

# TÜMAD

MADENCİLİK SANAYİ VE TİCARET A.Ş.



## NOISE AND VIBRATION MANAGEMENT PLAN for LAPSEKİ & İVRİNDİ PROJECTS

by TÜMAD Mining Industry and Trade Inc.

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**NOISE AND VIBRATION MANAGEMENT PLAN FOR LAPSEKİ &  
İVRİNDİ PROJECTS**

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#### **ABBREVIATIONS AND DEFINITIONS**

Project(s)	: Lapseki and İvrindi Gold and Silver Mine and Processing Projects
TÜMAD	: TÜMAD Madencilik San. ve Tic. A.Ş.
EBRD	: European Bank for Reconstruction and Development
EIA	: Environmental Impact Assessment
ESMS	: Environmental and Social Management System
EU	: European Union
IMS	: Integrated Management System
KPI	: Key Performance Indicator
MoEU	: Ministry of Environment and Urbanization
OHS	: Occupational Health and Safety
PR(s)	: Performance Requirement(s)

## 1 INTRODUCTION

TÜMAD Madencilik San. ve Tic. A.Ş. (TÜMAD) plans to establish the Lapseki Gold and Silver Mine and Processing Project (the Lapseki Project) within the administrative boundaries of the Şahinli and Kocabaşlar Villages of the Lapseki District in the Province of Çanakkale. The construction phase of the Lapseki Project has been at completion stage and the operation phase will start in October 2017.

TÜMAD plans to establish the İvrindi Gold and Silver Mine and Processing Project (the İvrindi Project) within the administrative boundaries of Değirmenbaşı and Küçükıllica Villages of the İvrindi District of Province of Balıkesir. The İvrindi Project has started with mobilization.

The project is seeking finance and this document is produced as a part of studies conducted to assess the Environmental and Social Impacts of the Project as per the EBRD Performance Requirements (PRs).

This Document is the Noise and Vibration Management Plan that is prepared for TÜMAD Operations. The Integrated Management System (IM) document registration number for Noise and Vibration Management Plan is TMD\_CEV\_PLN.002. This management plan sets the requirements for the operation phase of the Lapseki Project and for construction and operation phases of the İvrindi Project and is an integral part of the Environmental and Social Management System (ESMS) implemented by TÜMAD for the two mine projects.

This Management Plan is based on the Project(s) ESMS Framework (TMD\_EYS\_PLN.004) of TÜMAD, which is owned by the TÜMAD General Manager. Any subsequent changes to the TÜMAD ESMS may result in the changes to this document.

This Management Plan will be reviewed on a minimum of a six monthly basis during construction and commissioning. During operation phase, this Plan will be reviewed on an annual basis to determine whether any changes or updates are required to the Management Framework unless a more frequent update is required to reflect changing project design or ESMS requirements and procedures.

Any requests for changes to this Management Plan must be addressed to the owner of this Management Plan and will be subject to appropriate review and approval processes as outlined in the Management of Change Procedure (TMD\_EYS\_PRD.006).

## 2 PURPOSE

The purpose of the Noise and Vibration Management Plan is;

- To define the scope and applicable interphases for the management of noise and vibration emissions during TÜMAD activities,
- To define project standards in terms of noise and vibration emissions,
- To define responsibilities, commitments, operating procedures and instructions for the implementation of this Management Plan,
- To manage noise and vibration emissions and monitor the Project performance in relation to the management of noise and vibration associated with TÜMAD activities.
- To define training requirements and Key Performance Indicators,

Noise and Vibration Management Plan is valid as of the date on which it is approved by the General Manager of TÜMAD.

## 3 SCOPE

Noise and Vibration Management Plan includes all activities of TÜMAD during execution of Project(s) and also applicable to all TÜMAD contractors involved in the Project(s).

