



CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS

TÜMAD Madencilik San. ve Tic. AŞ

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TABLE OF CONTENTS

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS.....	2
REVISION HISTORY	3
TABLE OF CONTENTS.....	4
LIST of TABLES	5
ABBREVIATIONS AND DEFINITIONS	6
1 INTRODUCTION.....	7
2 PURPOSE	7
2.1 Overlaps with other Management Plans	7
3 SCOPE	8
4 ROLES AND RESPONSIBILITIES.....	8
5 PROJECT STANDARDS	9
5.1 Applicable National Standards	9
5.1.1 Regulation on Reclamation of Lands Disturbed by Mining Activities	9
5.1.2 Rehabilitation of Forest Lands	9
5.1.3 Rehabilitation of Waste Management Facilities	9
5.1.4 Rehabilitation of Pastureland Land.....	10
5.2 Applicable International Standards	10
5.3 Applicable TÜMAD Standards, Policies and Procedures	11
5.4 Other industry guidelines with which TÜMAD has committed to comply	11
5.5 Summary of Applicable Project Standards.....	11
5.6 Mine Closure Commitments in the Turkish EIA and the ESIA	11
Additional Commitments in the ESIA	17
6 PREPERATION OF MINE CLOSURE PLAN	19
6.1 Overall Mine Closure Objectives	19
7 TRAINING	23
7.1 Overview	23
7.2 Workplace Site Induction Trainings.....	24
7.3 Orientation Training	24
7.4 Work-Specific Training.....	24
8 AUDITING AND REPORTING	24
8.1 Internal Audit	24
8.2 External Audit	24
8.3 Recording	24

LIST of TABLES

Table 1: Roles and Responsibilities	8
Table 2: Applicable Project Standards.....	11
Table 3: Roles and Responsibilities	11
Table 4: Mine Closure Objectives and Key Approaches	19

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
HR	: Human Resources
IMS	: Integrated Management System
KPI	: Key Performance Indicator
MoEU	: Ministry of Environment and Urbanization
OHS	: Occupational Health and Safety
PR(s)	: Performance Requirements
DTSF	: Solid Waste Storage Area (Dry stack tailings facility)
PAG	: Potentially acid generating
NAG	: Non-acid generating
WRD	: Waste rock dump
Encapsulation	: Deactivation of a unit that has the potential to create acid rock drainage through buffering with a unit that is known not to create acid rock drainage or metal leaching

1 INTRODUCTION

TÜMAD Madencilik San. ve Tic. A.Ş. (TÜMAD) plans to establish the Lapseki Gold-Silver Mine and Processing Plant 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 reached the completion stage and the operation phase will start in October 2017.

During the construction and at the beginning of the open pit work, the top soil in the study areas is stripped and stored as specified in the EIA report, the visual impact assessment work for the project was completed and rehabilitation procedures were established and the landscape architect was employed.

TÜMAD Madencilik San. ve Tic. A.Ş. (TÜMAD) plans to establish the İvrindi Gold-Silver Mine and Processing Plant 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 Conceptual Closure Framework, for the TÜMAD's Lapseki and İvrindi Gold Mines. The document reference number for this Plan is (TMD_CEV_PLN.001). This management plans sets the requirements for the closure phase of the Lapseki and İvrindi Project and is an integral part of the Environmental and Social Management System implemented by TÜMAD for the two mine projects.

2 PURPOSE

The purpose of the Mine Closure Plan is to:

- Define the Roles, and Responsibilities and identify the references within scope of Mine Closure Plan monitoring activities.
- Define applicable standards and regulations
- Understand closure risks and prepare to mitigate impacts on associated communities
- Protect public health and safety and the environment by using safe and responsible closure practices
- Reduce or eliminate adverse environmental effects once the mine ceases operations
- Establish physical and chemical stable conditions for the project facilities
- Establish effective physical, chemical and ecological stability of disturbed areas.
- Identify post closure monitoring requirements and regulatory closure step
- Identify the training requirements.

This document comprises the Mine Closure Plan prepared for the enterprises of TÜMAD. The Integrated Management System (IMS) document registration number of the Conceptual Mine Closure Plan is TMD_CEV_PLN.001. This Mine Closure Plan is valid as from its approval date by the Head Office of TÜMAD.

2.1 Overlaps with other Management Plans

This Framework is part of the overall suite of Management Plans developed for the TÜMAD Project.

This Framework has overlaps and cross-linkages to a number of other Management Plans which have community health safety and security implications, including:

- Air Quality Management Plan (TMD_CEV_PLN.006), particularly in relation to management of community exposure to dust generated by TÜMAD activities.
- Noise & Vibration Management Plan (TMD_CEV_PLN.002), particularly in relation to management of community exposure to noise generated by TÜMAD activities.
- Waste Management Plan (TMD_CEV_PLN.007), particularly in relation to the protection of local communities from exposure to hazardous waste materials.
- Water Resources Management Plan (TMD_CEV_PLN.003), particularly in relation to the protection of potable drinking water supplies.
- Community Health Safety and Security Plan (TMD_EYS_PLN.006), particularly in relation to protection of local communities from physical hazards remaining once the mine has stopped operating.

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	7/24

- Community Development Plan (TMD_EYS_PLN.007), particularly in relation to minimising local social and economic dislocation related to the closure of the Project.
- Labour Management Plan (TMD_IK_PLN.002), particularly in relation to the demobilisation of TÜMAD workers.
- The Stakeholder Engagement Plans (TMD_LAP_EYS.001 & TMD_IVR_EYS.001), particularly in relation to community consultation requirements.

3 SCOPE

This plan applies to reclamation procedures subsequent to completion of activities under the TÜMAD Lapseki and İvrindi Gold Mine Projects.

4 ROLES AND RESPONSIBILITIES

The Mine Closure Plan has been prepared under the responsibility of the Environmental Department of TÜMAD Madencilik Sanayi ve Ticaret A.Ş.

This management plan shall be reviewed annually during the construction and operating periods by TÜMAD Madencilik Sanayi ve Ticaret A.Ş. to ascertain its consistency. The level of detail will be increased annually throughout the lifetime of the mine in order to reach the best and most suitable closure designs. Besides, the legal responsibilities shall be reviewed according to changes in the directives and procedures of TÜMAD Madencilik Sanayi ve Ticaret A.Ş., and updated as necessary. The primary roles and responsibilities in implementing this Mine Closure Plan are specified in Table 1.

