ADRIATIC METALS PLC

VAREŠ PROJECT ESIA

WATER AND WASTEWATER MANAGEMENT PLAN

January 2023

This document has been developed/revised as indicated below and described in the revision record on the next page. Please destroy all previous revisions.

Revision	Date	Authors	Reviewed by	Pages
1.0	01/10/21	Wardell Armstrong	Vildana Mahmutovic, Danira Zanovic	24
2.0	11/10/22	Danira Zanovic Nermin Taletovic	Vildana Mahmutovic	29
3.0	30/01/23	Danira Zanovic Nermin Taletovic	Vildana Mahmutovic	29

Revision	Status	Date	Update/change details
3.0	Project description, table 2.1.: Layout of the Vareš Project	30/01/23	Review of the Vareš Project, Rupice mine, final road route, Processing plant
3.0	Table 5.3	30/01/23	Table groundwater monitoring points

ISSUED FOR: ☐ Design ☒ Construction ☒ Operations ☐ Other _____

TABLES

1 INTRODUCTION

This Water and Wastewater Management Plan (WWP) follows recommendations made within Chapter 5.7 of the Environmental and Social Impact Assessment (ESIA) for Adriatic Metal's project Vareš, in Bosnia and Herzegovina (hereafter referred to as "the Project").

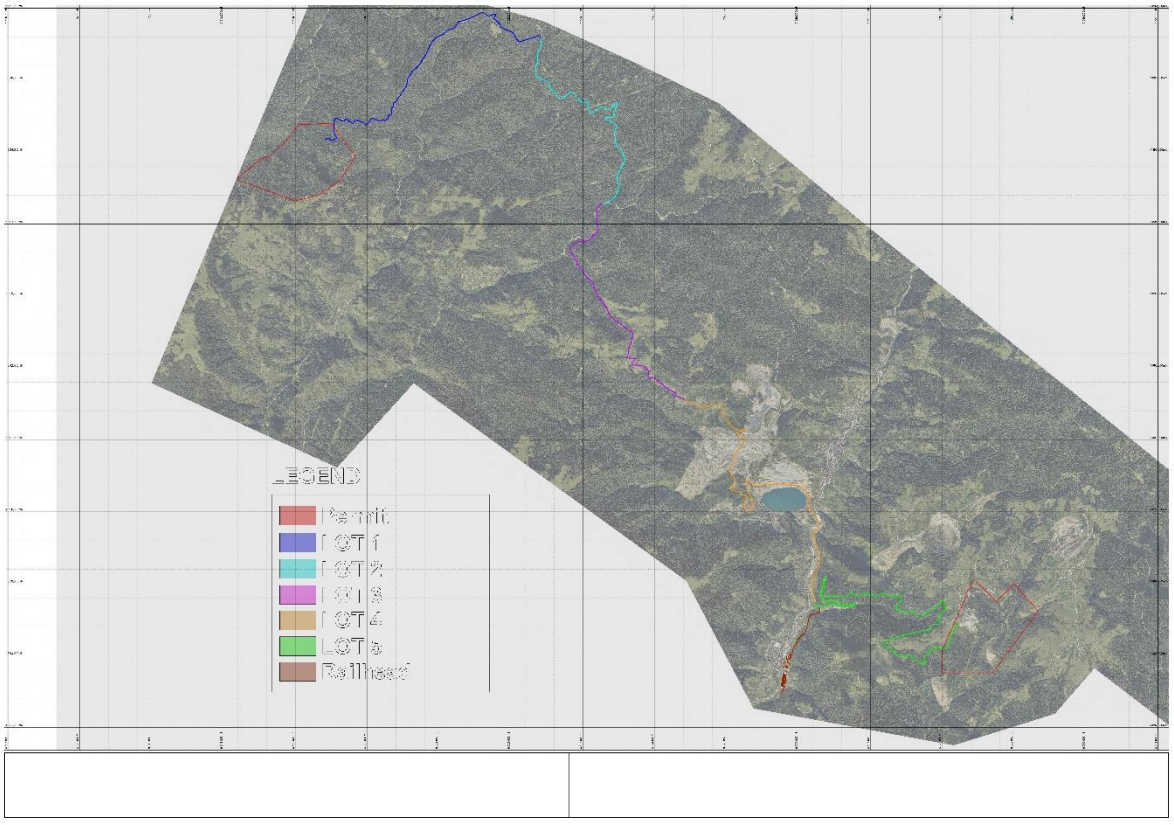
This Water Management Plan describes process for managing water through construction and operations phases at the site. It provides detail on the specific operational conditions as determined from water permits and authorisations; the local community requirements; the site social and environmental characteristics; and all operational programs and management plans required to manage water on site. This Plan works with the environment of surface waters and underground waters. It should be used as an integral part of the Environmental and Social Management System. The Plan should be reviewed annually and/or in response to any changes in site specific conditions, permits, or incidents.

