



Environmental & Social Management System

Noise & Vibration Management Plan

Noise & Vibration Management Plan		
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1 INTRODUCTION

1.1 Document Number

This document is the Noise & Vibration Management Plan for the Öksüt Gold Project. The document reference number for this Management Plan is OMAS-ESMS-NV-PLN-001.

1.2 Purpose

The purpose of this Management Plan is to:

- define the scope of the Management Plan and set out applicable management interfaces;
- define roles and responsibilities;
- outline the applicable Project Standards relevant to this Management Plan;
- define Project commitments, operational procedures and guidance relevant to this Management Plan;
- define monitoring and reporting procedures, including Key Performance Indicators;
- define training requirements;
- set out references for supporting materials and information.

1.3 Application

The requirements set out in this Management Plan apply to all OMAS activities throughout the lifecycle of the Öksüt Gold Project, including those carried out by contractors.

This Management Plan is based on the OMAS Environmental & Social Management System Framework (OMAS-ESMS-001), which is owned by the OMAS General Manager. Any subsequent changes to the OMAS Environmental & Social Management System (ESMS) Framework may result in the changes to this Management Plan.

1.4 Commencement

This Management Plan applies from 1 April 2016.

1.5 Authority and Management

The OMAS General Manager approved this Management Plan on 1 March 2016.

This Management Plan is owned by the OMAS Health, Safety, Environment and Training Manager. This Management Plan will be reviewed on a minimum of a six monthly basis during construction and commissioning. During steady state operations, this Management Plan will be reviewed on an annual basis to determine whether any changes or updates are required to the plan unless a more frequent update is required to reflect changing project design or procedures.

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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 MOC procedure set out in the ESMS Framework.

2 SCOPE

2.1 Scope of this Management Plan

This Management Plan covers all OMAS activities, including contractor activities. Implementation by contractors is addressed in the Contractor Management Framework (OMAS-ESMS-CM-PLN-001).

This Management Plan covers noise and vibration arising from exploration and operations, including mining, mineral processing, materials handling infrastructure an on-site and off-site transport, which may significantly impact on people, communities and the surrounding environment.

Occupational noise and vibration exposure is not covered by this Management Plan, but rather by a separate Occupational Health Management System, which sets out procedures on how the monitoring is to be undertaken. Where OMAS or OMAS Contractors are also responsible for ancillary activities or off-site transport, those activities are also under the scope of this Management Plan.

2.2 Overlaps with other Management Plans

This Management Plan is part of the overall suite of Management Plans developed for the OMAS Project and as described in the ESMS Framework.

This Management Plan has overlaps and cross-linkages to a number of other Management Plans which have noise and vibration implications, including:

- the Transport Management Plan (OMAS-ESMS-TMP-PLN-001), particularly in relation to noise from off-site vehicle movement;
- the Biodiversity Management Plan (OMAS-ESMS-BIO-PLN-001), particularly in relation to noise levels and disturbance to wildlife outside the EIA Permitted Area.

3 ROLES AND RESPONSIBILITIES

3.1 Key Roles and Responsibilities for Management Plan Implementation

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

Table 1: Key Roles and Responsibilities

Role	Responsibilities
OMAS General Manager	<ul style="list-style-type: none"> • Approval of this Plan and resources required for implementation.
OMAS HSE & Training Manager	<ul style="list-style-type: none"> • Ensuring Project compliance with the Project Standards and other requirements set out in this Plan. • Responsible for ownership and overall implementation of this plan and

