

TÜMAD

MADENCİLİK SANAYİ VE TİCARET A.Ş.



WATER RESOURCES MANAGEMENT PLAN for İVRİNDİ PROJECT

by TÜMAD Madencilik San. ve Tic. AŞ

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WATER RESOURCES MANAGEMENT PLAN for İVRİNDİ PROJECT

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ABBREVIATIONS AND DEFINITIONS

Project	: İvrindi 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)

1 INTRODUCTION

TÜMAD plans to establish the İvrindi Gold and Silver Mine and Processing Project (the İvrindi Project) within the administrative boundaries of Değirmenbaşı and Küçükıllica Villages of the İvrindi District of Province of Balıkesir. The İvrindi Project have 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 Water Resources Management Plan for the İvrindi Project. The document reference number for this Management Plan is TMD_IVR_CEV_PLN.003. This management plans sets the requirements for the operation phase of the İvrindi Project of the integral part of the Environmental and Social Management System implemented by TÜMAD for the İvrindi 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

This document is the Water Sources Management Plan prepared for Prepared for TÜMAD with the purpose of ensuring control and management of quality of water which has or has not been used as resource in the gold mine and has been qualified as waste generated as a result of mining activities. Document registry number for the Integrated Management System for Water Source Management Plan is TMD_IVR_CEV_PLN.003.

The purpose of Water Sources Management Plan is to;

- Define the project standards interfaces within the scope of the Water Management Plan,
- Define monitoring procedures by indicating the necessary sensitive water resources,
- Outline the Water Resources of study area and regularly compare with trigger and limit values, report and follow-up able to define the potential pollution that may be occurred by the activities of TÜMAD Madencilik Sanayi ve Ticaret A.Ş.
- Define legal responsibilities, undertakings, operating procedures and instructions in areas of activity in terms of Water Sources and Potential Pollution of These Sources,
- Evaluate Water Sources Limit Values for consumers and define performance goals,
- Define training requirements

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

Any subsequent changes to the Environmental & Social Management System (ESMS) Framework may result in changes to this Management Plan.

3 SCOPE

The Water Sources Management Plan covers all of 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.

This Management plan covers all water used by TÜMAD from the point of abstraction through to its loss from the system in the facility or 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.

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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

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

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

- 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_IVR_ISG_PLN.002), particularly in relation to accidental contamination of surface and groundwater resources.
- Stakeholder Engagement Plan (TMD_IVR_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 outline below.

- EIA Requirements
- Legislation
- Company Undertakings and Requirements of Undertakings
- International Standards and Guides
- 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.

4.2 National and International Legislations

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

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- By-law on Control of Water Pollution
- By-law on Protecting Groundwater Against Pollution and Contamination

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 Groundwater 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.

Activities will also be conducted by taking consideration of national laws and legislations.

European Bank for Reconstruction and Development Performance Requirements:

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

- identify and assess environmental and social impacts and issues, both adverse and beneficial, associated with the project,
- 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, identify and, where feasible, adopt opportunities to improve environmental and social performance,
- promote improved environmental and social performance through a dynamic process of performance monitoring and evaluation.

The objectives of European Bank for Reconstruction and Development Performance Requirement (PR) 3: "Resource Efficiency and Pollution Prevention and Control" are to:

- adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project,
- identify project-related opportunities for energy, water and resource efficiency improvements and waste minimization,
- promote to reduction of project-related the greenhouse gas emissions.

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

- avoid or, when unavoidable, minimize, involuntary resettlement by exploring alternative project designs,
- mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to assets and 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,
- restore or, where possible, improve the livelihoods and standards of living of displaced persons to pre-displacement levels,
- improve living conditions among physically displaced persons through the provision of adequate housing, including security of tenure at resettlement sites.

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

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- protect and conserve biodiversity using a precautionary approach,
- adopt the mitigation hierarchy approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity,
- promote good international practice in the sustainable management and use of living natural resources,
- To provide for fair and equitable sharing of the benefits from project development and arising out of the utilization of genetic resources,
- strengthen companies' license to operate, reputation and competitive advantage through best practice management of biodiversity as a business risk and opportunity,
- 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
- 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,

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- 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 Agreements and Contracts Signed by Turkey

Turkey has already signed a series of national agreement and contracts that are related to water resources management but not directly related to water resources. An agreement related to directly surface water is given below:

- The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (Turkey has approved on 1994)

National Guidance

A list of drinking water chemical limit values has been presented by World Health organization:

- Guidelines for Drinking-water quality by World Health Organization (WHO, 2011)

4.3 Water Monitoring Standards

Water monitoring standards used for water quality studies with the scope of the Project are given in table below.

Table 1: Water Monitoring Standards

Parameter	American Standard
Standard Execution for design and installation of groundwater measurement wells	ASTM D5092
Creation of groundwater measurement wells in granular aquifers	ASTM D5521

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Parameter	American Standard
Packing and transportation of environmental samples for laboratory analysis	ASTM D6911
Planning and preparation for groundwater sampling studies	ASTM D5903
Discharge methods of wells used in groundwater quality studies	ASTM D6452
Sampling from groundwater measurement wells	ASTM D4448
Choice of aquifer test method with hydraulic characteristics determined by well studies	ASTM D4043
Slug level test of determining hydraulic aquifers (field work)	ASTM D4044

Drinking water supply and wastewater discharge standards for personnel which are going to work during the operation are given in table below.