The proposed measures have been identified in accordance with regulatory requirements listed in the Legal and Other Requirement Register (LAORR) and ESIA commitments. The plan is also harmonized with the overall environmental and social management plan and the Adriatic Metal's management system.

2 PROJECT DESCRIPTION

The Project mostly consists of underground polymetallic mining at Rupice, transport of ore via a purpose-built haul route 24.5 km to the Vareš Processing Plant, processing of ore and transport of tailings back to Rupice in order to fill mining chambers. Waste rock will be stored at Rupice, before being used as part of backfill process. Tailings not used in backfill will be stored in a landfield, designed to meet capacity requirements over the life of mine, located in a valley south of the processing plant. The final lead-silver and zinc concentrates will be transported to a rail loadout facility in Vareš, and then transported for further processing and sale. The layout of the Project is shown on Table 2.1.

Figure 2.1: Vareš Project Layout



As part of the Project engineering studies, a temporary water balance was prepared. Procurement requirements and sources are shown in the Figure 2.1.

Table 2.1: Water Supply And Requirements		
Project Component	**Water Requirement**	**Water Source**
Rupice	10 l/s (864 m^3/d) maximum water consumption of which 4.5 l/s for mining sites and 5.5 l/s for backfill plant	Water is supplied from existing Sastavci water intake (4 l/s) and the Vrući Potok water intake (4 l/s). In addition, a connection to the water supply of Bukovica 'Mrestilište Studenac', which has an available capacity in the range of 5 to 20 l/s, will be provided.
Vareš Processing Plant	8 l/s (691 m^3/d)	JKP doo Vareš (JKP), network water supply from the source of Lalića Mlin to the receiving tank and pipeline, is currently in operation. The supply has a capacity of up to 9 l/s.

Rupice: Water permits have been obtained for the Project, and water permits will be obtained after completion of activities on construction of water infrastructure in Rupice. The permit, approval and final Project for connection to the Mrestilište Studenac will be provided by JKP d.o.o. Vareš (municipal company) that has a license for this level of engineering.

Processing Plant: The project water demand in the Vareš Processing Plant is completely consumable, i.e. a net negative water demand, because water is used along with flotation reagents in the Processing Plant and is continuously lost in moisture content of the concentrate and tailings which leaves the plant. Company Eastern Mining has received consent from JKP Vareš for connection to the public water supply system and water will be provided according to the contract with JKP to ensure a reliable supply with minimal changes to already existing supply system by the utility company.

3 SUMMARY OF KEY ACTIVITIES

Below are summarized water features that require special activities, which are described in more detail in Table 3.1.

Table 3.1: Water and wastewater management plan - key activities				
ID number	**Activity items**	**Activity content**	**Explanation of the activity**	**Period**
WWP.01	Provide water supply for the Vareš Processing Plant	Agreement on water supply with JKP Vareš for the needs of the processing plant, and the possibility of increasing the capacity of existing water source.	Third party water supply, requirements for system rehabilitation, infrastructure limitations in network, little to no recourse for project water recycling.	Main design phase before commissioning.
WWP.02	Provide water supply for Rupice	Maintenance of the existing water supply systems Sastavci and Vrući potok and water supply contract with JKP from water source Mrestilište Studenac. Control rules related to minimum ecological flows in Vrući potok and in Borovički potok for continuous use of smaller water supply systems.	Third party water supply, requirements for system development, infrastructure limitations in network, basins already experiencing water “stress”.	Main design phase before commissioning.
WWP.03	Water classes and treatment	Detailed design and installation for sewage systems, and design of the Acid Rock Drainage (ARD) system have been completed. A contract for construction of the ARD plant was signed. Continuous compliance monitoring.	Monitoring of the hydrological system.	Construction phase and operations phase.
WWP.04	Water storage	The potential imbalance between water demand and supply and obligations under ESIA require the use of water tanks/storage. Capacities are needed for assurance and supply reliability. Water tanks are installed for each individual activity on the site. The main rainwater collection tank will be designed together with the water treatment plant, the ARD plant.	Each location has its own tank for independent reliable water supply, as well as retention of excess atmospheric water. Continuity of water services should be ensured through rational management.	Construction phase and operations phase.
WWP.05	Water discharge management	Water that has been treated and is of suitable quality to be discharged to the environment is termed managed release water. The existing treatment system is defined by temporary solutions through construction of the project (sedimentation basins, oil separators), while through the final design, water will be treated in	Maintaining compliance with design guidelines, laws, regulations and water discharge standards.	Main design phase before commissioning.

