

6.2.2.1 Summary of Original Acoustic Environment Assessment

6.2.2.1.1 Assessment of Residual Effects in Original EIS

Section 6.2.2 of the original EIS (2012) and subsequent responses to information requests from the Panel provided an assessment of the following effects on the acoustic environment as result of the Project:

- change to noise levels

Additional information on the assessment of effects on the acoustic environment was provided in responses to the following IRs:

- Responses to IR 11.1 to IR11.11 (CIAR #435, 463, 395, 374, and 444)
- Responses to SIR2 (CIAR #577)
- Responses to AIR15 (CIAR #664)

The potential project-related changes to noise levels are associated with construction and operation activities at the mine site, and noise associated with traffic to and from the site and the potential Rail Load-out Facility. During the site preparation and construction phase, noise sources include the operation of construction, excavation and drilling equipment, generators, crushers, aggregate plant, concrete batch plant, and blasting. Project-related traffic to and from the site will also be a noise contributor. During the operations phase, noise sources include the operation of the Process Plant, ore handling (e.g. conveyor systems and stockpiles), crushing, blasting, excavation and drill equipment, generators, the concrete batch plant, assay lab, water treatment plant, truck shop. Additionally, project-related traffic to and from the site and the operation of the Rail Load-out Facility (if selected) will also be noise contributors.

Key mitigation measures originally proposed to avoid, reduce and/or offset potential effects of the Project on acoustic conditions include:

- The use of vehicles and equipment that meet the applicable noise suppression regulations
- Scheduling of concentrate delivery at times of day to minimize complaints, whenever possible
- The use of baghouses to limit noise and dust generation at the Rail Load-out Facility
- The implementation of an on-site overpressure and vibration monitoring program upon commencement of blasting
- Establishment of shunting zones at the Rail Load-out Facility to provide setbacks between shunting activities and nearby sensitive receptors in accordance with applicable regulations
- Implementation of a noise monitoring program

6.2.2.1.2 Determination of Significance in Original EIS

For the acoustic environment, the original EIS (2012) concluded that there would be no significant adverse effect. The residual effect is limited to the SSA, is short term, and reversible.

6.2.2.2 Approach to Update the Assessment

The following subsections provide an update to the assessment of residual environmental effects of the Project, including a determination of their significance based on the following:

- Updated environmental conditions within the SSA, LSA and RSA, as appropriate
- Recognition of updated standards, criteria, guidelines, or other thresholds that inform the determination of significance
- Consideration and recognition of project refinements, including changes to the project components and project activities, that may affect potential project interactions, mitigation measures and residual effects

Changes to the results of the previous assessment have been highlighted and discussed below, as appropriate. Supplementary rationale and explanation for the conclusions of the assessment have been provided based on the previous responses to the information requests (IRs, SIRs, AIRs) and additional input from the various technical discipline leads based on the current assessment.

6.2.2.3 Scope of the Assessment

6.2.2.3.1 Regulatory and Policy Setting

Since preparation of the original EIS (2012) and associated baseline reports, there have been changes and updates to the reference publications to be used when assessing the effects of Project-related noise. Table 6.2.2-1 identifies the reference documents used in the preparation of this assessment and those used in the original assessment that are now outdated. An overview of the noise and vibration criteria contained in these documents and considered in the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 1]) (CIAR #727) is provided below in Table 6.2.2-1.

Table 6.2.2-1: Reference Publications

Effects Assessment	Current Reference Document	Obsolete or Replaced Reference Document
Stationary Noise Impact – Operations and Construction	• MECP publication NPC 300; Stationary and Transportation Source – Approval and Planning (NPC 300) • MECP publication NPC 104: Adjustments for Intermittency and Tonality (NPC 104).	• MECP publication LU 131: Noise Assessment Criteria in Land Use Planning (LU 131). • MECP publication NPC 205: Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (NPC 205).

Table 6.2.2-1: Reference Publications

Effects Assessment	Current Reference Document	Obsolete or Replaced Reference Document
	• MECP publication NPC 233: Information to be Submitted for Approval of Stationary Sources of Sound (NPC 233).	• MECP publication NPC 232: Sound Level Limits for Stationary Sources in Class 3 Areas (NPC 232).
Traffic Noise Impact	• MECP publication NPC 300; Stationary and Transportation Source – Approval and Planning (NPC 300) • MECP publication: Ontario Road Noise Analysis Method for Environment and Transportation (ORNAMENT). • Ministry of Transportation (MTO), Environmental Guide for Noise (MTO Guide), dated October 2006.	• MECP publication NPC 206: Sound Level due to Road Traffic (NPC 206).
Blasting, General	• MECP publication NPC 119: Blasting (NPC 119).	• Not Applicable
Human Health Effects	• Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessment: NOISE, 2017 (HC Noise Guideline)	• Not Applicable

The MECP NPC-300 noise limits for stationary steady-state noise are presented in Table 6.2.2-2

Table 6.2.2-2: MECP NPC-300 Steady-State Noise Limits

Time of Day	Exclusionary Limit ($L_{eq(1)}$ dBA)	
	Class 2 Area for Receptors along Highway 17	Class 3 Area for Receptors at Hare Lake
07:00 – 19:00	50	45
19:00 – 23:00	50	40
23:00 – 07:00	45	40

MECP publication NPC-300 contains a road traffic daytime criterion for 16-hour equivalent continuous sound level ($L_{eq(16)}$) for sensitive outdoor living environments (Table 6.2.2-3). This level has been adopted as the base noise level limit for combined baseline traffic and Project traffic noise at the NSRs.

Table 6.2.2-3: NPC-300 Road Traffic Daytime Outdoor Sound Limits

Time Period	Road Traffic Noise Limit L_{eq} 16hr dBA
16-hour, 07:00 – 23:00	55

In addition to NPC-300, the MTO "Environmental Guide for Noise" (MTO 2006) (MTO Guide) identifies that mitigation (i.e. noise barriers) is necessary to reduce the impact of traffic noise when the predicted $L_{eq(16)}$ is greater than 65 dBA and the increase is at least 5 dB greater than the baseline $L_{eq(16)}$. The MTO Guide states that noise mitigation is not required when the predicted $L_{eq(16)}$ is less than 65 dBA and the increase in traffic noise is less than 5 dB.

Since the MTO Guide is used to assess highway traffic noise, the 65 dBA exclusionary noise limit may be excessive for the entire travel route in the Town of Marathon; instead, the 55 dBA NPC-300 sound limit has been adopted. However, consideration to implement mitigation based on a 5 dB increase in road traffic noise, as this represents a perceptible increase in loudness, has been considered in this effects assessment.

With respect to the rail load-out facility, the NPC-300 daytime and nighttime exclusionary limits for a Class 2 area (refer to Table 6.2.2-4) were adopted in this assessment. NPC-300 states that no restrictions apply to a stationary source resulting in an $L_{eq(1)}$ at a Class 2 sensitive POR lower than the daytime and nighttime exclusionary limits presented in Table 6.2.2-4.

Table 6.2.2-4: NPC-300 Rail Loadout Steady-State Noise Sound Limits

Time of Day	Exclusionary Limit ($L_{eq(1)}$ dBA)	
	Outdoor Point of Reception	Plane of Window of Noise Sensitive Spaces
07:00 – 19:00	50	50
19:00 – 23:00	45	50
23:00 – 07:00	-	45

For impulsive noise, the NPC-300 exclusionary noise limits for impulsive noise were applied as presented in Table 6.2.2-5.

Table 6.2.2-5: NPC-300 Rail Loadout Impulsive Noise Sound Limits

Time of Day	Actual Number of Impulses in Period of One-Hour	Class 2 Exclusionary Limit (L_{LM}, dBAI)
07:00 – 23:00	9 or more	50
	7 to 8	55
	5 to 6	60
	4	65
	3	70
	2	75
	1	80

With respect to blasting, the MECP NPC 119 recommended air blast and ground vibrations limits were considered (Table 6.2.2-6).

Table 6.2.2-6: Blasting Noise and Vibration Limits

Regulatory Criterion	Recommended Air Blast Limit (dB)	Recommended Ground Vibration Limit (mm/s)
NPC-119	120 (no monitoring), 128 (monitoring)	10.0 (no monitoring), 12.5 (monitoring)

In addition to the provincial criteria, Health Canada provides noise targets for annoyance and sleep disturbance in their Guidance Document, *Guidance for Evaluating Human Health Impacts in Environmental Assessment* (Health Canada 2017). The Health Canada guidance is typically followed when conducting Noise Impact Assessments to support federal environmental assessments.

The primary target recommended by Health Canada for use in acoustic assessments for activities longer than 12 months is the change in percent highly annoyed (%HA). The %HA is an estimate of the percentage of people who are potentially annoyed by noise emissions and is based on studies completed by the United States Environmental Protection Agency (US EPA). To calculate the %HA, the daytime equivalent sound levels (or L_d) and nighttime equivalent sound levels (or L_n) are combined to calculate an adjusted day-night average sound level (or L_{dn}). In the L_{dn} calculation, the L_n value is increased by 10 dB to account for higher sensitivity to noise emissions at night. The L_{dn} is then used to calculate the change in %HA due to project-related noise emissions.

Health Canada recommends that the maximum change in %HA due to project activities be no more than 6.5%. If the change in %HA threshold is exceeded, effects are considered to be of concern and may require mitigation.

Health Canada identifies sleep disturbance as difficulty falling asleep, awakenings, curtailed sleep duration, alterations of sleep stages or depth, and increased body movements during sleep (Health Canada 2017). Health Canada has adopted a noise limit of 60 dBA (L_{max}) outside a residence for Project-related instantaneous noise to address this (Health Canada 2017). This is based on the WHO recommended maximum indoor sound level of 45 dBA, and the Health Canada recommendation to use an indoor-to-outdoor transmission loss of 15 dB for windows (Health Canada 2017).

Further, this 60 dBA L_{max} criterion for Project-related instantaneous noise level has a frequency limit of no more than 10-15 exceedances per night (Health Canada 2017).

6.2.2.3.2 Influence of Consultation and Engagement on the Assessment

Consultation for the Project has been ongoing since 2004 and will continue throughout the life of the Project. Chapter 4 of the original EIS (2012) and Chapter 5 of this EIS Addendum (Vol 2) covers the consultation process and activities undertaken by GenPGM and formerly by Stillwater. Comments and feedback received throughout the consultation process pertaining to the acoustic environment are summarized below:

- Information was requested on the selection of noise monitoring locations and zones of influence
- Continued experience of undeveloped natural areas to maintain Indigenous way of life, includes air quality, noise, access, traffic, light, habitat loss and species loss
- Effects on fish and fish habitat from blasting

Feedback related to the acoustic environment has been addressed through updates to the EIS Addendum and supporting materials, responses and meetings with communities and stakeholders, as appropriate. Traditional knowledge and traditional land and resource use (TLRU) information that contributes to the Acoustic Environment was provided by Indigenous communities; however, given the confidentiality of this material, explicit details are not included nor are communities identified. Section 6.2.12 of this EIS Addendum (Vol 2) provides details on how TLRU and traditional knowledge have been incorporated into the assessment.

6.2.2.3.3 Potential Effects, Pathways and Measurable Parameters

Table 6.2.2-7 lists the potential environmental effects of the Project on the acoustic environment and provides a summary of the Project effect pathways, measurable parameters, and units of measurement to assess potential effects.

Table 6.2.2-7: Potential Effects, Effects Pathways and Measurable Parameters for Acoustic Environment

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in noise levels	• Noise emissions from Project activities including construction, operation, decommissioning and associated transportation.	• Highest predicted one-hour noise level from stationary noise (L_{eq} 1hr) • Highest predicted impact noise level (dBAI) • Highest predicted traffic noise level (L_{eq} 16-hr) • Day-night equivalent sound pressure level (L_{dn})

Table 6.2.2-7: Potential Effects, Effects Pathways and Measurable Parameters for Acoustic Environment

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
		measured in dBA, and associated change in %HA, measured in percent • Maximum nighttime noise level for sleep disturbance (L_{max} dBA) • Highest blasting overpressure noise level (dB)
Change in ground vibration	• Ground induced vibration from blasting during Project construction and operation	• Peak particle velocity (PPV) in mm/s

6.2.2.3.4 Assessment Boundaries

In general, the spatial boundaries for the assessment of environmental effects are presented in Section 2.4 of the EIS Addendum (Vol 1) (CIAR #727), while the LSA and RSA are defined based on the extent of potential effects specific to each VEC.