### 3.1 Overlaps with Other Management Plans

This Management Plan is part of the overall suite of Management Plans developed for the TÜMAD Project and as part of ESMS overlaps with the following management plans:

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- The Community Health, Safety and Security Management Plan (TMD\_EYS\_PLN.006), particularly in relation to noise and vibration impacts on local communities.
- The Traffic Management Plan (TMD\_ISG\_PLN.005), particularly in relation to the control of noise emissions from vehicles within and outside of the mine area.
- Framework Biodiversity Action Plans, particularly in relation to impacts of noise and vibration on biodiversity components.
- Explosive and Hazardous Materials Management Plan,(TMD\_ISG\_PLN.006) particularly in relation to use and management of explosives for blasting
- OHS Training Plan, (TMD\_PLN.001) particularly in relation to noise and vibration hazard trainings.
- Health and Safety Management Plan (TMD\_ISG\_PLN.007) particularly in relation management of noise and vibration hazards.
- Stakeholder Engagement Plans, (TMD\_LAP\_EYS\_PLN.001 & TMD\_IVR\_EYS\_PLN.001) particularly in relation to management of complaints from community on noise and vibration emissions.
- Contractor Management Plan (TMD\_ISG\_PLN.003), particularly in relation to defining contractor requirements for the management of noise and vibration

Noise and Vibration Management Plan is supported by the Procedures and Instructions on measurement and monitoring of noise and vibration levels as such;

- Procedures on Measurement and Monitoring of Environmental Activities (TMD\_ÇEV\_PRD.006)
- Noise and Vibration Measurement Instructions (TMD\_CEV\_TLM.003) which has been prepared for environmental noise and vibration measurement and use and calibration of the device

#### 4 PROJECT STANDARDS

The standards applicable to Project(s) activities are set by;

- Turkish Environmental Impact Assessment (EIA) Requirements
- Legal Requirements
- Company Commitments and Commitment Requirements
- International Standards and Guides
- TÜMAD policies, procedures and instructions

##### Noise

EBRD Performance Requirement 3: Resource Efficiency and Pollution Prevention and Control requires that projects be designed to comply with applicable EU environmental requirements. The EU Noise Directive (2000/14/EC)<sup>1</sup> establishes a common EU framework for the assessment and management of exposure to environmental noise but does not establish specific environmental noise limits – leaving these to be determined by Member States. Therefore the “Turkish Assessment and Management of Environmental Noise (AENR) Regulation”, which was harmonized as per the Environmental Noise Directive of EU (2002/49/EC) and has been in effect as of June 4, 2010 is used to define the Project Standards.

The objective of this Regulation is to determine a joint approach with respect to prevention and mitigation of negative impacts of environmental noise. The Regulation provides principles and procedures regarding environmental noise to which humans are exposed in built-up areas, in quiet areas in open country, near schools, hospitals and other very sensitive/sensitive areas. The Regulation also determines noise permit procedures.

As per the Assessment and Management of Environmental Noise Regulation, the provision of “noise levels at a workplace, workshop, production plant or similar places, which are close to noise-sensitive/very sensitive receivers and which may have impacts on the places where noise-sensitive/very sensitive receivers exist, should not exceed the background noise levels of 5 dBA in terms of Leq” shall be applied within the scope of the project.

In the case of this Project the noise limits to be complied with have been taken from Turkish Regulation on Assessment and Management of Environmental Noise as presented in Table 1 and Table 2.

<sup>1</sup> WHO/Europe is currently in the process of developing the WHO Environmental Noise Guidelines for the European Region as a regional update to the WHO Community Noise Guidelines. The earlier WHO Guidelines for Community Noise of 1999 defines guideline values for noise. These guidelines do not define limits for day, evening and night times.

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**Table 1: Legislative Limit Values for Environmental Noise Caused by Industrial Plants**

Receiver	L <sub>Aeq</sub> (dBA)/Daytime	L <sub>Aeq</sub> (dBA)/Evening	L <sub>Aeq</sub> (dBA)/Night
Educational, cultural and health service areas as well as regions that are dense in terms of summer houses and camping areas.	60	55	50
Commercial buildings and noise-sensitive regions which are dense in terms of residential buildings.	65	60	55
Commercial buildings and noise-sensitive regions which are dense in terms of work places.	68	63	58
Industrial areas	70	65	60

**Table 2: Legislative Limit Values for Environmental Noise Caused by Construction Sites**

Activities (Construction, Demolition and Renewal)	L <sub>Aeq</sub> (dBA)/Daytime
Building	70
Road	75
Other Sources	70

#### Vibration

The criteria for environmental vibration on buildings due to mining activities are given in the paragraph (a) of the Article 25 of Assessment and Management of Noise Regulation. The level of blasting induced ground vibration at very sensitive and sensitive structures in the vicinity should not exceed limit values given in Table 3 and Table 4 below as stipulated by the Appendix VII of the Regulation.

