

TÜMAD

MADENCİLİK SANAYİ VE TİCARET A.Ş.



WATER RESOURCES MANAGEMENT PLAN for LAPSEKİ PROJECT

by TÜMAD Madencilik San. ve Tic. AŞ

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WATER RESOURCES MANAGEMENT PLAN for LAPSEKİ PROJECT

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ABBREVIATIONS AND DEFINITIONS

Project	: Lapseki Gold and Silver Mine and Processing Projects
TÜMAD	: TÜMAD Madencilik San. ve Tic. A.Ş.
BCWP	: By-law on Control of Water Pollution
DSI or SHW	: State Hydraulic Works
DTSF	: Dry stack Tailings Facility
EBRD	: European Bank for Reconstruction and Development
EIA	: Environmental Impact Assessment
ESMS	: Environmental and Social Management System
IMS	: Integrated Management Systems
KPI	: Key Performance Indicator
Non-PAG	: Non-Potentially Acid Generating
PAG	: Potentially Acid Generating
RWQC	: Regulation on Water Quality Control
SIP	: Supplementary Information Package
WRD	: Waste Rock Dump (Mine waste facility)

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1 INTRODUCTION

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

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 Water Resources Management Plan for the Lapseki Gold Project. The document reference number for this Management Plan is TMD_LAP_CEV_PLN.003. This management plans sets the requirements for the operation phase of the Lapseki Project of the integral part of the Environmental and Social Management System implemented by TÜMAD for the Lapseki Project.

This Management Plan will be reviewed at a minimum on an annual basis to ensure that it remains valid and meets the needs of TÜMAD, local communities and other relevant stakeholders as identified in this SEP and to determine whether any changes or updates are required to the Management Framework unless a more frequent update is required to reflect changing project design or ESMS requirements and procedures.

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

2 PURPOSE

Prepared for TÜMAD, this document is the Water Sources Management Plan prepared for the purpose of ensuring control and management of quality of water which has or has not been used as resource in the Lapseki Gold mine and has been qualified as waste generated as a result of mining activities. The purpose of Water Sources Management Plan is to;

- Identify project standards of the Water Sources Management Plan,
- Defining receptors that sensitive to the mining activities and their monitoring schedule,
- Regularly measure, report, and ensure tracking of Water Sources trigger values and limit values resulting from activities of TÜMAD
- Define legal responsibilities, undertakings, business procedures and instructions in areas of activity in terms of Water Sources and Potential Pollution of these Sources,
- Evaluate Water Sources Limit Values in terms of local water users and define performance goals,
- Define Duties, Powers and Responsibilities and establish references in the scope of Water Sources monitoring.
- Define training requirements,

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

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

3 SCOPE

The Water Sources Management Plan encompasses all the activities of TÜMAD It also includes impact on water sources due to prospecting and operation activities including mining, mine operation, transportation of materials into and out of the site which may have a significant impact on all subcontractors employed in the scope of activities of TÜMAD communities and the environment.

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This Management plan covers all water used by TÜMAD from the point of abstraction through to its loss from elsewhere.

Requirements stated in the Water Sources Management Plan which has been prepared within the scope of the Integrated Management Systems will apply during all TÜMAD activities.

Revisions made in the scope of operation activities which may have an impact on Water Sources Limit Values, standard revisions in the Integrated Management System, or alterations in legislations may cause revisions in this management plan.

3.1 Overlaps with other Management Plans

As explained in the ESMM Plan, this Management Plan is a part of the general package of Management Plans developed for Lapseki Project of TÜMAD. All of TÜMAD Policies, Management Plans, Standard Operational Procedures (SOP), Instructions, and Permit requirements will also apply to TÜMAD's contractors and contractors. These requirements will be stated in contractor tender packages and in the contracts and contractors will be obliged to fully comply with the Management Plan and Procedures, instructions, and permits, either directly or indirectly.

- The Community Health and Safety Security Management Plan (TMD_EYS_PLN.006), particularly in relation to potential impacts on surface and groundwater resources used by local communities.
- The Emergency Action Plan (TMD_LAP_ISG_PLN.002), particularly in relation to accidental contamination of surface and groundwater resources.
- Stakeholder Engagement Plan (TMD_LAP_EYS_PLN.001), particularly in relation to potential impacts on surface and groundwater resources used by local communities.
- Waste Management Plan (TMD_CEV_PLN.004), particularly in relation to waste management and the protection of surface and groundwater.
- Explosives and Hazardous Materials Management Plan (TMD_ISG_PLN.006), particularly in relation to control of potential contamination of surface and ground waters.
- Mine Closure Framework (TMD_CEV_PLN.001), particularly in relation to the restoration of the WRD.
- Cyanide Management Plan (TMD_CEV_PLN.008), in relation to management of cyanide.

4 PROJECT STANDARDS

The standards applicable during all activities of TÜMAD are as follows.

- EIA Requirements
- Legislation
- Company Undertakings and Requirements of Undertakings
- International Standards and Guides
- Project Standards
- TÜMAD policies, procedures and instructions (IMS Management System Documents).

4.1 EIA Requirements

- All phases of these activities will be conducted in accordance with the "Regulation on Protection of Wetlands" published in the Official Gazette no. 28962 and entered into force on 04.04.2012.
- No effect of the plant is expected on the underground and surface water resources. In addition, in order to protect the water quality of the receiving waters after discharge, the provisions of the "Surface Water Quality Management Regulation" no. 28483, dated 11.30.2012, "Law on Ground Waters" no. 10688, dated 12.23.1960, with decision number 167, "Regulation on the Protection of Ground Waters against Pollution and Deterioration " no. 28257, dated 04.07.20012 and "Water Pollution Control Regulation" no. 25687, dated 12.31.2004 (Amended; O.G. dated 03.25.2012 with No 28244) entered into force through publication in the Official Gazette will be followed.

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4.2 Legislation

National Legislations:

- By-law on Protection of groundwater against Pollution and Degradation
- Regulation on Management of Surface Water Quality
- Law on Groundwater
- Regulation on Protection of Wetlands
- By-law on Control of Water Pollution
- Wetland Conservation Legislation

The EIA Report aims to Monitor Water Sources and monitoring the trend between current status of water and future status in order to use the current situation prior to mining activities as a reference by inspections conducted in the scope of the regulations stated above in addition to Article 4, Article 5, Article 7, Article 11, Appendix 2, Appendix 3, Appendix 9 of "By-law on Protection of Underground Waters against Pollution and Degradation" published in the Official Gazette and entered into force on 07.04.2012. In this context, comparisons to be made for groundwater shall be made according to the reference values rather than determined boundary values.

International Legislations:

- Activities of TÜMAD aims for Efficient Use of Resources and Prevention and Management of Pollution.
- Efficient use of Energy and Resources, following current technologies in order to update the operating system constantly,
- Investigating negative effects of pollution sources resulting from activities and constant improvement in order to minimize their impact,

are the main approaches being adopted.

European Bank for Reconstruction and Development Performance Requirements:

The objectives of the European Bank for Reconstruction and Development Performance Requirement (PR) 1 titled "Environmental and Social Appraisal and Management" is:

- To identify and assess environmental and social impacts and issues, both adverse and beneficial, associated with the project,
- To adopt measures to avoid, or where avoidance is not possible, minimize, mitigate, or offset/compensate for adverse impacts on workers, affected communities, and the environment,
- To identify and, where feasible, adopt opportunities to improve environmental
- and social performance,
- To promote improved environmental and social performance through a dynamic process of performance monitoring and evaluation.

The objectives of the European Bank for Reconstruction and Development Performance Requirement (PR) 3 titled "Pollution Prevention and Abatement" is

- To avoid or, where avoidance is not possible, minimize adverse impacts on human health and the environment by avoiding or minimizing pollution directly arising from projects,
- To assist clients in identifying project-related opportunities for energy and resource efficiency improvements and waste reduction,
- To promote the reduction of project-related greenhouse gas emissions.

The objectives of the European Bank for Reconstruction and Development Performance Requirement (PR) 5 titled "Land Acquisition, Involuntary Resettlement and Economic Displacement"

- To avoid or, at least minimize, involuntary resettlement wherever feasible by exploring alternative project designs,

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- To mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land by: (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected,
- To improve or, at a minimum, restore the livelihoods and standards of living of displaced persons to pre-project levels, through measures that can be enterprise-based, wage-based and/or enterprise based, so as to facilitate sustainable improvements to their socio-economic status,
- To improve living conditions among displaced persons through provision of adequate housing with security of tenure at resettlement sites.

The objectives of the European Bank for Reconstruction and Development Performance Requirement (PR) 6 titled "Biodiversity Conservation and Sustainable Management of Living Natural Resources"

- To protect and conserve biodiversity,
- To avoid, minimize and mitigate impacts on biodiversity and offset significant residual impacts, where appropriate, with the aim of achieving no net loss or a net gain of biodiversity,
- To promote the sustainable management and use of natural resources,
- To provide for fair and equitable sharing of the benefits from project development and arising out of the utilization of genetic resources,
- To strengthen companies' license to operate, reputation and competitive advantage through best practice management of biodiversity as a business risk and opportunity,
- To foster the development of pro-biodiversity business that offers alternative livelihoods in place of unsustainable exploitation of the natural environment.

The objectives of the European Bank for Reconstruction and Development Performance Requirement (PR) 10 titled "Information Disclosure and Stakeholder Engagement"

- To identify people or communities that are or could be affected by the project, as well as other interested parties.
- To ensure that such stakeholders are appropriately engaged on environmental and social issues that could potentially affect them through a process of information disclosure and meaningful consultation.
- To maintain a constructive relationship with stakeholders on an ongoing basis through meaningful engagement during project implementation.