- **Site Study Area**: The SSA is the direct footprint of the Project, and is consistent across all VECs. The SSA has been revised from the original EIS to reflect changes and refinements to the Project design.
- **Local Study Area**: The LSA represents the maximum area within which environmental effects from Project activities and components can be predicted or measured with a reasonable degree of accuracy and confidence. It consists of the SSA and adjacent areas where Project-related environmental effects are reasonably expected to occur based on available information and professional judgment.

  For the purpose of the acoustic environment, the LSA encompasses the SSA and the noise sensitive receptors (NSRs) within a 1 km setback from the SSA boundary.
- **Regional Study Area**: The RSA is the area within which residual environmental effects from Project activities and components may interact cumulatively with the residual environmental effects of other past, present and future (i.e., certain or reasonably foreseeable) physical

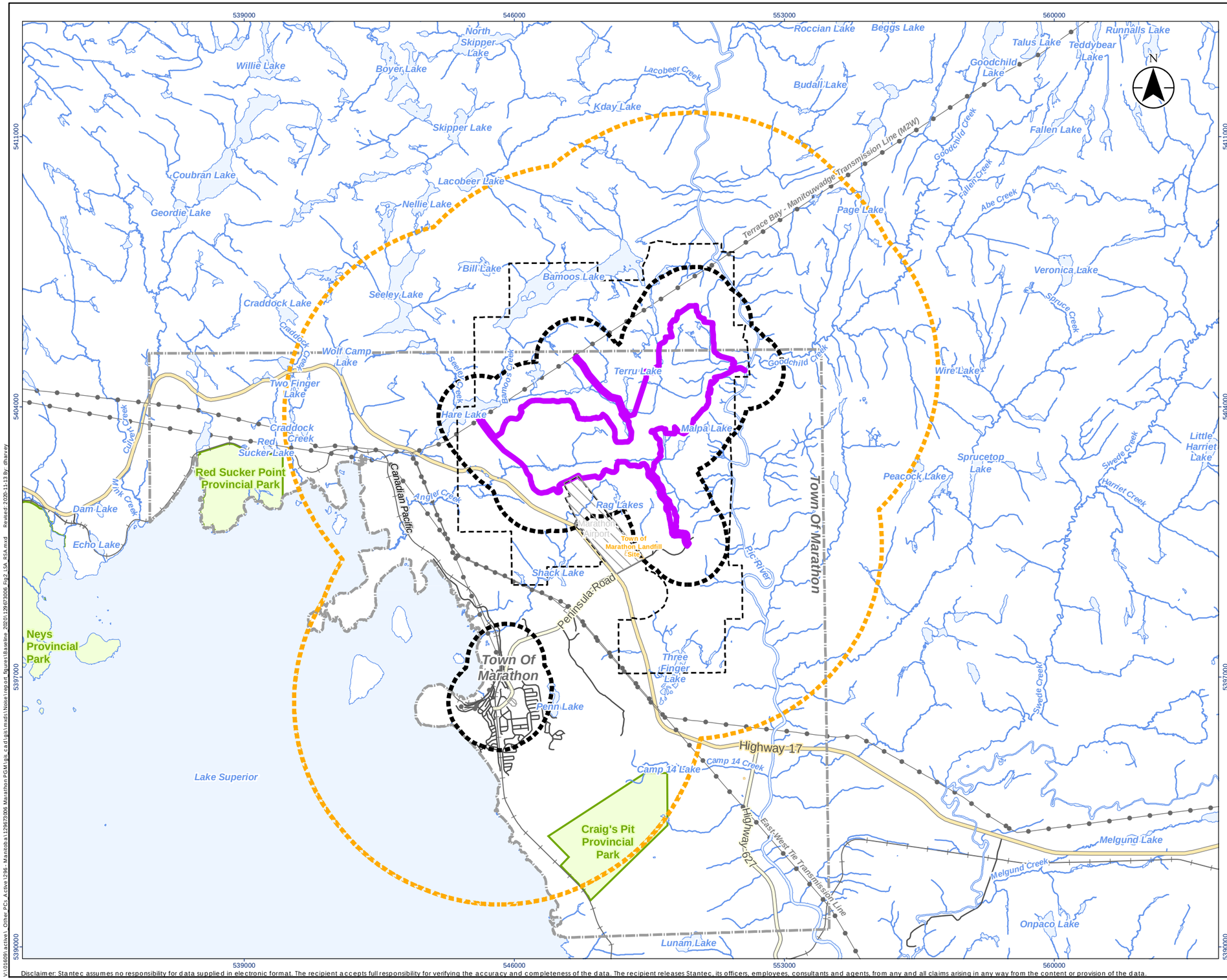
activities. The RSA is based on the potential for interactions between the Project and other existing or future potential projects.

For the purpose of the Acoustic Environment VEC, the RSA encompasses the SSA and includes the NSRs within a 5 km setback from the SSA, as well as the Town of Marathon.

The acoustic environment LSA and RSA boundaries are included on Figure 6.2.2-1.

The temporal boundaries for the Project that have been considered in the determination of environmental effects are described in Section 2.5 of the EIS Addendum (Vol 1) (CIAR #727). The temporal boundaries considered during the assessment of potential effects on the acoustic environment include:

- Phase 1 (Site Preparation and Construction) were assessed concurrently for construction noise and vibration impacts.
- Phase 2 (Operations) was assessed for operational noise and vibration impacts.
- Phase 3 (Decommissioning and Closure) was not assessed, as these activities are of reduced or no impact for noise and vibration compared to Phase 2.



Stantec

Legend

- Project Boundary (MLAS, MENDM Changed 2017)
- Site Study Area Boundary
- Local Study Area
- Regional Study Area
- Highway
- Major Road
- Minor Road
- Hydro Line
- Railway
- Watercourse
- Airport
- Municipal Boundary, Lower Tier
- Provincial Park
- Waterbody
- Waste Management Site

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

Project Location
Marathon

129673006 REVA
Prepared by SW on 2020-11-13
Technical Review by DH on 2020-11-13
Independent Review by ABC on yyyy-mm-dd

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.2-1

Title
Local and Regional Study Area **- Acoustic Environment**

6.2.2.3.5 Residual Effects Characterization

Table 6.2.2-8 presents definitions for the characterization of residual environmental effects on the acoustic environment. The criteria describe the potential residual effects that remain after mitigation measures have been implemented. Quantitative measures were developed, where possible, to characterize residual effects. Qualitative considerations were used where quantitative measurement was not possible.

Table 6.2.2-8: Characterization of Residual Effects on Acoustic Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive** – Effect moves measurable parameters in a direction beneficial to acoustic environment relative to baseline conditions. **Adverse** – Effect moves measurable parameters in a direction detrimental to acoustic environment relative to baseline conditions.
Magnitude	The amount of change in measurable parameters of the VEC relative to existing conditions	**Negligible –** no measurable change **Low –** a measurable change but within normal variability of baseline conditions. **Medium –** a measurable change with regard to the baseline but within applicable regulatory criteria **High –** Singly or as a substantial contributor in combination with other sources causing exceedances of applicable regulatory criteria beyond the SSA.
Geographic Extent	The geographic area in which a residual effect occurs	**Negligible (SSA) –** residual effects are limited to SSA **Low –** residual effects are restricted to the SSA or immediate surroundings **Medium (LSA) –** residual effects extend into the LSA **High (RSA) –** residual effects extend into the RSA
Timing	Considers when the residual effect is expected to occur, where relevant to the VEC.	**No sensitivity** - Not applicable **Medium sensitivity** - Not applicable **High sensitivity** - Not applicable
Duration	The time required until the measurable parameter or the VEC returns to its existing condition, or the residual effect can no longer be measured or otherwise perceived	**Negligible –** residual effect is limited to a single event **Low (short-term) –** the residual effect is limited to short term events (a few years or less) **Medium –** the residual effect is limited to the operational/decommissioning phases (years to decades) **High (Long-term) –** the residual effect extends beyond the life of the project (centuries)
Frequency	Considers whether the residual effect is expected to occur once, at regular or irregular intervals or continuously	**Negligible –** the condition of phenomena causing the effect rarely occurs **Low (Multiple irregular event) –** occurs at no set schedule and are unlikely to occur **Medium (Multiple regular event) –** occurs at regular intervals (i.e. >1% of the time) **High (Continuous) –** occurs continuously

Table 6.2.2-8: Characterization of Residual Effects on Acoustic Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Reversibility	Considers whether the residual effect is reversible or irreversible.	**Negligible –** effect ceases immediately once source or stressor is removed **Low –** effect ceases once source or stressor is removed **Medium –** effect persists for some time after source or stressor is removed **High (Irreversible) –** the residual effect is unlikely to be reversed
Ecological/Societal Value	Considers the magnitude that the residual effect is expected to have on the ecological or societal community, as determined through consultation and engagement.	**Negligible –** the VEC has no value from a cultural or societal context **Low –** the VEC is common in the LSA and/or has little to no value from a cultural or societal context **Medium –** the VEC is abundant in the RSA, though may be less so in the LSA, and/or has moderate cultural or societal value **High –** the VEC is rare and/or of high cultural or societal value

Note: Timing was not included in the original EIS.

6.2.2.3.6 Significance Definition

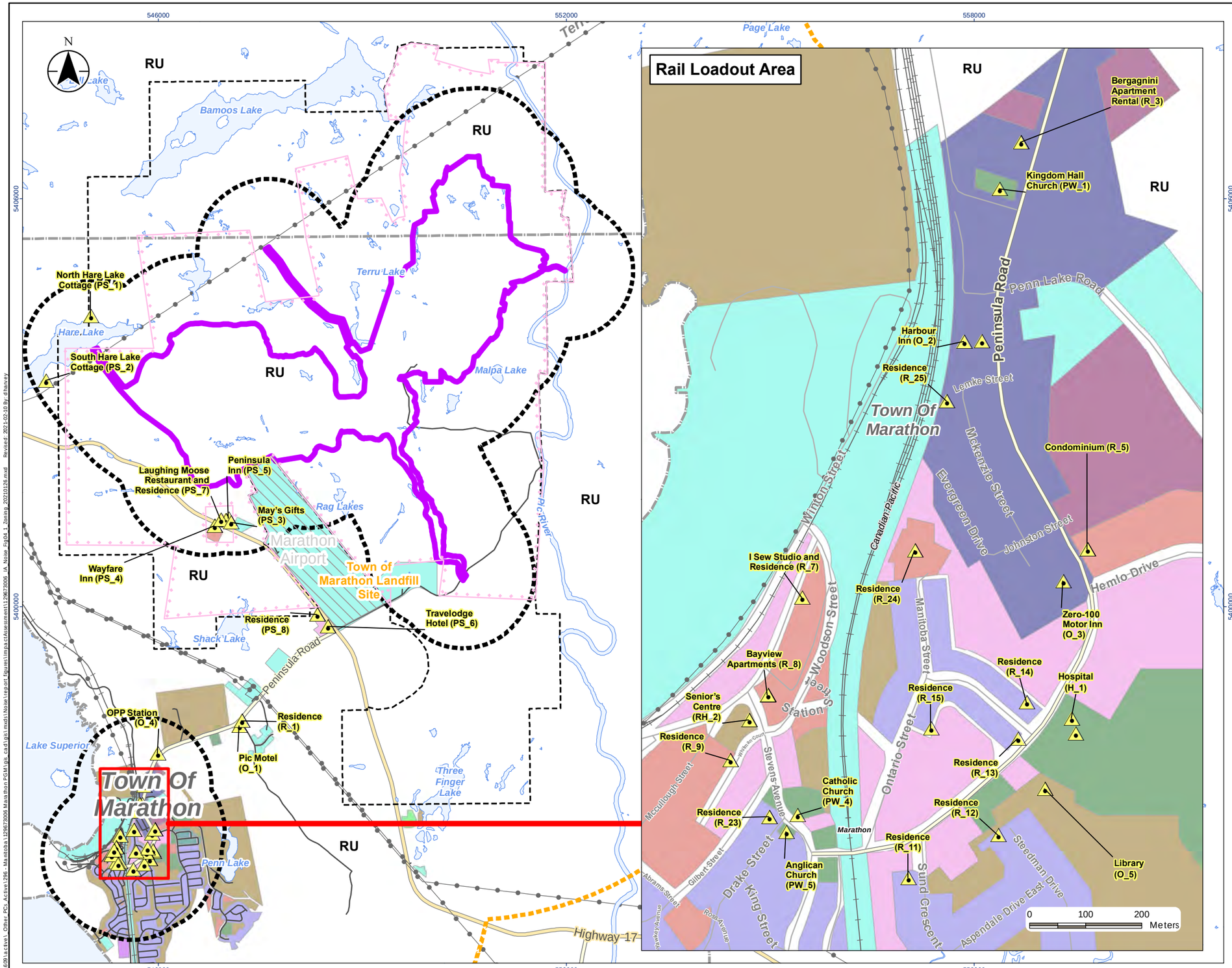
A significant residual adverse effect for a change in noise levels is one where Project-related noise levels at NSRs are likely to exceed provincial and/or federal noise criteria. If the predicted noise levels do not frequently exceed these targets, they are deemed to be not significant.

