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|  | Noise & Vibration Management Plan NAPG-ENV-SPI-0007 | | Revision | |
| | | | # | Date |
| | Report No (DM#): 1426653 | | B1 | 2020-03-18 Review |
| NORTH ATLANTIC PROJECTS GROUP | | | | |

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| <i>PREPARED BY:</i> | Ed Cocchiarella |  | Aug. 19, 2020 |
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ISSUE/REVISION INDEX

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Issue Codes: RC = Released for Execution, RD = Released for Design, RF = Released for Fabrication, RI = Released for Information, RP = Released for Purchase, RPA = Released for Permit Application, RQ = Released for Quotation, RR = Released for Review and Comments.



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1.0 PURPOSE & SCOPE

1.1 Purpose

The purpose of this Noise and Vibration Management Plan (the Plan, NVMP) is to provide guidance to project personnel on the requirements for noise and vibration minimization during the demolition and construction phases of NAPG Projects. The NVMP also establishes a framework to control and monitor construction processes that may impact the local environment and is consistent with *Management of Environmental Noise and Vibration* (PGS-003279). The NVMP does not directly address occupational health and safety workplace noise. The measures are required to ensure the protection of the environment and to ensure compliance with the project's legal and other environmental requirements.

1.2 Scope


The scope of the NVMP includes the following mining, demolition and construction activities that may emit noise and vibration:

- Construction and site preparation subsurface operations (pile driving, blasting);
- Intentional warning sounds;
- Temporary power generators;
- Demolition of obstacles, equipment and existing infrastructure;
- Underground blasting that may impact communities or surface operations.
- Vehicle loading and unloading of debris, road vehicular traffic, building construction, material transfer and ground excavation (cut, fill and haulage); and,
- Material transport trucks and worker vehicles resulting in increased traffic on public roadways.
- Installation and commissioning of underground ventilation fans systems.

The Plan requirements apply to all Project site personnel.

1.3 Objectives

The following is a list of environmental objectives relating to the NVMP:

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- Apply Best Management Practices (BMPs) for the minimization of noise and vibration which may have an impact on community residences, during demolition and construction activities on the Project;
- Ensure that horns and other signaling devices (reversing beepers) fitted to construction vehicles to provide a danger warning, are least intrusive to the residences and community off-site;
- Ensure underground blasting activities do not impact communities or sensitive receptors on surface.
- Prevent modifications that could potentially increase the noise emitted from exhaust systems of equipment utilized on site;
- Ensure adjustment of construction work hours to meet regulatory requirements; and,
- Integrate communication of noisy construction activities that may impact the local community with on-going Vale communication processes.

2.0 ROLES AND RESPONSIBILITIES

The following identifies roles and responsibilities to manage noise and vibration during demolition and construction for NAPG Projects.

2.1 Project Team

- Ensure all conditions in regulatory permits and commitments under any Environmental Impact Statement related to environment are followed.
- May inspect and audit activities for compliance to regulatory requirements and conformance to the NVMP.
- Coordinate host operations and project activities to allow for the efficient completion of the project and minimize overall air emissions from the site, if required.
- Arrange for internal and external communications concerning noise and vibration through Corporate Affairs.

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2.2 Vale Security

Monitor and enforce site speed limits.

2.3 Host Operations Environment Group

- Ensure all environmental permits for the operating site and the project are obtained and update the project team of any amendments or changes.
- Maintain any existing community vibration monitoring network and provide data when requested. (Mine Development or Operations)
- Refer and coordinate any noise and vibration complaints pertaining to Project construction activities to the project team for investigation.
- Provide environmental training materials and programs to the project team for use in developing Project specific training.

2.4 Vale Corporate Affairs

Communicate with the public particularly to advise in advance of noisy activities, and to respond to complaints receipt.


2.5 Project Construction Management

- Implement the NVMP and ensure compliance with all applicable regulations, guidelines and project commitments through planning, training, supervising, monitoring, inspection and reporting activities;
- Oversee Contractors to ensure compliance with the requirements of the NVMP;
- Investigate and report on all incidents of non-compliance with the NVMP and/or regulation; specify corrective actions and ensure their timely completion;
- Develop procedures and forms to facilitate compliance with the NVMP;

Be familiar with and adhere to the municipal codes and by-laws on Noise limits and prohibitions.