Table 2: Drinking Water Standards

Parameter	Unit	Turkish Standards	EU Standards	Project Standards
Aluminum (Al)	mg/l	-	0.2	0.2
Ammonium (NH ₄)	mg/l	-	0.5	0.5
Stibnite (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
Chlorite (Cl ⁻)	mg/l	-	250	250
Chlorine (Cl)	mg/l	-	5	5
Chromite (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

Parameter	Unit	Turkish Standards	EU Standards	Project Standards
1,2-Diklorometan	µg/l	3	-	3
Florid (F ⁻)	mg/l	1.5	0,7 – 1,5	0.7
Hydrogen Sulphide (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
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
Molybdenum (Mo)	mg/l	-	0.07	0.07
Nickel (Ni)	mg/l	0.02	0.02	0.02
Nitrate ion (NO ₃ ⁻)	mg/l	50	50	50
Nitrite ion (NO ₂ ⁻)	mg/l	0.5	1.0	0.5
Phosphate ion (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 ion (SO ₄ ²⁺)	mg/l	-	500	500
Strontium (Sr)	mg/l	-	2.0	2.0
Tetrachloroethane and Trichloroethane	µg/l	10	-	10
Trihalometan – total	µg/l	100	-	100
Vinyl Chlorite (C ₂ H ₃ Cl)	µg/l	0.5	-	0.5
Uranium (U)	mg/l	-	0.015	0.015
Vinyl Chlorite (C ₃ H ₃ Cl / H ₂ C)	mg/l	-	0.0003	0.0003
Zinc (Zn)	mg/l	-	5	5

Parameter	Unit	Turkish Standards	EU Standards	Project Standards
Radiological Quality				
Total α Radioactivity	Bq/l	-	4	4
Total β Radioactivity	Bq/l	-	1	1

Notes:

Upper limit values are given in the table unless it is specified as an interval or lower limit value.

EU Standard means Drinking Water Quality EU Directive 98/83/EC

EU Standard for radioactivity expressed as Tritium 100 Bq/l with a total indicative 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 Madra ve Sıpacı 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 3 below will be revised per EU standards.

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

Parameter	Units	SKKY 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: Standards for Discharge Standards for Domestic Wastewater

Parameter	Unit	Composite sample(2 hours)	Composite sample (24 hours)	91/271/EEC Limits*	Project Standard
Biochemical Oxygen Demand (BOD5)	(mg/L)	50	45	25	25

Chemical Oxygen Demand (COD)	(mg/L)	180	120	125	120
Suspended Solid(SS)	(mg/L)	70	45	35	35
pH	-	6-9	6-9		6-9

RWQC (Regulation on Water Quality Control) Table 21.1 Discharge Standards for Domestic Wastewater,

Turkish Water Pollution Control Regulation classifies the internal water resources (surface water). Surface water resources are divided to 4 main class according to Turkish Standards. Classification based on water resources are given below:

- I. Class I, High Water Quality
- II. Class II, Medium Contemned Water
- III. Class III, Contemned Water
- IV. Class IV, Highly Polluted Water

Classification with limits are given in table below. The color index is used in related tables which indicates the surface water quality.

Table 5: Water quality limits in accordance with Turkish water pollution control regulations

	Water Quality Classification			
Water Quality Parameters	I	II	III	IV
Parameter title				
Temperature (°C)	≤ 25	≤ 25	≤ 30	> 30
pH	6.5-8.5	6.5-8.5	6.0-9.0	6,0-9,0 dışında
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	Oil, tar and trash should be separated from floating liquid and related substance And should be separate from foam.			-
(A) Oxygen 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 (KOİ) (mg/L)	< 25	25-50	50-70	> 70
Biological Oxygen Demand (BOİ ₅) (mg/L)	< 4	4.0-8.0	8.0-20	> 20
(B) Food Items (Food Elements) Parameters				
Ammonium nitrogen (mg NH ₄ ⁺ -N/L)	< 0,2b	0,2-1b	1-2b	> 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)				
Aluminum (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
Florit (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
Chromite (µg Cr+6/L)	UDL	<20	20-50	> 50
Chromite (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
Sulfate (mg SO4/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

UDL: Under detection limit

Table 6: Water quality limits in accordance with Turkish water pollution control regulations (new regulation)

	Classification of Water Quality			
Water Quality Parameters	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
Dissolved Oxygen (mg/L)	>8	6	3	<3

Chemical Oxygen Demand (KOİ) (mg/L)	< 25	50	70	> 70
Biological Oxygen Demand (BOİ ₅) (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 (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
Fluorite (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 Madra and Sıpacı (Yahu) Stream are 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 levels.

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

	Water Quality Classification				BASELINE			Expected Contact Water Quality - Settling Pond	Trigger Limit for Sipacı Stream
Water Quality Parameters	I	II	III	IV	Sipacı Stream				
General					Summer 2015	Fall 2015	Spring 2017		
pH	6.5-8.5	6.5-8.5	6.0-9.0	Outside of 6,0-9,0	8.49	8.8	8.44	5.62	6.5-8.5
Arsenic (µg As/L)	≤20	20-50	100	> 100	UDL	UDL	UDL	1.5898	20
Cadmium (µg Cd/L)	≤ 2	2.0-5.0	5.0-7.0	> 7	0.4	0.4	UDL	0.2276	2
Chromium (total) (µg Cr/L)	≤20	20-50	50-200	> 200	UDL	UDL	UDL	0.1525	20
Copper (µg Cu/L)	≤20	20-50	50-200	> 200	1.2	UDL	UDL	0.1670	20
Iron (µg Fe/L)	≤300	300-1000	1000-5000	> 5000	UDL	14.1	UDL	0.0005	300
Lead (µg Pb/L)	≤10	10.0-20	20-50	> 50	UDL	UDL	UDL	0.0188	10

