ADRIATIC METALS PLC

VARES PROJECT

NOISE AND VIBRATION MANAGEMENT PLAN

SEPTEMBAR 2021

Contents

NOISE AND VIBRATION MANAGEMENT PLAN

This document has been developed/revised as indicated below and described in the revision record on the following page. Please destroy all previous revisions.

Version	Date	Authors	Reviewed	Pages
1.0	10/08/21	Damir Zukić	Vildana Mahmutović Kate Harcourt	14
2.0	30/09/2021	Vildana Mahmutović	Kate Harcourt	14

ISSUED FOR: [x] Design [x] Construction [x] Operations [ ] Other _____

1.0 INTRODUCTION

1.1 Purpose and Scope

Eastern Mining d.o.o. is owned and operated by Adriatic Metals PLC and located in Bosnia and Herzegovina (BiH). Eastern Mining d.o.o. is the holder of a concession for exploration and exploitation in Vareš (BiH). The ultimate goal is to revive the mining industry in the municipality of Vareš, by exploiting new and existing ore deposits. The project, named Vares Project is polymetallic mine, and has attracted reputable foreign investors in BiH. In many ways, this research project is unique in post-war BiH, both in terms of investment size and development potential.

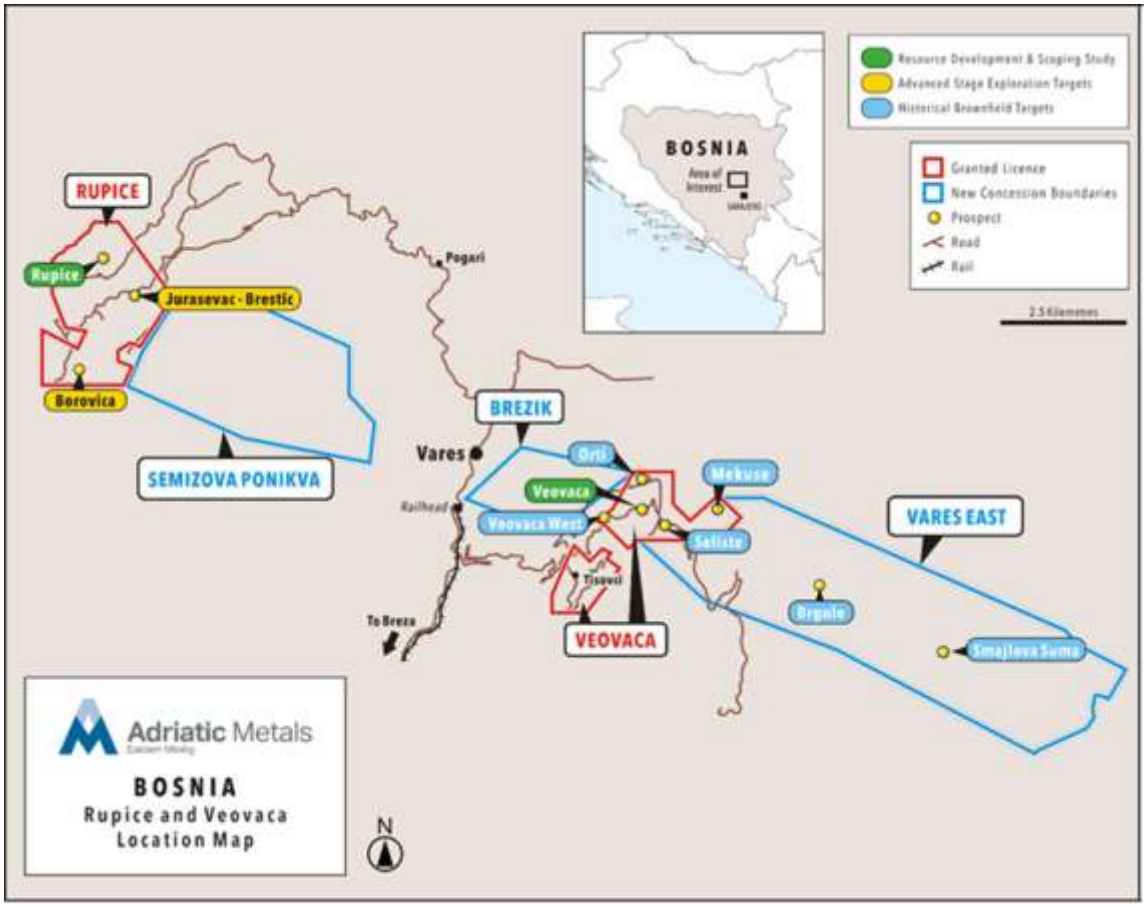

Figure 1.1. Map showing the location of the Vares Project

This Noise and vibration management plan (NVMP) has been developed to provide further details on the measures to be implemented during the construction and operational phase of project to ensure that the actual environmental impacts are consistent with those evaluated in

the Environmental Social Health Impact Assessment (ESHIA), and that mitigation measures are applied as intended and effective.

The purpose of the NVMP is to provide a clear set of actions and responsibilities for the control and minimization of potential impacts on sensitive receptors within the Project area of influence. There are a number of linkages between this NVMP and other environmental plans as described below:

- Occupational Health and Safety Plan provide identification and assessment of the occupational risks related to noise and vibration,
- Traffic Management Plan provide mitigation measures to reduce noise emissions arising from construction vehicles and equipment.
- Community Health Safety and Security Management Plan provides identification and assessment of the community risks related to noise and vibration

This plan also provides the mechanism to adopt new measures throughout the ongoing construction and operation to improve noise and vibration management.

The NVMP represents one component of the overall Environmental Social Management Strategy (ESMS). The ESMS includes a number of commitments and component management plans which together form the basis for the ongoing construction and operations of the Eastern Mining.