A significant residual adverse effect for a change in vibration is one where NSRs would be located within the ground vibration setback distance as calculated in accordance with the MECP Blasting Method.

6.2.2.4 Existing Conditions for Acoustic Environment

Existing conditions for the acoustic environment are described in Section 4.4 of the EIS Addendum (Vol 1) (CIAR #727). The Noise Baseline Update (Stantec 2020c) (CIAR #722) provides an overview of how baseline conditions have changed since the original EIS (2012) and/or how the understanding of the baseline conditions has evolved.

The locations of the representative NSRs (i.e., those closest to the Project activities and adjacent to the SSA and within the Town of Marathon) considered in the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]) are presented on Figure 6.2.2-2.



Stantec

Legend

- Receptor Location
- Project Boundary (MLAS, MENDM Changed 2017)
- Model Property Boundary
- Site Study Area Boundary
- Local Study
- Regional Study
- Highway
- Major Road
- Minor Road
- Hydro Line
- Railway
- Airport
- Municipal Boundary, Lower Tier
- Waterbody

Town of Marathon Land Use Designations*

- Enterprise (E)
- General Commercial (C2)
- Heavy Industrial (M2)
- Highway Commercial (C3)
- Institutional (I)
- Light Industrial (M1)
- Mobile Home (R2)
- Neighbourhood Commercial (C1)
- Open Space (OS)
- Residential 1 (R1)
- Residential Multiple (RM-1)
- Residential Multiple (RM-2)
- RU Rural (RU)[3]

0 1 2 km

1:57,000 (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. All unclassified areas have a Rural zoning designation as per Schedule A of the Marathon Official Plan.

* Land Use Designations have been adapted from the Town of Marathon Official Plan- Schedule A and should be considered approximate.

Project Location: Marathon

129673006 REVA
Prepared by SW on 2021-02-10
Technical Review by DH on 2020-09-16
Independent Review by MS on 2021-03-05

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.2-2

Title
Receptor and Zoning Plan

6.2.2.5 Determining Project Interactions with Acoustic Environment

Table 6.2.2-9 identifies, for each potential effect, the Project's physical activities that might interact with the acoustic environment and result in the identified effect. These interactions are indicated by a checkmark and are discussed below the table. For those activities where no interaction with the acoustic environment is anticipated, justification is provided. This table is based on a similar table from the original EIS (2012) and has been updated to reflect changes to the Project.

Table 6.2.2-9: Summary of Project Interactions with Acoustic Environment

Physical Activities	Activity	
	Change in Noise Levels	Change in Ground Vibration
Site Preparation and Construction		
Clearing, grubbing and stripping of vegetation, topsoil and other organic material	✓	-
Grading with topsoil	✓	-
Drilling and blasting to develop the open pits and plant site area	✓	✓
Excavation and pre-stripping to remove mine rock and overburden	✓	-
Preparation of construction surfaces and installation of temporary construction facilities	✓	-
Site preparation for waste management	✓	-
Construction of administration buildings, storage buildings, other ancillary structures and site services such as parking lots, area fencing, and security systems	✓	-
Construction of explosives facilities	✓	-
Construction of PSMF containment dams and MRSA	✓	-
Management of surface water and groundwater on the site, including seepage and run-off	–	-
Maintenance and management of mine rock stockpiles, overburden, and PSMF	–	-
Construction of water management facilities and drainage works (including but not limited to pipelines, dewatering facilities, stormwater management, control ponds, and water management pond)	✓	-
Dewatering of natural water bodies in the project area	–	-
Construction of new mine site access and haul roads, including any water crossings and water body shoreline works or undertaking	✓	-
Upgrading of the existing mine access road(s) and entrance(s) to the project area including any water crossings and water body shoreline works or undertakings	✓	-
Construction of a 115kV electrical transmission line within a new right-of-way from the M2W transmission corridor	-	-
Aggregate sources and amounts	–	-

Table 6.2.2-9: Summary of Project Interactions with Acoustic Environment

Physical Activities	Activity	
	Change in Noise Levels	Change in Ground Vibration
Management of waste	–	-
Any works or undertakings associated with upgrading a rail load-out facility for mine concentrate and off-site accommodations complex	✓	-
Operating vehicles	✓	-
Hiring and management of workforce	–	-
Taxes, contracts and purchases	–	-
Operations		
Drilling, blasting, loading and hauling of mine rock from the pits to ROM stockpile pad, crusher or the MRSA	✓	✓
Operation of explosives facilities	✓	-
Handling, transportation, use and disposal of explosives	✓	-
Transportation of crushed material to coarse ore stockpile	✓	-
Transportation of mill feed (ore) to the Process Plant	✓	-
Process Plant operation	✓	-
Transportation of filtered concentrate	✓	-
Management and maintenance of the entire mine waste stream, including but not limited to process solids and mine rock	–	-
Decommissioning of the temporary process water pond (proposed during mine operations), including removal or breaching of dams	✓	-
Dewatering activities (e.g. open pit)	–	-
Management of surface water and groundwater on the site; including seepage, run-off, contact water, process water and storm water	–	-
Management of surface water on site during dam removal or breaching	–	-
Management of domestic waste from the mine site	–	-
Management of hazardous waste	–	-
Environmental safety procedures	–	-
Operating vehicles	✓	-
Hiring and management of workforce	–	-
Taxes, contracts and purchases	–	-
Decommissioning and Closure		
Installation of barriers around the pit perimeters	–	-
Management of inputs from groundwater and surface water run-off into pits	–	-
Decommissioning, dismantling and/or disposal of equipment	✓	-
Demolition/removal of surface buildings and associated infrastructure and disposal of resulting rubble	✓	-

Table 6.2.2-9: Summary of Project Interactions with Acoustic Environment

Physical Activities	Activity	
	Change in Noise Levels	Change in Ground Vibration
Decommissioning/removal of explosives facilities	✓	-
Removal of power lines and electrical equipment	✓	-
Decommissioning of the potable water and sewage treatment systems (e.g. water treatment plant and membrane bioreactor)	✓	-
Maintenance and management of mine rock stockpiles and PSMF	–	-
Following removal of infrastructure, soil, groundwater, and surface water testing for residual contamination, and disposal of contaminated soils and treatment of groundwater and surface water, as required	–	-
Reclamation and restoration of landscape (including water bodies) to productive capacity including management and monitoring	–	-
Management of flooded pits to protect groundwater and surface water quality during flooding and pit overflow	–	-
Operating vehicles	✓	-
Hiring and management of workforce	–	-
Taxes, contracts and purchases	–	-

Notes:
✓ = Potential interaction
– = No interaction
Note - minor wording changes to the physical activities list have been made to better align with the updated Project description covered in Chapter 1 (EIS Addendum [Vol 1])

Emissions of noise are generated by most Project activities, and they may result in a change in noise levels above applicable criteria. Ground vibration may result from blasting activities during both construction and operation. Project activities marked with a “check” are those that have been identified to potentially interact with the acoustic environment to result in a change in noise levels or change in ground vibration and are further discussed below and assessed in Section 6.2.2.6 of this report.

During Project construction and operation, blasting will be required to prepare the site for construction and to extend the life of the pits. Blasting activities will result in ground-induced vibration and, therefore, this activity was further assessed in Section 6.2.2.6 of this report. Other Project activities presented in Table 6.2-4 are not anticipated to result in ground-induced vibration effects and have therefore not been further assessed.

The following site preparation and construction activities will result in emissions of noise through the use of heavy mobile equipment/machinery, blasting, diesel generators, material handling, and vehicle and haul truck traffic and, therefore, have the potential to interact with the acoustic environment to result in a change in noise levels:

- Clearing, grubbing and stripping of vegetation, topsoil and other organic material

- Grading with topsoil
- Drilling and blasting to develop the open pits and plant site area
- Excavation and pre-stripping to remove mine rock and overburden
- Preparation of construction surfaces and installation of temporary construction facilities
- Site preparation for waste management
- Construction of explosive factory and magazine facilities
- Construction of tailings containment dams
- Construction of water management facilities and drainage works (including but not limited to pipelines, dewatering facilities, stormwater management, polishing ponds, sediment control ponds and mine process water reservoirs
- Upgrading of the existing mine access road(s) and entrance(s) to the project area including any water crossings and water body shoreline works or undertakings
- Operating vehicles

The following operation activities will result in emissions of noise through the use of heavy mobile and stationary equipment/machinery, pollution control equipment, building exhaust fans, emergency generators, blasting, material handling, and vehicle, haul truck and rail traffic, and therefore have the potential to interact with the acoustic environment to result in a change in noise levels:

- Drilling, blasting, loading of mine rock from the pit to mine rock storage areas and the ore to the crusher
- Operation of explosives factory and magazine facilities
- Handling, transportation, use and disposal of explosives
- Transportation of crushed run-of-mine material
- Transportation of mill feed (ore) to the grinding section of the processing facility
- Mill processing
- Transportation of filtered concentrate
- Decommissioning of the temporary process water pond (proposed during mine operations), including removal or breaching of dams
- Operating vehicles

The following decommissioning and closure activities will result in emissions of noise through the use heavy mobile equipment/machinery, diesel generators, material handling and vehicle and haul truck traffic, and therefore has the potential to interact with the acoustic environment to result in a change in noise levels:

- Decommissioning, dismantling and/or disposal of equipment

- Demolition/removal of surface buildings and associated infrastructure and disposal of resulting rubble
- Decommissioning/removal of explosives factory and magazine facilities
- Removal of power lines and electrical equipment
- Decommissioning of the potable water and sewage treatment systems (e.g. settling ponds associated with mine rock storage, roads and plant site)
- Operating vehicles

Noise emissions during the decommissioning and post-closure phase of the Project will be similar to, or less than, those during site preparation and construction and operation and were, therefore, not further assessed.

The Project activities that are not anticipated to interact with the acoustic environment (i.e. no interaction) to result in a change in noise levels are denoted with a "-" and are not further discussed or assessed.