Table 1: Roles and Responsibilities

Roles	Responsibility
General Manager	<ul style="list-style-type: none"> • Approval of resources necessary for the implementation of this management plan
Environmental Department	<ul style="list-style-type: none"> • Ensuring the compliance of this management plan with commitments and standards, • Providing technical assistance to the department managers and subcontractors of TÜMAD Madencilik Sanayi ve Ticaret A.Ş. for works to be performed according to the Mine Closure Plan and related procedures, • Ensuring the monitoring, measuring and reporting of the Mine Closure Plan as defined in the Management Plan, related procedures and directives, • Reviewing and updating the closure plan, conducting monitoring and trials for developing the closure approach plan and designs • Following regulations and updating the closure plans, receiving approvals from regulators. • Ensuring that the plan is accessible to employees of TÜMAD Madencilik Sanayi ve Ticaret A.Ş. and also to employees of subcontractors, • Controlling the efficiency of this management plan through periodical inspection of all activity areas of both TÜMAD Madencilik Sanayi ve Ticaret A.Ş. and subcontractors, • Reporting all hazards, non-compliances and incidents,
Project Manager Operating Manager	<ul style="list-style-type: none"> • Ensuring that all activities of TÜMAD Madencilik Sanayi ve Ticaret A.Ş. are performed in compliance with the Mine Closure Plan, related procedures and directives,

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	8/24

Subcontractor Managers	<ul style="list-style-type: none"> Ensuring the reporting of all hazards, non-compliances and incidents, Ensuring that training is given by Department Managers to personnel that will work in noise-emitting activities,
Landscape Architect	<ul style="list-style-type: none"> Cost analysis of rehabilitation and visual impact assessment studies, creating, implementing and controlling their plans
Internal Auditors	<ul style="list-style-type: none"> Performing routine workspace inspections to ensure compliance of all related activities with this Management Plan and related Procedures. Reporting all hazards, non-compliances and incidents,

5 PROJECT STANDARDS

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

- Applicable Turkish Standards;
- Local EIA and ESIA requirements and commitments;
- Other commitments to and requirements of Turkish Government authorities;
- Applicable international standards and guidelines;
- Applicable TÜMAD standards, policies and procedures;
- Other industry guidelines with which TÜMAD has committed to comply

5.1 Applicable National Standards

5.1.1 Regulation on Reclamation of Lands Disturbed by Mining Activities

Regulation on Reclamation of Lands Disturbed by Mining Activities, issued in 2010 and updated in 2012, covers reclamation responsibilities of mining companies during closure in terms of their EIA commitments, and how these are monitored by the Ministry of Environment and Urbanization. The Regulation requires a timetable for regeneration activities. There are no specific budget requirements and no specific bond terms, however the regulation dictates legal fines and reactions if the mining companies do not comply with their EIA commitments. Monitoring is carried out by the Ministry of Environment and Urbanization yearly, and the company has to submit yearly monitoring reports. It requires that reclamation plans for mining projects be appended to the Environmental Impact Assessment (EIA) reports.

Depending on the status of the land, the rehabilitation activities are monitored by the Ministry of Environment and Urbanization, General Directorate of Forestry (forestry land), Ministry of Food, Agriculture and Livestock (agricultural land). The operator shall submit annual rehabilitation monitoring reports to the relevant provincial environment and urbanization directorate. The monitoring activities continue after the completion of the rehabilitation activities for the periods defined in the EIA report in accordance with the Environmental Impact Assessment Regulation. The closure and rehabilitation becomes definite and approved as a result of the evaluation of the relevant provincial environment and urbanization directorate at the end of the monitoring period.

5.1.2 Rehabilitation of Forest Lands

Under Article 16 of the Forestry Law, it is a requirement to prepare a Forest Rehabilitation Plan for areas within forestry land. Regulation for Application of the Forestry Law Article 16. Number: 28976 Date: 18 April 2014 describes the format of the rehabilitation plan

5.1.3 Rehabilitation of Waste Management Facilities

The Mine Waste Regulation published in Gazette 29417 dated July 15, 2015 and became effective in July 15, 2017 provides guidelines for the closure of heap leach facilities, tailings storage facilities and the waste rock dumps. The regulations set out the requirements for the bottom liner system for the heap leach pads and a cover system.

Current regulations in Turkey specify that waste rock dumps will be closed to limit and manage seepage from the dumps and to limit any acid rock drainage (ARD). The regulations anticipate that a mineral waste dump would have

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	9/24

been operated in a manner to limit ARD and at closure the closure plan will address any ARD concerns. This would include mixing the PAG and NAG rock to promote neutralization or collection and treatment of the contact water. A cover should be placed on the waste rock dump to limit infiltration and measures taken in operation to contain waste rock which has a potential to generate ARD. The regulations and applications are monitored by the Ministry of Environment and Urbanization. A summary of the Mine waste Regulation (29417) is listed below:

ARTICLE 12 - (1) In the facilities where the mining waste is stored, the closure project including the geotechnical survey report which contains all the details of the closure process before the closure operation is prepared and submitted to the approval of the Ministry.

(2) In the facilities where the mining waste is stored, after the landfill is completely finished, before the top cover is formed in the storage area, the area is dried / dewatered and then uncovered as a buffer layer by laying out excavated soil or acid- Before starting the closure process, it is determined that the stored waste mass is sufficiently seated against the risk of slippage and collapse of the waste or structure.

(3) For the drainage of rain water, the embankment channels are constructed taking into account precipitation / evaporation data. Natural or geosynthetic materials are used in the appropriate thickness and impermeability in order to reduce the most of the infiltration and ensure drainage.

(4) Clay group minerals or geosynthetic clay liner are used to provide impermeability on the buffer layer in the upper cover system, where hazardous and non-hazardous mineral wastes are stored. In this case, the buffer layer thickness should be at least one meter. Natural or geosynthetic drainage material is applied on these layers in a suitable thickness and characteristic to drain the rain water.

(5) As top cover soil, it is laid in suitable thickness and planting is done so as to enable the cultivation of plant species unique to the region.

(6) These provisions are not applied in the facilities where inert mineral wastes are stored, and it is obligatory that the land is covered and vegetated after the landfill is closed.

5.1.4 Rehabilitation of Pastureland Land

Pastureland is state-owned land. Under Article 2 of the *Regulation on the Naturalization of Lands Degraded by Mining Operations*, lands designated as forest, agricultural or meadow lands are excluded from the scope of the Regulation. However, TÜMAD will seek to ensure that where possible land is restored as closely as possible to its former land use (for features such as open pits, WRD of HLF, this will not be possible).