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Role	Responsibilities
	<p>ensuring Principal Contractors implement applicable elements of this plan.</p> <ul style="list-style-type: none"> • Overall responsibility for the implementation of this Management Plan. • Provide technical support to OMAS Departmental Managers and Principal Contractors to ensure compliance with the Noise & Vibration Management Plan and related Procedures. • Ensure that noise and vibration monitoring is undertaken as set out in applicable Management Plans and Procedures. • Work with the Community Relations Manager to address any off-site noise and vibration issues and/or grievances. • Prepare quarterly and annual environmental reports. • Ensure Plan is available to all OMAS employees and Principal Contractors. • Undertake periodic audits and inspections of OMAS Department and Principal Contractor workplaces against the requirements of this Management Plan and related Procedures. • Report all hazards, non-conformances and incidents.
<p>OMAS Project Manager (Construction)</p> <p>OMAS Mine Operations Manager</p> <p>Principal Contractor Managers</p>	<ul style="list-style-type: none"> • Ensure that relevant activities are undertaken in accordance with this Management Plan and related Procedures. • Ensure that department personnel are fully trained in waste management practices, particularly when working with noise generating equipment. • Ensure incident investigations are undertaken and reported.
<p>Workplace HSE Supervisors / Superintendents</p>	<ul style="list-style-type: none"> • Conduct routine work area inspections to ensure relevant activities are in accordance with this Management Plan and related Procedures. • Report all hazards, non-conformances and incidents.
<p>OMAS Community Relations Manager</p>	<ul style="list-style-type: none"> • Engagement with local stakeholders related to off-site noise • Management of grievance procedure

3.2 Key Interfaces

Key interfaces in the implementation of this Management Plan (i.e. roles with responsibility for delivering elements of this Management Plan) include:

- OMAS Project Construction Manager, particularly in relation to the management of off-site activities during construction;
- OMAS General Manager Operations, particularly in relation to the management of mining operations and off-site activities during operation;

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- OMAS Operational Department Managers, particularly in relation to specification of control measures and emissions limits to plant and equipment.

4 PROJECT STANDARDS

Applicable Standards must be complied with for all Project activities (the “Project Standards”). Project Standards comprise:

- applicable Turkish Standards;
- Turkish EIA requirements;
- other commitments to and requirements of Turkish Government authorities;
- applicable international standards and guidelines;
- applicable Centerra and OMAS standards, policies and procedures;
- other industry guidelines with which OMAS has committed to comply.

4.1 Applicable Turkish National Standards

Noise

The Turkish regulation concerning environmental noise is the *Regulation on the Assessment and Management of Environmental Noise* which was published on the Official Gazette numbered 27601 and dated 04.06.2010.

The purpose of this Regulation is to define a common approach for prevention or mitigation of adverse impacts of environmental noise. The Regulation presents the principles and procedures with regards to environmental noise to which humans are exposed to in highly populated areas, quiet locations in open areas, schools, hospitals and other sensitive areas. The Regulation also sets forth the principles for noise permission.

The criteria for the noise levels dispersed from enterprises, facilities and working places is given in the Regulation. Noise levels from industrial facilities should not exceed the limit values defined in Table-4 of Annex VII of the Regulation which are presented below in Table 2. The limit values depend on the type of the areas where receptors are located.

Table 2: Turkish Ambient Noise Limits Generated by Industrial Facilities

Receptor	LAeq (dBA) Day-time	LAeq (dBA) Evening-time	LAeq (dBA) Night-time
Noise sensitive areas - with training, culture and health areas, summer houses and camps	60	55	50
Combination of commercial and noise sensitive areas - with dense residential buildings	65	60	55
Combination of commercial and noise sensitive areas with dense commercial buildings	68	63	58
Industrial areas	70	65	60

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The criteria for the evaluation of noise levels emitted from construction sites and for determining the prevention of noise is presented in the Regulation. The noise levels from construction activities should not exceed the limit values given in Table-5 of Annex VII to the Regulation which is presented below in Table 3.

Table 3: Turkish Ambient Noise Limits Generated by Construction Sites

Activity (construction, demolition and renovation)	LAeq (dBA) Day-time
Building	70
Road	75
Other sources	70

The Regulation also specifies that the environmental noise levels at any workplace, workshop, manufacturing facility or similar, which is close to noise sensitive receptors, and which may have impacts on locations where there are noise sensitive receptors, should not exceed the background noise levels by 5 dBA in terms of Leq.