**Table 3: Maximum Allowable Limit Values for Ground Vibrations Occurred Outside of the Nearest Very Sensitive/Sensitive Areas due to Blasting Activities Performed at Mine Sites and Quarries as well as at Similar Places**

Vibration Frequency (Hz)	Maximum allowable vibration rate (Peak Value/mm/s)
1	5
4-10	19
30-100	50

**Table 4: Maximum Allowable Limit Values for Ground Vibrations Occurred Outside of the Nearest Very Sensitive and Sensitive Areas due to Construction Activities and Construction Machinery as defined in Assessment and Management of Noise Regulation**

	Maximum Allowable Vibration Rate (Peak Value/mm/s)	
	Continuous Vibration	Intermittent Vibration
<b>Settlement Areas</b>	5	10
<b>Industrial and Commercial Regions</b>	15	30
<i>At frequency bands between 1 Hz and 80 Hz</i>		

## 5 ROLES AND RESPONSIBILITIES

Noise and Vibration Management Plan has been prepared under the responsibility of Environment Department of TÜMAD and owned by TÜMAD General Manager.

Primary roles and responsibilities with respect to the implementation of Noise and Vibration Management Plan are given in Table 5.

**Table 5: Roles and Responsibilities**

Role	Responsibility
<b>TÜMAD General Manager</b>	<ul style="list-style-type: none"> <li>Approval of necessary resources to implement this management plan.</li> </ul>
<b>TÜMAD IMS &amp; Sustainability Manager</b>	<ul style="list-style-type: none"> <li>To ensure that this management plan conforms to Project(s) commitments and standards.</li> </ul>
<b>TÜMAD Head of Environment Department Environmental Engineers on site</b>	<ul style="list-style-type: none"> <li>To provide technical assistance to TÜMAD department managers and Contractors with respect to studies to be carried out within the scope of Noise and Vibration Management Plan and the relevant procedures,</li> <li>To ensure monitoring, measurement and reporting of noise and vibration as described in this Plan, the relevant procedures and instructions with the use of third part consultants when required,</li> <li>To make the plan available to employees of TÜMAD and to those of contractors,</li> <li>To control effectiveness of this plan through periodic inspections on all activity areas of TÜMAD and those of contractors,</li> <li>To report all hazards, non-compliances and incidents.</li> </ul>
<b>TÜMAD Operation Manager Contractor Managers</b>	<ul style="list-style-type: none"> <li>To ensure that all activities of TÜMAD are conducted in accordance with the Noise and Vibration Management Plan and the relevant procedures and instructions,</li> <li>To report all hazards, non-compliances and incidents,</li> <li>To ensure that Department Administrators provide employees with training on noise generating activities.</li> </ul>
<b>Contractors</b>	<ul style="list-style-type: none"> <li>To carry out activities in line with Projects Standards set out in this plan,</li> <li>To implement Mitigation Measures and Management Controls as set in this Plan and in the EIA, including planning of noise creating activities to be at permissible times of the day,</li> </ul>

Role	Responsibility
	<ul style="list-style-type: none"> <li>To report timely on any incidents or on activities that may result in unusual noise and vibration emissions,</li> <li>To implement timely any corrective actions resulting from audits, inspections or complaints and as agreed with TÜMAD Managers or TÜMAD IMS and Sustainability Manager.</li> </ul>
<b>TÜMAD Internal inspectors</b>	<ul style="list-style-type: none"> <li>To perform routine inspections in the working area in order to ensure that the related activities are being carried out in accordance with this Management Plan and the relevant Procedures,</li> <li>To report all hazards, non-compliances and incidents.</li> </ul>
<b>Head of Community Relations Department</b>	<ul style="list-style-type: none"> <li>Within the Grievance and Feed Back Mechanism, taking actions for resolving the public grievances on Noise and Vibration emissions,</li> <li>To record the grievances.</li> </ul>