5.2 Applicable International Standards

The international standards which TÜMAD will implement are those set by the European Bank for Reconstruction and Development (EBRD). The key requirements related to mine closure are set out in the EU Mine Waste Directive. The EU Mine Waste Directive applies to waste resulting from the extraction, treatment and storage of mineral resources and the working of quarries. Requirements of the Directive which are relevant to TÜMAD are as follows:

Extractive industry waste facilities

When a new waste facility is built or an existing one modified, the [competent authority] must ensure that the following measures are taken:

- the facility must be suitably located;
- its physical stability must be ensured and soil, air and water pollution prevented;
- it must be monitored and inspected by competent persons;
- arrangements must be made for the closure of the facility, the rehabilitation of the land and the post-closure phase.

Waste facility operators must provide a financial guarantee before the beginning of operations so as to ensure that the Directive's obligations are covered and to ensure the existence and availability of funds to restore the site when the facility is closed.

A waste facility is regarded as finally closed when the competent authority has carried out a final inspection, assessed the reports submitted by the operator, confirmed that the site has been restored and given its approval. After closure, the operator must maintain and monitor the site for as long as the competent authority considers necessary. The costs of these measures are, in principle, borne by the operator.

The requirements of the EU Mine Waste Directive are covered under this Mine Closure Framework.

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	10/24

5.3 Applicable TÜMAD Standards, Policies and Procedures

TÜMAD standards, policies or procedures related to mine closure is as follows:

- Procedure on the Measuring and Monitoring of Environmental Activities (TMD_LAP_CEV_PRD.006)
- Rehabilitation Instruction (TMD_CEV_TLM.007)

5.4 Other industry guidelines with which TÜMAD has committed to comply

TÜMAD will undertake its activities in line with the International Cyanide Management Code (ICMI) and will also take account of the International Council on Mining & Metals guidance set out in ICMM publication planning for Integrated Mine Closure: Toolkit.

5.5 Summary of Applicable Project Standards

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

Applicable Project Standards are summarized below table.

Table 2: Applicable Project Standards

Standard	Scope
Regulation on Reclamation of Lands Disturbed by Mining Activities	• Mine closure planning
Forestry Law	• Forest Rehabilitation Project
EU Mine Waste Directive (Directive 2006/21/EC on the management of waste from the extractive industries)	• Risk assessment and management mine waste management and mine closure planning, including financial assurance.
International Cyanide Management Code	• Use and management of cyanide.

5.6 Mine Closure Commitments in the Turkish EIA and the ESIA

The Turkish EIA prepared for the Project contains a range of commitments related to mine closure. These will be integrated into mine closure planning and are set out below.

The Turkish EIA sets out key concepts for closure planning in line with Turkish legal requirements. As part of the EIA scoping process, the Regional Directorate of Forestry outlined the requirement for a Forest Rehabilitation Project Plan to be prepared during the EIA process, and this has been presented in the Appendices of the Turkish EIA. The commitments included to the EIA and the ESIA are presented below.

Table 3: Roles and Responsibilities

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	11/24

Reference	EIA & ESIA Commitments (Lapseki & İvrindi Project)
Land Use Lapseki	<p>Lapseki 385.38 ha of the EIA site covering a total size of 394,9 ha, determined as operation area within scope of the Lapseki Project, is forest land, whereas the remaining 9,52 ha is agricultural land. Before commencement of production activities, a Rehabilitation Project has been prepared for forest land pursuant to Forest Law no. 6831 in conjunction with the Regulation on the Implementation of Article 16 of the Forest Law, promulgated in the Official Gazette dated 18.04.2014 no. 28976 (amendment: dd. 19.04.2015 no. 29331), The lands where the project units are positioned will be used for mining activities. Therefore, they will be temporarily removed from the forest land status. The shallow surface soil on these lands will be scraped off and stored in a defined area for use in rehabilitation. Use of these lands as non-forest will be limited with the operation period. At the end of the operation period, all lands will be made ready for forestation and handed over to the Regional Directorate of Forestry and submitted to the approval of the Canakkale Regional Directorate of Forestry, and a forest permit has been obtained from the Directorate General of Forestry.</p> <p>Lapseki as for agricultural land, an application has been filed at the Çanakkale Provincial Directorate of Food, Agriculture and Livestock, and a non-agricultural utilization permit has been obtained as per Law No. 5403 on Soil Preservation and Land Utilization</p> <p>Before activities are commenced, the borders of the project site has been surrounded with wire cages mesh fence, which will be removed during the permit process and rehabilitation monitoring process.(Chapter 4)</p>
Land Use İvrindi	<p>İvrindi Project- Impact regarding land use: Land use of more extensive in a mine operated by opencast mining. Another factor in terms of land use is the fact that opencast mining produces more GR compared to underground and therefore requires more storage area aboveground. Thus, taking measures in order to control visual impact and potential impact on the habitat due to reduction in vegetation is particularly important in the case of opencast mining. For these reasons, rehabilitation (restoring the nature) following site operations is a crucial necessity in terms of minimizing the impact of opencast mining. Rehabilitation activities must be carried out in a greater area and based on a good plan as GR storage area created due to high ratio of land use requires quite an amount of land. This may increase rehabilitation costs.(Chap 6)</p> <p>Topsoil, that is ensured to be stored under suitable conditions without loss of land preparation and construction stage and loss of productivity during the operation phase in the project area, shall be reused within the scope of rehabilitation works to be carried out in parallel with closing studies. In this regard, the project area shall be contributed to the rapid recovery of a landscape identity in the post-operation period, in accordance with the ecological balance of the project and other uses in the environment. The top soil shall be prevented from coming into contact with any contaminants while being transported to and from the rehabilitation areas. During the rehearsing of the upper soil during the rehabilitation work, a slightly rough and loose texture shall be formed on the surface and a suitable environment for planting studies shall be prepared. Following the laying process, the soil shall be buried with the aim of preventing the top soil from being trapped by human and vehicle traffic.(Chap9)</p>
Lapseki Top Soil Stripping and Storage	<p>Topsoil stripping works will be commenced after all tree cutting works are performed by the Regional Forest Directorate. An average of 0,10 m thick topsoil will be stripped off from the areas defined within the EIA site and temporarily stored at designated topsoil storage areas for use in rehabilitation works. Topsoil stripping will be carried out simultaneously with the mining activities. The topsoil that will be temporarily stored at the storage area will be stored in a manner that will ensure its contact with oxygen and prevent any loss of fertility. All precautions will be taken to prevent any contamination of the stored topsoil with pollutants or foreign matters, and weed growth on soil piles will be prevented. The top of the stored topsoil will be vegetated to maintain its biologic characteristic and prevent convection by erosion.</p>