The Plan is in compliance with national legislation, requirements of international financing institutions (e.g. IFC Performance Standards, EBRD Performance Requirements) and other applicable good practices. This Plan is a living document, and the responsibilities, procedures and compliance actions should be updated as appropriate.

2.0 Legislative Requirements and Standards

Eastern Mining intends to implement practices in accordance with international practices in addition to local law legislation, respecting principles and policies of the European Bank for Reconstruction and Development (EBRD) and International Finance Corporation (IFC).

2.1 National Legislation

- Environmental Protection Law ("Official Gazette of the Federation of BiH", No. 15/21)
- Law on protection against noise ("Official Gazette of Federation BiH" No. 110/12)
- Law on protection against noise ("Official Gazette of Zenica-Doboj Canton" No. 01/14)
- Mining law ("Official Gazette of the Federation of BiH", No. 26/10)

2.2 Environmental permit noise measures applicable to project

Noise protection measures from environmental permits (permits number: UPI 05/2-02-19-5-60/20 SC and UPI 05/2-23-11-195/19) that will be applied on the project are:

- use equipment that meets the requirements of the European Directive EC/2000/14 regarding the emissions of noise produced by equipment for outdoor use,
- if the level of noise exceeds the permitted values, prohibit the use of machinery that produces impermissibly high noise, or use modern and technically valid working machinery, for which the contractor must have the necessary permits,
- in case of complaints by the local population, carry out additional monitoring and corrective measures
- sound signals with equipment should be given only in exceptional cases because the intensity of sound signals on these vehicles is over 105 dB (A),
- during the execution of works and organization of the plant, preserve all possible vegetation, i.e. Plants and / or plant the same,
- form green protective belts which perform absorption and refraction of elastic sound waves, perform complete amplification of sound waves by changing their accentuated components whereby the energy of these waves is transformed and sound waves take on the properties of waves which have no harmful or disturbing characteristics or their basic characteristics are reduced to a level where their intensity impact is brought below the perception limit,
- for permanent noise sources, such as a compressor make sound barriers.