Be familiar with and adhere to the noise or vibration requirements imposed by the project's Environmental Impact Statement, if any.

Lead activities, in the event of an environmental incident regarding noise and vibration.

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Complete environmental reporting to the Project team and the host site's Environmental group, as required.

2.6 Environmental Lead

Advise Construction Management on the requirements of the NVMP, regulations, Environmental Impact Statement commitments, etc. including managing compliance, reporting on performance, arranging to inspect and audit the Plan and propose improvements.

Regularly review and update the NVMP and specialized procedures and plans as required.


Manage the environmental audit, inspection and monitoring program for noise and vibration associated with the project, including noise surveys.

Monitor site inspection and audit records. Assess the performance of the identified control measures to ensure they are effective and compliant with the NVMP.

Where required, develop and arrange for delivery of environmental training for all site personnel and contractors relative to noise and vibration.

Liaise with Vale's Corporate Affairs representative as required relative to noise and vibration. Ensure appropriate investigation and responses are completed to any potential public complaints with regards to construction activities, utilizing established complaints protocol. (Vale conducts all public contacts.)

Ensure that basic NVMP requirements are included in project orientation training delivered to all workers on the project site;

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2.7 Environmental Representative

Deliver environmental training to on-site personnel and Contractors relative to the NVMP.

Support Construction Management, in conjunction with Vale, in the event of a noise or vibration incident.

Ensure regular observations at sensitive locations (such as adjacent to neighbouring residences or near demolition/construction sites) are completed when noisy construction activities are undertaken.

Update work method statements for noise and vibration aspects, as required through the PMRA process.

Review JHA reports filed by contractors and assess the adequacy of control measures related to noise and vibration as appropriate.

Complete routine reports.

Work with Environmental Lead to provide advice regarding the effectiveness of control measures identified in the NVMP.

2.8 Contractors

Appoint an Environmental liaison to coordinate with the project as needed **to ensure** ongoing adherence to the NVMP.

Implement the requirements of the NVMP during mining, demolition and construction activities.

Document these control requirements through the JHA and PMRA processes.


Ensure blasting and other activities **do not** impact communities or sensitive receptors on surface.

Be familiar with and adhere to any municipal by-laws or codes regarding noise and the prohibitions relative to construction and excavation that may be required.

Be familiar with and adhere to the noise or vibration requirements imposed by the project's Environmental Impact Statement, if any.

Be aware of compliance status of the host site for regular operations (e.g. Sudbury operations are subject to a Noise Abatement Action Plan) and adopt any additional measures required.

Resolve any operational difficulties (noisy conditions or excessive vibration) that may be identified.

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2.8 Contractor’s continued:

Where requested by the Project Team, participate in complaint investigation process and implement corrective actions.

2.9 All Workers

Follow the requirements for noise and vibration management during demolition and construction activities as described in the JHA and PMRA documents, including any additional measures required for sensitive locations or activities.

Implement the requirements of the NVMP relative to the work undertaken.

Resolve any operational difficulties (noisy conditions) that may be identified.

3.0 DEFINITIONS

Best Management Practice (BMP): are methods that have been determined to be the most effective and practical **means** of preventing or reducing sources of pollution, including noise.


Job Hazard Analysis (JHA): A systematic analysis of the steps involved in doing a task, the hazards or loss exposures involved and the controls necessary to prevent loss.

Pre-Mobilization Risk Assessment (PMRA) Vale’s program to identify and evaluate potential safety (and environmental) hazards and risks associated with work activities and the area in which work will be undertaken.

4.0 COMPLIANCE OBLIGATIONS

The compliance obligations associated with Project activities are detailed in the *Project Permitting Plan*.

There is no federal legislation that specifically governs noise and vibration management on construction sites. Ontario considers noise to be a “contaminant” which allows the province to regulate noise as part of Air Compliance Approvals. Manitoba and Newfoundland & Labrador do not specifically address noise in provincial legislations. However, municipalities in all jurisdictions may have noise by-laws. This is a concern for projects in Sudbury. Noise may be an environmental concern discussed in the Environmental Impact Statement for a project, if one is required. The project may make commitments to address these concerns that should be documented in the Permitting Plan. Each project should establish noise management requirements through the project study phases and implement them in demolition and construction activities.