## 6 MITIGATION MEASURES AND MANAGEMENT CONTROLS

### 6.1 Mitigation Measures

Noise and vibration sources considered as resulting significant potential impacts during the Project(s) activities are:

- Drilling and blasting activities at the open pit,
- Activities of mineral processing equipment,
- Use of transportation vehicles,
- Plant activities,
- Maintenance works,
- Other potentially noisy activities,

The mitigation measures and management controls for the noise and vibration emitted from Project(s) activities are described in below sections.

#### 6.1.1 EIA Requirements

- Noise sources shall be controlled and, if necessary, noise barriers shall be installed. Mechanical Equipment and vehicles shall be regularly maintained and noise levels of these equipment shall be controlled. As described in the Regulation on Assessment and Management of Environmental Noise, it is not required to take special control measures for a noise level, which is lower than limit value.
- During blasting activities, simultaneous explosion of explosives shall be prevented by using mili-second delay blasting method and thus, noise and vibration induced by blasting activities shall be minimized. In addition, proper blasting method and material shall be selected based on ground conditions. Blasting activities shall be regularly carried out at certain time intervals.
- Delay detonators shall be used in blasting activities in order to mitigate environmental impacts, mainly vibration, to prevent fly rocks and to enable extraction of suitable size ore. Delay detonators of 25 ms for cross-hole transitions, those of 42 ms for transition between rows and of 500 ms inside the holes shall be used.

#### 6.1.2 Other Mitigation Measures for Noise Management

The other measures to be taken in order to prevent or reduce noise, which may be caused by activities at the mine site are described below.

- Noise levels should be kept at normal levels by carrying out periodic maintenance works of all equipment and machinery.

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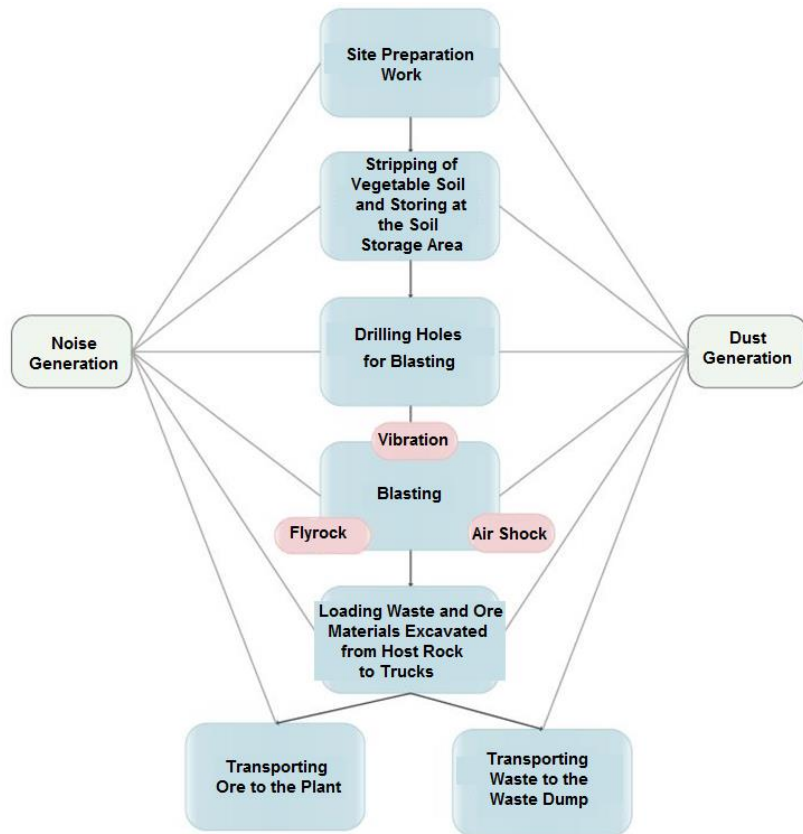
- All noise sources shall be isolated as long as possible. (For example, isolation of generator devices and installing sound absorbers to the equipment).
- Necessary precautions shall be taken in order to reduce noise, which may occur during loading and transportation activities at the open pit. According to the daily plan prepared by the Mining Department, number of equipment that will be used at the open pit shall be determined, and accumulation of construction equipment and the corresponding noise shall be prevented accordingly.