6.2.2.6 Assessment of Residual Effects on Acoustic Environment

For each potential effect identified in Section 6.2.2.5 of this report, specific Project activities that may interact with the acoustic environment and result in an environmental effect (i.e., a measurable change that may affect the VEC) are identified and described. The following sections first describe the pathways by which a potential Project effect could result from Project activities in the absence of mitigation during each Project phase (i.e., site preparation and construction and operation). Mitigation and enhancement measures are applied to avoid or reduce these potential pathways and resulting environmental effects. Residual effects are those remaining following implementation of mitigation, which are then characterized using the criteria defined in Table 6.2.2-8. A summary of predicted residual effects is provided in Section 6.2.2.7.1 of this report.

6.2.2.6.1 Change in Noise Levels

Analytical Assessment Techniques

The following tasks were conducted as part of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]) for a change in noise levels to determine the potential for residual effects on the acoustic environment:

- Review of previous impact assessment findings (Section 6.2.2.1 of this report)
- Identification of regulatory framework to be used for the assessment (Section 6.2.2.3.1 of this report)
- Identification of spatial and temporal Project boundaries and noise-sensitive receptors (NSRs) (Section 6.2.2.3.4 of this report)

- Review of the original baseline monitoring data and identification of baseline sound pressure levels within the LSA and RSA (Section 6.2.2.4 of this report)
- Identification of Project activities that could interact with the acoustic environment to result in a change in noise levels and change in ground vibration (Section 6.2.2.5 of this report)
- Summary of the methodology and approach used to conduct the effects assessment (Section 6.2.2.6.1 of this report)
- Implementation of the effects assessment on the acoustic environment (Section 6.2.2.6.1 of this report):
    - Identification of modelling scenarios that reflect worst-case construction and operation in terms of noise emissions
    - Identification of noise emission sources from Project construction and operation activities
    - Characterization of the sound levels for each noise emission source
    - Development of an acoustic model for construction and operation of the Project
    - Prediction of sound levels within the LSA and RSA, and at the NSRs
    - Calculation of the setback distances for air blast and ground vibration
    - Assessment of compliance of the construction and operation of the Project by comparing the modelled and calculated results to applicable provincial and federal noise criteria, including human health criteria
- Summary of the residual Project effects (Section 6.2.2.7.1 of this report)

Predictive noise modelling was completed to determine future Project noise emissions for construction and operation considering the worst-case years with respect to noise. Based on the Project operating assumptions and results of the original Impact Assessment Technical Report (SID #17), it was determined that year 1 of construction would be the worst-case with respect to noise. For Project operation, year 2 was considered to be the worst-case based on the following:

- The open pit extraction volumes are at or near maximum capacity.
- The south open pit (closest to nearest receptors) extraction is near surface.
- The PSMF construction/earthwork location is closest to the NSR.

The Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]) considers noise and ground vibration (emitted from the following sources:

- stationary steady-state equipment operating within the SSA (construction and operation)

- traffic along the access road, Highway 17 and within the Town of Marathon (construction and operation)
- the rail load-out facility – Option 2 (operation only)
- blasting (construction and operation)

The Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]) uses the latest version of the commercially available CADNA/A software. The CADNA/A software incorporates the ISO 9613-2 algorithm for outdoor sound propagation. ISO 9613 standards are commonly used by acoustic practitioners for modelling sound propagation and are accepted by Health Canada and MECP.

The ISO 9613-2 standard for outdoor sound propagation algorithm in CADNA/A was used to predict stationary and mobile steady-state noise impacts at the Project site and rail load-out facility. The US Federal Highway Administration (FHWA) Traffic Noise Model (TNM) version 2.5, incorporated into CADNA/A, was used to predict traffic noise along the Project access road, Highway 17 and within the Town of Marathon.

Additional details with respect to the modelling inputs and assumptions is provided in the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Blasting was assessed based on potential structural damage to buildings. The type of geology and the blast configuration influence how the energy of the blast is released into the environment. During a blast, the majority of the energy is consumed in fragmenting the desired portion of rock with the remaining energy released as undesirable by-products including air blast and ground vibration. Air blast is low frequency sound generated by energy waves transferred through the air. Vibration is energy waves transferred through the ground and characterized by particle velocity. Potential effects from air blasts and ground vibration were analyzed following the MECP Blast Analysis Method (MOE Blasting), as it was considered most consistent with the NPC-119 guideline and is an approved blasting methodology developed by MECP.

The noise assessment methodologies, outlined above, for construction and operational activities noted implicitly consider effects on human health. However, Health Canada has developed its own guidance on addressing human health concerns related to noise in the HC Noise Guideline (Health Canada 2017). These include community annoyance and sleep disturbance related to noise. These two metrics were calculated, as per the HC Noise Guideline, and considered in this assessment.

Project Pathways

During site preparation and construction, noise emissions are expected from the following sources:

- Operation of generators to provide power to the site pre-installation of the transmission line
- Heavy mobile equipment (i.e., crushers, loaders, excavators, graders, dozers, compactors, concrete plant, haul trucks) to be used during site clearing, grubbing and stripping, grading, excavating

- Pre-stripping, preparation of construction surfaces for installation of construction facilities
- Construction of site buildings and mine infrastructure
- Upgrades to rail load out facility
- Development of the site road network and transmission line corridor.

Other vehicle activities, such as those associated with the access road (e.g., delivery of supplies, rotation changes) and, once constructed, building infrastructure such as pollution control equipment and fans, will also generate noise. Emissions of noise will also result from drilling, shoveling and blasting activities to develop the open pits and plant site areas. Blasting during Project development is impulsive and provides a low frequency air blast and ground vibration at large distances.

During Project operation, emissions of noise are expected from blasting, the use of heavy mobile equipment (i.e., drills, shovels, loaders, excavators, haul trucks, compactors) within the pits, ore handling (i.e., crushing and loading and unloading of mined/crushed ore), conveying, ore processing, concentrate handling, storage and transportation, the operation of site infrastructure (i.e., pollution control equipment, back-up generators, pumps, wastewater treatment plant) and the operation a rail load-out facility. Emissions of noise will also be generated from the operation of other vehicles along the access road. Ground borne vibration is also expected during blasting.

Emissions of noise are also expected during the decommissioning and closure of mine features and infrastructure. As the amount of heavy equipment operating during the decommissioning and closure of the mine is expected to be less than that required during Project construction and operation, the resulting changes in noise levels are also anticipated to be lower and were therefore not quantified separately from construction and operation; however, residual effects during this phase are characterized below.

The NSRs considered as potential pathways for effects include representative receptors (typically the closest to the Project activities) identified as Points of Reception (PORs) adjacent to the SSA and within the Town of Marathon. The remaining NSRs in the LSA and RSA are expected to experience lower sound levels due to increased setback distances and screening provided by intervening structures. The NSRs included in the effects assessment are presented on Figure 6.2.2-2 in Section 6.2.2.4 of this report.

Mitigation and Enhancement Measures

A series of environmental management plans will be developed by GenPGM to mitigate the effects of Project development and operation on the acoustic environment.

A summary of the mitigation and enhancement measures that will be incorporated into the Project design and/or the best management practices to manage and reduce emissions of noise are summarized below.

- Purchase vehicles and equipment that meet the applicable noise suppression regulations
- Schedule concentrate delivery at times of the day to reduce complaints whenever possible

- Implement an overpressure and vibration monitoring program on-site upon commencement of blasting operations, assessing and modifying the program as site specific data becomes available

Details regarding the mitigation and management measures to be implemented to reduce noise emissions from mobile and non-mobile equipment will be defined in an Atmospheric Management Plan (per the EMMP).

Project Residual Effect

Construction

The construction phase of the Project is anticipated to occur over a period of 18 – 24 months, with year 1 considered to be the worst-case with respect to emissions of noise. To predict the noise levels associated with the operation of stationary/mobile construction equipment, the ISO 9613-2 standard for outdoor sound propagation algorithm in CADNA/A was used. The US FHWA TNM version 2.5, as incorporated into CADNA/A, was used to predict traffic noise along the Project access road, Highway 17, and within the Town of Marathon.

A list of the noise sources, quantities, sound data, and assumptions, considered during the effect's assessment for Project construction on the acoustic environment are provided in Appendix C of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]). The sound levels for the construction noise sources were taken from the equipment manufacturers' datasheets (where available), Stantec's database, and/or estimated based on the equipment capacity when not available. Sound levels from Stantec's database are based on site measurements from similar projects that were taken in accordance with applicable MECP guidelines. Outdoor source sound levels of less than 100 dBA and indoor sources enclosed within buildings (with no significant openings) were considered insignificant and not included in the updated modelling. It was assumed that the Project equipment within the SSA would operate 24 hours per day and seven days per week. The conceptual design contemplates Project equipment operating during the day/evening was also assumed to be operating during the night. At permitting, limitations around the following activities will need to be confirmed at the PSMF during both the construction and operation phases:

- The compactors do not operate between the hours of 11:00 pm and 7:00 am.
- During operations, the bulldozer working on the southern portion of PSMF berm does not operate between the hours of 11:00 pm and 7:00 am
- In the southern portion of the PSMF, if heavy equipment activities are focused in one general area and equipment is congregating during operations, equipment maybe required to idle while trucks are dumping and/or reduce truck traffic to an average of 4 haul trucks per hour from 11:00 pm to 7:00 am.

The locations of the sources of sound associated with Project construction are shown on Figures 3 through 6 of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Steady-State Noise

The steady-state sound levels for the predictable worst-case hour (i.e., all significant noise sources operating in the same one-hour period) during Project construction activities were determined at the representative NSRs closest to the Project site and are presented in Table 6.2.2-10. Noise contours for the predictable worst-case steady state daytime and nighttime construction are presented on Figures 11 and 12 in Appendix A of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Table 6.2.2-10: Predicted Steady-State Sound Levels – Project Construction

NSR ID	NSR Description	Predicted Sound Levels at NSR (dBA L_{eq},1hr)			MECP Criteria at NSR (dBA L_{eq},1hr)			Comply with Performance Limits? (Y/N)
		Daytime	Evening	Night	Daytime	Evening	Night	
PS_1	North Hare Lake Cottage	33	33	33	45	40	40	Y
PS_2	South Hare Lake Cottage	32	32	31	45	40	40	Y
PS_3	May's Gifts	46	46	43	50	50	45	Y
PS_4	Wayfare Inn	46	46	43	50	50	45	Y
		48	48	44	50	50	45	Y
PS_5	Peninsula Inn	47	47	44	50	50	45	Y
		49	49	45	50	50	45	Y
PS_6	Travelodge Hotel	39	39	39	50	50	45	Y
		40	40	39	50	50	45	Y
PS_7	Laughing Moose Restaurant and Residence	48	48	44	50	50	45	Y
PS_8	Residence	39	39	39	50	50	45	Y
		40	40	40	50	50	45	Y

The predicted construction sound levels at the representative NSRs are in compliance with the applicable MECP criteria.