European Union Directives

The key European Union Directives related to the project are presented below:

Water Framework Directive 2000/60/EC

The Water Framework Directive (WFD) establishes an overarching legal framework for the management, protection and restoration of water across Europe to as to secure long term sustainable use. The WFD provides a framework for water management based on river basins and the natural geographical and hydrological units, and sets specific deadlines for Member States to protect aquatic ecosystems. The Directive addresses inland surface waters, transitional waters, coastal waters and groundwater and is supported by a number of daughter Directives that implement its requirements in specific areas.

- Groundwater Directive 2006/118/EC
- Environmental Quality Standards Directive 2008/105/EC
- Marine Strategy Framework Directive 2008/56/EC
- Floods Directive 2007/60/EC
- Bathing Water Directive 2006/7/EC
- Drinking Water Directive 98/83/EC as amended by Directive 2015/1787

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- Urban Waste Water Directive 91/271/EEC
- Nitrates Directive 91/676/EEC
- Priority Substances Directive 2013/39/EU
- Monitoring of Chemical Analysis and Water Status Directive 2009/90/EC
- Directive 2014/101/EU, amending 2000/60/EC
- Directive 2014/80/EU, amending 2006/118/EC
- Environmental quality standards directive in the field of water policy with no. 2008/105/EC amending the European Parliament and Council Directive with no. 2000/60/EC, amending the Council Directives with no. 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC and 86/280/EEC and subsequently repealing these directives,
- Protection of Groundwater against Pollution and Deterioration Directive 2006/118/EC
- Establishing a List of Priority Substances in the Field of Water Policy Decision 2455/2001/EC
- Criteria for Quality of Water Intended for Human Consumption Directive 98/83/EC
- Directive 2009/90/EC of Technical Specifications for Monitoring of Chemical Analysis and Water Status according to the European Parliament and of the Council Directive 2000/60/EC.
- Urban Waste-Water Treatment Directive 91/271/EEC
- Priority Substances in The Field Of Water Policy Directive 2013/39/EU
- Directive 166/2006 on Pollutant Release and Transfer Register and amending Council Directives 91/689/EEC
- Establishing a framework for Community action in the field of water policy Directive 2014/101/EU
- Protection of groundwater against pollution and deterioration Directive 2014/80
- Integrated Pollution Prevention and Control Directive 96/61/EC
- Protection of Groundwater Against Pollution Caused by Certain Dangerous Substances Directive 80/68/EEC

The following Directives do not directly relate to the WFD, but do have some aspects that relate to management of impacts on water quality:

- Waste Framework Directive 2008/98/EC
- Mining Waste Directive 2006/21/EC
- Landfill Directive 1999/31/EC
- Integrated Pollution Prevention and Control Directive 2008/1/EC
- EIA Directive 2011/92/EU, as amended by Directive 2014/52/EU

The provided list of EU legislation is not exhaustive but focusses on key elements. The project will follow all relevant current and future Turkish and EU legislation. Project Standards have been developed based on the more stringent standard of national Turkish Legislation or EU regulatory requirements or EBRD requirements where applicable.

International Convention and Treaties to which Turkey is a Signatory

Turkey has been involved as signatory of a number of international treaties and conventions that are related to water resource management, but not directly addressing water quality, and a convention that is directly related to surface water management is given below:

- Convention on Wetlands of International Importance (Ramsar Convention), (approved by Turkey in 1994).

International Guides

A list of drinking water chemical limit values is provided by the World Health Organization:

- Drinking water quality guidelines set by the World Health Organization (WHO, 2011).

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4.3 Water Monitoring Standards

The water monitoring standards used in the water quality monitoring works carried out under the project are given in the table below.

Table 1: Water Monitoring Standards

Parameter	American Standard
Standard Practice for Design and Installation of Groundwater Observation Wells	ASTM D5092
Development of Groundwater Monitoring Wells in Granular Aquifers	ASTM D5521
Packaging and Shipping Environmental Samples for Laboratory Analysis	ASTM D6911
Planning and Preparing for a Groundwater Sampling Event	ASTM D5903
Purging Methods for Wells Used in Groundwater Quality Investigations	ASTM D6452
Sampling Groundwater Monitoring Wells	ASTM D4448
Choice of Aquifer Test Method in Determination of Hydraulic Properties by Well Techniques	ASTM D4043
Instantaneous Change in Head (Slug) Test for Determining Hydraulic Properties of Aquifers (Field Study)	ASTM D4044

The drinking water standards used for drinking water supply of the personnel that will work during the mining activity and the discharge standards for wastewater are given below.

Table 2: Drinking Water Standards

Parameter	Unit	Turkish Standard	EU Standard	Project Standard
Aluminum (Al)	mg/l	-	0,2	0,2
Ammonium (NH ₄)	mg/l	-	0,5	0,5
Antimony (Sb)	mg/l	0,0005	0,005	0,0005
Acrylamide (C ₃ H ₅ NO)	mg/l	0,0001	-	0,0001
Arsenic (As)	mg/l	0,01	0,01	0,01
Barium (Ba)	mg/l	-	0,7	0,7
Beryllium (Be)	mg/l	-	0,0002	0,0002
Benzene (C ₆ H ₆)	mg/l	0,1	-	0,1
Benzopyrene (C ₂₀ H ₁₂)	µg/l	0,01	-	0,01
Boron (B)	mg/l	1,0	0,5	0,5
Bromate (BrO ₃)	µg/l	10	-	10
Cadmium (Cd)	mg/l	0,005	0,003	0,003
Calcium (Ca ²⁺)	mg/l	-	100	100
Chloride (Cl ⁻)	mg/l	-	250	250
Chlorine (Cl)	mg/l	-	5	5
Chromium (Cr)	mg/l	0,05	0,05	0,05
Copper (Cu)	mg/l	2	1	1
Cyanide (CN)	mg/l	0,05	0,01	0,01
1,2-Dichloromethane	µg/l	3	-	3
Fluoride (F ⁻)	mg/l	1,5	0,7 – 1,5	0,7
Hydrogen Sulfide (H ₂ S)	mg/l	-	0,1	0,1
Iodine (I)	mg/l	-	1,0	1,0
Iron (Fe)	mg/l	-	0,2	0,2

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Parameter	Unit	Turkish Standard	EU Standard	Project Standard
Lead (Pb)	mg/l	0,01	0,01	0,01
Magnesium (Mg ²⁺)	mg/l	-	30	30
Manganese (Mn)	mg/l	-	0,05	0,05
Mercury (Hg)	mg/l	0,001	0,0005	0,0005
Molibden (Mo)	mg/l	-	0,07	0,07
Nickel (Ni)	mg/l	0,02	0,02	0,02
Nitrate (NO ₃ ⁻)	mg/l	50	50	50
Nitrite (NO ₂ ⁻)	mg/l	0,5	1,0	0,5
Phosphate (PO ₄ ²⁺)	mg/l	-	3,5	3,5
Pesticide	µg/l	0,1	-	0,1
Total Pesticide	µg/l	0,5	-	0,5
Polycyclic Aromatic Hydrocarbons	µg/l	0,1	-	0,1
Selenium (Se)	mg/l	0,1	0,01	0,01
Silver (Ag)	mg/l	-	0,1	0,1
Sodium (Na)	mg/l	-	200	200
Sulfate (SO ₄ ²⁺)	mg/l	-	500	500
Strontium (Sr)	mg/l	-	2,0	2,0
Tetrachloroethane And Trichloroethane	µg/l	10	-	10
Trihalomethane - Total	µg/l	100	-	100
Vinyl Chloride (C ₂ H ₃ Cl)	µg/l	0,5	-	0,5
Uranium (U)	mg/l	-	0,015	0,015
Vinyl Chloride (C ₃ H ₃ Cl / H ₂ C)	mg/l	-	0,0003	0,0003
Zinc (Zn)	mg/l	-	5	5
Radiological Quality				
Total α Radioactivity	Bq/l	-	4	4
Total β Radioactivity	Bq/l	-	1	1

Notes:

In the table upper limits are given as long as it is not specified as an interspace or lower limit.

EU Standard is an EU Directive no. 98/83/EC.

EU standard for radioactivity described as Tritium 100 Bq/l with a total indication dose of 0,1 mSv/year.

The discharge of water from mining operations is covered by a number of EU Directives. The discharge of cyanide is specifically regulated by the Mining Waste Directive 2004/35/EC, which sets a limit of 10 ppm of “weak acid dissociable cyanide at the point of discharge of the tailings from the process plant into the pond”. All other substances are regulated by the Water Framework Directive and the Groundwater Directive. For groundwater this requires a “prohibition of direct discharges of pollutants into groundwater”, subject to certain exemptions (2000/60/EC) and an absolute prohibition on indirect discharges of hazardous substances. For surface water there is a requirement to cease or phase out emissions of hazardous substances and discharge limits are set based on back calculation using the Environmental Quality Standards (2008/105/EC) and Drinking Water Standards (DWS), depending on the type of receiving water body. These surface water discharge limits are determined on a site/discharge specific basis and may include for mixing (2008/105/EC) in the receiving water body. The project will follow all relevant current and future Turkish and EU legislation. Trigger limits for Kovanlık Stream have been developed based on the exiting baseline water quality of the receptors. Where there is no defined trigger limit for a receptor, the average baseline reference values observed in receptors will be used to define the trigger levels. If the contact water discharge (even though the discharge water quality is within the discharge limits) deteriorate the reference baseline water quality of the receptors, the contact water discharge standards presented in table below will be revised per EU standards.