There is no specific Turkish legislation for noise limits at the boundary fence.

Vibration

The criteria for environmental vibration to buildings arising from mining operations are set out in paragraph (a) of Article 25 of the *Regulation on the Assessment and Management of Noise*. The ground vibration caused by blasts to very sensitive and sensitive structures in the surrounding areas must not exceed the limit values set out in Table 6 in Annex VII of the Regulation.

Daily exposure limit values for hand and arm vibration for employees are set out in the *Regulation on the Protection of Employees from Risks Associated with Vibration*, issued by the Ministry of Labour and Social Security under the Workers' Health and Job Safety Law (Law No. 6331) and published in the Official Gazette no. 28743 of 22/08/2013. The daily exposure limit values for hand and arm vibration of the employees working at the site over a working time of eight hours have been determined at 5 m/s² and for whole body vibration at 1.15 m/s² as per article 5 of the Regulation. Pursuant to Article 6, the level of mechanical vibration incurred by the workers will be assessed and, if necessary, measured and compliance with the exposure limit values will be ensured. Any risks posed by vibration will be assessed in accordance with Article 7, and Articles 8 and 9 will be complied with in order to prevent, reduce and limit the exposure, and the workers will be informed and trained pursuant to Article 10.

4.2 Turkish EIA requirements

The Turkish EIA states that environmental noise monitoring will be undertaken based on the limits set out in the *Regulation on the Assessment and Management of Environmental Noise*.

In relation to worker health and safety, the Turkish EIA states that OMAS will comply with the *Regulation on the Protection of Employees from Risks Associated with Noise*, issued under the Law on the Workers' Health and Job Safety (Law No. 6331) and published in the Official Gazette no. 28721 of 28/07/2013.

Key monitoring commitments related to occupational exposure to noise are set out in the Turkish EIA and comprise:

- Noise sources will be checked regularly and noise barriers will be erected when necessary. Tools and trucks will be maintained regularly and their noise levels will be checked. It is not necessary to employ special control methods for any noise level lower than the noise threshold as established by the *Regulation on the Assessment and Management of Environmental Noise*.

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- Drilling and blasting arrangements will be optimized, so that the environmental noise and vibration levels will be minimized. A regular blasting program will be implemented, so that safety of the local people and the workers will be ensured and any noise and vibration effects which are not expected by them will be eliminated.

In terms of environmental noise, the following monitoring commitments are set out in the Turkish EIA:

- Works of monitoring of the noise and vibration arising from the project will be carried out at the monitoring spots determined within the fence boundary of the plant nearby the villages of Öksüt and Zile. The measurement results will be compared with the limit values specified in the *Regulation on the Assessment and Management of Environmental Noise*.
- The program for the works of monitoring to be carried out regarding the air quality, noise and vibration impacts during the operation period is [given in Table 7 in this Management Plan]. The planned measurement locations are marked on the topographic map [given in Figure 1 in this Management Plan]. The measurement locations have been determined approximately. The locations of the monitoring spots may be changed by evaluating the environmental factors during the operation period.

4.3 Other Commitments to and Requirements of Turkish Government Authorities

None applicable.

4.4 Applicable International Standards and Guidelines

The international standards which OMAS will implement are those set by the European Bank for Reconstruction and Development (EBRD).

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) 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. In the case of this Project the noise limits selected have been taken from Turkish and German Standards, as presented in *Section 4.7*.

4.5 Applicable Centerra and OMAS Standards, Policies and Procedures

None applicable.

4.6 Other industry guidelines with which OMAS has committed to comply

None applicable.

4.7 Summary of Applicable Project Standards

OMAS will comply with the more stringent of national standards and applicable lender standards, with the more stringent standards representing the Project Standards.

When comparing the Turkish limits with other European Member States, the Turkish Night standard of 50 dBA in residential areas was deemed too high. The Project Standard for night time noise in residential areas

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is set at 45 dBA, which is comparable with Germany's Noise Protection Standards¹. The Day and Evening levels stipulated in Turkish legislation are adopted as Project Standards as they are considered to be comparable with European Member States, such as Germany and Austria.