Manganese (µg Mn/L)	≤100	100-500	500-3000	> 3000	0.55	5.33	UDL	0.1097	100
Mercury (µg Hg/L)	<0.1	0.1-0.5	0.5-2	> 2	UDL	UDL	UDL	0.3389	0.1
Nickel (µg Ni/L)	≤20	20-50	50-200	> 200	UDL	UDL	UDL	0.1074	20
Selenium (µg Se/L)	≤10	≤10	10-20	> 20	UDL	UDL	UDL	0.3699	10
Sulfate (mg SO ₄ /L)	<200	<200	200-400	> 400	16.6	14.1	14.6	0.5012	200
Zinc (µg Zn/L)	≤200	200-500	500-2000	> 2000	UDL	UDL	2.2	0.2491	200
Cyanide (total) (µg Cr/L)	≤10	50	100	> 100	UDL	UDL	UDL	n.a.	<10

*UDL: Under detection limit

Table 8: Madra Stream baseline parameters, expected contact water quality at the main settling pond and the trigger limits for the Madra Stream

	Water Quality Classification				BASELINE			Expected Contact Water Quality - Settling Pond	Trigger Limit for Madra Stream
Water Quality Parameters	I	II	III	IV	Madra Stream				
General					Summer 2015	Fall 2015	Spring 2017		
pH	6.5-8.5	6.5-8.5	6.0-9.0	Outside of 6,0-9,0	8.19	8.02	7.3	5.62	6.5-8.5
Arsenic (µg As/L)	≤20	20-50	100	> 100	UDL	UDL	UDL	1.5898	20
Cadmium (µg Cd/L)	≤ 2	2.0-5.0	5.0-7.0	> 7	0.4	0.4	UDL	0.2276	2
Chromium (total) (µg Cr/L)	≤20	20-50	50-200	> 200	UDL	UDL	UDL	0.1525	20
Copper (µg Cu/L)	≤20	20-50	50-200	> 200	1.3	UDL	UDL	0.1670	20
Iron (µg Fe/L)	≤300	300-1000	1000-5000	> 5000	UDL	16	UDL	0.0005	300
Lead (µg Pb/L)	≤10	10.0-20	20-50	> 50	UDL	UDL	UDL	0.0188	10
Manganese (µg Mn/L)	≤100	100-500	500-3000	> 3000	UDL	1.15	UDL	0.1097	100
Mercury (µg Hg/L)	<0.1	0.1-0.5	0.5-2	> 2	UDL	UDL	UDL	0.3389	0.1
Nickel (µg Ni/L)	≤20	20-50	50-200	> 200	UDL	UDL	UDL	0.1074	20
Selenium (µg Se/L)	≤10	≤10	10-20	> 20	UDL	UDL	UDL	0.3699	10
Sulfate (mg SO4/L)	<200	<200	200-400	> 400	UDL	5.38	5.1	0.5012	200
Zinc (µg Zn/L)	≤200	200-500	500-2000	> 2000	UDL	UDL	UDL	0.2491	200
Cyanide (total) (µg Cr/L)	≤10	50	100	> 100	UDL	UDL	UDL	n.a.	<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.

- Water resources which will be periodically monitored for quality and quantity. 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.

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 9: 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.
TÜMAD Operation Manager Subcontractor Managers	<ul style="list-style-type: none"> • Ensuring that all activities of TÜMAD A.Ş. 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,
General Staff	<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
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.

	<ul style="list-style-type: none">Reporting all hazards, non-compliances and incidents,
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6 MITIGATION MEASURES AND MANAGEMENT CONTROLS

The intent of this management plan is to ensure efficient, safe and sustainable management and protection of water resources in and around the mine site.

The main purpose of the Water Sources Management Plan is to minimize negative impact on quality of Groundwater, surface waters, and drinking water found at the area of impact of activities. Determining potential impact of resources in the Water Sources Management Plan Framework, evaluating potential impacts based on their importance and taking and developing necessary precautions in the scope of this plan.

The Water Sources Management Plan will be supported by Procedures and Instructions which contain all details regarding potential pollution effect of activities of TÜMAD 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 10: 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 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. • 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. • 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 or 	Operating Manager Machinery Maintenance Department Environment Department, Occupational Health and Safety Department, Sub subcontractors,	Material Equipment Characteristics TÜMAD Procedures and Instructions Site Inspection Review of Monitoring Results