Reference	EIA & ESIA Commitments (Lapseki & İvrindi Project)
İvrindi Top Soil Stripping and Storage	<p>The purpose of the construction activities is to prevent any lasting effect on the top soil existing in the project area and to save the upper soil to the rehabilitation works to be carried out in the progressive stages of the project, the top soil in the areas where the project units shall be constructed shall be stripped away.</p> <p>The aim of reducing the amount of land to be squeezed and contaminated by heavy machinery, construction equipment and personnel on the field shall be limited only by working areas and on-site service roads, and shall not go beyond these areas.</p> <p>Temporary and permanent erosion control methods shall be applied against erosion risks on construction sites. In this context, embankment and drainage channels, cutting structures and slope breakers shall be created for the control of surface flow, and mulch application shall be made. Where necessary, the channels shall be covered with riprap and mortar riprap and the risk of wear and erosion shall be minimized.</p> <p>Uncontaminated waters collected with ventilation channels shall be discharged to the receiving centre. If necessary, it shall be collected in the water collecting pools to be constructed within the scope of the project and used in the system.</p>
Design Criteria for Dry Stack Tailing Facility and Heap Leach Facility	<p>The DTSF designed as Class I facility per the Regulation for Landfill of Wastes as published in Gazette 27533 dated October 26, 2010. DTSF will have a composite liner foundation composed of 50cm of k<10-9m/s clay and 2mm HDPE Geomembrane liner.</p> <p>HLF will have a composite liner foundation composed of 50cm of k<10-9m/s clay and 2mm HDPE Geomembrane liner.</p>
Lapseki Waste Rock Storage Area	<p>Waste rock to be stored in the open area of from the open pit casting area, DTSF areas and founding dry wastes, contact with precipitation water and leachate formation will take place. Waters leaking from these areas will be deposited in sedimentation basins that will be installed at the channel outlets of drainage lines to be installed on the basin. These waters will be fed to the facility if possible, otherwise they will be discharged to the receiving centre to provide the limit values of the parameters given in SKKY (Turkish Water Pollution Control Regulation) Table-7.1</p> <p>It is planned to use clay as the selected material for closing cover in order to provide high infiltration conditions as part of detailed closing plan of most efficient closing cover design to minimize water seepage and air ingress into the stored piles of material.</p> <p>Although the closing step parameters (slope angles and heights) of the waste rock dumping area are to be updated during the operating period, the storage of waste rock piles and the arrangement of steps will be finalized before the closing plan so that the undesired deformations can be avoided pursuant to the waste rock management plan</p> <p>The topsoil to be used for rehabilitation works of the waste rock dumping area to be performed simultaneous to production shall be supplied from the topsoil that was stripped off from the area to the extent possible. If not possible, necessary permits shall be obtained to purchase fertile soils of sufficient quality for revegetation works.</p> <p>In the project area, the areas where the interception channels and the basins will be installed are the pit, waste rock dump and DSTF areas. Water that will come into these areas with surface runoff from the basin will be collected in the interception channels and transferred to the water collection basins. Water that will come into the areas with precipitation and contaminated due to contact will be collected in the settling basins downstream of the areas via the drainage systems.</p> <p>PAG rock will be encapsulated within the waste rock dump and the waste rock dump will be capped with a low permeable cover system during closure.</p>
İvrindi Waste Rock Storage Area	<p>Soil pollution that may occur in case of contact with contaminated surface waters coming into contact with the soil environment due to contact with contaminated surfaces in the pit , Waste Rock storage area, heap leaching area and other facilities;</p>

Reference	EIA & ESIA Commitments (Lapseki & İvrindi Project)
	<p>Pollutant effects that can form on the soil environment as a result of dusting from open pit area, Waste Rock Storage area, crushing plant;</p> <p>The Waste Rock to reveal within scope of the project shall be stored at approximately 100 hectares Waste Rock storage area. Waste Rock , which shall be produced from Kartel and Kabak quarries which shall be produced in the first 6 years of the project, shall be stored in the storage area while some of the Waste Rock shall be stored in South and Ballık quarries in the next stage of the operation and some of them shall be used in rehabilitation of Kartel and Kabak pits.</p> <p>Covering Waste Rock storage and heap leaching areas with cover systems and regeneration of vegetation cover over the areas shall have the least impact on the risk of erosion and sediment transport and soil resources that may arise from these areas. However, the cover closing process shall minimize the risk of ARD formation and metal release by reducing water contact and oxygen content in the units that are shut down after operation.</p>
Lapseki Open Pit Areas	<p>The PAG rock exposed on the pit walls will be covered by NAG material.</p> <p>Some of the pits will be partially backfilled</p> <p>After closure of the open pits, the containment ditches (surface flow diversion channels) will be removed and rehabilitated.</p> <p>After closure of the open pits each pit will be surrounded by an embankment of inert material to stop the accidental entrance of surface flows, people, animals and vehicles into open pits. The embankments will be surrounded by wire mesh security fencing with warning signs.</p> <p>Observation wells downgradient of the open pits will be used to monitor groundwater quality.</p>
İvrindi Open Pit Areas	<p>Following completion of operation activities at open mine sites, partial backfill shall be applied with Waste Rock. Therefore, both considerable amount of materials shall be recycled to the site and water accumulation shall be prevented on the mine ground. However, the potholes that are filled back shall be protected against the effect of air and precipitation, which shall reduce the risk of erosion and ARD formation.</p>
Surface Water	<p>Geochemical properties of waste rock and ore materials for the characterization of acid rock drainage and potential geochemical test programs for potential ARD / metal leaching that can be generated from these rocks. Data obtained from waste rock deposits at the end of the dry waste storage open pond water quality and the quality of leachate Preventing and controlling ARD in situ by establishing the mixture balance models with PHREEQC program has been determined the measures to be taken in order to protect the chemical stability of the waste areas and the protection of the water quality in the long term in the activity area and the permission period</p> <p>After the closure, the closure top cover will be formed on the waste rock to prevent contact of precipitation waters falling on the waste rock and passing to the surface flow with the waste rock.</p> <p>During the operation and until the end of the rehabilitation, surface waters will be transmitted through the interception channels to the natural drainage in the downstream without contacting the waste rock. In order to prevent erosion and sediment transport, measures such as plantation and/or use of rip-rap, etc. will be taken, stability of outlet structures of will be ensured, and additional structures for sediment retaining will be built at the outlets if necessary.</p>
İvrindi Heap Leach Facility	<p>Sampling and analysis will be carried out regularly in accordance with the underground water observation and monitoring program on the observation wells in the upstream and downstream areas of the heap leach. Water quality monitoring will be carried out in the heap leaching area including the operation and post-closing period. Regular monitoring will be performed in the lower drainage collection system to understand the presence of leaks in the bulk leachate material.</p> <p>The heap leach will be rinsed (rinse using recycled water) during the closure period.</p> <p>After completion of the operation and rinsing of the heap leach facility a suitable cover layer will be created to meet the specifications for a top cover required Class I landfills as set out in the ADDDY regulation or the mine waste regulation. Further studies will be conducted to develop the water balance of the heap leach facility and for the management of rinsing water</p>