As per the Turkish Noise Regulation, the Project also adopts the specification that if the environmental noise levels at any workplace, workshop, manufacturing facility or similar, which is close to noise sensitive receptors, and which may have impacts on locations where there are noise sensitive receptors, should not exceed the background noise levels by 5 dBA in terms of Leq.

As there is no Turkish or EU legislation for noise limits at the boundary fence, OMAS has adopted a noise limit of 75 db(A) at the boundary fence during normal operations.

The Project has adopted Turkish limits on vibration levels for construction and operation activities. Applicable Project Standards are summarised below.

Table 4: Noise Standards

Pollutant / Source	Receptor	Standard (dB(A)Leq 1 h) unless stated otherwise				
		EU	Day	Evening	Night	Project Standard
Noise	Boundary fence	NA	NA			75 (boundary)¹
Noise (off site receptors)	Sensitive areas with Schools, libraries and conference rooms, Hospitals and health centres	-	60	55	45	60 (Day) 55 (Evening) 45 (Night)
	Locations with commercial areas and sensitive areas (dominated by residential areas)	-	65	55	45	65 (Day) 55 (Evening) 45 (Night)
	Locations with commercial areas and sensitive areas (dominated by commercial areas)	-	68	63	58	68 (Day) 63 (Evening) 58 (Night)
	Industrial areas	-	70	65	60	70 (Day) 65 (Evening) 60 (Night)
Activities (Construction, demolition and renovation)	Building ²	-	70	-	-	70
	Road ²	-	75	-	-	75
	Other Source ²	-	70	-	-	70

¹ OMAS has adopted a guideline noise limit of 75 dB(A) at boundary fence during normal operations.² Turkish National Noise Limits for Construction Sites are based on the type of construction activity rather than receptor.

Note: EU Noise Directive does not specify equivalent numeric threshold limits and a combination of German and Turkish standards are adopted as the Project Standard.

¹ Annex 1 to DIN 18005 Noise Protection in Urban Planning (1987), comparable with night time limit for residential areas, campgrounds and special residential areas.

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Table 5: Vibration Standards

Ground Vibration ***	Sensitive Receptors	Vibration Frequency (Hz)	Peak Vibration Level (mm/s)	Vibration Frequency (Hz)	Peak Vibration Level (mm/s)
		1	5	1	5
		4-10	19	4-10	19
		3-100	50	3-100	50
Ground Vibration ****		Continuous Vibration (mm/s)	Intermittent Vibration (mm/s)	Continuous Vibration (mm/s)	Intermittent Vibration (mm/s)
	Residential Areas	5	10	5	10
	Industrial and Commercial Areas	15	30	15	30

*** National Vibration Limits occurring at ground at sensitive receptors close to mining operations

**** National Vibration Limits occurring at ground at sensitive receptors close to construction activities

Note: The Turkish limit values defined in Table-6 and Table-7 of Annex VII of *Regulation on the Assessment and Management of Environmental Noise* (Official Gazette numbered 27601, dated 04.06.2010)

5 MITIGATION MEASURES AND MANAGEMENT CONTROLS

5.1 Summary

The general intent of this management plan is to minimise noise and vibration impacts on the surrounding environment and communities. This includes impacts on biota, people, heritage aspects and surrounding land use. Control is accomplished through identifying noise and vibration sources, evaluating and prioritising the sources according to the significance of potential impacts and then taking effective measures to design and implement appropriate controls.

Priority sources of noise and vibration that have been identified as having significant potential impact include:

- open pit and earthworks blasting activities;
- mine site operational activities;
- operations of ore processing equipment;
- on-site and off-site transportation and vehicular use;
- other potentially noisy activities.

This Management Plan is also supported by the following Procedures, which provide more details on specific aspects of the day-to-day noise and vibration management activities at OMAS:

- Noise & Vibration Monitoring Procedure.