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Table 3: Standards for Discharge of Waste Water to Receiving Environment

Parameter	Units	RWQC 7.1	IFC Standards	Project Standards
pH		6 - 9	6 - 9	6 - 9
Total Suspended Solids	mg/l	60	50	50
COD	mg/l	50	150	50
BOD5	mg/l		50	45
Oil and Grease	mg/l		10	10
Arsenic (As)	mg/l		0.1	0.1
Cadmium (Cd)	mg/l	0.2	0.05	0.05
Chromium (Cr)	mg/l	1	0.1	0.1
Copper (Cu)	mg/l	3	0.3	0.3
Cyanide	mg/l	0.1	1	<0.01**
Cyanide WAD	mg/l		0.5	<0.01**
Cyanide Free	mg/l		0.1	<0.01**
Iron (Fe)	mg/l	3	2	2
Lead (Pb)	mg/l	0.5	0.2	0.2
Mercury (Hg)	mg/l	0.05	0.002	0.002
Nickel (Ni)	mg/l		0.5	0.5
Selenium (Se)	mg/l		0.1*	0.1
Phenols	mg/l		0.5	0.5
Zinc (Zn)	mg/l	3	0.5	0.5

RWQC Table 7.1 Regulation on Water Quality Control Table 7.1

IFC: International Finance Corporation

*: Based on Former IFC General Environmental Guidelines published on 1998

**Cyanide will not be discharged to the receiving environment

Table 4: Discharge Standards for Domestic Wastewater

Parameter	Unit	Composite sample(2 hours)	Composite sample (24 hours)	91/271/EEC Limits*
Biochemical Oxygen Demand (BOD5)	(mg/L)	50	45	25
Chemical Oxygen Demand (COD)	(mg/L)	180	120	125
Suspended Solid(SS)	(mg/L)	70	45	35
pH	-	6-9	6-9	6-9

Discharge standards are based on RWQC Table 21.1. Discharge Standards for Domestic Wastewater, 91/271/EEC Limits* will be met in case of adverse environmental impacts are observed during monitoring

Turkish Water Pollution Control Regulation classifies the inland water resources (ambient water). The surface water resources are classified into four classes based on these limits. Guidelines of the classes according to the water types are as follows:

- I. Class I, high quality water
- II. Class II, Slightly contaminated water
- III. Class III, Contaminated water
- IV. Class IV, highly contaminated water.

The limits are provided in the following table. The color scheme is also used in the tables reporting surface water quality values in the related sections in this report.

Table 5: Water Quality Limits According to Turkish Water Pollution Control Regulation

	Water Quality Classification			
Water Quality Parameters	I	II	III	IV
Parameters Names				
Temperature (°C)	≤ 25	≤ 25	≤ 30	> 30
pH	6.5-8.5	6.5-8.5	6.0-9.0	Outside of 6,0-9,0
Conductivity (µS/cm)	< 400	400-1000	1001-3000	> 3000
Color	RES 436 nm: ≤1.5	RES 436 nm: 3	RES 436 nm: 4.3	RES 436 nm: >4.3
	RES 525 nm: ≤1.2	RES 525 nm: 2.4	RES 525 nm: 3.7	RES 525 nm: >3.7
	RES 620 nm: ≤0.8	RES 620 nm: 1.7	RES 620 nm: 2.5	RES 620 nm: >2.5
Oil and grease	Must be free from floating liquid materials like oil, tar, and garbage and similar solid materials and foam.			-
(A) Oxygenation Parameters				
Dissolved oxygen (mg O ₂ /L) ^a	> 8	8.0-6.0	6.0-3.0	< 3
Oxygen saturation (%) ^a	>90	70-90	40-70	< 40
Chemical oxygen demand (COD) (mg/L)	< 25	25-50	50-70	> 70
Biological oxygen demand (BOI ₅) (mg/L)	< 4	4.0-8.0	8.0-20	> 20
(B) Nutrient (Nutrient Elements) Parameters				
Ammonium nitrogen (mg NH ₄ ⁺ -N/L)	< 0,2 ^b	0,2-1 ^b	1-2 ^b	> 2
Nitrite nitrogen (mg NO ₂ ⁻ -N/L)	< 0.01	0.01-0.06	0.06-0.12	> 0.3
Nitrate nitrogen (mg NO ₃ ⁻ -N/L)	< 5	5.0-10	10.0-20	> 20
Total kjeldahl-nitrogen (mg/L)	0.5	1.5	5	> 5
Total phosphor (mg P/L)	< 0.03	0.03-0.16	0.16-0.65	> 0.65
(C) Trace Elements (Metals)				
Aluminium (mg Al/L)	<0,3	<0,3	0.3-1	>1
Arsenic (µg As/L)	≤20	20-50	100	>100
Copper (µg Cu/L)	≤20	20-50	50-200	> 200
Barium (µg Ba/L)	<1000	1000-2000	1000-2000	>2000
Boron (µg B/L)	≤1000	≤1000	≤1000	>1000
Mercury (µg Hg/L)	< 0.1	0.1-0.5	0.5-2	> 2
Zinc (µg Zn/L)	≤200	200-500	500-2000	> 2000
Iron (µg Fe/L)	≤300	300-1000	1000-5000	>5000
Fluoride (µg Fe/L)	≤1000	1000-1500	1500-2000	>2000
Cadmium (µg Cd/L)	≤ 2	2.0-5.0	5.0-7.0	> 7
Chloride (mg Cl/L)	<25	25-200	200-400	>400
Cobalt (µg Co/L)	<10	44105	20-200	>200
Chromium (µg Cr+6/L)	So slight to measure	<20	20-50	> 50
Chromium (total) (µg Cr/L)	≤20	20-50	50-200	>200
Lead (µg Pb/L)	≤10	10.0-20	20-50	> 50
Manganese (µg Mn/L)	≤100	100-500	500-3000	>3000
Nickel (µg Ni/L)	≤20	20-50	50-200	> 200
Selenium (µg Se/L)	≤10	≤10	Eki.20	>20
Cyanide (total) (µg Cr/L)	≤10	50	100	>100

Sulphate (mg SO ₄ /L)	<200	<200	200-400	>400
(D) Bacteriological Parameters				
Fecal Coliform (EMS/100 mL)	≤10	10-200	200-2000	> 2000
Total Coliform (EMS/100 mL)	≤100	100-20000	20000-100000	> 100000

Table 6: Water Quality Limits According to Turkish Water Pollution Control Regulation (New – Updated Limits)

Water Quality Parameters	Water Quality Classification			
	I	II	III	IV
Color	RES 436 nm: ≤1.5	RES 436 nm: 3	RES 436 nm: 4.3	RES 436 nm: >4.3
	RES 525 nm: ≤1.2	RES 525 nm: 2.4	RES 525 nm: 3.7	RES 525 nm: >3.7
	RES 620 nm: ≤0.8	RES 620 nm: 1.7	RES 620 nm: 2.5	RES 620 nm: >2.5
pH	6-9	6-9	6-9	6-9
Conductivity (µS/cm)	< 400	1000	3000	> 3000
Oil and grease (mg/L)	< 0.2	0.3	0.5	>0.5
Oxygen saturation (mg/L)	>8	6	3	<3
Chemical oxygen demand (COD) (mg/L)	< 25	50	70	> 70
Biological oxygen demand (BOİ5) (mg/L)	< 4	8	20	> 20
Ammonium nitrogen (mg NH ₄ ⁺ -N/L)	< 0,2	1	2	> 2
Nitrate nitrogen (mg NO ₃ ⁻ -N/L)	< 3	10	20	> 20
Total kjeldahl-nitrogen azot (mg/L)	0.5	1.5	5	> 5
total nitrogen (mg N/L) ^c	<3.5	11.5	25	>25
orthophosphate phosphor (mg o-PO ₄ -P/L)	<0.05	0.16	0.65	>0.65
total phosphor (mg P/L)	<0.08	0.2	0.8	>0.8
fluoride (µg/L)	≤1000	1500	2000	>2000
Manganese (µg/L)	≤100	500	3000	>3000
Selenium (µg/L)	≤10	15	20	>20
Sulfur (µg/L)	≤2	5	10	>10

The expected contact water quality of the Project and the trigger limits set for the Kovanlık Stream is presented in the table below. Where there is no defined trigger limit for a given parameter or if trigger limits have not been defined for a receptor, the average reference values observed in receptors will be used to define the trigger limits.

Table 7: Kovanlık Stream baseline parameters, expected contact water quality at the main settling pond and the trigger limits for the Kovanlık Stream.

	Water Quality Classification				BASELINE			Expected Contact Water Quality - Settling Pond	Trigger Limits for Kovanlık Stream
Water Quality Parameters	I	II	III	IV	Kovanlık Stream				
					Spring 2015	Autumn 2015	Winter 2016		
pH	6.5-8.5	6.5-8.5	6.0-9.0	Outside of 6,0-9,0	7.72	7.86	7.74	7.22	6.5-8.5
Arsenic (µg As/L)	≤20	20-50	100	> 100	<5	<5	<5	20	20
Cadmium (µg Cd/L)	≤ 2	2.0-5.0	5.0-7.0	> 7	<0,4	<0,4	<0,4	0.1	2
Chromium (total) (µg Cr/L)	≤20	20-50	50-200	> 200	<1	<1	<1	0.5	20
Copper (µg Cu/L)	≤20	20-50	50-200	> 200	<1	<1	1.13	3.5	20
Iron (µg Fe/L)	≤300	300-1000	1000-5000	> 5000	2.9	<2	<2	3.3	300
Lead (µg Pb/L)	≤10	10.0-20	20-50	> 50	<5	<5	<5	0.2	10
Manganese (µg Mn/L)	≤100	100-500	500-3000	> 3000	6.89	0.9	2.45	868	500
Mercury (µg Hg/L)	<0.1	0.1-0.5	0.5-2	> 2	<0,01	<0,01	<0,01	0.1	0.1
Nickel (µg Ni/L)	≤20	20-50	50-200	> 200	<2	<2	<2	14.4	20
Selenium (µg Se/L)	≤10	≤10	10-20	> 20	<10	<10	<10	17.8	10
Sulfate (mg SO4/L)	<200	<200	200-400	> 400	71.9	86.1	54.3	315	200
Zinc (µg Zn/L)	≤200	200-500	500-2000	> 2000	<2	<2	<2	29.6	200
Cyanide (total) (µg Cr/L)	≤10	50	100	> 100	<5	<5	<5	na	<10

4.4 Company Undertakings and Requirements of Undertakings

In the scope of the Water Sources Management;

- The Material Safety Data Sheets (MSDS) the materials to be used will be kept available within the scope of operation activities and handling, storage on site and use of them will be carried in accordance with the provisions stated in these data sheets. In addition, within the scope of the project, the works will be performed in compliance with the International Cyanide Management Institute (ICMI), International Cyanide Management Code (Cyanide Code).
- No effect of the plant is expected on the underground and surface water resources. In addition, in order to protect the water quality of the receiving waters after discharge, the provisions of the "Surface Water Quality Management Regulation" no. 28483, dated 11.30.2012, "Law on Ground Waters" no. 10688, dated 12.23.1960, with decision number 167, "Regulation on the Protection of Ground Waters against Pollution and Deterioration" no. 28257, dated 04.07.20012 and "Water Pollution Control Regulation" no. 25687, dated 12.31.2004 (Amended; O.G. dated 03.25.2012 with No 28244) entered into force through publication in the Official Gazette will be followed.
- Any unpredicted impacts that might influence on users of the local water resources in case of water quality degradation or quantity reduction due to the mining activities will be compensated by TÜMAD.