	<p>will be discharged in accordance with the Project standards.</p> <ul style="list-style-type: none"> 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. All field vehicles will have spill-kit to be used in case of an accidental spill. Construction wastes will not spill into rivers. Contractors will be trained and the construction activities will be monitored by TÜMAD Environmental Department. <p>During the Operation Period;</p> <ul style="list-style-type: none"> Interception channels will be constructed to collect and divert surface run-off away from the Project facilities. Through these channels, contamination of the waters coming out of the pit area will be avoided The diversion and embarkation channels will be designed to convey the non-interacting water to the surrounding rivers. The collected contact water will usually be returned to the processing plant for reuse to reduce the plant's need for additional water. With the embankment channels, the water passing from the storage areas to the surface stream will collect the geomembrane-covered interactive pools of water. The flow of precipitation on the pit walls will be transferred to the collection pool and returned for reuse in operation. Periodic water quality monitoring downstream of flows and receptors will be performed. If significant changes are detected in the water chemistry, appropriate precautions will be taken. A treatment plant will be built if necessary During operation, the permitted water intake rates are limited in order to ensure that the existing aquifer is sustainable and not to have a significant negative impact on other water users. The plant's water needs will be ensured as far as possible from re-use of contact water so that groundwater withdrawal will be minimized. Groundwater levels will be monitored regularly to ensure that the dewatering impacts are in acceptable limits. Settling basins, which are to be installed in the pits and downstream of the storage areas, will collect the water which is the contaminant. The waters collected in the sedimentation pools will be used as process water. In case of excess water coming from the facility in case of heavy rainfall periods, the chemical analysis will be completed and it will be determined 		
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	<p>that it conforms to the discharge standards. If the chemical content of the water conforms to the project standards, the receiver will be discharged and if the water quality is above the water quality limits or impose adverse impacts on the receiver environment, the contact water will be discharged after the water quality improvement have been carried out by applying the treatment procedures.</p> <ul style="list-style-type: none"> • 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. Değirmenbaşı village water source (İsale Fountain) and water transmission line is located within the Project area. The quality and quantity of the fountain and the village depot will be monitored regularly. TÜMAD will provide drinking water to the Village from another source if the fountain quality or quantity is impacted from mining activities. • Düdüklü Spring providing water to Burhaniye is located out of the Project boundary and the impact assessment indicate that the project will not impact Düdüklü spring however the spring will be monitored on a regular basis. • A weir will be installed to Madra Stream and Sıpacı Stream to obtain continuous flow measurements to monitor flow reductions • Water required by the process will be obtained with maximum recycling of water, • Precautions regarding protecting surface and groundwater quality will be taken. • The İvrindi 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. Treatment options would include adding certain chemicals to the contact water prior to discharge or design and 		
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	<p>construction of a treatment plant by TÜMAD during the operation stage of the Project.</p> <ul style="list-style-type: none"> 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 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. 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, heap leach facility and the pits. 		
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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 (contaminated water) will be collected to be used in the plant. The Project discharge water limit values are going to be considered first in case of discharging water to the receiving environments. Contact water discharge will not deteriorate the quality of the receptors.

6.1 Water Sources of İvrindi Gold Mine

There are unused water sources in TÜMAD İvrindi 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 İvrindi Gold Mine site are as below;

- Raw Water
- Process Water
- Other Water Sources
 - * Rain Water
 - * Water from open pits
 - * Personnel Based Waters
- Underground Observation Wells

6.1.1 Raw Water

Employees at the plant and certain process units require approximately 8-10 m³/hour raw water, which will be provided from groundwater wells certified by State Hydraulic Works. Raw water collected from these wells will be pumped into the raw water tank, after which this water will be distributed among necessary units.

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6.1.2 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.

- . Rainfall and surface water flow at the plant
- . Open Pit Waters
- . Personnel Based Waters

6.1.3 Rain Water

Rain falls on the solid waste storage area, a large volume of this rainfall vaporizes and returns to the atmosphere, rainfall on the solid waste storage area and open pits accumulate in these locations whereas they accumulate in interception channels along with surface flow. Rainfall on open pit flows through pit walls to the lowest elevation and mix with waters flowing through the formation; water accumulated here is used for dust suppression and road spraying.

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 environment. 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 after meeting the project discharge standards. Underdrains will be installed beneath the WRD. Figure 1 presents the water management flowchart for the two stages of the project. The locations of the waste dump area, interception channels and settling ponds are shown in Figure-2.

6.1.5 Open Pit Based waters

Rainfall waters falling into the open pits and the groundwater inflow will be taken to settling ponds within the scope of interactive water management planning. It will be provided through transmission lines in order to reach the water demand of the plant from the settlement ponds. During rainy seasons, surface water inside the open pit accumulates inside basins built at the lowest elevation of the pit. This accumulated water is later used in dust suppression and road spraying.