Traffic Noise

The baseline and Project traffic sound levels for Project construction were calculated at the representative NSRs closest to the Project construction activities and are presented in Table 6.2.2-11 Noise contours for the daytime baseline traffic and daytime Project traffic are shown on Figures 13 and 14 in Appendix A of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

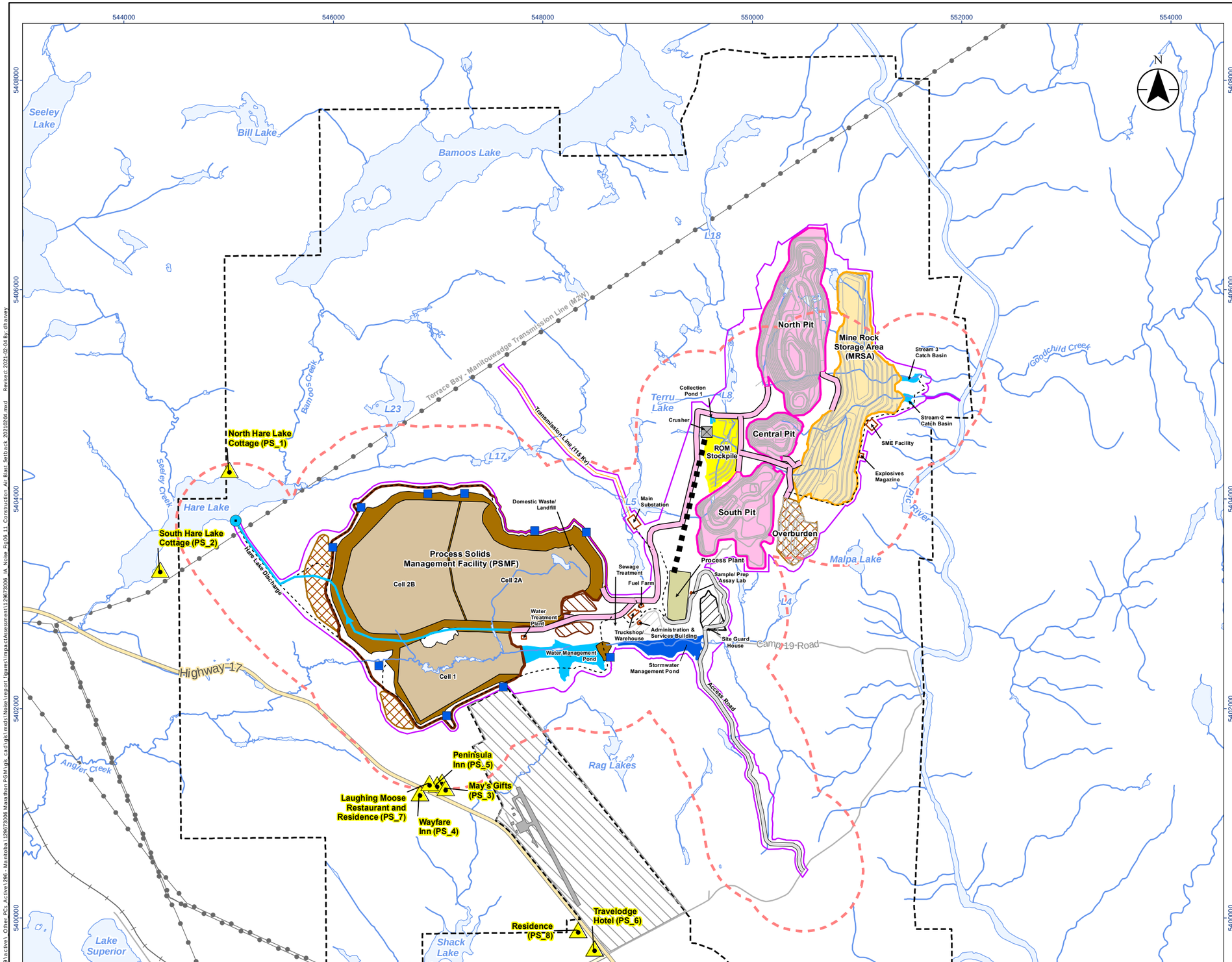
Table 6.2.2-11: Predicted Traffic Baseline and Project Sound Levels – Project Construction

NSR ID	NSR Description	Predicted Daytime Sound Levels at NSR (dBA L_{eq}, 16hr)		Project Increase Over Baseline (dB)	MECP Criteria at NSR (dBA L_{eq}, 16hr)	Mitigation Requirement (Y/N)
		Baseline	Project + Baseline			
O_1	Pic Motel	50.2	50.8	0.6	55	N
O_2	Harbour Inn	54.6	55.1	0.5	55	N
O_4	OPP Station	51.5	52.1	0.6	55	N
PS_1	North Hare Lake Cottage	18.4	18.5	0.1	55	N
PS_2	South Hare Lake Cottage	25.2	25.3	0.1	55	N
PS_3	Mays Gift	54.3	54.3	0.0	55	N
PS_4	Wayfare_Inn	53.3	53.4	0.1	55	N
		55.1	55.2	0.1	55	N
PS_5	Peninsula Inn	54.5	54.5	0.0	55	N
		56.2	56.2	0.0	55	N
PS_6	Travelodge Hotel	52.4	52.6	0.2	55	N
		53.6	53.8	0.2	55	N
PS_7	Laughing Moose Restaurant and Residence	55.4	55.5	0.1	55	N
PS_8	Residence	51.3	51.4	0.1	55	N
		52.2	52.3	0.1	55	N
R_1	Residence	50.9	51.4	0.5	55	N
		56.9	57.4	0.5	55	N
R_3	Bergagnini Apartment Rental	57.5	58.0	0.5	55	N
		58.4	59.0	0.6	55	N

The predicted traffic noise levels at the representative NSRs are below the sound level thresholds provided by the MECP or MTO requiring noise mitigation. The change in Project traffic sound levels over baseline traffic sound levels were less than 5 dB and, therefore, do not warrant investigation into construction traffic noise mitigation.

Blasting

The results of the setback analysis for air blast during Project construction are shown in Table 6.2.2-12 and illustrated on Figure 6.2.2-3.



Stantec

Legend

- Blasting Contour, 120 dB No Monitoring
- Noise Receptors
- Site Study Area Boundary
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Major Road
- Hydro Line
- Railway
- 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

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

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
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 2021-02-04

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.2-3

Title
Construction Air Blast Setback

Table 6.2.2-12: Air Blast Setback Distance – Project Construction

Type	Charge Size (kg)	Air Blast Setback Distance (m)
Construction	12.2	575

The NPC 119 120 dB limit was used to define air blast setback, where no monitoring is required. As shown on Figure 6.2.2-3, the following NSRs are located within the 120 dB contour for construction air blast:

- North Lake Hare Cottage (PS_1)
- Laughing Moose Eatery Restaurant and Residence (PS_7)
- Peninsula Inn (PS_5)
- May's Gifts (PS_3)

As the Project construction air blast receptors identified above are at the edge of the calculated setback distance, we expect that blasts can occur within the 575 m setback distance provided air blast noise is monitored.

The results of the setback analysis for ground vibration during Project construction are presented in Table 6.2.2-13 and illustrated on Figure 6.2.2-4.

Table 6.2.2-13: Ground Vibration Setback Distance – Project Construction

Type	Charge Size (kg)	Ground Vibration Setback Distance (m)
Construction	12.2	68

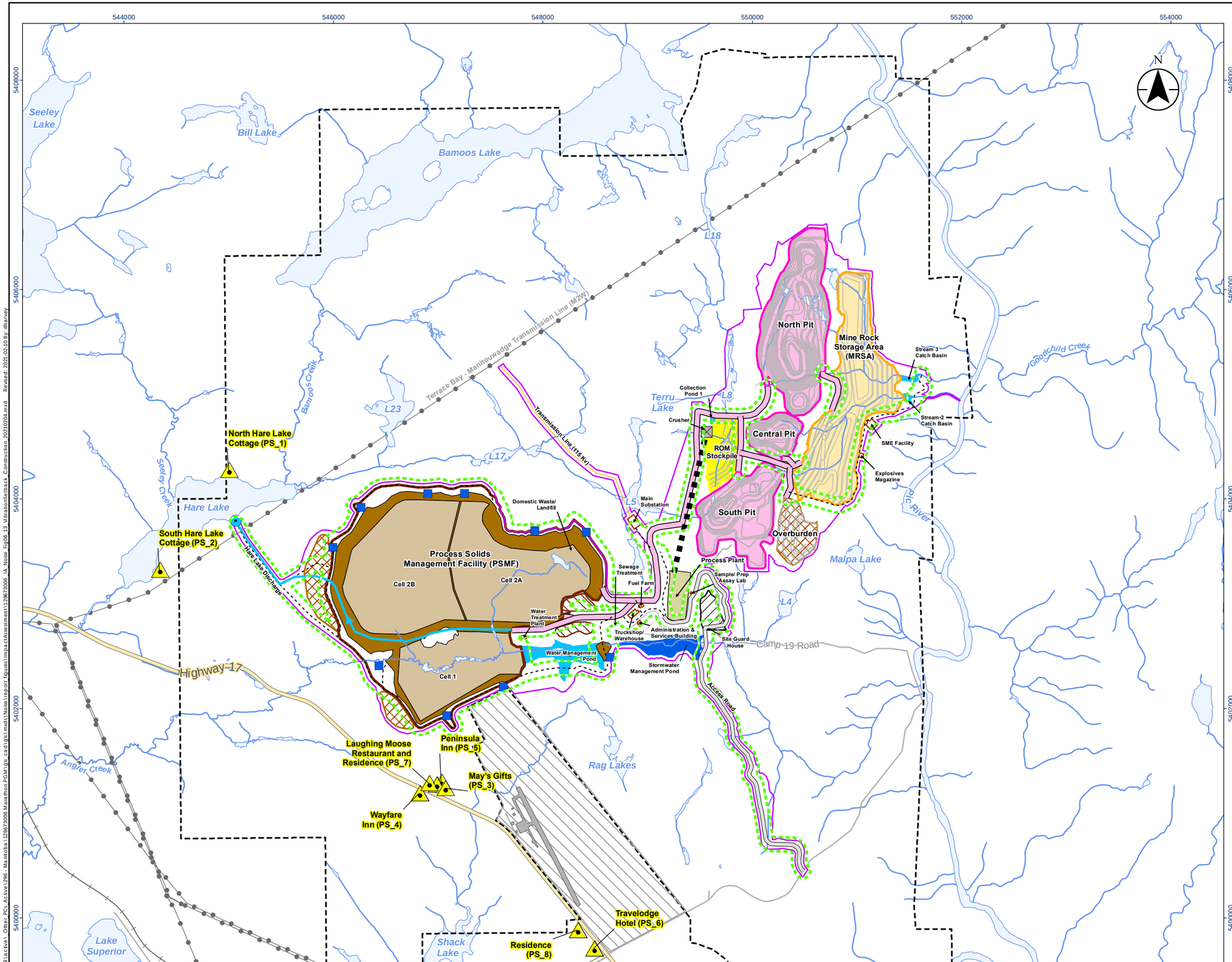
The NPC 119 10 mm/s limit was used to define ground vibration setback, where no monitoring is required.

As shown on Figure 6.2.2-4, no NSRs fall within the 10 mm/s ground vibration setback distance. Therefore, blasting during Project construction does not require vibration monitoring.

Community Annoyance

Community annoyance analysis has been completed in accordance with HC Noise Guideline (Health Canada 2017), using the Percent Highly Annoyed (%HA) method. This requires determining the baseline Day-Night Noise Level (L_{dn}) and %HA, the baseline + Project impact L_{dn} and %HA, and determining the change in %HA from baseline to baseline plus Project to determine if it is greater than 6.5 %.

The baseline Ldn and %HA, the baseline plus Project Ldn and %HA, and the change in %HA for Project construction, considering steady state noise sources with the SSA only, is presented in Table 6.2.2-14.



Stantec

Legend

- Vibration Setback (No Monitoring)
- Noise Receptors
- Site Study Area Boundary
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Major Road
- Hydro Line
- Railway
- 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

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

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
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 2021-02-10

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.2-4

Title
Construction Vibration Setback

Table 6.2.2-14: Community Annoyance, Steady-State Noise – Project Construction

NSR Description	Baseline Ldn (dBA)	Project + Baseline Impact Ldn (dBA)	%HA		
			Baseline	Project + Baseline	% Change
North Hare Lake Cottage (PS_1)	48.0	48.5	1.7	1.8	0.1
South Hare Lake Cottage (PS_2)	48.0	48.3	1.7	1.8	0.1
May's Gifts (PS_3)	43.0	50.4	0.9	2.3	1.4
Wayfare Inn (PS_4)	57.5	58.4	5.6	6.3	0.7
Peninsula Inn (PS_5)	38.5	52.3	0.5	2.9	2.4
Travelodge Hotel (PS_6)	56.0	56.3	4.7	4.9	0.2
Laughing Moose Restaurant and Residence (PS_7)	35.9	50.9	0.3	2.5	2.2
Residence (PS_8)	54.6	55.1	3.9	4.2	0.3

The predicted %HA for noise related to Project construction activities is generally insignificant (minimal change in %HA) for most of the NSRs. The highest predicted %HA is at the Peninsula Inn (PS_5) with a 2.4%HA change from the Project plus baseline. As the change in %HA from baseline to baseline plus Project at the NSRs is less than 6.5%, there is no expected noise impact on community annoyance.