The summary of the water management approach is as follows:

- Minimise erosion of disturbed areas and minimise suspended sediment flow to streams.
- Separate contact and non-contact water as much as applicable,
- Divert the non-contact water and discharge to receiving environment to minimize hydrologic impacts
- Do not abstract groundwater from the wells located in the close vicinity of the Project site except emergency situations,
- Provide water to nearby villages in order to replace their water sources that will be lost during the mining operation
- Collect open pit runoff water to ponds and collection sumps
- Collect WRD runoff and seepage water to contact water ponds
- Collect DTSF runoff and seepage water to contact water ponds
- Use the captured contact water in the processing plant or discharge if it meets the Project discharge standards
- Encapsulate the PAG rock with NAG rock within the WRD
- Cover the sulfide zones within the pit with NAG rock during closure
- Conduct monitoring and update the plans and mitigations if necessary
- Cap the facilities with suitable cover systems and conduct rehabilitation

4.5 TÜMAD Policies, Procedures and Instructions

TÜMAD has adopted the policy of evaluating environmental impact of mining activities and prevent any negative impact on the environment by applying necessary precautions and monitoring procedures for the purpose of eliminating or minimizing negative environmental impact. Relevant Management Plans are given in Section 3.1.

Assistance from independent and accredited institutions will be received for monitoring monthly periods in order to record and report data according to the monitoring schedule identified in the scope of the monitoring program described in the procedure on Measuring and Monitoring Environmental Activities.

5 ROLES AND RESPONSIBILITIES

The table below lists the main powers and responsibilities regarding execution of the Water Sources Management Plan.

Table 8: 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 for works to be performed according to the Water Sources Management Plan and related procedures, • Ensuring the monitoring, measuring and reporting of the Water Sources Management Plan as defined in related procedures and directives, • Ensuring that the plan is accessible to employees of TÜMAD and also to employees of subcontractors, • Controlling the efficiency of this management plan through periodical inspection of all activity areas of both TÜMAD and subcontractors, • Reporting all hazards, non-compliances and incidents, • Investigation and implementation of pollution prevention and control measures to mitigate impacts on surface and groundwater quality.

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Operating Manager Subcontractor Managers	<ul style="list-style-type: none"> Ensuring that all activities of TÜMAD are performed in compliance with the Water Sources Management Plan, related procedures and directives, Ensuring the reporting of all hazards, non-compliances and incidents, Ensuring that training is given by Department Managers to personnel that will work in activities that might cause water pollution,
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,
General Stuff	<ul style="list-style-type: none"> Use natural resources efficiently and to reduce consumption Follow the water resource management plan and report any non-compliance to environmental department

6 MITIGATION MEASURES AND MANAGEMENT CONTROLS

The main purpose of the Water Sources Management Plan is to minimize negative impacts on quality of groundwater, surface water, and drinking water sources located within the area of impact of activities. Determining potential impacts on resources within the framework of Water Sources Management Plan, evaluating potential impacts based on their importance and taking and developing necessary precautionary steps in the scope of this plan.

The Water Resources Management Plan will be supported by Procedures and Instructions which contain all details regarding potential pollution effects of activities of TÜMAD Madencilik Sanayi ve Ticaret A.Ş. and monitoring of these effects.

- The Procedure on Measuring and Monitoring Environmental Activities, (TMD_LAP_CEV_PRD.006)
- Environmental Monitoring and Measuring Plan
- Water Quality Monitoring Table

Revisions, standard alterations etc. made on activity scopes in order to support the Water Sources Management Plan will be assessed and improved by Procedures and Instructions.

Table 9: Management Controls

Activity	Control	Responsibility	Verification Tools
Water Quality Monitoring	Allows early detection of potential hazards and water quality values in the scope of water quality monitoring that will be conducted by TÜMAD	Environment Department	Water Quality Monitoring Data
Environmental Aspects	Determining and improving environmental aspects in order to determine health and environmental hazards (and disturbance) created due to plant operations. Sorting identified risks based on their priorities by assessing documented environmental aspects of Water Sources pollution controls and reduction targets and related risks.	Environment Department	Determining Environmental Aspects Site Inspection Review of Monitoring Results
Impact Control	Below are certain controls which have been identified as impact reducers in the EIA Report and within the framework of Legal responsibilities: During the Construction Period; <ul style="list-style-type: none"> Raw water will be used by personnel and for the purpose of dust suppression. Raw water that will be utilized during the construction 	Operating Manager Machinery Maintenance Department Environment Department,	Material Equipment Characteristics TÜMAD. Procedures and Instructions Site Inspection

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Activity	Control	Responsibility	Verification Tools
	<p>phase will be supplied from wells that have been certified by the State Hydraulic Works. Wells will be monitored regularly to avoid impacts to aquifers.</p> <p>The water at the project site will be classified into non-contact and contact water. Diversion channels will discharge non-contact water back into the natural drainage.</p> <ul style="list-style-type: none"> Work areas will be equipped with appropriate drainage systems to minimize the amount of surface flow and contact water development. Temporary settling ponds will also be installed downstream of work areas in order to capture surface water run-off and allow sedimentation to settle-out prior to being released into the environment or the contact water will be re-used for dust suppression. Implementation of pollution prevention and control measures will mitigate impacts on surface and groundwater quality in relation to contamination from accidental spills. Immediate remedial action in the event that there is a spill will prevent the contaminants from entering watercourses and seeping into the groundwater. In such events, immediate remedial actions will be taken within the frameworks of Hazardous Materials Management Plan and Emergency Response Plan. Şahinli Catchment and associated springs will be lost during the construction stage of the Project. TÜMAD developed a better quality and quantity water supply source to Şahinli village to replace the catchment during the life of the operation. Kocabaşlar catchment is located out of the EIA boundary and will not be affected from construction activities. TÜMAD will provide drinking water to Kocabaşlar Village from another source if the catchment is affected Groundwater will not be used for project water supply purposes. Project water will be supplied from Lapseki water transmission pipeline which is located around 10km's away from the Project area. Construction water requirement will be supplied from the Lapseki source or from the contact water collected in the sedimentation ponds. <p>During the Operation Period;</p> <ul style="list-style-type: none"> 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 	Occupational Health and Safety Department, Sub subcontractors,	Review of Monitoring Results

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Activity	Control	Responsibility	Verification Tools
	<p>sources that would be impacted from the mining operation.</p> <ul style="list-style-type: none"> Three staged diversion and drainage channels were designed according to the annual mine development plan. Between years 5-10 of the operation 49% of the surface water of the project area will be collected as contact water and 51% will be released to environment as non-contact water Kovanlıkdere stream will be the main discharge point for contact and non-contact water. Collected contact water will be pumped back to the Processing facility for re-use or will be discharged. The overall surface water quantity reduction in the project site micro-basins will be around 50% (assuming no discharge). A weir will be installed to Kovanlıkdere to obtain continuous flow measurements to monitor flow reductions Limit non-contact water contacting with WRD, DTSF and Pits by diversion channels. Collect run-off water from WRD and DTSF by interception channels and collect in the contact water ponds lined with geomembrane. Direct precipitation runoff from Pit walls and groundwater inflows will report to a collection sump and returned for re-use in the operation. Periodic water quality monitoring at the downstream of the streams and the receptors. If significant changes to water chemistry are identified, investigate appropriate mitigations. The Lapseki project is defined as a low sulfidation gold deposit and the ARD potential is low according to the conducted testing and modeling studies. The ARD and ML will be mitigated during operation by encapsulation of the PAG rock within the WRD, collection of contact water and covering the sulfur zone rocks on the pit walls. The collected contact water will be monitored on a regular basis. The water quality estimates indicate that the quality of the contact water will meet the project discharge standards and will not cause adverse impacts on the environment. However the ARD/ML 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, or cause quality changes in the environmental receptors, the contact water will be used in the process and contact water treatment options will be evaluated and implemented depending on the parameters causing environmental impacts. 		
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Activity	Control	Responsibility	Verification Tools
	<ul style="list-style-type: none"> 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. 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 Şahinli Catchment and associated springs will be lost during the construction stage of the Project. TÜMAD developed a better quality and quantity water supply source to Şahinli village to replace the catchment during the life of the operation. ATK catchment is used by Şahinli village and an alternative has already been provided by TÜMAD. Continuous water level monitoring program at the observation wells to monitor the progress of the cone of depression. Monthly flow monitoring program at the fountains and springs used by the villagers. Water required by the process will be obtained with maximum recycling of water, Precautions regarding protecting surface and groundwater quality will be taken. The interception channel will be used to protect and collect storm waters coming to the region and the drainage channels will be used to protect groundwater; and precipitation falling on the units (contact water) will be collected to be used in the plant or will be discharged to Kovalık Stream in accordance with the project discharge standards. Where there is no defined trigger limit for a given parameter for a receptor, the average reference values observed in receptors will be used to define the trigger levels. The contact water quality will be monitored on a regular basis and further mitigation measures including design or management approach changes or construction of a contact water treatment plant will be evaluated and conducted if the contact water quality exceeds the discharge standards, groundwater or surface water receptors water quality exceeds trigger limits or contact water discharge or the project impacts deteriorate the reference baseline water quality of the receptors. If the contact water discharge (even though the discharge water quality is within the 		

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Activity	Control	Responsibility	Verification Tools
	<p>discharge limits) deteriorate the reference baseline water quality of the receptors, the contact water discharge standards presented in Table 3 will be revised per EU standards.</p> <ul style="list-style-type: none"> Domestic Waste water discharges will not be made to the receiving environment without being treated, either directly or indirectly. If the domestic water discharge create adverse environmental impacts, the treatment plan will be modified to meet 91/271/EEC Limits. 		