### 6.1.3 Other Mitigation Measures for Vibration Management

Open pit blasting activities shall be performed based on blast hole pattern, which is to be designed by considering the results of trial blasting activities conducted at the pit.

The following factors shall be taken into consideration during planning of blasting activities as stipulated in Figure 1.

- Ground vibration (quake),
- Air shock (noise),
- Dust,
- Fly rock,
- Situation of the surrounding buildings



**Figure 1: Blasting Activities**

A stability assessment report will be prepared before the start of blasting activities. This report will identify structures and building in the blasting impact area which are susceptible to resulting vibration levels and define any required specific mitigation measure.

## 6.2 Management Controls

Management controls defined within the scope of Noise and Vibration Management Plan are summarized in the following table.

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**Table 6: Management Controls**

Activity	Control	Responsibility	Verification Tools
<b>Blasting Activities</b>	<p>Blasting plan and design given in the EIA report shall be complied with. Blasting Procedures and Instructions in which design and operations are defined for blasting shall be prepared and these Procedures and Instructions shall be complied with.</p> <p>In addition to TÜMAD Procedures and Instructions;</p> <ul style="list-style-type: none"> <li>Drilling and Blasting activities shall be monitored and improved,</li> <li>Delay blasting method shall be used and it should be ensured that the most suitable blasting rate is achieved,</li> <li>Appropriate blasting plans, which are to be optimized in blast model by using the best techniques, shall be prepared.</li> <li>Blasting activities may be restricted due to meteorological conditions (wind and temperature change),</li> <li>Blasting activities will not be carried out during night time.</li> </ul>	TÜMAD Contractors	<p>Drilling and blasting activities shall be carried out according to the prepared Procedures and Instructions,</p> <p>Noise and vibration shall be monitored during blasting activities,</p>
<b>Noise Control</b>	<p>Noise caused by the activities of mineral processing equipment shall be controlled within the scope of the Procedures on Measurement and Monitoring of Environmental Activities as well as Noise and Vibration Measurement Instructions.</p> <p>These equipment will not be operated during night time.</p>	Environment Department, Contractors,	Internal Inspections, Measurement and monitoring activities
<b>Vehicle Usage</b>	<p>Noise from vehicle traffic shall be limited by setting speed limits inside and outside of the plant area.</p>	Environment Department, Occupational Health and Safety Department Contractors,	Field Drive Training Records
<b>Flora and Fauna</b>	<p>Road traffic and noisy equipment shall be controlled in order to minimize potential disturbance of the wild life.</p>	Operation Manager, Occupational Health and Safety Department Environment Department, Contractors,	Internal Inspections, Flora and Fauna Monitoring
<b>Community Relations</b>	<p>In case of complaints from communities in regards to noise and vibration Monitoring records will be checked to confirm the actual emission values</p> <p>The process will be revised or equipment will be replaced if possible and needed</p>	Community Relations Department Operation Manager, Environment Department, Contractors,	

Activity	Control	Responsibility	Verification Tools
	Measurements are done to confirm the noise levels are reduced  Compliant is communicated throughout the process		

## 7 MONITORING

### 7.1 Overview

The baseline conditions in terms of ambient noise levels are defined EIA Study through noise level measurements at closest sensitive receivers within project study area of Project(s). Monitoring of the noise levels during construction and operation has been added to the monitoring programme. No vibration level have been defined as part of baseline conditions.

In addition, during the construction period of Lapseki Project;

- Measurements are performed with mobile measurement device by TÜMAD twice a month at the sensitive receptors (Şahinli and Kocabaşlar Village)
- Continuous noise and vibration measurement device have been installed in Şahinli Village and measurements have been taken during construction.
- Noise measurements have been performed at sensitive receptors (Şahinli and Kocabaşlar Village as given in EIA) by authorized laboratory twice in a month as per EIA requirements to ensure compliance with Regulatory Limits.
- Vibration measurements have been performed at closest sensitive receptor (house, school and etc.) according to blasting design at 1 minute increments with a mobile device during blasting to ensure compliance with Regulatory Limits.