Reference	EIA & ESIA Commitments (Lapseki & İvrindi Project)
	<p>during closure including treatment of the rinsing water or installation of evaporators, or partially covering the Heap Leach Pad during operation etc.</p> <p>With the monitoring program to be carried out during the construction, operation and post-closure periods, monitoring works will be carried out regularly in the observation wells and sub-lining drainage system at the heap leaching site, and in addition to this, an environmental monitoring program will be carried out after the closure. [monitoring will be conducted during operations and during the post-closure phase]</p> <p>Heap Leach facility will be capped with a low permeable cover during the closure.</p> <p>Since the top cover to be formed with mineral material on the heap after the washing will prevent contamination of precipitation waters falling onto the heap and then passing to the surface flow, no impact on the surface waters due to surface flows will occur. [the top cover will prevent leachate from impacting water quality]</p>
Reclamation of Pit Areas	<p>Pit slopes will be smoothened in such manner that their height will not create any hazard and their rehabilitation will be commenced by adequate revegetation. The rehabilitation to be performed will be different for every pit. Some of the pits would also be backfilled to prevent pit lake developments. Closure studies will be detailed during the operation periods by using the actual field data and observations. Within scope of rehabilitation works waste rock and/or limestone with high buffering capacity will be laid on PAG rocks are exposed on the pit walls in order to cover the exposed sulphide zones. The crushed waste rock and/or limestone will be covered with fine-grained top layer to ensure minimum water contact. In regions where production is completed, the slope smoothening will be performed to increase stability and revegetation works will be performed after laying of topsoil. Monitoring activities will be performed to create a water quality database during the operating period. Ground water quality during the operating period will be regularly monitored from observation wells downstream of the open pit, in a manner that will include also the post-operating period. ARD development will be monitored by collecting additional samples and by barrel tests and the ARD management plans, mitigations and the closure plans will be further refined during the operation.</p>
Reclamation of DSTF and Heap Leach Areas	<p>At the DSTF (dry stack tailing storage) area, and the Heap Leach Area, the closure works will comprise the levelling of the area and laying of an permeability layer (compressed clay material in form of 2 layers with a thickness of min. 50 cm). To strengthen the permeability of the clay unit, a geomembrane will be laid on top of it. Thereafter, a min. 50 cm thick drainage layer and min. 50 cm thick topsoil will be laid. Rehabilitation works will be completed after the topsoil is greened in harmony with the environment. Heap Leach Facility will be rinsed prior to closure. The water management of the rinsed water will be developed by using the actual data gathered during the operation.</p>
Reclamation of Waste Rock Areas	<p>Encapsulation during storage at the waste rock dumping area will be performed with neutralizing rocks that have a high buffering capacity for potentially acid-generating rocks, and it will be ensured that the blending rates are determined in the waste rock management plan during the operating period. The waste rock management plan will be prepared according to 3D geological model and annual production. The waste rock management plan to be developed during the operating period will be continuously updated on the basis of daily production. Within scope of encapsulation operations, it will be ensured that the waste rock generated at the open pits are transported to the waste rock dumping area by trucks, an laid in form of compressed layers. Encapsulation will be applied according to the principle that acid generating waste rock laid in 1m thick layers are encapsulated with min. 5m thick non-acid-generating buffering waste rock. Appropriate drainage conditions for surface flow will be obtained by levelling the created pile as necessary. It will be ensured that the waste rock pile is covered in a manner that will minimize seepage and rehabilitated with an appropriate cover (0.3 m clay and 0.25 m topsoil).</p> <p>The waste rock dumping area is designed as a permanent structure. The surface to be formed in the final closing phase will have an average slope of 3%. Within scope of rehabilitation activities to be performed simultaneously with production, surface cover will be laid according to the "store-and-release" method and vegetated subsequently. The store-and-release cover system retains water in rainy seasons, which is them evaporated or transpired during dry periods.</p>

Reference	EIA & ESIA Commitments (Lapseki & İvrindi Project)
	<p>Simultaneously with production, rehabilitation of the waste rock reaching its final elevation in the dumping area will be commenced. The cover layer to be used will be levelled to prevent ponding on the waste rock and slopes will be created adequate to the drainage system. Even though the basis of the waste rock dumping area has been levelled, appropriate slopes have been created and lower drainage systems have been made, the amount of seepage will be minimized to reduce the amounts of sediments and pollutants that can be carried to groundwater to a minimum. Vegetation works will be done simultaneously with the laying of topsoil after laying of the cover layer. It is planned to use clay with a thickness of 0.3 m as the selected material for closing cover in order to provide high infiltration conditions as part of detailed closing plan of most efficient closing cover design to minimize water seepage and air ingress into the stored piles of material.</p> <p>Although the closing step parameters (slope angles and heights) of the waste rock dumping area are to be updated during the operating period, the storage of waste rock piles and the arrangement of steps will be finalized before the closing plan so that the undesired deformations can be avoided pursuant to the waste rock management plan.</p> <p>The topsoil to be used for rehabilitation works of the waste rock dumping area to be performed simultaneous to production shall be supplied from the topsoil that was stripped off from the area to the extent possible. If not possible, necessary permits shall be obtained to purchase fertile soils of sufficient quality for revegetation works.</p>
Operation Buildings and Infrastructure	<p>The prefabricated structures to be installed under the project will be dismantled and removed from the area after completion of operating activities. Infrastructures such as power lines and roads will not be removed from the site if found necessary and will be allocated for use by nearby villages.</p> <p>During rehabilitation works, erosion control as well as land grading and vegetation works will be performed to prevent landslides. In order to facilitate plant growth, the topsoil to be laid on the area to be rehabilitated will be enriched with elements such as nitrogen, phosphorus and organic matter. This will help the vegetation cover to develop in shorter time. Vegetation and/or afforestation works shall be performed on the fertilized area taking into account the characteristics of soil and climate characteristics of the region. Thus, the region will be improved visually while preventing erosion as result of precipitation or mining activities.</p>

**Additional Commitments in
the ESIA**

TÜMAD will provide water to the Şahinli and Kocabaşlar villages from the Lapseki water transmission line during the operation period of the project. During the closure phase of the Project, TÜMAD will make sure that sustainable water sources are allocated to the Villages in order to compensate the water sources that would be impacted from the mining operation so the residual impacts are considered acceptable.