6.1 Water Sources of Lapseki Gold Mine

There are unused water sources in TÜMAD's Gold Mine, which are qualified as waste resulting from mining activities. The purpose of water management at the mine site is to manage efficient water use and preserve water quality.

Water sources at the Lapseki Gold Mine site are as below;

- Raw Water
- Process Water
- Other Water Sources
 - * Ore Moisture
 - * Rain Water
 - * Water from Chemicals
 - * Water from open pits
 - * Personnel Based Waters
- Underground Observation Wells
- Raw Water gained from Lapseki Municipality, Underground Water Wells

6.1.1 Raw Water

The Project require approximately 8-10 lt/s raw water, which will be supplied from Lapseki water transmission pipeline (per the Protocol signed between TÜMAD and Lapseki Municipality, from groundwater wells owned by Lapseki Municipality and certified by DSI (State Hydraulic Works)). Raw water collected from the pipeline will be pumped into the raw water tank, after which the water will be distributed among necessary units. Below are the units that consume raw water at the plant,

- The Crushing Unit
- The Desorption Unit (throughout desorption and during carbon transfer)
- Flocculant preparation.
- Mill bed waters
- Pump seal waters

6.1.2 Process Water

Process water sources, condensing overflow water, Filter Press and Solid Waste Storage are waters that are pumped back and distributed from tanks among necessary units. Areas in which process water is utilized;

- Ball mill exit trommel spray
- Cyclone feed
- Cyanide preparation

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- Washing areas hedged with concrete
- Sieve sprays

Process water will be re-used in the system and will not be discharged to the environment. The system is designed as a zero discharge system and the amount of water within the system will be ensured to be preserved so that any lack of water asides from evaporation will be detected.

6.1.3 Other Water Sources

In addition to raw water and process water, the plant also contains waters flowing into the plant naturally.

Some of other uses are quite low in terms of volume but they mix with other waters utilized at the plant and change water volumes. Other waters can be summarized as below.

- Moisture found inside ore
- Rainfall and surface water flow at the plant
- Open Pit Waters
- Metabisulfite and acid solutions
- Personnel Based Waters
- Ore Moisture

Laboratory analyses project the amount of moisture inside ore to be 1 m³/hour.

6.1.4 Contact and Non-Contact Water

Surface water not touching the project facilities will be collected as non-contact water by interception channels and will be discharged to Kovanlık stream. Surface run-off due to rainfall on open pit walls will be collected at the ponds/sumps that will be excavated at the lowest elevation of the pits together with the groundwater seeping through the pit walls; water accumulated in the sumps will be used for dust suppression and road spraying within the pits and/or will be pumped to contact water collection ponds.

Waste rock dump seepage and run-off water will be collected in the contact water collection pond and will be re-used in the process or will be discharged to Kovanlık Stream after meeting the project discharge standards. An underdrain system will be constructed and connected to the contact water collection pond to capture the seepage water. The capacity of the main settling pond (contact water collection pond) to be constructed at the downstream of the waste rock dump is 60,000 m³. The locations of the waste area, interception channels and settling pond are shown in Figure-2. The contact water collected within the pit sumps will also be pumped back to the main settling pond (contact water collection pond). DTSF will have a separate contact water collection pond. Contact water from the DTSF will be re-used in the project. If it meets the project discharge standards, the DTSF contact water will be pumped to the WRD contact water collection pond and will be discharged to Kovanlık stream. The contact water quality will be monitored on a regular basis and further mitigation measures including design or management approach changes or construction of a contact water treatment plant will be evaluated if the contact water quality exceeds the discharge standards or deteriorate the reference baseline water quality of the receptors.

Interception and diversion channels have been designed at 3 stages. Final approval with regard to the mentioned designs by 25th Regional Directorate of State Hydraulic Works has been provided in 2017. Designs of the interception channels have been calculated by using the 1/500-year storm event based the opinion of the Directorate General of State Hydraulic Works (DSI). All water collected through interception channels has been designed to be discharged to the downstream of the project site, to the Kovanlık stream. Diversion channels have been designed to keep the stream interrupted by the mining areas away from the mine field. These diversion channels in the project site are designed to be wider than the existing seasonal stream beds in order to ensure that they do not overflow in possible extreme rainfalls. Their sizes are conservatively designed to handle extreme rainfall events that is observed once in a 500 years. Figure 1 presents the water management flowchart for the three stages of the project.

6.1.5 Water from chemicals

They are used as sodium metabisulfite (30% solution), sodium hydroxide (50% solution) and hydrochloric acid (32% solution) during activities, water flows from these solutions into process water at a rate of approximately 0.16 m³/hour.

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6.1.6 Open Pit Based waters

During rainy seasons, surface water inside the open pit accumulates inside basins/ponds/sumps built at the lowest elevation of the pit and it will send to sedimentation/contact water collection pond and these water discharged to receiving in the consideration of environmental project standards. If the contact water quality does not meet the discharge standards, or cause quality changes in the environmental receptors, the contact water will be used in the process and contact water treatment options will be evaluated and implemented depending on the parameters causing environmental impacts. 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. This accumulated water will also be used for dust suppression and road spraying within the pits.

6.1.7 Personnel based Waters

Employees at the mine consume water at a rate of approximately 0,213m³/day per person. Domestic wastewater will be treated with biological treatment process in accordance with the discharge standards defined in Table-4 Standards for Discharge Standards for Domestic Wastewater. It will then be discharged to the receiving environment in accordance with project standards. Alternatively, it is used in dust suppression and road spraying.

6.1.8 Groundwater Observation Wells

There are eight DSI certified groundwater production wells together with other groundwater monitoring wells drilled at the downstream of the solid waste storage area. Groundwater abstraction from the wells will only be conducted in case of an emergency situation. Groundwater wells will be monitored on a regular basis and will be replaced or deepened if the wells are lost during the mining operation to allow continuous monitoring during and after operation.

6.1.9 Water Wells of Lapseki Municipality and Lapseki Water Transmission Pipeline

TÜMAD has signed a water supply agreement with the Municipality of Lapseki to use the water from the Lapseki Municipality wells. The owner of the wells is the Lapseki Municipality, the agreement is for ten years and TÜMAD will pay annual fees to the Municipality and will be responsible with the maintenance and operation costs of the wells, pumps and the Lapseki pipeline. Lapseki Municipality owns four water supply wells and water usage permits provided by DSI. The total yield of the four wells assessed and approved by DSI is 55 l/sec. DSI allocated drinking water to Lapseki Municipality from Bayramdere Dam so the wells are no longer required by the Lapseki Municipality. TÜMAD will use the water from Lapseki wells for project water supply and to provide drinking water to Şahinli and Kocabaşlar Villages to meet the village water requirements. In this context, the construction of 10.12 km Lapseki (main pipeline) has been completed by TÜMAD. Approximately 10 l/s will be used for the process water supply and 2 l/s will serve the Villages of Şahinli and Kocabaşlar. The remaining capacity would be used in case of increasing water demands in the future. TÜMAD will operate the Lapseki pipeline during the operation period of the Project. 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.