The baseline Ldn and %HA, the baseline plus Project Ldn and %HA, and the change in %HA for Project traffic during construction is presented in Table 6.2.2-15.

Table 6.2.2-15: Community Annoyance, Traffic Noise – Project Construction

NSR Description	Baseline Ldn (dBA)	Project + Baseline Impact Ldn (dBA)	%HA		
			Baseline	Project + Baseline	% Change
North Hare Lake Cottage (PS_1)	48.0	48.0	1.7	1.7	0.0
South Hare Lake Cottage (PS_2)	48.0	48.0	1.7	1.7	0.0
May's Gifts (PS_3)	56.7	56.7	5.1	5.1	0.0
Wayfare Inn (PS_4)	57.5	57.5	5.6	5.6	0.0
Peninsula Inn (PS_5)	58.6	58.6	6.5	6.5	0.0
Travelodge Hotel (PS_6)	56.0	56.0	4.7	4.7	0.0
Laughing Moose Restaurant and Residence (PS_7)	57.8	57.8	5.9	5.9	0.0
Residence (PS_8)	54.6	54.6	3.9	3.9	0.0
Harbour Inn (O_2)	57.0	57.2	5.3	5.4	0.1
Pic Motel (O_1)	52.6	52.8	3.0	3.1	0.1

Table 6.2.2-15: Community Annoyance, Traffic Noise – Project Construction

NSR Description	Baseline Ldn (dBA)	Project + Baseline Impact Ldn (dBA)	%HA		
			Baseline	Project + Baseline	% Change
Residence (R_1)	58.9	59.2	6.7	7.0	0.3
OPP Station (O_4)	53.9	54.1	3.6	3.7	0.1
Bergagnini Apartment Rental (R_3)	60.8	61.0	8.5	8.7	0.2

As the change in %HA from baseline to baseline plus Project at the NSRs is less than 6.5%, there is no expected noise impact on community annoyance.

As noted in Section 6.2.2.3.1 of this report, Health Canada has adopted a noise limit of 60 dBA outside a residence to reduce noise-induced sleep disturbance from Project-related instantaneous noise.

The maximum predicted sound levels (L_{max}) during Project construction are presented in Table 6.2.2-16.

Table 6.2.2-16: Sleep Disturbance Noise – Project Construction

NSR Description	Sleep Disturbance Noise Level (dBA L_{max})
	Facility Construction
North Hare Lake Cottage (PS_1)	34.5
South Hare Lake Cottage (PS_2)	33.7
May's Gifts (PS_3)	50.7
Wayfare Inn (PS_4)	53.3
Peninsula Inn (PS_5)	54.4
Travelodge Hotel (PS_6)	54.1
Laughing Moose Restaurant and Residence (PS_7)	52.9
Residence (PS_8)	47.4

The maximum predicted sound levels from Project construction activities within the SSA are below the noise-induced sleep disturbance criteria recommended by the WHO in the HC Noise Guideline (Health Canada 2017).

Operation

The operation phase of the Project is anticipated to last 12.7 years with year 2 considered to be the worst-case with respect to emissions of noise. To predict the noise levels associated with the operation of stationary/mobile construction equipment, the ISO 9613-2 standard for outdoor sound propagation algorithm in CADNA/A was used. The US FHWA TNM version 2.5, as incorporated into CADNA/A, was used to predict traffic noise along the Project access road, Highway 17, and within the Town of Marathon.

A list of the noise sources, quantities, sound level data, and assumptions, considered during the effect's assessment for Project operation on the acoustic environment are provided in Appendix C of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]). The sound levels for the operation noise sources were taken from the equipment manufacturers' datasheets (where available), Stantec's database, and/or estimated based on the equipment capacity when not available. Sound levels from Stantec's database are based on site measurements from similar projects that were taken in accordance with applicable MECP guidelines. Outdoor source sound power levels less than 100 dBA and indoor sources enclosed within buildings (with no significant openings) were considered insignificant and not included in the updated modelling. It was assumed that the Project equipment within the SSA would operate 24 hours per day and seven days per week. The conceptual design contemplates Project equipment operating during the day/evening was also assumed to be operating during the night. At permitting, limitations around the following activities will need to be confirmed at the PSMF during both the operations phase:

- The compactors do not operate between the hours of 11:00 pm and 7:00 am.
- The bulldozer working on the southern PSMF berm does not operate between the hours of 11:00 pm and 7:00 am.

The haul truck traffic transporting mine rock will be reduced from 8 trucks per hour to 4 trucks per hour during the hours of 11:00 pm to 7:00 am.

The locations of the sources of sound associated with Project operation are shown on Figures 7 through 10 of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Steady State Noise

The steady-state sound levels for the predictable worst-case hour (i.e., all significant noise sources operating in the same one-hour period) during Project operation activities were determined at the representative NSRs closest to the Project site and are presented in Table 6.2.2-17. Noise contours for the predictable worst-case steady state daytime and nighttime construction are presented on Figures 6.5 and 6.6 in Appendix A of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Table 6.2.2-17: Predicted Steady State Sound Levels – Project Operation

NSR ID	NSR Description	Predicted Sound Levels at NSR (dBA L_{eq}, 1hr)			MECP Criteria at NSR (dBA L_{eq}, 1hr)			Comply with Performance Limits? (Y/N)
		Daytime	Evening	Night	Daytime	Evening	Night	
PS_1	North Hare Lake Cottage	34	34	33	45	40	40	Y
PS_2	South Hare Lake Cottage	33	33	31	45	40	40	Y
PS_3	May's Gifts	46	46	43	50	50	45	Y
PS_4	Wayfare Inn	46	46	42	50	50	45	Y
		47	47	44	50	50	45	Y
PS_5	Peninsula Inn	47	47	43	50	50	45	Y
		49	49	45	50	50	45	Y
PS_6	Travelodge Hotel	39	39	38	50	50	45	Y
		40	40	39	50	50	45	Y
PS_7	Laughing Moose Restaurant and Residence	47	47	43	50	50	45	Y
PS_8	Residence	39	39	38	50	50	45	Y
		40	40	39	50	50	45	Y

The predicted operational sound levels at the representative NSRs are in compliance with the applicable MECP criteria.

Traffic Noise

The baseline and Project traffic sound levels for Project operation were calculated at the representative NSRs closest to the Project operation activities and are presented in Table 6.2.2-18. Noise contours for the daytime baseline traffic and daytime Project traffic are shown on Figures 13 and 14 in Appendix A of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Table 6.2.2-18: Predicted Traffic Baseline and Project Sound Levels – Project Operation

NSR ID	NSR Description	Predicted Daytime Sound Levels at NSR (dBA L_{eq},16hr)		Project Increase Over Baseline (dB)	MECP Criteria at NSR (dBA L_{eq},16hr)	Mitigation Requirement (Y/N)
		Baseline	Project + Baseline			
H_1	Hospital	54.8	55.2	0.6	55	N
		53.8	54.2	0.4	55	N
O_1	Pic Motel	50.2	51.3	1.1	55	N

Table 6.2.2-18: Predicted Traffic Baseline and Project Sound Levels – Project Operation

NSR ID	NSR Description	Predicted Daytime Sound Levels at NSR (dBA L_{eq},16hr)		Project Increase Over Baseline (dB)	MECP Criteria at NSR (dBA L_{eq},16hr)	Mitigation Requirement (Y/N)
		Baseline	Project + Baseline			
O_2	Harbour Inn	54.6	55.7	1.1	55	N
O_3	Zero-100 Motor Inn	53.7	54.6	0.9	55	N
O_4	OPP Station	51.5	52.8	1.3	55	N
O_5	Library	50.3	50.7	0.4	55	N
		50.6	51.1	0.5	55	N
PS_1	North Hare Lake Cottage	18.4	18.8	0.4	55	N
PS_2	South Hare Lake Cottage	26.8	27.2	0.4	55	N
PS_3	May's Gifts	54.3	54.6	0.3	55	N
PS_4	Wayfare Inn	53.3	53.6	0.3	55	N
		55.1	55.4	0.3	55	N
PS_5	Peninsula Inn	54.5	54.8	0.3	55	N
		56.2	56.5	0.3	55	N
PS_6	Travelodge Hotel	52.4	52.8	0.4	55	N
		53.6	54.0	0.4	55	N
PS_7	Laughing Moose Restaurant and Residence	55.4	55.7	0.4	0.3	N
PS_8	Residence	51.3	51.6	0.3	55	N
		52.2	52.5	0.3	55	N
PW_1	Kingdom Hall Church	52	53.1	1.1	55	N
PW_4	Catholic Church	51.7	53.9	2.2	55	N
R_1	Residence	50.9	51.9	1.0	55	N
		56.5	57.5	1.0	55	N
R_11	Residence	50.5	51.0	0.5	55	N
R_12	Residence	39.1	39.7	0.6	55	N
R_13	Residence	61.3	61.7	0.4	55	N
R_14	Residence	55.9	56.3	0.4	55	N
R_15	Residence	43.9	44.5	0.6	55	N
R_23	Residence	48.2	50.7	2.5	55	N
		49.1	51.4	2.3	55	N

Table 6.2.2-18: Predicted Traffic Baseline and Project Sound Levels – Project Operation

NSR ID	NSR Description	Predicted Daytime Sound Levels at NSR (dBA L_{eq},16hr)		Project Increase Over Baseline (dB)	MECP Criteria at NSR (dBA L_{eq},16hr)	Mitigation Requirement (Y/N)
		Baseline	Project + Baseline			
R_3	Bergagnini Apartment Rental	57.5	58.5	1	55	N
		58.4	59.5	1.1	55	N
R_5	Condominium	54.8	55.8	1	55	N
		55.1	56.1	1	55	N
		55.1	56.1	1	55	N
R_7	I Sew Studio and Residence	50.9	54.1	3.2	55	N
R_8	Bayview Apartments	47.6	50.8	3.2	55	N
		48.1	51.2	3.1	55	N
		48.4	51.5	3.1	55	N
R_9	Residence	39.4	42.1	2.7	55	N
		39.9	42.4	2.5	55	N
RH_2	Seniors Centre	47.8	51.0	3.2	55	N
		49.2	52.4	3.2	55	N
R_25	Residence	37.0	39.9	2.9	55	N
R_24	Residence	36.9	40.2	3.3	55	N
		37.8	40.8	3.0	55	N
PW_5	Anglican Church-Trinity	52.2	54.5	2.3	55	N

The predicted operational traffic sound levels at the representative NSRs were below the sound level thresholds provided by the MECP or MTO requiring noise mitigation. Project traffic sound level increases over baseline were less than 5 dB and, therefore, do not warrant investigation for operational traffic mitigation.

Rail Load-Out Facility

The steady-state sound levels for the predictable worst-case hour during Project operation at the rail load-out facility (assessed for the option 2 location) were determined at the representative NSRs closest to the facility and are presented in Table 6.2.2-19. Noise contours for the predictable worst-case daytime operations are shown on Figure 19 in Appendix A of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Table 6.2.2-19: Predicted Steady-State Sound Levels, Rail Load-Out – Project Operation

NSR ID	NSR Description	Predicted Sound Levels at NSR (dBA)		MECP Criteria at NSR (dBA)		Comply with Performance Limits? (Y/N)
		Daytime	Evening	Daytime	Evening	
PW_1	Kingdom Hall Church	42	42	50	50	Y
O_2	Harbour Inn	50	50	50	50	Y
R_25	Residence	38	38	50	50	Y
R_24	Residence	31	31	50	50	Y
		32	32	50	50	Y

The predicted daytime and evening sound levels at the representative NSRs due to steady-state operations at the rail load-out facility are in compliance with the applicable MECP criteria.