- Table 1: *Law on protection against noise "Official Gazette of F BiH" No 110/12 - Table 2 Ref III*

Type of Premises or Area	Time	LAeq dB(A)	LAmax dB(A)
External noise limits for residential, education and health institutions, public green space, and recreation areas.	07:00 -23:00	55($L_{Aeq,15\ min}$)	70
	23:00 – 07:00	45($L_{Aeq,15\ min}$)	

It should be noted that the national regulatory limits provided in Table 1 include maximum instantaneous noise impact limits.

2.2 International requirements

- European Bank for Reconstruction and Development (EBRD) Performance Requirement (PR) 1
- European Bank for Reconstruction and Development (EBRD) Performance Requirement (PR) 4
- Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise
- Directive 2000/14/EC Noise of Equipment for use outdoors
- IFC PS1: Assessment and Management of Environmental and Social Risks and Impacts,

- IFC General EHS Guidelines: Environmental Noise Management, January 1,2012
- IFC General EHS Guidelines: Construction Materials Extraction, April 30,2007
- IFC PS1: Assessment and Management of Environmental and Social Risks and Impacts,
- IFC PS4: Community Health, Safety, and Security,
- World Health Organisation's Guidelines for Community Noise 1999 (WHO).

International Finance Corporation – Environmental, Health, and Safety Guidelines, Noise Management, April 2007 (IFC)

The guidance document sets out limits for noise impact at sensitive receptors within the vicinity of mining operations and states;

"Noise impacts should not exceed the levels presented in Table 1.7.1 or result in a maximum increase in background noise levels of 3 dB at the nearest receptor location off-site."

Table 2: Noise Level Guidelines		
Receptor	**One Hour LAeq(dB)**	
	Daytime 0700 - 2200	**Night-time 2200 - 0700**
Residential; Industrial; Educational	55	45
Industrial; Commercial	70	70
Guideline values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.		
For acceptable noise levels for residential, industrial and educational settings refer to WHO (1999).		

World Health Organisation's Guidelines for Community Noise 1999 (WHO)

The WHO Guidelines for Community Noise 1999 suggests guideline values for internal noise exposure which take into consideration the identified health effects and are set, based on the lowest effect levels for general populations. Guideline values for annoyance which relate to external noise exposure are set at 50 or 55 dB(A), representing daytime levels below which a majority of the adult population will be protected from becoming moderately or seriously annoyed respectively.

The following guideline values are suggested by WHO:

- 35 dB $L_{Aeq(16\ hour)}$ during the day time in noise sensitive rooms;
- 30 dB $L_{Aeq(8\ hour)}$ during the night-time in bedrooms;
- 45 dB $L_{Amax(fast)}$ during the night-time in bedrooms;
- 50 dB $L_{Aeq(16\ hour)}$) to protect majority of population from becoming moderately annoyed; and
- 55 dB $L_{Aeq(16\ hour)}$ to protect majority of population from becoming seriously annoyed.

It should be noted that the WHO night-time internal guideline value for bedrooms is

equivalent to 45dB L_{Aeq} outdoors, which is also quoted as the IFC night-time guidance level. The noise level criteria used in this assessment for comparison with outdoor construction and operational noise level predictions are, therefore;

- 55 dB L_{Aeq} Daytime; and
- 45 dB L_{Aeq} Night-time.

The LAeq average national regulatory limits correlate directly with the IFC EHS Guidelines as presented within previous tables, when considering general residential, industrial and educational receptors.

3.0 Roles and Responsibilities

Principal roles and responsibilities for the implementation of this plan are outlined below.