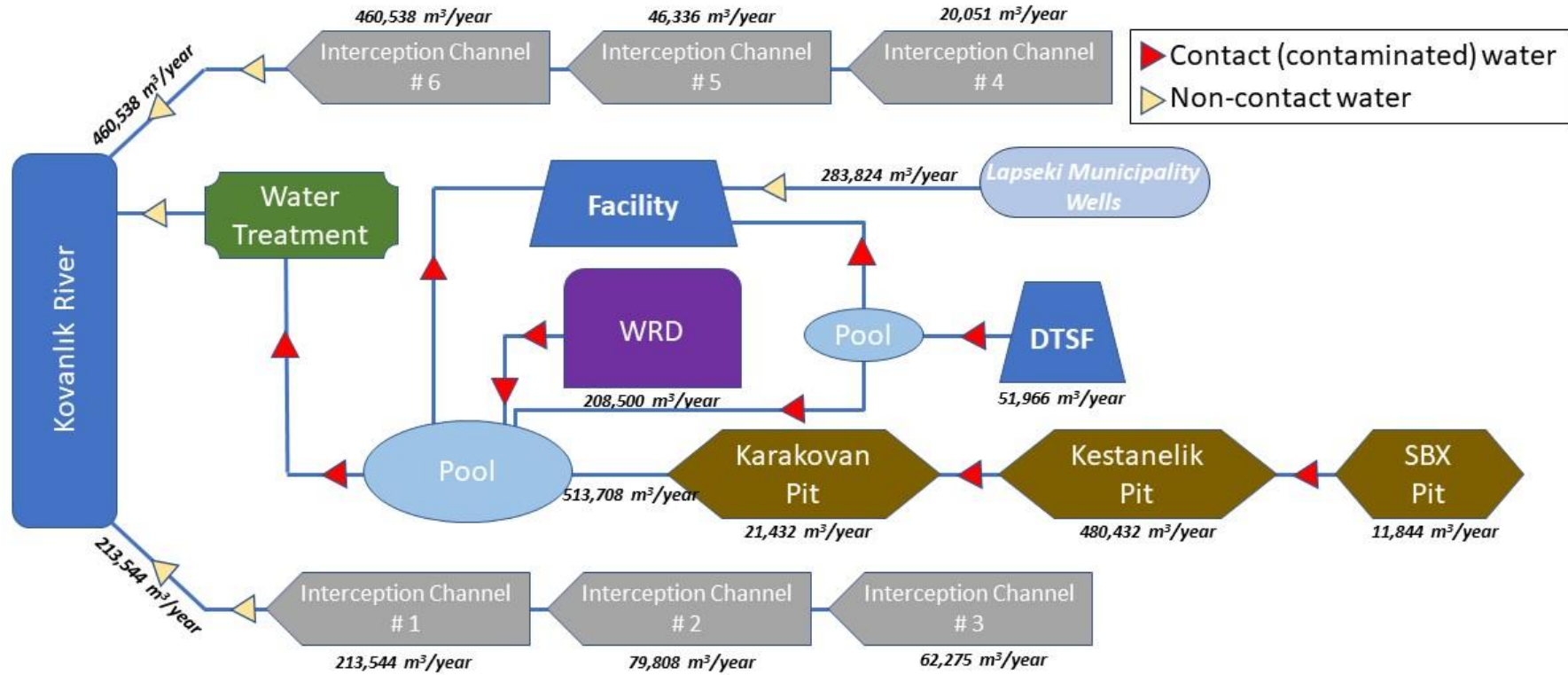
6.1.10 Village Water Supply Pipelines

TÜMAD completed the construction of 22.48 km Şahinli water distribution pipeline. The Şahinli pipeline has gravitational flow and is considered as an alternative water source for the Şahinli village. There are other gravitational pipelines transmitting water to the villages. The water transmitted via the Kızılcapınar, Kovanlık and Alanpınar water distribution pipelines are collected in Şahinli water depot to provide water to the Şahinli village. In addition, Çırpılık water distribution pipeline will be constructed by TÜMAD to supply water to the Kocabaşlar village.

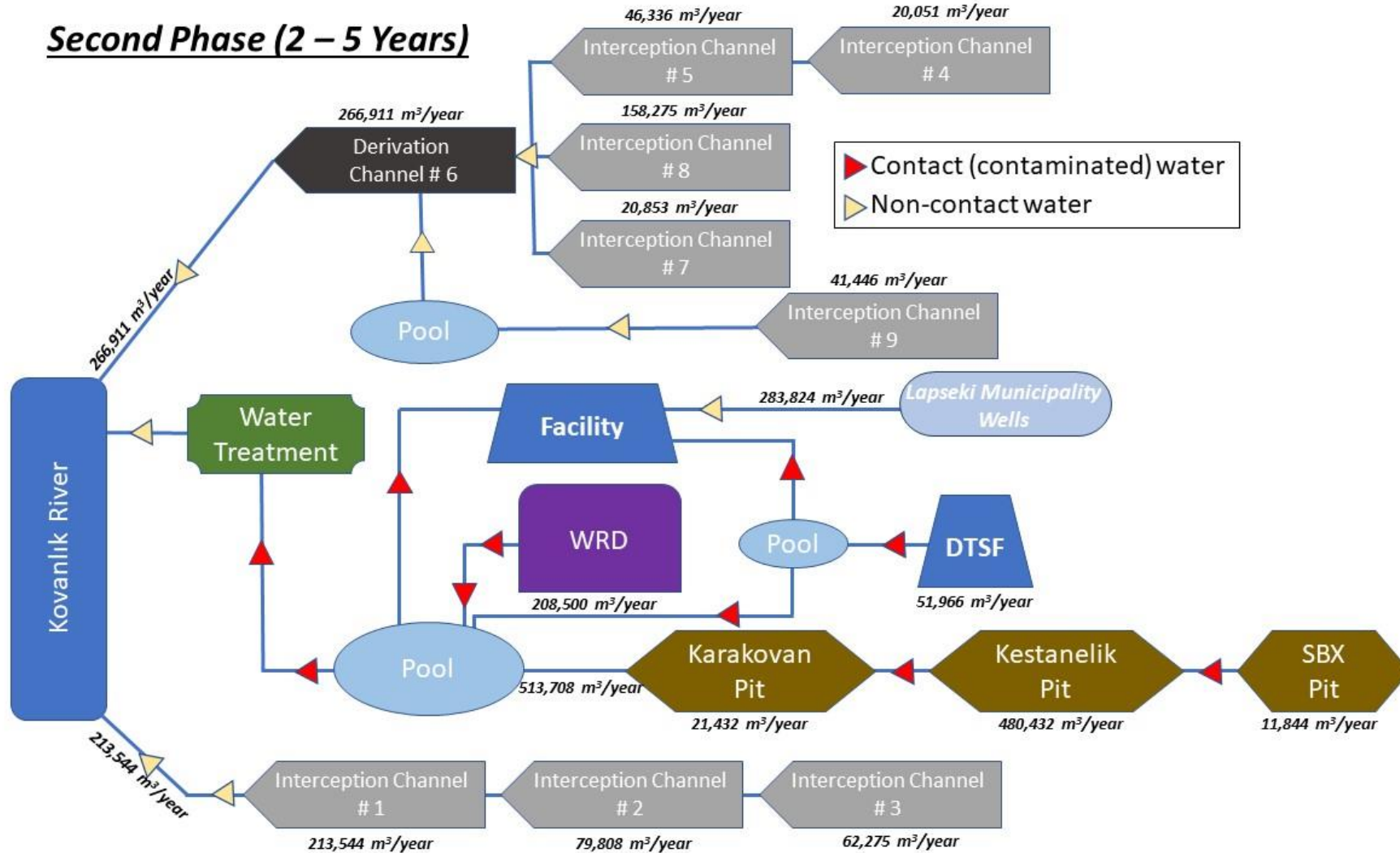
Planned contact and non-contact water management flow charts along with the annual water budget estimations were prepared and shown in the figures below.

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First Phase (0 – 2 Years)



Second Phase (2 – 5 Years)



Third Phase (5 – 10 Years)

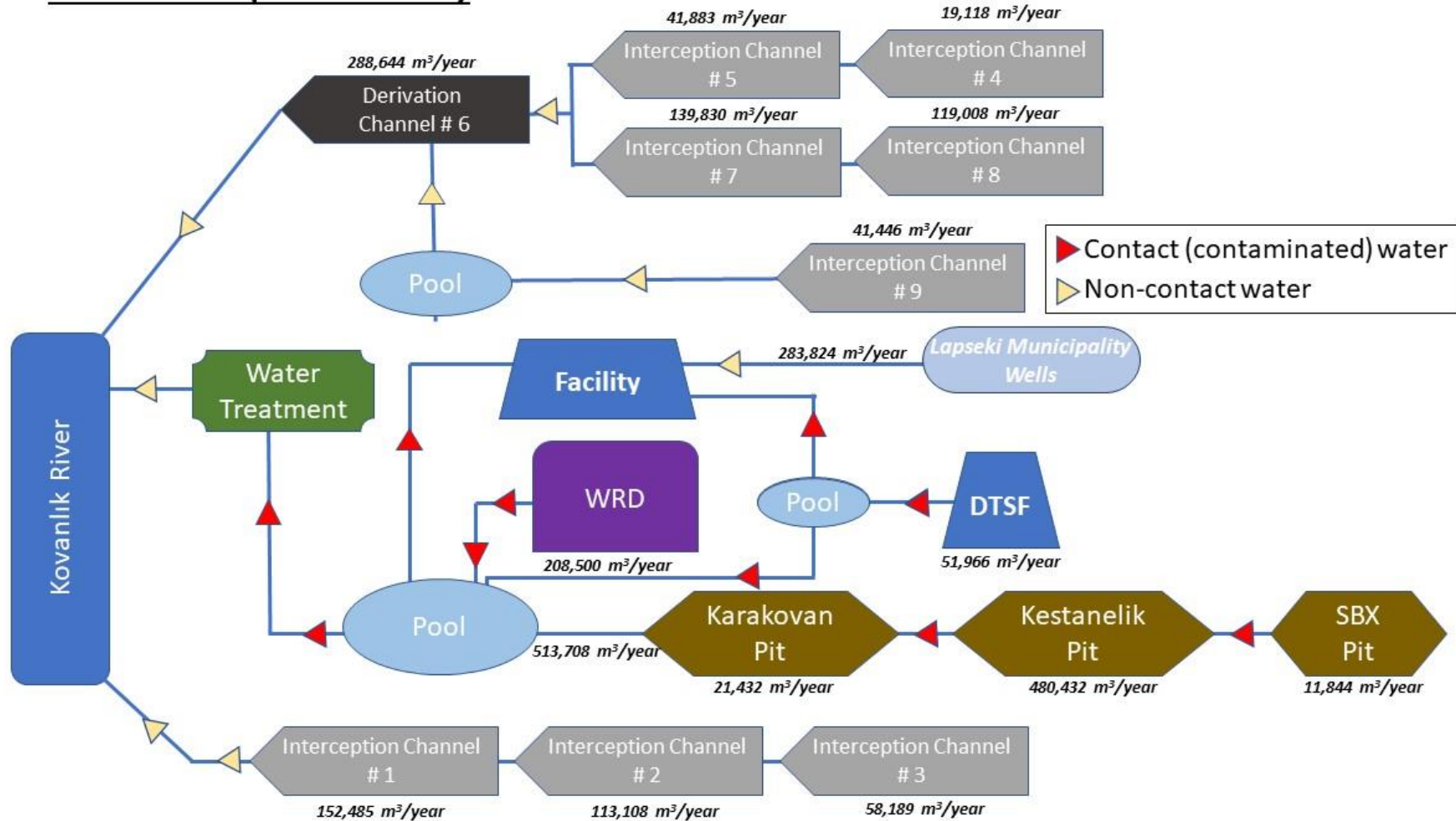


Figure 1: Water Management Plan

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6.2 Implementation Schedule

6.2.1 Revision of the Water Sources Management Plan

This management plan will monitor construction and operation phases of TÜMAD in periods of six months in order to determine stability. In addition, legal responsibilities and changes in Instructions and Procedures of TÜMAD will be reviewed and updated in one year periods.