The impulsive sound levels for the predictable worst-case hour during Project operation at the rail load-out facility were predicted at the representative NSRs using noise emissions from the rail car coupling and are presented in Table 6.2.2-20. Noise contours for the predictable worst-case daytime operations are shown on Figure 20 in Appendix A of the Noise Updated Effects Assessment (Appendix D2 of the EIS Addendum [Vol 2]).

Table 6.2.2-20: Predicted Impulsive Noise, Rail Load-Out – Project Operation

NSR ID	NSR Description	Predicted Sound Levels at NSR (L_{LM}, dBAI)		MECP Criteria at NSR (L_{LM}, dBAI)		Comply with Performance Limits? (Y/N)
		Daytime	Evening	Daytime	Evening	
PW_1	Kingdom Hall Church	56	56	70	70	Y
O_2	Harbour Inn	69	69	70	70	Y
R_25	Residence	43	43	70	70	Y
R_24	Residence	42	42	70	70	Y
		42	42	70	70	Y

The predicted impulsive sound levels at the representative NSRs are in compliance with the applicable MECP criteria.

Blasting

The results of the setback analysis for air blast during Project operation are shown in Table 6.2.2-21 and illustrated on Figure 6.2.2-5.

Table 6.2.2-21: Air Blast Setback Distance – Project Operation

Type	Charge Size (kg)	Air Blast Setback Distance (m)
Operation	384.2	1,820

The NPC 119 120 dB limit was used to define air blast setback, where no monitoring is required. As shown on Figure 6.2.2-5, no NSRs are located within the 120 dB contour for operation air blast.

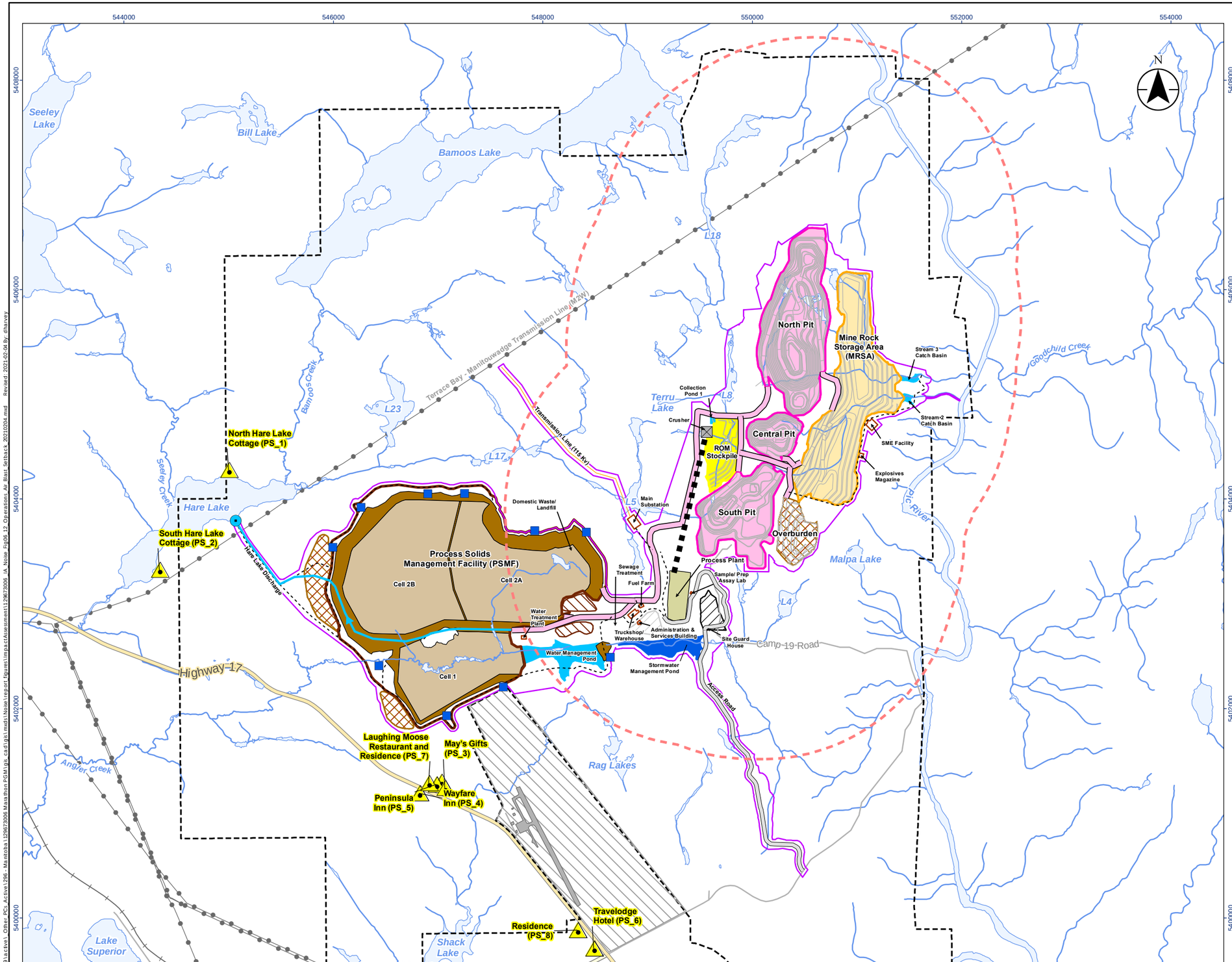
The results of the setback analysis for ground vibration during Project operation are presented in Table 6.2.2-22 and illustrated on Figure 6.2.2-6.

Table 6.2.2-22: Ground Vibration Setback Distance – Project Operation

Type	Charge Size (kg)	Ground Vibration Setback Distance (m)
Operation	384.2	375

The NPC 119 10 mm/s limit was used to define ground vibration setback, where no monitoring is required.

As shown on Figure 6.2.2-6, no NSRs fall within the 10 mm/s ground vibration setback distance. Therefore, blasting during Project operation does not require vibration monitoring.



Stantec

Legend

- Blasting Contour, 120 dB No Monitoring
- Noise Receptors
- Site Study Area Boundary
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Major Road
- Hydro Line
- Railway
- 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

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

Notes

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

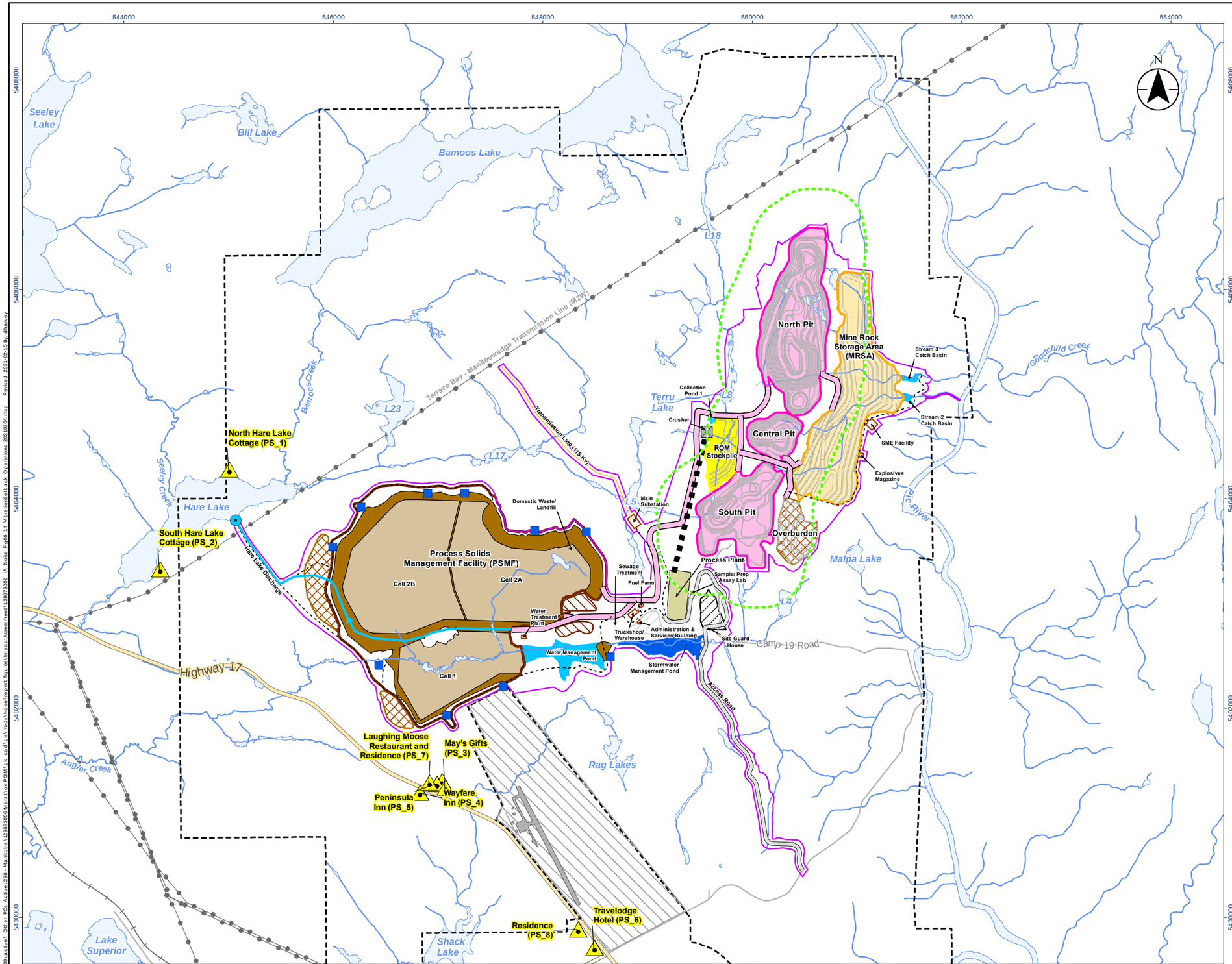
Project Location
Marathon

129673006 REVA
Prepared by DH on 2021-02-04

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.2-5

Title
Operations **Air** Blast Setback



Stantec

Legend

- Vibration Setback (No Monitoring)
- Noise Receptors
- Site Study Area Boundary
- Project Boundary (MLAS, MENDM Changed 2017)
- Highway
- Major Road
- Hydro Line
- Railway
- 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

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

Notes

1. Coordinate System: NAD 1983 UTM Zone 16N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
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 2021-02-10

Client/Project
GENERATION PGM INC.
MARATHON PALLADIUM PROJECT

Figure No.
6.2.2-6

Title
Operations Vibration Setback

Community Annoyance

Community annoyance analysis has been completed in accordance with HC Noise Guideline (Health Canada 2017), using the Percent Highly Annoyed (%HA) method. This requires determining the baseline Day-Night Noise Level (L_{dn}) and %HA, the baseline + Project L_{dn} and %HA, and determining the change in %HA from baseline to baseline plus Project to determine if it is greater than 6.5 %.

The baseline Ldn and %HA, the baseline plus Project Ldn and %HA, and the change in %HA for Project operation, considering steady-state noise sources within the SSA, are presented in Table 6.2.2-23.

Table 6.2.2-23: Community Annoyance, Steady-State Noise – Project Operation

NSR Description	Baseline Ldn (dBA)	Project + Baseline Impact Ldn (dBA)	%HA		
			Baseline	Project + Baseline	% Change
North Hare Lake Cottage (PS_1)*	48.0	48.5	1.7	1.8	0.1
South Hare Lake Cottage (PS_2)*	48.0	48.4	1.7	1.8	0.1
May's Gifts (PS_3)	43.0	50.3	0.9	2.3	1.4
Wayfare Inn (PS_4)	57.5	58.3	5.6	6.3	0.7
Peninsula Inn (PS_5)	38.5	52.1	0.5	2.9	2.4
Travelodge Hotel (PS_6)	56.0	56.3	4.7	4 .9	0.2
Laughing Moose Restaurant and Residence (PS_7)	35.9	50.4	0.3	2.3	2.0
Residence (PS_8)	54.6	55.1	3.9	4.2	0.3

Note:
*NSRs include the +10 dB adjustment for "quiet rural" acoustic environment, as per Health Canada 2017

As the change in %HA from baseline to baseline plus Project at the NSRs is less than 6.5%, there is no expected noise impact on community annoyance.