### 7.2 Key Monitoring Activities

An overview of the monitoring principles are;

#### As stipulated by EIA;

Within the scope of Environmental Monitoring Program, it shall be continuously checked if there is a structural damage at settlement areas within the project area due to blasting activities.

Noise and Vibration measurement results shall be compared to the limit values given in the Regulation on Assessment and Management of Environmental Noise, and if the limits are exceeded, additional precautions, such as noise barriers, shall be taken. Reports shall be submitted to The Ministry of Environment and Urbanization within the scope of Environmental Monitoring Program.

#### As stipulated by TÜMAD ESMS;

In order to comply with the limit values, noise and vibration measurements shall be made by Environment Department personnel by using blasting measurement device.

After measurements are taken, the device shall be connected to the computer and the records shall be transferred to database. Technical details and information about blasting shall be kept in the Open Pit Department.

Measurement devices shall be made available in case of a request by the departments of the mine or a complaint from the villagers and measurements shall be made when necessary.

If an issue is raised in accordance with the complaint and feedback procedure (TMD\_KTİ\_PRD.001) by the departments at the Mine Site or surrounding settlement areas due to noise caused by the activities, a feedback should be provided by removing the corresponding noise source or if it is not possible, by performing studies to reduce noise and taking necessary measures.

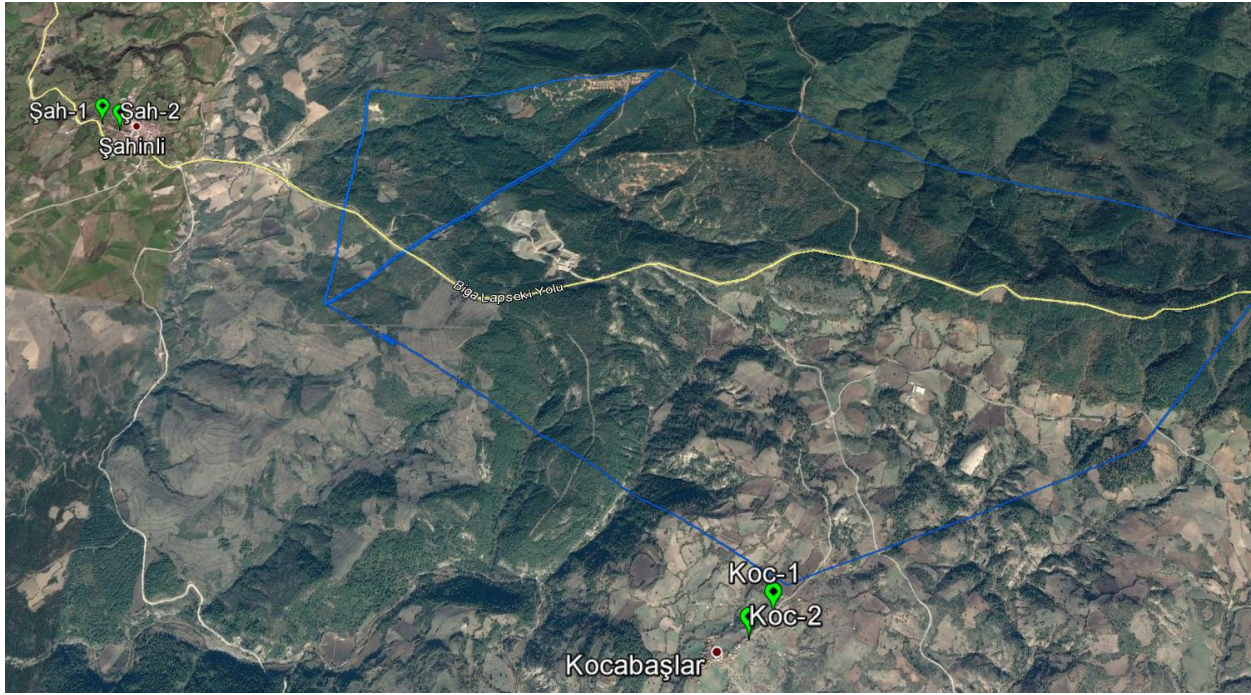
Monitoring commitments defined in line with the Project(s) Standards and EIA requirements are given in the following Table.