In case of a revision on the Water Sources Management Plan, the up-to-date version will be delivered to all TÜMAD employees and subcontractors.

7 MONITORING

7.1.1 Overview

Monitoring and measurement activities which will be carried out in the scope of international standards and guides in the scope of TÜMAD activities have been defined in the Water Sources Management Plan and related Procedures and Instructions. This plan also includes corrective and preventive measures which will be taken in case of nonconformity. In case of observation of adverse impacts on groundwater and surface water quality and quantity further investigation and implementation of pollution prevention and control measures to mitigate impacts on surface and groundwater quality will be conducted.

7.1.2 Monitoring Activities

Monitoring undertakings stated in the EIA Report, monitoring due to legal requirements, and monitoring and measurement requirements in the scope of the Integrated Management System are listed in the table below.

After the operation, monitoring schedule will be conducted quarterly for the first 5 years, then once in a six month for the next five years and annually for the final five years after the operation. So that the monitoring will be continued for 15 years after the operation in accordance with the monitoring schedule defined by the Ministry of Environment and Urbanization during the EIA process.

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Table 10: Monitoring Parameters during operation

No	Activity	Period	Standard/Statute	Location
WRM-LAP-01	Surface Water Quality and Quantity	Monthly	Undertaking Requirement & Regulation on Surface Water Quality Management	Surface Water Sources within Area of Impact of the Plant
WRM-LAP-02	Underground Water Quality	Monthly	Undertaking Requirement & By-law on Protection of Underground Waters against Pollution and Deterioration	Observation wells dug at the plant and within the area of impact
WRM-LAP-03	Water Level Measurements in Observation Wells	Weekly	Internal Monitoring	Observation wells dug at the plant and within the area of impact
WRM-LAP-04	Depot, Spring and Fountain Water Quality and Quantity	Monthly	Undertaking Requirement & By-law on Protection of Underground Waters against Pollution and Deterioration	Drinking and usage water sources of settlements nearby the area of impact of the plant
WRM-LAP-05	Discharge Water Quality	Prior to Discharge	Undertaking Requirement & By-law on Control of Water Pollution	In biological treatment system and settling basins
WRM-LAP-06	ARD Leachate Quality	Monthly	Undertaking Requirement & By-law on Control of Water Pollution	Field Kinetic Tests Barrels (ARD Monitoring)
WRM-LAP-07	Contact water/Sedimentation Pond Water Quality	Monthly	Undertaking Requirement & Regulation on Surface Water Quality Management	at settling basins
WRM-LAP-08	Sampling at the Biological Wastewater Treatment Plant	In Periods Determined in the scope of Environmental Permit	By-law on Control of Water Pollution & Environmental Permit and License Regulation (in the scope of Environmental Permit)	Biological treatment system

Table 11: Frequency and Parameters to be monitored during Operation

Measurement Point Type	Measurement Point	Parameter	Construction Phase	Operation Phase	Closure Phase		
					1. Period	2. Period	3. Period
Weir Point	Kovanlık Dere Weir	Flow	Continuous	Continuous	Continuous	Continuous	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
Surface Waters	Kestanelik Dere upstream (KesMb) ve Downstream (KesMp), Kovanlık Dere (KovD) MSY Mevkii (MSY)	Flow	Continuous (using prob)	Continuous (using prob)	Continuous (using prob)	Continuous (using prob)	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Chemical parameters (Laboratory analysis)	Quarterly	Quarterly	Quarterly	every sixth month	Yearly
Groundwater Wells	PGK1, PGK2, TGK1, KEMW4, OGK1, OGK2, ŞahK,	Groundwater level	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Chemical parameters (Laboratory analysis)	Quarterly	Quarterly	Quarterly	every sixth month	Yearly
Catchments & Depots	ŞahDK, ATK, KocD Catchment and Village Depots	Flow	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Chemical parameters (Laboratory analysis)	Quarterly	Quarterly	Quarterly	every sixth month	Yearly
Fountains	Alanpınar, Baklacı, Yetimçeşme and Kızılcapınar Fountains	Flow	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Chemical parameters (Laboratory analysis)	Quarterly	Quarterly	Quarterly	every sixth month	Yearly
Water Quality, Quantity and Water Use of the Villages	Şahinli and Kocabaşlar Villages and water pipelines	Flow / Volume	Continuous	Continuous	Continuous	Continuous	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Chemical parameters (Laboratory analysis)	Quarterly	Quarterly	Quarterly	every sixth month	Yearly
Collection Ponds	settlement ponds at the waste rock dump, DTSF and Pits	Flow / Volume	Continuous (using prob)	Continuous (using prob)	Continuous (using prob)	Continuous (using prob)	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Chemical parameters (Laboratory analysis)	Quarterly	Quarterly	Quarterly	every sixth month	Yearly

Program for monitoring groundwater, surface water and resources (each period shows a period of 5 years at closure phase)

Notes: 1. Period: first 5 years after closing, 10 years after closing 2nd period, 15 years after closing 3rd period

The water quality analyses will include the parameters provided in Table 11 for the groundwater samples. Surface water and drinking water samples will be analyzed according to the project standards defined in Table 5 and Table 2. The monitoring parameters will be reviewed and revised if necessary at the end of the 4th water quality monitoring period.

Table 12: Parameters to be analyzed in groundwater samples

Groundwater Analyses Parameters	
Total Suspended Solids (TSS)	Total Alkalinity
Total Dissolved Solids (TDS)	Aluminum (Al)
Chemical Oxygen Demand (COD)	Antimony (Sb)
Biological Oxygen Demand (BOD)	Arsenic (As)
pH	Boron (B)
Electrical Conductivity	Cadmium (Cd)
Chloride (CL)	Calcium (Ca)
Sulfate (SO ₄)	Copper (Cu)
Fluoride (F)	Cobalt (Co)
Carbonate (CO ₃)	Chrome (Cr)
Bicarbonate (HCO ₃)	Iron (Fe)
Sulfide (S-2)	Lead (Pb)
N-NH ₄	Magnesium (Mg)
N-NO ₂	Manganese (Mn)
N-NO ₃	Mercury (Hg)
Total Organic carbon (TOC)	Nickel (Ni)
Total Cyanide (TCN)	Potassium (K)
WADCN (Weak Acid Dissociated Cyanide)	Selenium (Se)
Tetrachloroethylene	Sodium (Na)
Trichloroethylene	Zinc (Zn)

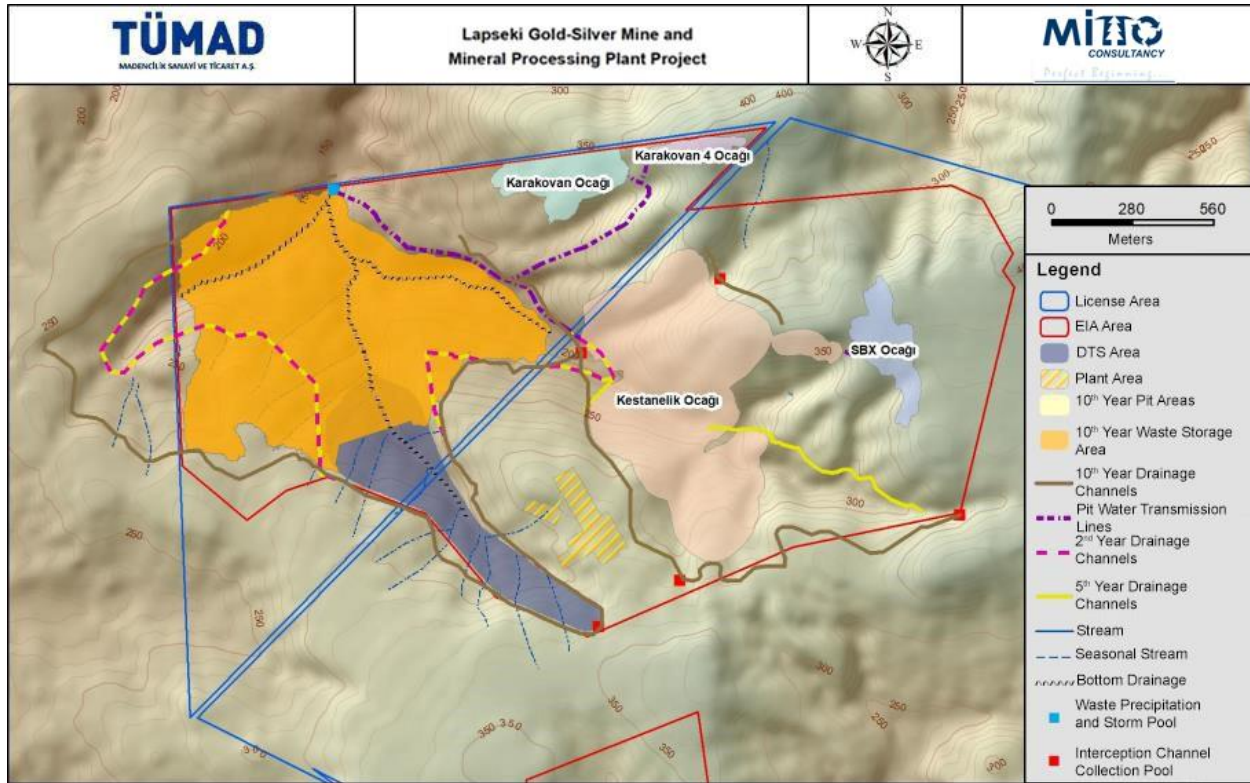


Figure 2: Water related structures

Contact Water Ponds and Outlets;

Contact water originated from the pit, waste rock dump and DTSF areas will be collected in the settling ponds in the scope of the Project. Sampling studies will be conducted at outlets of the ponds. Analyses will be conducted in accordance with Table 7.1 of By-law on Water Pollution Control and project groundwater and surface water standards in order to determine whether sampled waters comply with discharge criteria.