6.1.6 Personnel Based Waters

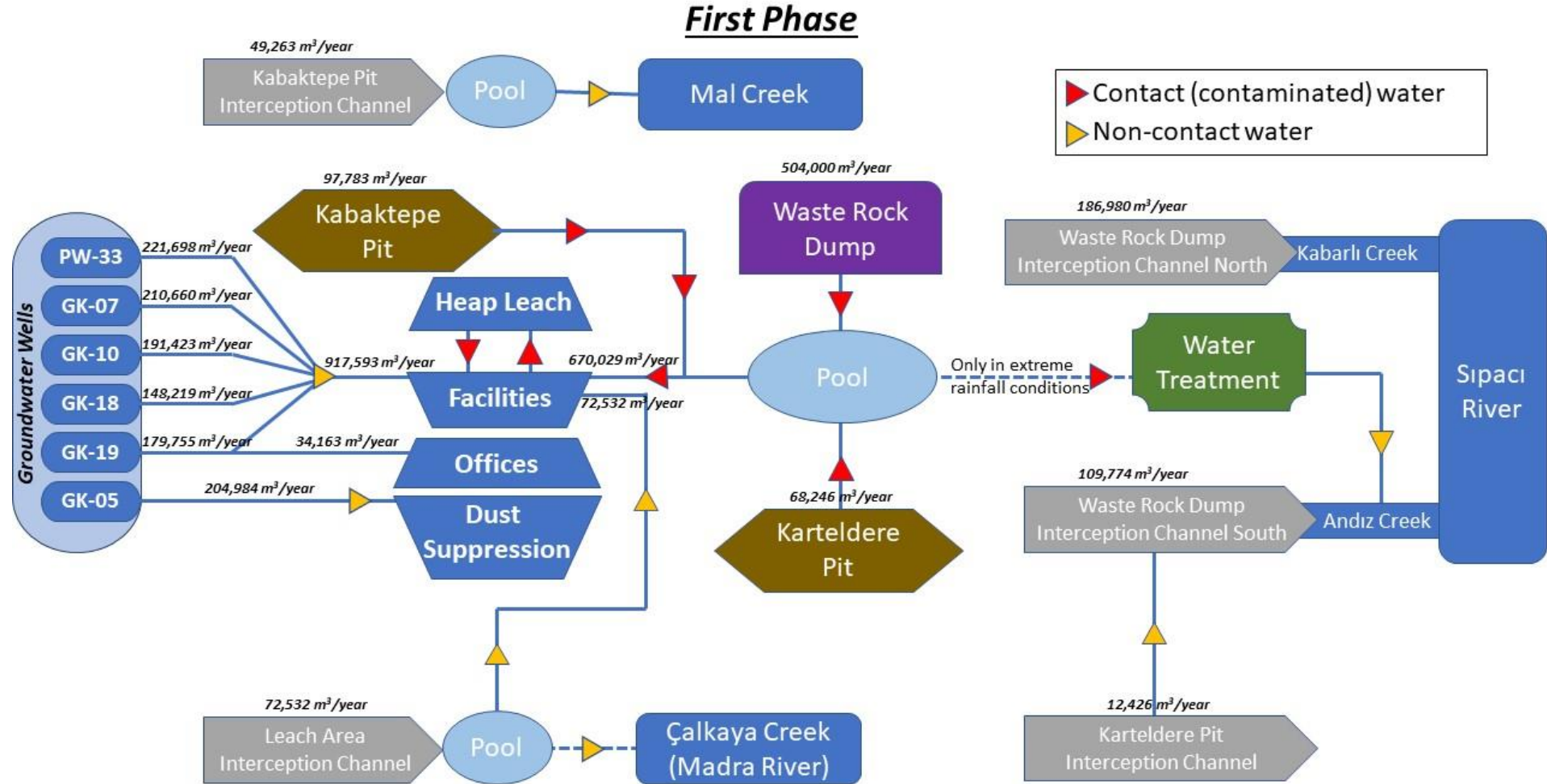
Assuming that during the operation 0,213 m³/day per person of water will be used, a total of 42.6 m³/day of wastewater may be occurred meanwhile for 200 people with the assumption of 100% of the used water will be sent as wastewater. Domestic waste water treatment plant is going to be built for the purpose of treatment of this wastewater. Domestic waste water is going to be treated in accordance with discharge standards defined Table-4 Standards for Discharge Standards for Domestic Wastewater It is going to be discharged to receiving environment in accordance with project standards afterwards. It is also used to prevent the dust and for road irrigation.

6.1.7 Groundwater Monitoring and Production Wells

TÜMAD İvrindi Gold Mine has underground monitoring wells able to represent the groundwater transmission and possible contamination. There are currently 6 certified and licensed groundwater production wells certified from DSİ (General Directorate of State Hydraulic Works). These holes are going to provide the water demand of plant. Additional water demand is going to be provided by these wells after dewatering of the pits. The water with the flow of 39 l/sec is going to be used from 6 wells during operation of the mine within average climate conditions.

Interacted and non-interacted water management flow charts planned for both phases with the scope of the project were prepared and shown together with the annual average water amounts in the following diagram.