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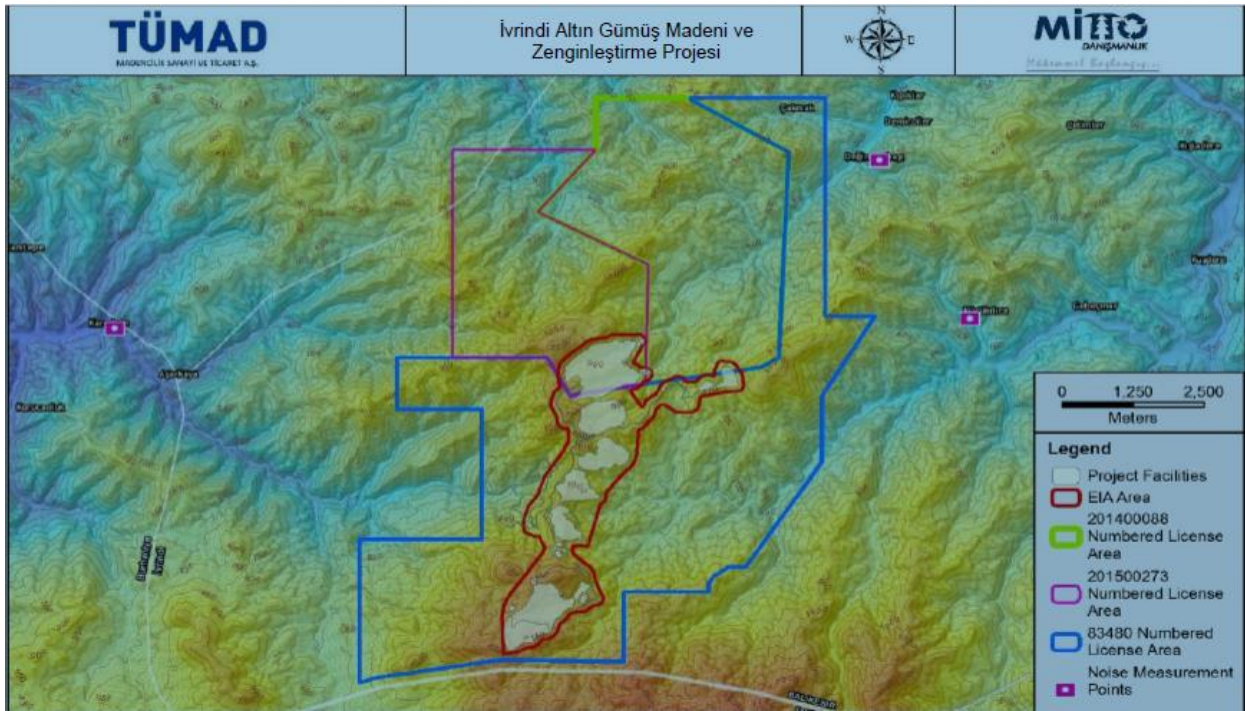
**Table 7: Noise and Vibration Monitoring Program**