Spring-Fountain, Catchment and Village Depot Sampling Locations;

Fountains, catchments and village depots located in and around the project site have been the subject of monitoring studies since the year 2009. The monitoring studies will continue throughout land preparation, construction, operation and post-operations phases of the project. The quality and quantity of the water provided to the villages and the water consumption of the Şahinli and Kocabaşlar Villages will be monitored on regular basis.

Non-Contact Water Collection Basins;

Non-contact water collected by interception channels will be accumulated in water collection basins. Dust generated in nearby locations due to activities carried out within the scope of the Project may result in sedimentation in interception channels and water collection basins. Channels and basins will be inspected and cleaned on a regular basis.

Groundwater Sampling Locations;

Sampling from wells which are being subjected to analyses since 2009 will continue in the scope of this monitoring. In addition, springs and groundwater wells located around and downstream of the project facilities will be included into the monitoring program. The sampling points are shown in Figure 3.

Surface Water Sampling Locations;

Surface water locations which are being analyzed since 2009 are included into the monitoring and monitoring activities will continue at the same locations. A weir will be installed to Kovanlıkdere to obtain continuous flow measurements to monitor flow changes.

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Water quality at open pits, leachate quality at mine waste and DTSF areas, underground water quality of the project site area during the final shutdown process will be compared to the results of water quality estimation models prepared in the scope of the Project, after which a report which includes current status report and effectiveness of measures will be prepared and submitted to General Directorate of State Hydraulic Works every 5 years and prior to the shutdown phase.

The locations of water resources sampling points including groundwater, surface water and drinking catchments were given in the Figure below.

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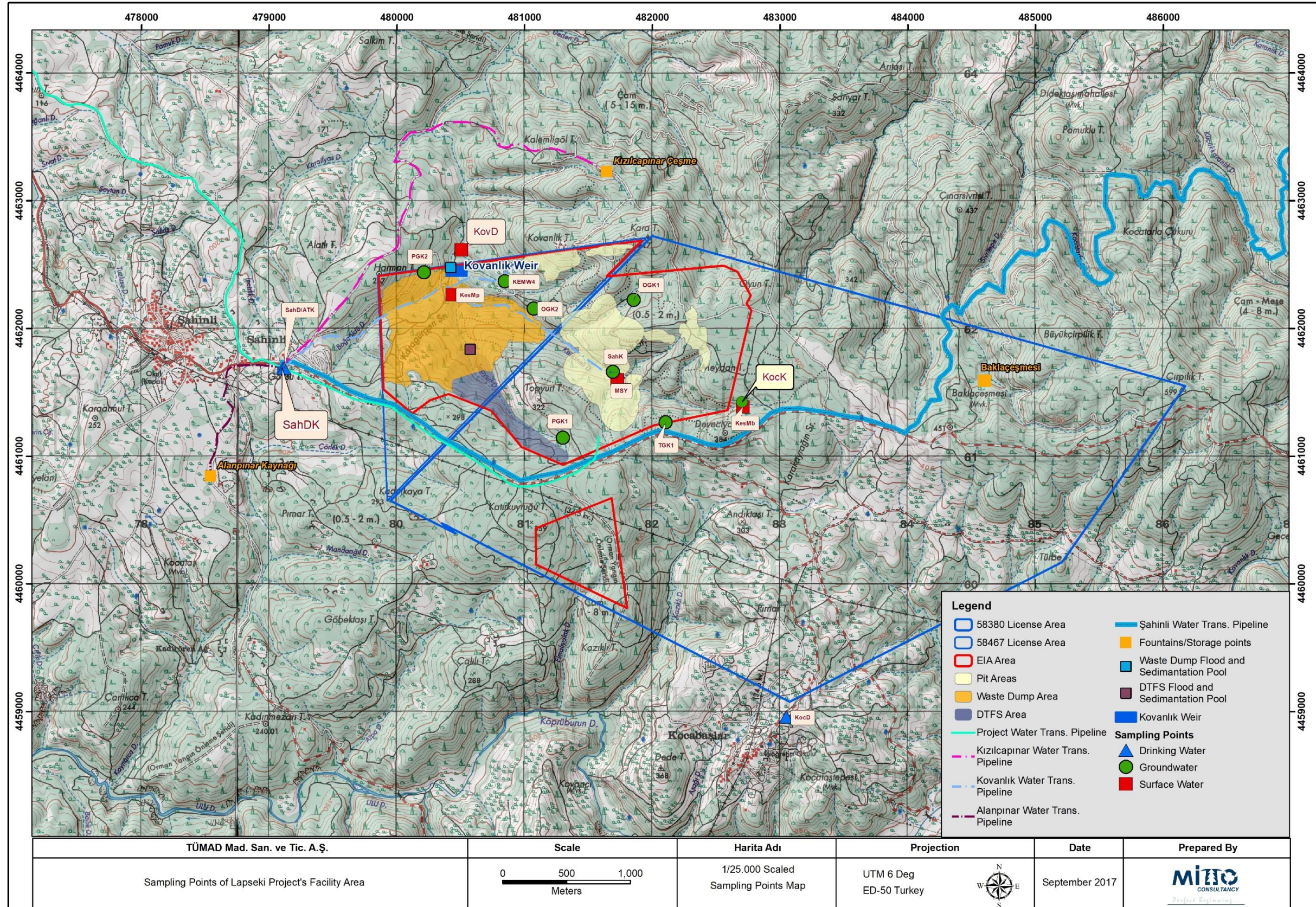


Figure 3: Locations of Groundwater, Streams and Drinking Water Locations Where Samples are Taken within the Scope of Water Monitoring Studies

Acid Rock Drainage Monitoring Program

Acid production and metal leaching potentials of the lithological units to be excavated during the operation phase will be examined by performing geochemical analysis of advanced rock and water. Acid-base calculations and short-time static tests will be performed for new lithologies to be encountered during mining operations. In this context, the pit walls shall be continuously monitored and sulfur analysis shall be performed on samples to be taken from the new surface of the pit after each blasting, and wall washing tests shall be performed on the surfaces.

Table 13: ARD Monitoring Program

Stage of the Project	Component	Monitoring Spot	Monitoring Method	Parameter	Purpose
Construction and operation period	Waste rock and open-pit surface lithology	Selected rock samples and/or existing barrel samples	Evaluation of updated results of on-going barrel tests Conduct tests on new lithology groups observed during mining Conduct further tests on transition samples	Evaluation of the data of acid generation speed, metal leachate generation rate obtained over the longer period pH, Alkalinity, Acidity, Conductivity, Metals, Anions Acid generation and neutralization potentials, state of metal leachate generation	Update open-pit and waste rock dump closure plans and waste rock management plans Comparison with pre-operation test results and refining the ARD monitoring and mitigation plans Analysis of rocks which have potential to generate ARD or which will be used for neutralization
Operation period	Waste Rock	Continuous Sampling during operation	Conduct tests on rock samples during mining, blasting etc.	Sulfur Content	Identify PAG and NAG rocks during operation and manage and update encapsulate plans
Operation period	Geologic/block model	Waste rock lithology and open-pit surface lithology	Evaluation of updated geologic model Evaluation of PAG rock percentage that will be exposed on the pits walls Evaluation of NAG and PAG material volumes and comparison with the plans	NAG-PAG material volume update	Operational waste rock management and obtaining of final closure planning

Operation period	Quality of contact water obtained at the site	Waste rock dump leachates and open-pit surfaces contract waters Discharge Water Quality Barrel Tests results	Site measurements and sampling Evaluation and update of water quality predictions based on site monitoring, new test results and updated geological models, PAG-NAG material volumes	pH, EC, ORP, measurements and chemical analyses	Comparisons with the results of the water quality estimation models, and operational waste rock management and closure planning
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7.1.3 Key Performance Indicator

The table below shows basic performance monitoring for Procedures and Instructions related to the Water Sources Management Plan.

Table 14: Table of Performance Indicators

No	Performance Indicator	Target	Monitoring and Measurement
WRM-LAP-KPI-01	Incidents related to Use of Water Sources	Minimizing the number of reported incidents related to use of sources and constant improvement.	Incidents related to water sources reported in a year.
WRM-LAP-KPI-02	Nonconformity with Water Quality Standards	In the scope of Activities Annual Nonconformity: 0 Maximum Annual Nonconformity: 5	The number of nonconformities not resulting from natural climate conditions and according to Project water quality measured in a year.
WRM-LAP-KPI-03	Complaints	Annual Nonconformity in the scope of Activity 0 Maximum Annual Nonconformity: 5	The number of community complaints related to water quality reported in a year.

8 TRAINING

8.1 Overview

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

8.2 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.

8.3 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.

8.4 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.

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9 AUDITING

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.

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

10 REPORTING

Audits, incidents and nonconformities shall be documented and managed pursuant to instructions and procedures of TÜMAD. All records shall be kept according to requirements of the Records Management Procedure (TMD_EYS_PRD.004).

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