Roles	Responsibilities
Executive Director	• Ensure adequate resources are provided for implementation of this Plan. • Ensure the Plan is distributed to all relevant Contractors and subcontractors. • Ensure Design mitigation measures are included in Main projects
Project Director	• Ensure Operation Plant mitigation measures are respected and provide necessary technical support for implementation • Ensure Residential mitigation measures are respected and provide necessary technical support for implementation
Environmental and Social Manager	• Ensure technical support is provided to Contractors for implementation of the Plan. • Ensure related trainings are provided
Environmental and Social Management Associate	• As required, review and update the Plan • Implementation of monitoring and mitigation measures • Inspection of contractors and subcontractors on respecting mitigation measures

4.0 Noise and Vibration Management Plan

4.1 Design Mitigation

- Designed mitigation measures prior to start up, including housing for the crushing plant, will be in place before tests on the crushing plant are commenced. Soil mounds constructed adjacent to haul roads will be located to provide additional attenuation between the haul trucks and the nearest community.
- During the detailed design stage, the use of noise barriers, baffles, or enclosures to provide abatement for noisy equipment such as generators, compressor, pumps and gearboxes will be included;
- Adequate distance between the stationary noise sources and the nearby communities should be maintained; and
- The façade of the proposed processing building will be designed to provide a minimum of 39dB Rw.

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4.2 Operational Plant Mitigation

- All mobile plant should undergo regular inspection and maintenance to ensure that the installed mufflers are performing to an adequate standard and that worn parts are replaced;
- Hard surface roads will be installed and maintained to reduce road noise and dust;
- Design of the haul road should minimise excess revving;
- A speed limit should be imposed to minimise aerodynamic noise.

During operations, the following noise abatement best practice measures will be implemented:

- Workers will be trained in noise abatement best practices, including avoiding unnecessary revving of engines and switching off equipment when it is not required;
- Haul routes will be well maintained and where steep gradients are required, operatives will be trained to minimize engine noise through avoiding unnecessary revving etc;
- Drop heights for materials will be minimised;
- Vehicle and plant start-ups will be sequenced to avoid simultaneous noise bursts;
- All vehicles will be fitted with reversing alarms set at lowest level subject to health and safety considerations;
- Provide an air inlet silencer and exhaust silencers for stationary combustion engines and other units (for example generators);
- Perform regular inspection and maintenance of material handling vehicles and equipment to ensure that they have quality mufflers installed, worn parts are replaced, and lubricants are applied so that the design noise-output specifications continue to be met;
- When plant equipment has to be replaced, the selected plant will have a sound power level equal to or less than the plant that it is replacing;

- Employees and contractors involved in mining and blasting operations will be issued with and wear appropriate hearing protection in high-noise areas. Such areas will be designated by signage in the appropriate language, and employees and contractors will be trained in hearing protection procedures;
- The static plant located in the crusher and processing areas will be housed within a building, and breakout points in the facade of these buildings (i.e. doors, windows etc.) will be minimised, as well as minimising the reverberant noise inside the buildings, which will be controlled through sound absorptive material;
- Complaints related to noise associated with any of the project activities will be monitored through the stakeholder engagement activities and the Project's complaints and grievance process, including the use of drop boxes to encourage comments on performance;
- Noise monitoring will be undertaken in accordance with Section 5 below and following any complaints from within the affected community receptors;
- If possible, vehicle movements should be limited during the weekend and night time periods to reduce the noise impact during the quieter periods and
- All measured data will be logged and maintained as a record for the site EMS, which should be available on request and published annually for the duration of the Project.

The following general measures will be implemented to minimize transportation-related noise impacts associated with the Project:

- Enforce speed limits in relation to road conditions and location of sensitive receptors such as populated areas;
- Maintain access road surfaces in good repair to reduce tyre noise; and
- Ensure continuous traffic flow to avoid prolonged idling.