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Second Phase

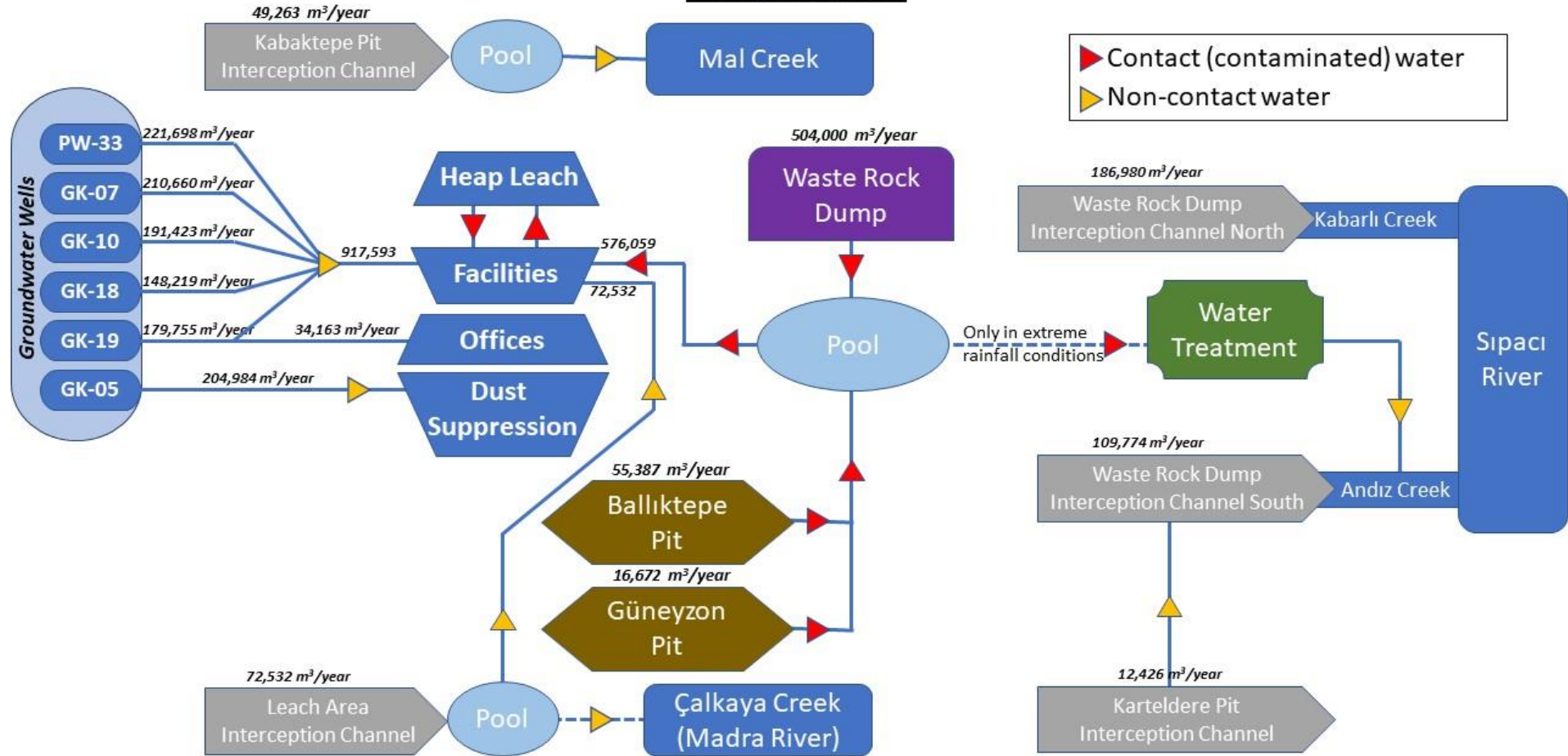


Figure 1: Interacted and Non-Interacted Water Management Plans

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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.

Table 11: Monitoring Parameters

No	Activity	Period	Standard/Statute	Location
WRM-IVR-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-IVR-02	Groundwater Quality	Monthly	Undertaking Requirement & By-law on Protection of Groundwater against Pollution and Deterioration	Observation wells dug at the plant and within the area of impact
WRM-IVR-03	Water Level Measurements in Observation Wells	Weekly	Internal Monitoring	Observation wells dug at the plant and within the area of impact
WRM-IVR-04	Spring and Fountain Water Quality	Monthly	Undertaking Requirement & By-law on Protection of Groundwater against Pollution and Deterioration	Drinking water sources of settlements nearby the area of impact of the plant
WRM-IVR-05	Discharge Water Quality	Prior to Discharge	Undertaking Requirement & By-law on Control of Water Pollution	In biological treatment system and settling basins
WRM-IVR-06	Leachate Quality	Monthly	Undertaking Requirement & By-law on Control of Water Pollution	Field Kinetic Tests Barrels (ARD Monitoring)

No	Activity	Period	Standard/Statute	Location
WRM- İVR-07	Drainage Basin Quality	Monthly	Undertaking Requirement & Regulation on Surface Water Quality Management	at settling basins
WRM-İVR-01	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

Monitoring frequency of mine closure phase is going to be transformed as seasonal for the first 5 year, in every 6 months after 5 years and for the last 5 years once in a year. It is going to continue after 15 years of operations completed. The duration of the monitoring has been defined by DSI and the Ministry of Environment and Urbanization during the EIA process.

A weir will be built in Madra Dere and Sipacı Dere (Yahu Creek) so that the streams can be continuously and more accurately monitored. The monitoring program of groundwater, surface water and important resources is given in Table 10. GK20 (below the WRD field stream) and GK21 (north of the heap leach area) wells will be added in the monitoring program from the groundwater sample points provided in the table.

Table 12: Program for monitoring groundwater, surface water and resources (each period shows a period of 5 years at closure phase)

Measurement Point Type	Measurement Point	Parameter	Construction Phase	Operation Phase	Closure Phase		
					1. Period	2. Period	3.Period
Weir Point	Madra Dere Weir (İMSV)	Flow	Continuous	Continuous	Continuous	Continuous	Yearly
	Sipacı Dere Weir	Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	Every sixth month	Yearly
Surface Waters	SW01, SW03, SW04, SW07, SW08, SW09, SW10, SW11	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	GK01, GK02, GK03, GK04, GK08, GK09, GK10, GK11, GK12, GK13, GK14, GK16, GK20, GK21, PW-22	Groundwater level	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Chemical parameters	Quarterly	Quarterly	Quarterly	every sixth month	Yearly

Measurement Point Type	Measurement Point	Parameter	Construction Phase	Operation Phase	Closure Phase		
					1. Period	2. Period	3.Period
		(Laboratory analysis)					
Source and Fountains	Kuzu Çeşme, Karabacak Çeşme, Arıcılar Çeşme, Suluktutan Çeşme, Sıra Çeşme, SP8, SP11, SP7	Flow	Monthly	Monthly	Quarterly	every sixth month	Yearly
		Field parameters (T, pH, EC)	Monthly	Monthly	Quarterly	every sixth month	Yearly
Important Sources and Fountains	Düdüklü Kaynağı, İsale Çeşme, Değirmenbaşı Village Depot	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
Collection Pools	Lower and upper drainage pools at the exit of the Waste Area, settlement pools	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