Other Procedures may be developed, as required, to support this Management Plan.

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The control measures described below have been developed in response to the risks identified by OMAS through the ESIA process.

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Table 6: Key Management Controls

ID	Applicability/ Activity	Control Description	Responsible Parties	Means of verification
NV01	Blasting activities	<p>The design and operations for blasting will be undertaken in accordance with blasting procedures to be developed and agreed by OMAS and the Mining Contractor.</p> <p>In addition to the content of the OMAS Procedures, OMAS will also:</p> <ul style="list-style-type: none"> • Monitor blasts and revise blast design, as required. • Ensure the correct blasting ratio is obtained; the blasting ratio is a measure of the amount of work expected per unit volume of explosives i.e. tonnes/kg. • Control blasting using delayed sequences and which are previously simulated and tested as appropriate. • Split the explosives charge column into discrete charges fired on separate delays as appropriate. • Prepare blasting plans, optimised by using best techniques in the blasting pattern design and explained to any affected local communities, as appropriate. • Restrict blasts to favourable weather conditions (wind and temperature gradient) where practicable. 	<ul style="list-style-type: none"> • OMAS Operations Manager • Principal Contractors 	<ul style="list-style-type: none"> • Auditing against agreed blasting procedures • Vibration monitoring during selected blasts
NV02	On site Noise Control	Noise levels on site from the operation of plant and equipment will be controlled in terms of the Environmental Monitoring and Measurement Procedure	<ul style="list-style-type: none"> • Health, Safety, Environment and Training Manager • Principal Contractors 	<ul style="list-style-type: none"> • Internal audits • Registered noise grievances

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ID	Applicability/ Activity	Control Description	Responsible Parties	Means of verification
NV03	Driving	Traffic noise levels will be controlled by the Transport Management Plan, which will include adherence to speed limits on and offsite.	<ul style="list-style-type: none"> • Health, Safety, Environment and Training Manager • Operational Departments • Principal Contractors 	<ul style="list-style-type: none"> • Records of driver training
NV04	Fauna and Flora Protection	Management of activities (which are considered likely to create intrusive noise levels at sensitive receptors in excess of Project Standards) including road traffic and noisy equipment to minimise potential disturbance to wildlife.	<ul style="list-style-type: none"> • Health, Safety, Environment and Training Manager • Operational Departments • Contractors • Environmental Manager 	<ul style="list-style-type: none"> • Audits

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6 IMPLEMENTATION SCHEDULE

6.1 Review and Revision of this Management Plan

This Management Plan will be reviewed on a minimum of a six monthly basis during construction and commissioning. During steady state operations, this Management Plan will be reviewed on an annual basis and any necessary revisions made to reflect the changing circumstances or operational needs of OMAS. Revision of this Management Plan will be the responsibility of the OMAS Health, Safety, Environment and Training Manager, who is custodian of this Plan.

If material changes to operating procedures are required (as identified through the Management of Change procedure contained within the OMAS ESMS Framework), this Management Plan may be updated on an “as required” basis.

Any revisions to this Management Plan will be uploaded to the OMAS Document Control Centre to ensure that all OMAS staff have access to the latest version of this Management Plan.

7 MONITORING

7.1 Overview of Monitoring Requirements

The monitoring measures that are to be implemented during the operations phase to assess compliance with Project Standards (see *Section 4: Project Standards*) are described in the section.

In the event that monitoring identified non-conformance with Project Standards, these will be investigated and appropriate corrective actions identified (see Component 12 Non-conformance incident and action management of the OMAS ESMS).

7.2 Key Monitoring Activities

Based on the monitoring commitments set out in the Turkish EIA, and the additional monitoring requirements arising from the ESIA, key monitoring measures are set out below. Full details of monitoring are set out in the Environmental Monitoring and Measurement Procedure (OMAS-HSEC-PRC-009).

In the event that any monitoring results identify a non-conformance with the Project Standards, these will be investigated and corrective actions identified (see OMAS ESMS Framework Document for further details).