4.3 Residential Mitigation Measures

A number of measures are recommended at key locations where project activities will be taking place close to residential properties, some of which are only occupied occasionally (i.e. are weekend retreats or summer holiday homes). These are outlined below:

- It is recommended that a 2.5m high acoustics barrier is installed between the haul road and ESR 4, as residential buildings are present at this location, assuming if these buildings are confirmed to be residential dwellings and there is adequate space to install an acoustic barrier. The choice may be given to the residents to whether an acoustic barrier is installed, or an alternative glazing and ventilation scheme is installed. The residential dwelling (holiday property) at ESR6 will require the installation of If the dwellings at ESR 5 and 6 are confirmed to be residential dwellings the installation of the glazing and ventilation scheme will be required.
- The acoustic barrier can consist of either an earthen bund or close boarded acoustic fencing. If an alternative glazing and ventilation scheme is used to mitigate the noise impact on these properties, the exact glazing requirements will be identified on a plot-

by-plot basis. The glazing scheme required will depend on the construction of the building, existing ventilation system and internal room dimension.

- The alternative ventilation system should be installed to allow for adequate airflow to the building without requiring windows to remain open. Most forms of trickle ventilation allow for the windows to be opened when purge ventilation is required.

5.0 Monitoring and Audit

5.1 Sensitive receptors

All closest sensitive receptors are residential properties, therefore, the sensitivity of each is considered medium, even though some are not occupied all the time.

Table 2. Sensitive receptors

Receptor	Co-ordinates		Closest Project Area	Distance to Project (m)
	X	Y		
ESR 1	278637	4896957	Rupice Mine	441
ESR 2	283029	4894683	Haul Road	49
ESR 3	283299	4894617	Haul Road	69
ESR 4	285831	4891505	Haul Road	17
ESR 5	286446	4891153	Haul Road	14
ESR 6	286786	4890652	Haul Road	7
ESR 7	287835	4890897	Processing Plant	64
ESR 8	287929	4891029	Processing Plant	33

Noise monitoring will be undertaken at locations considered representative of sensitive receptors closest to the Project periodically through each stage of the proposed Project. Additional monitoring will be undertaken in response to noise complaints at any location.

5.2 Residual Impacts

Standard noise mitigation and best practices will be adopted by the Project to protect workers and community receptors. During the early stages of operation, it is good practice to monitor noise at the nearest sensitive receptors to ensure the predicted noise impact is being experienced within the sensitive areas. Additionally, the effectiveness of mitigated noise activities will be monitored via the Project's complaints and grievances mechanism.

Table 3: Impact Summary

Impact	**Mining Stage**	**Impact before mitigation**	**Key Mitigations**	**Residual Impacts**
Noise on existing community receptors	Construction and Operations	Minor (low)	Perform Regular maintenance and inspection of vehicles and mobile equipment, including mufflers. Enforce speed limits for heavy equipment and general traffic on all roads and maintain roads. Install noise attenuation devices on construction equipment and use temporary barriers where possible to reduce noise propagation.	Minor (low)

Table 3: Impact Summary

Impact	Mining Stage	Impact before mitigation	Key Mitigations	Residual Impacts
			Position stationary noise sources away from residents. Installation of noise insulation should be installed to the main processing building. Implement Noise Management Plan.	
	Haul Road	Major	Engage with occupants of ESR 4 and 6 to develop appropriate noise mitigation measures, such as installing an acoustic barrier between the haul road and the residential dwellings or an improved glazing and ventilation system at ESR 4 and install additional glazing and ventilation (air conditioning) for ESR6.	Moderate
Vibration on existing community receptors	Vehicles, Heavy Equipment	Negligible	Schedule high vibration-generating activities to daytime hours. Perform regular maintenance and inspection of equipment in accordance with the Air Quality and Vibration Management Plan. Monitor vibration-related complaints through the Complaints and Grievances Process.	Negligible
	General Project Operations	Negligible	Schedule high vibration-generating activities to daytime hours. Perform regular maintenance and inspection of equipment. Monitor vibration-related complaints through the Complaints and Grievances Process.	Negligible

5.3 Monitoring and Audit

The monitoring and audit planning required to validate the effectiveness of the mitigation strategies have been identified in Table 4.