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The following are the primary regulatory requirements and with respect to construction noise and vibration in Ontario, and Sudbury in particular:

- Ontario Environmental Protection Act R.S.O. 1990, CHAPTER E.19, Section 14.
- City of Sudbury Municipal Code, Chapter 776 Noise Protection dated Jan 1991 – see Appendix A; and,

It is notable that the Copper Cliff Smelter Complex currently operates under a Noise Abatement Action Plan whereby various noise mitigating activities are implemented within regular operations over a defined timeline. Accordingly, construction-based noise and vibration (distinct from operational noise and vibration) must also be minimized where possible. The minimization of nuisance caused by noise will be achieved through the implementation of recognized industry best practices noted herein.


5.0 REQUIREMENTS

5.1 General

Best Management Practices (BMPs) will be used regarding the control of noise and vibration, as noted below. These requirements are applicable to Contractors employed in activities that may generate noise and vibration.

The Project Team and in turn the Contractor shall plan construction activities and adopt the noted procedures that minimize noise and vibration impacts while retaining productive efficiency. These include:

- Prioritizing noise reduction at the source or choosing locations that enable natural attenuation;
- Choosing alternative, lower-impact equipment or methods wherever possible;
- Scheduling the use of noise and vibration-causing equipment, such as jackhammers, at the least sensitive time of day (through the day not in the evening);
- Setting up access routes that will reduce the need for trucks to back up (due to back-up alarms);
- Operating construction equipment and conducting work in authorized areas and locations only;
- Sequencing operations so that noise and vibration-causing activities do not occur simultaneously, and;

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- Generally, keeping equipment well maintained. Noisy equipment shall be inspected and maintained on a regular basis.
- For underground and surface blasting, employ well controlled drilling, loading and blasting practices (sequential detonation) at appropriate times during the day to minimize surface impacts.
- When noisy activities are unavoidable or there are non-routine activities that may attract attention near communities, issue notifications to the community through the Vale Corporate Affairs representative.


5.2 Roads

The most severe noise and vibrations associated with road traffic result from heavy vehicles with stiff suspensions moving rapidly along roads with irregular surfaces, like speed bumps and potholes. All drivers at the site must obey speed limits. The project shall employ a service provider to maintain roads. The road maintenance service may be shared or coordinated with the host site, if applicable

5.3 Mobile Equipment

Contractors shall implement and incorporate the following measures, where safety regulations allow:

- Use light signals such as stroboscopes in place of whistles, bells or other audible warnings to indicate shift changes, concrete pours, lifting manoeuvres and other site activities;
- Use adjustable audible backup warnings and operate so that the warnings do not exceed 85 dB(A) at 1 m from the device;
- Ensure that noise levels do not exceed 85 dB(A) at 1 m from the equipment. Where excursions occur, the Contractor shall implement mitigation measures;
- All internal combustion engines of heavy earthmoving and power equipment (e.g. graders, dozers, excavators, generators, air compressors, cranes, etc.) must be fitted with effective mufflers before operating on site;
- Low-noise vacuum trucks must be utilized;
- Slamming of dump truck rear gates is prohibited close to urban and residential areas;

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- Where possible, utilize existing buildings as noise shields when considering vehicle placement;
- Use of electric equipment instead of pneumatic or hydraulic equipment and percussion tools fitted with noise-abatement devices where possible; and
- Where possible, locate compressors, generators and other noisy equipment is as far away from sensitive receptors as possible.
- Prohibit the use of engine brakes.

5.4 Blasting

Contractors shall employ the following BMPs for surface or underground blasting to minimize transmission of vibrations to sensitive communities, impact Vale operations or other project activities, as required and in accordance with regulations:

- Employ an appropriate drill pattern, length and diameter;
- Ensure drilling is accurate for the entire length of the hole;
- Deploy instruments to measure air blast or ground vibration, if required;
- Employ sequential or decoupled charges;
- Use blast mats on surface;
- Set a regular blast timetable if possible, and blast only during the day;
- Provide notifications to the sensitive community about the blast timetable and any warning sirens they may hear;
- Blast when weather conditions are favourable (wind blowing away from sensitive receptors and no atmospheric inversions); and,
- Implement fly rock controls.