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 13: 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)

Groundwater Analyses Parameters	
Electrical Conductivity	Cadmium (Cd)
Chloride (CL)	Calcium (Ca)
Sulphate (SO4)	Copper (Cu)
Fluoride (F)	Cobalt (Co)
Carbonate (CO3)	Chrome (Cr)
Bicarbonate (HCO3)	Iron (Fe)
Sulphide (S-2)	Lead (Pb)
N-NH4	Magnesium (Mg)
N-NO2	Manganese (Mn)
N-NO3	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)

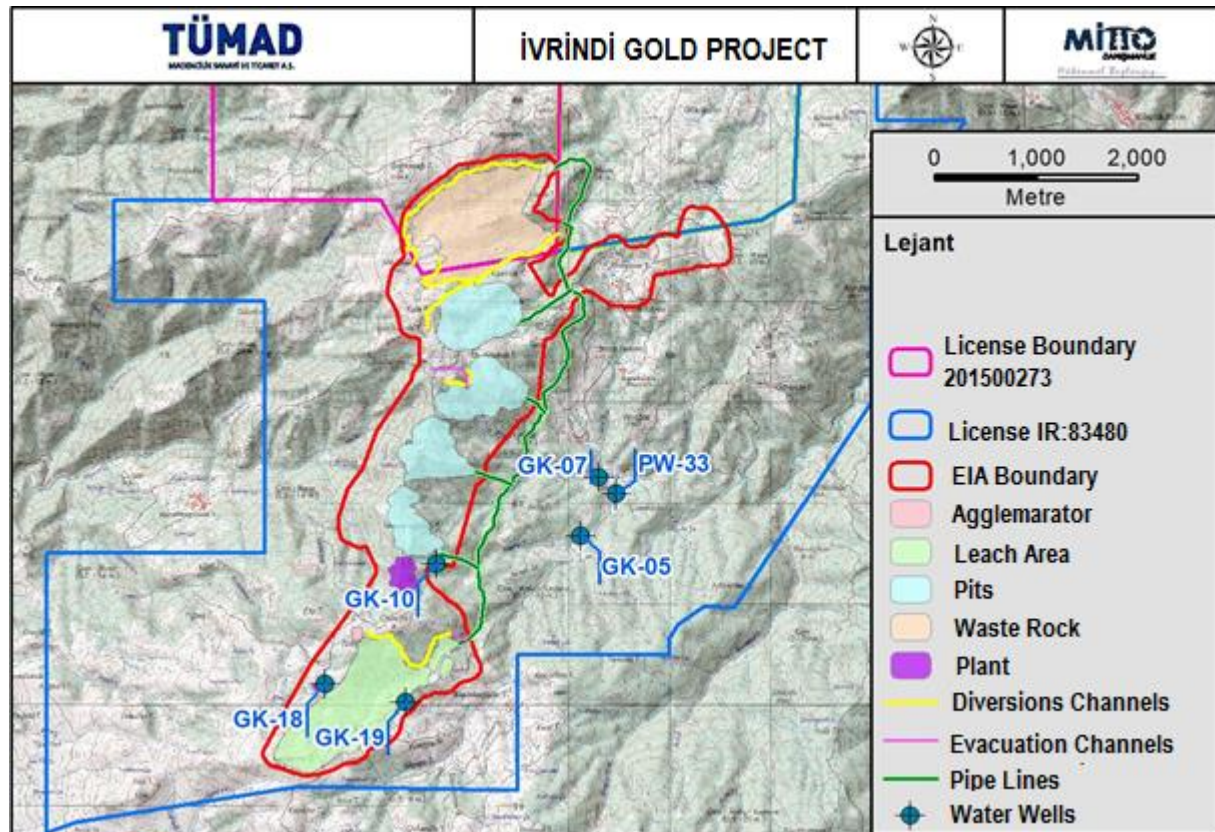


Figure 2: Water related structures

Settling Basins and Outlets

Mine waste and HLF areas will be collected by drainage channels and accumulated in the contaminated settling basins in the scope of the Project. Sampling studies will be conducted at outlets of the basins. Analyses will be conducted in order to determine whether sampled waters comply with discharge criteria.

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Spring-Fountain Sampling Locations;

Fountains, catchments and village reservoirs located in and around the project site have been the subject of monitoring studies. Monitoring studies will continue throughout land preparation, construction, operation and post-operations phases of the project.

Water Collection Basins;

Clean 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. Water collection basins will be monitored in the scope of regulations in order to monitor quality of this water with sedimentation.

Groundwater Sampling Locations;

Sampling from wells which are being subjected to analyses sine 2009 will continue in the scope of this monitoring. In addition, wells downstream of springs at the mine waste area, downstream spring wells at the pit sites, HLF area downstream spring wells and wells located at the plant site will be included in the monitoring program.

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 Madra Stream and Sıpacı (Yahu) Stream to obtain continuous flow measurements to monitor flow changes.

Water quality at open pits, leachate quality at mine waste and HLF areas, groundwater 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 closure phase.

Location of the sampling points from water resources (groundwater, surface water and drinking water) are shown in the map below.