Table 4: Noise Monitoring and Audit

Noise - Monitoring Approach		
Standard Operating Procedures	• Suitable Monitoring Equipment – Class 1 noise meters with environmental monitoring kits will be used for noise monitoring and suitable maintenance requirements and non-conformance events or activities will be identified. Chain of custody documentation will be required if equipment is hired in. The equipment will be calibrated before use and periodically sent to the manufacturer for laboratory recalibration. • Noise Monitoring Procedures - The noise assessment will define the monitoring requirements and periods for the use of the equipment, which will be directed towards areas of the operation where the effectiveness of mitigation measures can be determined. The procedure will ensure that representative data is collected and suitable records retained throughout the duration of the Project and will include details of: - suitable monitoring locations; - duration of monitoring to be undertaken at each location for each identified stage of works; and - recording of all required noise data including noise level (L_{Aeq}), date, time, weather conditions and any other relevant information. - guideline noise levels - action to be undertaken in the event that guideline noise levels are exceeded at identified receptors. Complaints Procedure –The procedure will detail actions to be undertaken in the event that noise specific complaints are received by the operator either directly or through the dedicated liaison mechanisms implemented as part of the project	
Monitoring strategy	**Equipment**	**Procedure**
Noise	Class 1 noise meters with environmental monitoring kits will be retained on site and maintained throughout the duration of the Project.	**Noise monitoring will be undertaken at locations considered representative of sensitive receptors closest to the Project periodically through each stage of the proposed Project:** - **During construction works at day and night;** - **During operational phase annually and** - **Additional monitoring will be undertaken in response to noise complaints at suitable locations.**
Vibration - Monitoring Approach		
Standard Operation Procedures	• Suitable Monitoring Equipment - seismograph will be used for vibration monitoring at the existing sensitive receptors and suitable maintenance requirements and non-conformance events or activities will be identified. Chain of custody documentation will be required if equipment is hired in. The equipment will be calibrated before use and periodically sent to the manufacturer for laboratory recalibration • Vibration Monitoring Procedures - The procedure will ensure that representative data is collected, and suitable records retained throughout the duration of the Project and will include details of: - suitable monitoring locations; - duration of monitoring to be undertaken at each location for each identified stage of works; and - action to be undertaken in the event that guideline vibration levels are exceeded at identified receptors.	

	Complaints Procedure – The procedure will detail actions to be undertaken in the event that noise specific complaints are received by the operator either directly or through the dedicated liaison mechanisms implemented as part of the project.	
Monitoring strategy	**Equipment**	**Procedure**
Vibration	Vibration meters of a suitable standard and level of maintenance will be used as required. Vibration monitoring will be undertaken in response to vibration complaints at suitable representative locations.	Vibration meters of a suitable standard and level of maintenance will be used as required. **Vibration monitoring will be undertaken in response to vibration complaints at suitable locations.**