Note that people will perceive blast related shaking well below levels that may damage structures. Air blast and ground vibration at the nearest structure must be kept below levels that may cause complaints.


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5.5 Management Activities

In advance of planned noisy work, Contractors shall inform the project team who will inform neighbours about planned noise and vibration generating activities such as large excavation, pile driving and rock-breaking including blasting.

The Contractor shall ensure that piling, if needed, in noise sensitive areas should be undertaken within prescribed working hours in consultation with the Project's Environmental Representative. Contractors shall avoid scheduling night-time construction activities wherever possible to minimize impact on residential receptors per any restrictions imposed by local by-law requirements.

If required, Vale will seek appropriate allowances from the municipality when noise or vibration must occur outside allowable hours.

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6.0 LEARNING AND COMPETENCE

6.1 General Project Orientation

Noise and vibration control will be an integral part of the project orientation. This training module will familiarize participants with general noise and vibration protection requirements.

6.2 Specific Environmental Training

A specific noise and vibration training module may be required for those contractors who are engaged in activities that are of significant concern. This will be determined based on a review of the job specific JHA to protect the community. The module should include:

- Obligation to noise and vibration controls for all outdoor activities;
- Regulatory requirements;
- More detailed presentation of the site-specific BMPs required.

7.0 INSPECTIONS, MONITORING AND AUDITING


7.1 Inspection

During routine inspections, the Project team and Construction Management shall verify their respective construction areas conform to the NVMP and controls are being implemented effectively. These inspections consider the site environmental standards as the minimum standards that should be achieved, with necessary actions to be recorded and raised at weekly progress meetings, or earlier as required. Projects may create a site-specific Environmental Inspection Form, including NVMP control elements, to record findings.

Vale environmental personnel from the host site may be invited to attend the inspections and completed inspection reports may be forwarded to the host site upon request. Unless addressed by a straightforward stop and correct action, non-conformities must be added to the Environmental Corrective Action Register. For any non-conformance identified, Vale may participate in the development of the proposed correction action.

7.2 Noise and Vibration Monitoring

Ambient noise monitoring may be required as a condition of permits either in the form of a noise study or a permanent network. The Project must address these requirements through the Permitting Plan.

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Should blasting be required near residences or sensitive structures, ground vibration and/or air blast monitoring may be required. These monitoring requirements should be determined at the PMRA exercise and implemented before blasting begins. Appropriate notifications should be made to the affected community.

7.3 Auditing Program

The annual audit program described in the NAPG Environmental plan must include conformity with the NVMP and compliance with regulatory requirements.

7.4 Management of Non-Conformities

The project Environmental Representative assesses the environmental performance based upon the information received from Construction Management, Vale, the contractors and his or her own inspection and audits of the construction works. Issues and non-conformities are reported and discussed at weekly Progress Meetings, or on an as-needed basis.

If non-conformity with the NVMP or non-compliance with regulations is observed, the project shall follow the Process to Manage Non-Conformities in the NAPG Environment Plan.


Environmental occurrences will be assessed using Vale’s standard for classification and reported according to the Communications instructions in the NAPG Environment Plan.

The project shall investigate all noise and vibration complaints received through the established Community Concerns Line, if they could be related to Project construction activities. The investigation will include root cause analysis, and recommendations for resolution of the issue be put forward for mutual discussion and consideration. Responses to complaints will be documented and forwarded/discussed with the host site Environment Group, and Corporate Affairs for contact with the public.

8.0 COMMUNICATION AND REPORTING

Communications of issues relative to noise and vibration are coordinated through the project Environmental Representative and the Construction Manager at least at weekly construction meetings, or on an as-needed basis.

Only Vale communicates directly with the public through a Corporate Affairs representative. This process is described in the NAPG Environmental Plan.

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9.0 REFERENCE

NAPG Environmental Plan, NAPG- ENV-SPI-0001

Management of Environmental Noise and Vibration (PGS-003279)

City of Sudbury Municipal Code, Chapter 776 Noise Protection, City of Sudbury, January 1991.

Ontario Environmental Protection Act RSO 1990 CHAPTER 19, Ontario Ministry of the Environment.

Vale Canada Limited, Copper Cliff Smelter Complex Noise Abatement Action Plan.

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