Third party water users will not be negatively impacted in terms of quantity and quality, the situation will be monitored and mitigation measures will be implemented if required.

During the operation and closure of the facility, oxidized waste with high buffer capacity will be used to cover the sulphur zones in the open pit surfaces for the purpose of closing slope surfaces thus the surfaces with high acid forming potential will be prevented from contact with the atmosphere

ML/ARD properties of the materials to be produced during the operation may vary according to the tests and predictions done before the operation. In this scope, monitoring will be undertaken during the operational stage to validate the predictions, solidifying knowledge and improving the closure plan. Risks due to mistakes and deficiencies will be mostly eliminated through monitoring and operational procedures to be developed during operational stage. An inventory will be created for the samples which are going to be collected during these observations. Monthly sampling will be done during the observation stage in consideration of seasonal changes (rain, snow, etc.). Pit walls will be continuously examined and sampled for sulphide analysis after each explosion. If there is going to be a different sulphide percentage for the defined lithology, wall washing tests will be run on that pit wall.

The groundwater model has been developed to evaluate potential impacts of the project. The model will be reviewed and compared with the actual site and monitoring data and the model will be revised / recalibrated on an annual basis to better represent the groundwater conditions observed during the operation. Based upon this data analysis and conditions at the time, whether additional groundwater wells are needed will be determined. Further technical studies will be conducted to better develop dewatering/depressurization plan for the open pit mining and assess pit lake development.

The contact water quality estimates prepared by PHREEQC will be compared with the monitoring results and the quality estimates will be revised on an annual basis depending on the data collected through the ARD monitoring plan and the PAG-NAG rock volumes excavated during the mining.

During the mining phase of the Project, a testing program will be used to classify waste rock and segregate PAG and NAG material by testing method very similar to that used for segregation of ore and waste. During mining, when benches in the pit are drilled, samples will be collected from each borehole for gold assays. The samples will also be measured for sulfur to identify PAG and NAG rock. A sulfur threshold to segregate NAG and PAG rock will be developed during the first year of the mining operation by conducting further static/kinetic testing and barrel testing

The encapsulation during storage in the waste rock dump will be performed for the rocks having acid forming potential with neutralizing rocks having high buffering capacity and the blending rates will be determined in the waste rock management plan during the operating period.

The Waste Rock Management Plan to be prepared during the operating period will be continuously updated on the basis of daily production. Encapsulation operations will be carried out by transportation of the mine waste from open pits to the waste rock dump and placement of waste rock in the form of compacted layers. It is based on the principle of isolation (encapsulation) of acid forming waste rock laid in layers of 1 m with the non-acid forming waste rock having a buffering capacity in a thickness of minimum 5 m. The required levelling process is performed on this formed pile to obtain suitable drainage conditions for surface runoff. Top soil with a thickness of 10 cm will be laid to minimize the drainage over the waste rock stack.

Encapsulation studies will be undertaken to prevent the ARD at waste rock dump. According to geochemical model, there will not be an ARD production at the waste rock dump. However, taking into account any unpredicted contamination potential and to verify the model results, on-site barrel tests will continue to be conducted on potential acid producing samples. In addition to these precautionary steps for a possible ARD production; a bottom drainage, collection and settling pools for the waste rock dump will be installed and monthly monitoring will be done continuously from these pools. If any ARD production is observed

Reference	EIA & ESIA Commitments (Lapseki & İvrindi Project)
	<p>during the monitoring, one of the most common ARD neutralization process, which is active neutralization will be applied. With this process, the collected contaminated water at bottom drainage pool will be transferred to settling pools and the metals and sediments will be precipitated using chemical stabilizers (generally pH stabilizer). The precipitated sediments will be transferred to the tailing storage (having impermeable bottom layer). Based on water quality monitoring results, constructed wetlands (which is a passive stabilization method that does not need continuous human intervention) will be built. The uncontrolled extension of the wetland plants will be prevented by isolating the wetlands with impermeable layers (clay, geomembrane, etc.) on the drainage path and storage area.</p> <p>Monitoring for geotechnical stability will include visual monitoring, site inspections as well as geotechnical instrumentation that will be installed in and around the DTSF. Monitoring instruments would include vibrating wire piezometers, monuments to measure settlement and movement, radar systems and inclinometers. Vibrating wire piezometers would also be installed to the pit to better define vertical hydraulic gradients on the active pit walls.</p> <p>The mine closure plan will be developed and refined during the operation stage based on increased knowledge and greater definition of circumstances at the time of mine closure. Mine closure planning will be undertaken in successive phases: conceptual closure plan, detailed closure plan and final closure plan. Each phase will bring greater detail to the plan, based on increased knowledge and information</p> <p>Periodic water quality samples will be taken to detect the changes in the chemical composition of the receptors. If adverse effects on quantity or quality (e.g. significant changes in chemical composition) are observed, remedial measures or other mitigation measures will be taken.</p> <p>The monitoring results will be compared with the existing reference conditions at each monitoring point. If the parameter concentrations exceed the defined trigger levels, a risk assessment study will be conducted to identify potential environmental and human health risks that will increase the frequency of monitoring and sampling. Depending on the result of the risk assessment and monitoring studies, further mitigation measures will be applied to reduce the impacts to an acceptable level.</p> <p>There will be monthly monitoring during the life of the mine and after the closure, periodical monitoring will be continued. After the operation, monitoring schedule is also seasonal for the first 5 years, then once in a six month for the next five years and once in a year for the final five years after the operation.</p> <p>Rehabilitation of the waste rock reaching the final level in the disposal area will start simultaneously with the production.</p> <p>Waste Rock Management Plan to be updated during the operation period, the storage of the waste rock piles and the arrangement of the steps will be finalized before the closure plan so as not to observe any other undesirable deformations.</p> <p>ARD will be monitored and the water quality estimates and management plans will be updated on a regular basis during the Project. If the contact water quality does not meet the discharge standards, the contact water will be used in the process and contact water treatment options will be evaluated and implemented depending on the parameters exceeding the discharge standards. Treatment options would include adding certain chemicals to the contact water prior to discharge or design and construction of a treatment plant by TÜMAD during the operation stage of the Project.</p> <p>The facilities will be capped by low permeable cover systems during the closure stage and long term chemical and physical stable conditions will be achieved for the permanent project facilities including the waste rock dump, dry stack tailings facility and the pits.</p> <p>The HLF, DTSF and the WRD will be completely covered by a low permeable cover system to prevent infiltration.</p> <p>In the heap leach system, zero discharge principle applies during the operation and shutdown period. There will be no discharge of process water to the receiving environment.</p> <p>Develop and implement comprehensive Biodiversity Action Plans (BAP) for both Lapseki and İvrindi based on the BAP Framework documents that have been disclosed as part of the Supplemental Information Package, dated June 2017.</p>