The baseline Ldn and %HA, the baseline plus Project Ldn and %HA, and the change in %HA for Project traffic during operation is presented in Table 6.2.2-24.

Table 6.2.2-24: Community Annoyance, Traffic Noise – Project Operation

NSR Description	Baseline Ldn (dBA)	Project + Baseline Impact Ldn (dBA)	%HA		
			Baseline	Project + Baseline	% Change
North Hare Lake Cottage (PS_1)*	48.0	48.0	1.7	1.7	0.0
South Hare Lake Cottage (PS_2)*	48.0	48.0	1.7	1.7	0.0
May's Gifts (PS_3)	56.7	56.8	5.1	5.2	0.1
Wayfare Inn (PS_4)	57.5	57.6	5.6	5.7	0.1
Peninsula Inn (PS_5)	58.6	58.7	6.5	6.6	0.1
Travelodge Hotel (PS_6)	56.0	56.1	4.7	4.8	0.1

Table 6.2.2-24: Community Annoyance, Traffic Noise – Project Operation

NSR Description	Baseline Ldn (dBA)	Project + Baseline Impact Ldn (dBA)	%HA		
			Baseline	Project + Baseline	% Change
Laughing Moose Restaurant and Residence (PS_7)	57.8	57.9	5.9	6.0	0.1
Residence (PS_8)	54.6	54.7	3.9	4.0	0.1
Anglican Church (PW_5)	54.6	55.6	3.9	4.5	0.6
Bayview Apartments (R_8)	50.8	52.2	2.4	2.9	0.5
Senior's Centre (RH_2)	51.6	53.1	2.7	3.3	0.6
Catholic Church (PW_4)	54.1	55.0	3.7	4.2	0.5
Condominium (R_5)	57.5	57.9	5.6	5.9	0.3
Harbour Inn (O_2)	57.0	57.4	5.3	5.6	0.3
Hospital (H_1)	57.2	57.3	5.4	5.6	0.2
Library (O_5)	53.0	53.2	3.2	3.3	0.1
Pic Motel (O_1)	52.6	53.0	3.0	3.2	0.2
Kingdom Hall Church (PW_1)	54.4	54.8	3.8	4.1	0.3
Zero-100 Motor Inn (O_3)	56.1	56.4	4.7	5.0	0.3
Residence (R_1)	58.9	59.3	6.7	7.1	0.4
Residence (R_14)	58.3	58.4	6.2	6.4	0.2
Residence (R_13)	63.7	63.8	11.9	12.2	0.3
Residence (R_15)	46.3	46.5	1.3	1.4	0.1
Residence (R_12)	41.5	41.7	0.7	0.7	0.0
Residence (R_11)	52.9	53.1	3.2	3.2	0.0
Residence (R_23)	51.5	52.5	2.6	3.0	0.4
Residence (R_9)	42.3	43.4	0.8	0.9	0.1
OPP Station (O_4)	53.9	54.4	3.6	3.8	0.2
I Sew Studio and Residence (R_7)	53.3	54.8	3.3	4.0	0.7
Bergagnini Apartment Rental (R_3)	60.8	61.2	8.5	9.0	0.5
Residence (R_24)	40.2	41.6	0.6	0.7	0.1
Residence (R_25)	39.4	40.7	0.5	0.7	0.2

*NSRs include the +10 dB adjustment for "quiet rural" acoustic environment, as per Health Canada 2017

As the change in %HA from baseline to baseline plus Project at the NSRs is less than 6.5%, there is no expected noise impact on community annoyance related to operational traffic activities.

The baseline Ldn and %HA, the baseline plus Project Ldn and %HA and the change in %HA for Project operation, considering steady-state noise sources at the rail load-out facility, are presented in Table 6.2.2-25.

Table 6.2.2-25: Community Annoyance, Steady-State Noise, Rail Load-Out Facility – Project Operation

NSR Description	Baseline Ldn (dBA)	Project + Baseline Impact Ldn (dBA)	%HA		
			Baseline	Project+ Baseline	% Change
Harbour Inn (O_2)	35.8	48.6	0.3	1.8	1.5
Kingdom Hall Church (PW_1)	54.4	54.5	3.8	3.9	0.1
Residence (R_24)	40.2	40.5	0.6	0.6	0.0
Residence (R_25)	39.4	41.1	0.5	0.7	0.2

As the change in %HA from baseline to baseline plus Project at the NSRs is less than 6.5% there is no expected noise impact on community annoyance related to rail load-out activities.

The maximum predicted sound levels (L_{max}) during Project operation are presented in Table 6.2.2-26.

Table 6.2.2-26: Sleep Disturbance – Project Operation

NSR Description	Sleep Disturbance Noise Level (dBA L_{max})
	Facility Operations
North Hare Lake Cottage (PS_1)	34.7
South Hare Lake Cottage (PS_2)	34.1
May's Gifts (PS_3)	50.7
Wayfare Inn (PS_4)	53.2
Peninsula Inn (PS_5)	54.3
Travelodge Hotel (PS_6)	54.1
Laughing Moose Restaurant and Residence (PS_7)	52.9
Residence (PS_8)	47.2

The maximum predicted sound levels from Project operation activities within the SSA are below the noise induced sleep disturbance criteria recommended by the WHO in the HC Noise Guideline (Health Canada 2017).

Determination of Significance

The site preparation and construction and operation of the Project will result in noise emissions and ground vibration; however, the magnitude of the releases will be limited and well managed.

Construction related noise emissions will occur through the operation of heavy machinery and from earth moving and material handling, site preparation (including blasting) and material handling, power generation, and vehicle and haul truck traffic. Air blast noise and ground borne vibration are anticipated due to blasting activities.

Emissions during Project operation are expected to be similar and would also include ore processing, transportation of concentrate and activities at the rail load-out facility.

Acoustic modelling and analysis were completed following provincial and federal guidance to predict sounds levels at representative NSRs due to Project construction and operation steady-state noise, traffic noise, rail load-out noise and blasting activities. The predictions were compared to applicable provincial and federal noise criteria to determine the change in noise levels from baseline conditions. The potential for ground vibration to impact nearby NSRs due to Project blasting activities was also assessed.

As presented in Section 6.2.2.3.6 of this report, a significant residual adverse effect for a change in noise levels is one where Project-related noise levels at NSRs are likely to exceed provincial and federal noise criteria.

The predicted sound levels (i.e., L_{max}, L_{eq} 16-hour, L_d, L_e, L_n and L_{dn}) and subsequent analysis (i.e., air blast setback distances and %HA) at representative NSRs from Project construction and operation activities are expected to be below the applicable provincial and federal criteria (refer to Section 6.2.2.3.1 of this report).

With the implementation of mitigation and environmental protection measures as described in this assessment and based on the results of the acoustic modelling and characterization of residual effects in Section 6.2.2.3.5 of this report, residual environmental effects on a change in noise levels during the construction, operation and decommissioning phases of the Project are predicted to be not significant.

With respect to air blast from blasting, the assessment determined monitoring for blasting noise during Project construction is recommended as some NSRs fell along the boundary of the setback distance. For Project operation, no NSRs were identified within the air blast setback distance.

With the implementation of mitigation and environmental protection measures as described in this assessment and based on the results of the ground vibration assessment and characterization of residual effects in Section 6.2.2.3.5 of this report, residual environmental effects on a change in ground vibration during the construction and operation are predicted to be not significant.

6.2.2.7 Prediction Confidence

The estimation of noise emissions associated with Project construction and operation depends on the final design, processing approach, intensity of mining activity and required supporting infrastructure. The prediction confidence for noise emissions is rated as high because the equipment noise emissions are well-understood and are based on equipment totals and published and measured sound power levels for similar equipment. Also, existing noise levels are based on measured sound level monitoring data collected near the SSA. Finally, the predicted sound pressure levels at representative NSRs were completed using industry-standard software, using international calculation standards (i.e. ISO 9613), that is routinely used for predicting environmental noise from industrial activities. Further, predictive analysis with the latest software versions (TNM 3.0) were compared with the results presented showing good correlation.

6.2.2.8 Summary of Project Residual Effects

The residual environmental effects that are likely to occur as a result of the Project are summarized in Table 6.2.2-27 and discussed below. The significance of the residual adverse effects is considered in Section 6.2.2.6 of this report.

Construction

The residual environmental effects on a change in noise levels during Project construction are adverse, as the Project construction results in a predicted increase of noise levels compared to baseline conditions. The magnitude is predicted to be low and limited to the LSA/RSA, with a relatively small change in noise levels predicted for the representative NSRs, except for the NSRs located within the air blast setback distance. The duration is low (short-term), the frequency is continuous when activities are occurring, and the residual effect on change in noise levels during construction is predicted to be negligible as the predicted increase in sound levels due to the Project construction would end once construction is complete.

The residual environmental effects on a change in ground vibration during Project construction are adverse, as the Project construction (blasting only) results in a predicted increase of ground vibration compared to baseline conditions. The magnitude is predicted to be low and restricted to the SSA and immediate surroundings. The duration is low, as construction is anticipated to last 18-24 months, the frequency is medium, the effect occurs only when blasting activities are taking place, and the residual effect on change in ground vibration during construction is predicted to be negligible as the predicted vibration due to the Project construction would end once construction is complete.

Operation

The residual environmental effects on a change in noise levels during Project operation are adverse, as the Project operation results in a predicted increase of noise levels compared to baseline conditions. The magnitude is predicted to be medium and limited to the LSA/RSA, with a relatively small change in noise levels predicted for the representative NSRs. The duration is medium, the frequency is continuous when activities are occurring, and the residual effect on change in noise levels during operation is predicted to be negligible as the predicted increase in sound levels due to the Project operation would end once operation activities cease.

The residual environmental effects on a change in ground vibration during Project operation are adverse, as the Project operation results in a predicted increase of ground vibration compared to baseline conditions. The magnitude is predicted to be low and restricted to the SSA and immediate surroundings. The duration is medium, as operation is anticipated to last 12.7 years, the frequency is medium, the effect occurs only when blasting activities are taking place, and the residual effect on change in ground vibration during operation is predicted to be negligible as the predicted vibration due to the Project operation would end once blasting related to operation activities ceases.

Table 6.2.2-27: Project Residual Effects on Acoustic Environment

Residual Effect	Residual Effects Characterization									
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility	Ecological/ Societal Value	Significance Determination
Change in Noise Levels	C, O, D	A	L - M	L - M	N/A	L - M	L - H	N	N	NS
Change in Ground Vibration	C, O, D	A	L	L	N/A	L – M	M	N	N	NS

KEY

See Section 2.5 of EIS Addendum (Vol 1) and Table 6.2.2-8 for detailed definitions

Project Phase:
C: Site Preparation / Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Medium
H: High

N/A: Not applicable

Geographic Extent:
N: Negligible
L: Low
M: Medium
H: High

Timing:
NS: N/A
MS: N/A
HS: N/A

Duration:
N: Negligible
L: Low
M: Medium
H: High

Significance Determination
S: Significant
NS: Not Significant

Frequency:
N: Negligible
L: Low
M: Medium
H: High

Reversibility:
N: Negligible
L: Low
M: Medium
H: High

Ecological / Societal Value:
N: Negligible
L: Low
M: Medium
H: High

Note: Timing was not included in the original EIS.

6.2.2.9 References

Health Canada. 2017. Guidance for Evaluating Human Health Impacts in Environmental Assessment: NOISE, (HC NOISE)

Ministry of Transportation (MTO). 2006. Environmental Guide for Noise (MTO Guide), dated October 2006

Stantec Consulting Ltd. (Stantec). 2020c. Marathon Palladium Project Environmental Noise Updated Baseline Report. Prepared for Generation PGM Inc. 13 November 2020.