6.0 Training

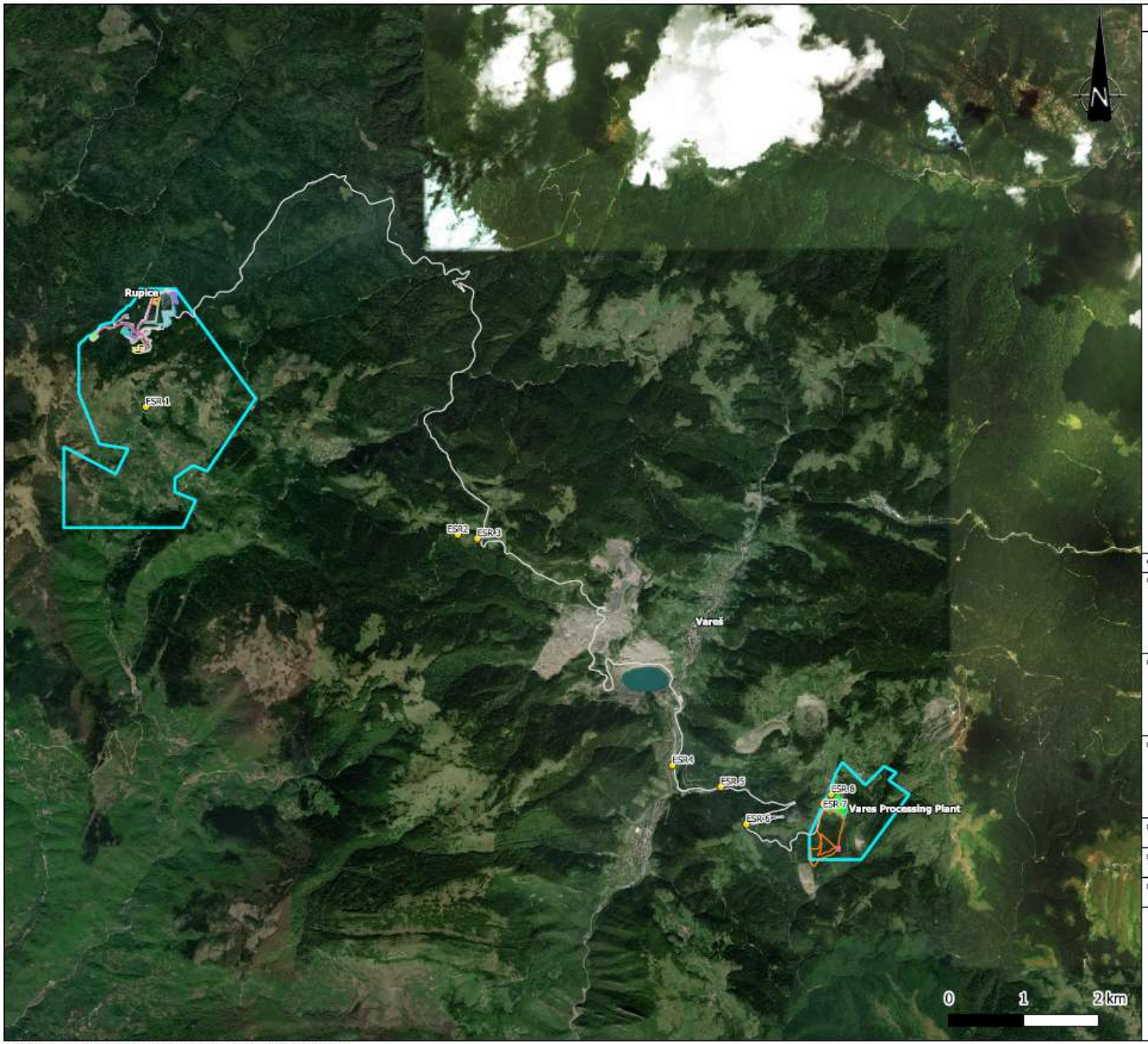
Regular internal and external (when necessary) trainings will be made to ensure that the mitigation measures indicated in this plan are applied during project for all involved parties.

Regular internal inspections will be made to ensure that the mitigation measures indicated in this Plan are applied during project.

7.0 Review and Update

The results of monitoring will be reported to responsible parties to ensure that the project activities comply with the national legislation and international standards.

Depending on the monitoring results, the Noise and vibration management plan will be reviewed and updated when necessary.



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Key

- Existing Sensitive Receptors - Noise
- Haul Road
- Tailings Storage Facility
- Vares Processing Plant
- Rupice Blasting Storage and Emulsion
- Rupice Crushing Plant
- Rupice Paste Plant
- Rupice Warehouses and Storage Areas
- Rupice Waste Rock Stockpile
- Concession Boundaries

REVISION	DETAILS	DATE	DRN	CHKD	APP'D

CLIENT: Adriatic Metals PLC

PROJECT: Vares Project ESIA

DRAWING TITLE: Existing Sensitive Receptors - Noise

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