Reference	EIA & ESIA Commitments (Lapseki & İvrindi Project)
	<p>Implement Stakeholder Engagement Plan (SEP) which includes project level grievance mechanism. Monitor effectiveness of SEP implementation for the life of Project. The SEP should be revised and updated on a regular basis. The SEP may be integrated into existing company procedures.</p> <p>Work with local authority, other mine companies and Gold Mine Association to undertake a potential cumulative environmental, heritage and social impacts from the operation of existing and reasonably foreseeable future Mine projects in the region and establish a network to raise awareness in the sector with regards to international standards.</p> <p>Disclose the final mine closure plan when available in accordance with the SEP.</p>

6 PREPERATION OF MINE CLOSURE PLAN

TÜMAD will adopt a staged approach to the development of a Mine Closure Plan. This is based around:

- An initial list of overall mine closure objectives based on commitments set out in the Turkish EIA and the ESIA,
- A mine closure planning process that will refine the Mine Closure Plan over time based on increased knowledge and greater definition of circumstances at the time of mine closure.

6.1 Overall Mine Closure Objectives

Based on the closure commitments set out in the Turkish EIA, TÜMAD objectives and closure planning processes, the following basic objectives will guide mine closure planning:

- Return as much land as possible back to its original state and usage;
- Minimize risks to the environment;
- Minimizing safety risks to local communities
- Minimizing economic disruption to local communities;
- Implement long-term post-closure monitoring to ensure that stable and safe land forms are left behind.

The following key approaches will be used to achieve the overall closure objectives.

Table 4: Mine Closure Objectives and Key Approaches

Objective	Key Approaches
Minimize risks to the environment	<ul style="list-style-type: none"> • Capping the WRD to minimize ARD generation • Rinsing the HLF as part of the closure process to remove reagents and potential contaminants <p>Capping the HLF to minimize ingress of water</p>
Minimizing safety risks to local communities	<ul style="list-style-type: none"> • Removal and appropriate disposal of all wastes, chemicals, reagents and materials from the EIA Permitted Area • Demolition and removal of surface infrastructure • Disposal of all inert demolition materials and wastes • Construction of a safety berm and security fence around the open pits to limit to the greatest extent possible the potential for access by wildlife or the public
Minimizing economic disruption to the workforce and local communities	<ul style="list-style-type: none"> • Demobilization of the workforce and provision of support to employees in finding suitable new employment • Develop a long-term community development strategy focused on closure from the outset. The objective will be to ensure that

Implement long-term post-closure monitoring to ensure that stable and safe land forms are left behind.	<ul style="list-style-type: none"> Implementation of remedial measures to minimize long-term maintenance of the site Implementation of a post-closure monitoring program that will ensure physical and chemical stability of the EIA Permitted Area and associated facilities that may remain
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Mine closure objectives will be developed in more detail as part of ongoing mine closure planning and the objectives and approaches will evolve over time as greater knowledge is gained.

- Mine Closure Planning Phases

Mine closure planning will be undertaken in successive phases:

- conceptual closure plan;
- detailed closure plan;
- final closure plan.

Each phase will bring greater detail to the plan, based on increased knowledge and information.

➤ **Schedule for Mine Closure Planning**

Based on the current mine life, the following schedule will be used for mine closure planning:

- conceptual closure plan - 1 year after commencement of mining operations;
- closure plan - within 3 years of commencement of mining operations;(Appendix-1)
- final closure plan - 2 years prior to planned completion of mining operations.

Under the Turkish Mine Waste Regulation (2015) mine closure should be completed within 2 years of the cessation of mine site activities.

Activity	Before and after mine stop										
	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	1
MINE CLOSURE											
Revision / update of closure plan when necessary											
Agreement with the authorities on detailed plan											
PLANT FACILITIES											
Dismantling of fixed installations											
Demolition of buildings											
Dismantling of infrastructure											
Cleaning and removal of materials and residues											
OPEN PIT FACILITIES											
Slopes and steps/open pit dismantling/cleaning/back fill or partially back fill/ slope angle correction											
Water Management Systems											
Safety Regulations											
Correciton/Planting/Test works											
DRY STACK TAILING/ HEAP LEACH FACILITIES											
Rinsing of heap leach facility											
Water Discharge Criteria											
Reclamation/Planting											

➤ **Process for Mine Closure Planning**

TÜMAD will undertake a mine closure planning process in line with ICMM guidelines, this will include:

- issues identification and management planning;

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	20/24

- defining closure goals and outcomes;
- engaging stakeholders in the closure planning process;
- developing actions plans for closure;
- defining post-cost monitoring and evaluation;
- defining and managing closure costs.

➤ **Risk identification and Management**

A Closure Risk Assessment Workshop will be held at an early stage in closure planning to ensure that all issues related to closure are considered in an integrated manner.

- **Closure Risk Assessment Workshop**

A Closure Risk Assessment Workshop will be held with key TÜMAD staff to identify and assess key risks related to closure. This will be undertaken using a standard methodology for closure risk assessment.

Based on the Risk Assessment Workshop, an outline Closure Risk Management Programme will be developed to manage risks to acceptable levels based on the TÜMAD Risk Assessment Procedure.

- **Closure Goals and Outcomes**

Based on the Risk Assessment Workshop and the outline Closure Risk Management Programme, closure goals and outcomes will also be developed. This will include:

- Environmental goals
- Safety goals
- Community goals

Based goals on the risk identification and management process will ensure that closure goals are achievable and address the key risks related to mine closure. Defining goals will also ensure that monitoring metrics can be developed to measure progress towards achieving the desired closure status.