Table 7: Key Monitoring Measures

ID	Topic/ Aspects	Parameters	Methods	Periodicity	Location
NVM1	Noise Level	Leq dB(A) LA _{eq} , LA ₁₀ , LA ₉₀ Number of Grievances	Calibrated noise meter B&K Mediator 2238.	Monthly, including day, evening and night readings, and to coincide with	Two locations within the fence boundary in the direction of the villages of Zile (N-04) and Öksüt (N-05) as outlined in the Turkish EIA. See map

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ID	Topic/ Aspects	Parameters	Methods	Periodicity	Location
				blasting activities	below.
NVM2	Noise Level	Leq dB(A) LA _{eq} , LA ₁₀ , LA ₉₀ Number of Grievances	Calibrated noise meter B&K Mediator 2238.	Weekly during access road construction, including day, evening and night readings	Locations as defined in the ESIA, (the nearest residential receptor to access road) in neighbourhoods of Yazıbaşı (N-01), Gömedi (N-02) and Epçe (N-02). See map below.
NVM3	Noise Spectrum	Noise Spectrum analysis	Noise spectrum meter – by specialist Consultant	Annually, including day and night readings	Various, including on-site and off-site sensitive receptor locations
NVM4	Blast Ground Vibration	Nm and seismogram	Seismogram – by specialist Consultant	Annually, during blasts	Various, including on-site and off-site sensitive receptor locations
NVM5	Workplace Inspections	NA	Daily inspections will be carried out by area HSE superintendents / supervisors.	Daily	All main workplaces

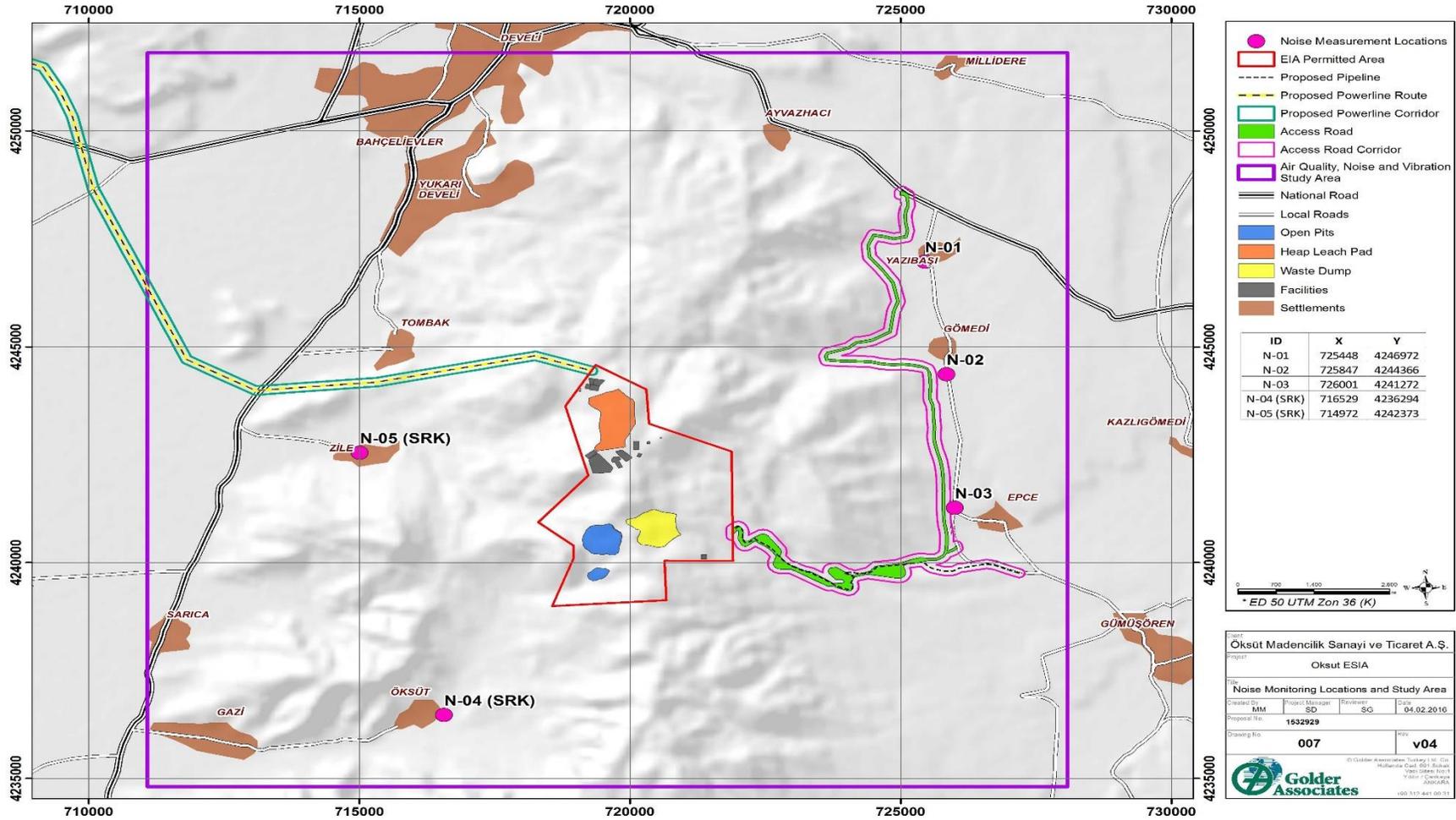
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Figure 1: Noise Monitoring Locations