No	Activity	Parameters	Standard	Measurement Period	Location (see following Figures)
<b>NVM-01</b>	Noise Level	$L_{eq}$ , $LA_{eq}$ , $LA_{10}$ , $LA_{90}$ dB(A)	TS 9315 ISO:1996-1 TS ISO:1996-2 SVAN 958 A	<ul style="list-style-type: none"> <li>Monthly, including daytime, evening and night readings</li> <li>Instant during blasting</li> </ul>	<ul style="list-style-type: none"> <li>In the vicinity of Sensitive Receptors; at Şahinli (at two points) and Kocabaşlar Villages (at two points) for Lapseki</li> <li>Küçükılıca, Karadere and Değirmenbaşı Villages for İvrindi</li> <li>These locations correspond to the baseline measurement locations in the EIA</li> <li>According to the local grievance additional measurement locations will be located</li> <li>No grievance has been raised during completed construction phase of Lapseki</li> </ul>
<b>NVM-02</b>	Noise Spectrum	Noise Spectrum Analysis	Noise Spectrum Analyzer SVAN 958 A	Monthly, including Daytime, Evening and Night readings	<ul style="list-style-type: none"> <li>In the vicinity of Sensitive Receptors; at Şahinli (at two points) and Kocabaşlar Villages (at two points) for Lapseki</li> <li>Küçükılıca, Karadere and Değirmenbaşı Villages for İvrindi</li> <li>These locations correspond to the baseline measurement locations in the EIA</li> <li>According to the local grievance additional measurement locations will be located</li> <li>No grievance has been raised during completed construction phase of Lapseki</li> </ul>
<b>NVM-03</b>	Blasting Noise and Vibration	$LC_{max}$ , dB(C), dB(A) mm/s	TS 9315 ISO:1996-1 TS ISO:1996-2 TS 10354: 1992 SVAN 958 A, SV84	Instant during blasting	<ul style="list-style-type: none"> <li>In the vicinity of Sensitive Receptors; at Şahinli (at two points) and Kocabaşlar Villages (at two points) for Lapseki</li> <li>Küçükılıca, Karadere and Değirmenbaşı Villages for İvrindi</li> <li>These locations correspond to the baseline measurement locations s in the EIA</li> <li>According to the local grievance additional measurement locations will be located</li> <li>No grievance has been raised during completed construction phase of Lapseki</li> </ul>





**Figure 2: Noise Measurement Locations for Lapseki Project**



**Figure 3: Noise Measurement Locations for İvrindi Project**

### 7.3 Key Performance Indicators

Basic performance monitoring of Noise and Vibration Management Plan and the corresponding Procedures and Instructions are organized in the following table.

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**Table 8: Key Performance Indicators**

No	Key Performance Indicator	Target	Monitoring and Measurement
NVM-KPI-01	Noise and Vibration	Minimizing the number of reported Noise and vibration incidents and continuous improvement.	Annually reported noise and vibration incidents.
NVM-KPI-02	Non-compliance With the Standards	Maximum Non-compliance, Annual: 5	Number of annual non-compliance with noise and vibration standards.
NVM-KPI-03	Complaints	Annual Complaints Within the Scope of Activity 0 Maximum Complaints, Annual: 5	Number of annual community complaints with regard to noise and vibration. Number of resolved complaints by removing the corresponding noise source or if it is not possible, by reducing noise levels and narrowing the work duration.

## 8 TRAINING

### 8.1 General

All employees of TÜMAD as well as contractors shall have a training on special site entry induction and environmental awareness training and they shall be subject to comprehensive medical screening.

All personnel who start to work at the mine site are provided with orientation training periodically under supervision of Department Administrators.

Plant operators and key personnel, who are engaged site cleaning, construction or material usage activities, shall be provided with Job-specific specialist training.

### 8.2 Specific Training

All construction and operation contractor workers will be trained on:

- Project noise and vibration limits
- Limitations on night works
- Recording and responding community complaints on noise and vibration

All TÜMAD operation workers will be trained on;

- Project noise and vibration limits
- Limitations on night works
- Recording and responding community complaints on noise and vibration

Personnel assigned for the monitoring of the noise and vibration will be trained on using the measurement equipment and reporting the measurement results.

## **9 AUDIT**

Operation supervisors and inspectors perform daily inspections in accordance with the activities outside the fence boundary by including a wide range of operation issues, including community health and safety.

Any incident or non-compliance determined during these inspections shall be recorded and reported according to the Integrated Management System of TÜMAD.

The activities defined by this Management Plan is subject to auditing as per the TÜMAD Audit Procedures.

## **10 REPORTING**

Inspections, incidents and non-compliances shall be documented and administered in accordance with the Record Management Procedures of TÜMAD (TMD\_EYS\_PRD.004).

Third party environmental monitoring company will prepare Construction Phase Environmental Monitoring Reports every three months in the format defined by Ministry of Environment and Urbanisation (MoEU) to be submitted to MoEU when required.

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