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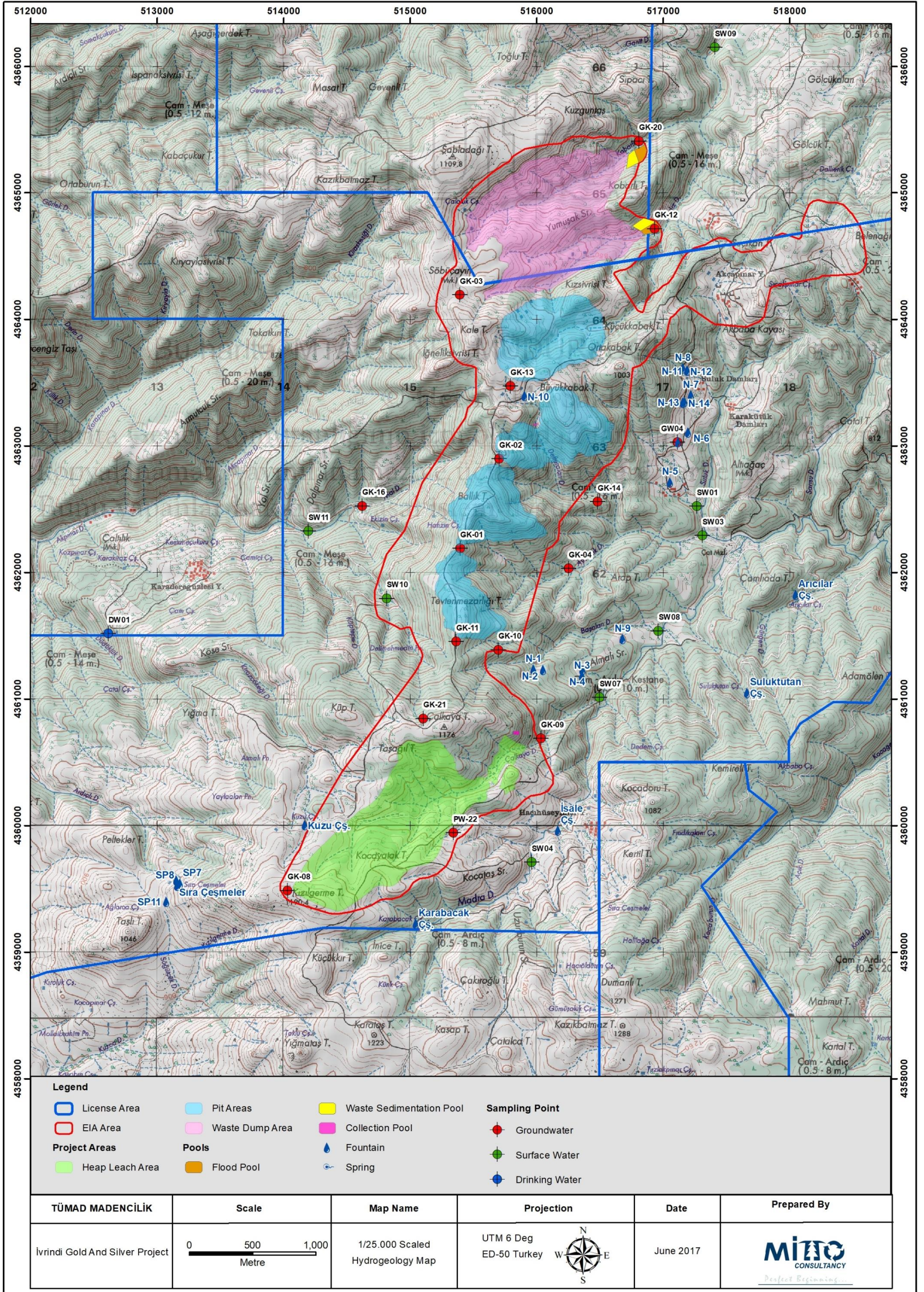


Figure 3: Sampling points from groundwater, surface and drinking water locations within the scope of Water Monitoring Studies

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.

The acid rock drainage monitoring program under the İvrindi Project is included in the following table.

Table 14: ARD Monitoring Program Table

Stage of the Project	Component	Monitoring Spot	Monitoring Method	Parameter	Purpose
Before the construction period	Land-scale kinetic test canister	Leachate samples	Kinetic Test Analysis in Samples	pH, Alkalinity, Acidity, Conductivity, Metals, Anions	Lab scale kinetic comparison with tests
Operation period	Open-pit geologic/block model	Waste rock lithology and open-pit surface lithology	Evaluation of updated geologic model	Monitoring of amounts and rates of mine lithology	Operational waste rock management and obtaining of final closure planning
Construction and operation period	Waste rock and open-pit surface lithology	Selected rock samples	Static analyses	Acid generation and neutralization potentials, state of metal leachate generation	Analysis of rocks which have potential to generate ARD or which will be used for neutralization
Construction and operation period	Waste rock and open-pit surface lithology	Selected rock samples and/or existing kinetic analysis samples	Evaluation of updated results of on-going kinetic analyses	Evaluation of the data of acid generation speed, metal leachate generation rate obtained over the longer period	Update open-pit and waste rock dump closure plans and waste rock management plans
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	Quality of contact water obtained at the site	Waste rock dump leachates and open-pit surfaces contact waters	Site measurements and sampling	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

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 15: Table of Performance Indicators

No	Performance Indicator	Target	Monitoring and Measurement
WRM-IVR-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-IVR-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-IVR-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 are necessary.

8.2 Workplace Site Induction Trainings

Site induction training, environmental awareness trainings and extensive health screening will be provided to all personnel and subcontractors workers at the site of TÜMAD.

8.3 Orientation Training

Orientation training will be given at certain breaks 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.

9 AUDITING AND REPORTING

9.1 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.

9.2 External Audit

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.

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9.3 Recording

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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