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7.3 Key Performance Indicators

The table below summarises the key performance indicators and associated key monitoring actions that can be used to assess the progress and effectiveness of proposed mitigation strategies.

Table 8: Key Performance Indicators and Monitoring Measures

ID	KPI	Target	Monitoring measure
NV-KPI 01	Noise and Vibration Incidents	Minimise and continued improvement in number of reported noise and vibration related incidents.	Number of reported noise and vibration related incidents per year
NV-KPI 02	Non-Compliance with Project Standards	Goal: 0 per year. Target maximum: 5 per year.	Number of measured non-compliances with Project noise and vibration standards per year that are not caused by natural weather conditions.
NV-KPI 03	Number of noise-related community grievances	Goal: 0 per year. Target Maximum: 5 per year.	Number of reported noise and vibration related community complaints per year (as recorded in the complaints and grievance management system).

8 TRAINING

8.1 Overview

All necessary training is provided as part of induction training (to provide general awareness) and job-specific training as necessary.

8.2 Induction Training

All employees of OMAS and Contractors working at the Öksüt Gold Project site will be provided with general induction, site specific induction and a broad range of health, safety and environmental awareness training.

Appropriate Personal Protective Equipment (PPE) will be made available to personnel if required. All relevant personnel will be trained in the use and maintenance of protective equipment.

8.3 Job-Specific Training

Specialist training shall be provided to plant operators and key personnel involved in activities which involve land clearance, construction or materials handling activities.

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8.4 Other Training Requirements

General aspects of environmental management will be included in induction training to be provided to all employees.

9 AUDIT AND REPORTING

9.1 Auditing

Daily inspections will be carried out by operational area superintendents / supervisors covering a broad range of operational aspects, including community health safety and security issues as appropriate to activities outside the fence line.

Any incidents identified during these inspections will be reported to the incident management system (Component 10 of the OMAS ESMS).

Conformance will be monitored in accordance with Component 11 of the OMAS ESMS (Monitoring and Evaluation).

All incidents and non-conformances will be reported as per the requirements of the OMAS ESMS as described in the ESMS Framework Document (OMAS-ESMS-001).

9.2 External Auditing

Conformance with this plan will be subject to periodic assessment as part of the Centerra audit programme and separately by Project Lenders.

9.3 Record Keeping

Records of audits, inspections and incidents will be managed in accordance with OMAS procedures.

10 DOCUMENT CONTROL

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