➤ **Stakeholder Engagement**

Due to the short planned mine-life, the Stakeholder Engagement Plan (TMD_EYS_PLN.001) will be updated following completion of the Risk Assessment Workshop.

TÜMAD will define principles & objectives of stakeholder engagement for closure planning and integrate these into the Stakeholder Engagement Plan. These will include:

- Commencing engagement on closure at an early stage in the operational life of the project;
- Soliciting views and opinions from relevant stakeholders on how best to manage and minimise closure impacts;
- Building closure planning into the Community Development Plan (TMD_EYS_PLN.007) to ensure that dependence on TÜMAD is not built into community development activities.

➤ **Monitoring and Evaluation**

Based on the identified closure goals, a monitoring and evaluation framework will be developed. This will be based on quantitative data and will be focused on measuring progress towards achievement of closure goals.

Social closure goals may also include qualitative goals.

➤ **Closure Cost Estimation**

The determination of high cost issues related to mining will be examined under three topics

- Open pit mine
 - Backfill, Partially Back Fill, Slope Angle reclamation
- Waste dump
 - Waste dump improvement
- Heap leach and dry stack tailing facilities

When discussing mining issues, different closure options will be developed and examined considering cost and environment

As part of the mine closure planning process a closure cost estimate will be developed. This will include the construction, demobilisation, demolition, removal and remediation of all plant facilities as well as all other ongoing

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	21/24

remediation activities. The closure cost estimate will include direct and indirect costs and will be within a typical order of magnitude study cost range of -30/+30%. Cost categories will include:

- Site rehabilitation and restoration;
- Dismantling;
- Workforce retrenchment;
- Socio-economic activities;
- Post-closure management & monitoring;
- Administration;
- Other costs as defined by engineering studies;
- Contingency.

Closure costs will be accounted for in line with International Financial Reporting Standards. Closure costs will be included in successive updates of the Closure Plan.

The closure cost estimate, as reported in the Project financial statements, will be updated annually during the operation's life to reflect known developments, including scope changes, the effect of a further year's inflation, exchange rate differentials and new regulatory requirements. Closure cost estimation procedures will ensure that identified post-closure costs, whether ongoing or one-off, are realistically estimated and incorporated into the estimate.

➤ **Closure Cost Provisioning**

TÜMAD has estimated mine closure costs throughout the operational life of the Project and will accrue mine closure cost provisions from operating cash flow on a quarterly basis and reviewed annually. This will ensure that at all times the accrued closure provision will cover potential closure costs for temporary and permanent and planned and unplanned closure events. In the event of temporary and/or unplanned mine closure; TÜMAD will develop and agree with the relevant Turkish regulatory authorities a care and maintenance regime, the costs for which would be covered by TÜMAD's own cash reserves and cash-flows.

➤ **Unexpected Closure**

TÜMAD will develop contingency plans for unexpected closure including:

- temporary closure/shut-downs;
- unexpected permanent closure prior to the planned end of mine-life.

This will include the retrenchment of workers, including provision for collective redundancy as outlined in the Labour Management Plan (TMD_IK_PLN.002).

➤ **Updates to the Closure Plan**

The closure plan will be developed and updated in accordance with the schedule set out in *Section 5.1* of this Framework.

➤ **Scope of Issues Addressed by the Mine Closure Plan**

The Mine Closure Plan will cover all facilities owned and operated by TÜMAD. This will include:

- Open pit mining:
 - o Long-term use and security of the former open pit areas;
 - o Long-term Slope stability; o Pit access and mining benches.
- Materials handling:
 - o Crushers;
 - o Conveyors;

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	22/24

Vehicles.

- Heap leach facility
- Processing facilities
- Buildings and surface infrastructure:
 - Buildings;
 - Site access roads;
 - On-site access roads;
 - On-site power lines;
 - Water supply wells and pipeline;
 - Borrow pits and quarries.
- On-site water management facilities:
 - Industrial water supply;
 - Potable water supply.
- Mine waste management:
 - Waste rock dumps;
 - Other stockpiles.
- Other potentially impacted areas
- Community initiatives
- Economic initiatives
- Local and regional opportunities at closure

➤ **Post Closure Monitoring**

The Mine Closure Plan will set out:

- Physical stability monitoring:
 - Open pits;
 - Mine site and disturbed areas; ○ Waste rock dumps; ○ Heap leach facility; ○ Site security features.
- Chemical stability:
 - Open pits;
 - Mine site and disturbed areas; ○ Waste rock dumps; ○ Heap leach facility.
- Environmental impacts and anticipated mitigation, management measures and associated monitoring
- Expected maintenance requirements
- Monitoring of community initiatives
- Monitoring of socio-economic activities

The duration of post-closure monitoring may be up to 30 years.

7 TRAINING

7.1 Overview

All necessary trainings, workplace site induction trainings, orientation trainings and work-specific trainings will be given.

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	23/24

7.2 Workplace Site Induction Trainings

Site-specific site induction training, environmental awareness trainings and extensive health screening will be provided to all personnel and subcontractors working at the site of TÜMAD Madencilik Sanayi ve Ticaret A.Ş.

7.3 Orientation Training

Orientation training will be given at certain intervals under the supervision of Department Chiefs to all personnel starting to work at the site.

7.4 Work-Specific Training

Work-specific specialized training will be given to plant operators and all key personnel taking part in activities that involve land clearance, construction or use of materials.

8 AUDITING AND REPORTING

8.1 Internal Audit

Daily inspections will be carried out at the operating site by supervisors and auditors, covering a wide range of operating aspects, including community health and safety issues, in accordance with activities outside the fence borders.

Any incidents and nonconformities detected during these inspections shall be recorded and reported in accordance with Integrated Management System documents of TÜMAD Madencilik Sanayi ve Ticaret A.Ş.

8.2 External Audit

Legal responsibilities and Management System Responsibilities are audited by official bodies and auditors at certain periods within the framework of the Mine Closure Plan.

8.3 Recording

Audits, incidents and nonconformities shall be documented and managed pursuant to the Records Management Procedure of TÜMAD Madencilik Sanayi ve Ticaret A.Ş (TMD_EYS_PRD.004).

CONCEPTUAL MINE CLOSURE FRAMEWORK for LAPSEKİ & İVRİNDİ PROJECTS	Document No	Rev.	Page
	TMD_CEV_PLN.001	0	24/24