Table 3.1: Water and wastewater management plan - key activities				
ID number	**Activity items**	**Activity content**	**Explanation of the activity**	**Period**
		the ARD plant, which will meet EU standards for discharge of waste water into the environment.		
WWP.06	Water balance	A demand analysis and detailed water balance has been developed and is currently being updated during the detailed design phase, construction and operations phases.	Ensure that there is sufficient water to meet demand and that systems operate within their optimal capabilities, as well as that sufficient storage and treatment capacity is retained	The main design phase before commissioning and the operations phase
WWP.07	Water accounting	Evaluation of actual water use against design, development of closed loop systems promoting higher efficiency. Continuous improvement and measurement from year to year.	Annual assessment and analysis of water demand and improvement of water efficiency by promoting higher efficiency and ensuring adequate water retention or capacity to meet demanded estimates.	Construction phase and operations phase
WWP.08	Specific operational requirements	Development of control scheme and training planning necessary for the operation of site's drainage system. A standard operating procedure for monitoring and managing the water supply system (SOP) was developed.	Develop drainage system control rules. Water consumption goals will be set. A rational system is needed to check for leaks, high points, potential reuse and minimize risk of flooding or inadequate maintenance.	Construction phase and operations phase

Table 3.1: Water and wastewater management plan - key activities				
ID number	**Activity items**	**Activity content**	**Explanation of the activity**	**Period**
WWP.09	Operational monitoring	Water demand will be continuously measured and monitored. A system of continuous measurement and monitoring of water resources usage has been established. The contract company will estimate the monthly usage requirements, review their usage on a monthly basis and compare it to what was estimated. Regular monitoring of the total water flow was established on a monthly basis. An inspection regime and appropriate procedures for maintenance of pumps, filters or other equipment have been established for all distribution water pipelines and equipment.	Detection of contamination, non-conformance. Adequate design, construction and operational control are defined to avoid release of treated, raw and recycled water.	Construction phase and operations phase
WWP.10	Permits and authorizations	Permits for drainage (temporary), water supply and discharge are provided. Upon completion of construction, a water permit will be obtained for possible discharge of wastewater, which was previously treated, and annual data reporting.	Necessary for the professional execution and maintenance of aforementioned activities.	Construction phase and operations phase
WWP.11	Data management	Record data on water quality sampling, water usage, water discharge, compliance requirements, water consumption estimating and water recycling along with other hydrometric data including control levels of major storage facilities, discharge regimes and water accounting system.	Required to ensure that data quality is acceptable, reliable and meets Project standards for repeatability and certification.	Construction phase and operations phase

Table 3.1: Water and wastewater management plan - key activities				
ID number	**Activity items**	**Activity content**	**Explanation of the activity**	**Period**
WWP.12	Risk, Contingency and Emergency Response	Formal water risk and mitigation approaches to supply security, drought estimation and determination of contingency measures, vulnerability assessment for surface water, groundwater and downstream waters, including spill modelling, source contamination risk assessment and risk assessment for water from acidic drainage rocks/dam for tailings storage facility (TSF). Further systematic water balance and modelling is carried out in order to determine risk of deviation from schedule and compliance with the highest requirements. Management of drainage efficiency and risk during floods, and operational control of surface waters.	Minimizing interruptions is of the utmost importance for continued uninterrupted operation of operations. An Emergency Response Plan was developed to specify necessary water infrastructure aspects that require stand-by or additional capacity (such as backup pumps), or alternatives such as backup treatment or storage. Emergency response planning is necessary for flood risk and extreme event simulation.	Main design phase ahead of commissioning.

4 OVERVIEW OF WATER REQUIREMENTS AND PROJECT INTERACTIONS

4.1 General

The project water demand varies throughout the construction and operations phases as personnel numbers change, ore production increases, and activities and seasonal demands also change water demands. The demand will be determined based on the expected number of people and average daily consumption for different groups of users. A number of different water classes are also defined for the Project, ranging from untreated water used for low-quality purposes such as dust suppression, to drinking water supplies and a number of process wastewaters that require treatment before discharge or reuse. Details about this are given in the following sections of this Plan.

In summary, the overall water concept for the Project includes:

- Water is provided from existing water intakes and renewed network sources.
- Water is pumped into small 'day-tank' sized reservoirs at the project sites (Rupice and Vareš Processing Plant, VPP) through a pipeline that follows existing and new routes.
- Water abstraction are designed to avoid any impacts on the water supply of communities and ecological receptors near the sites. Water quality monitoring has been established and is monitored regularly.
- Water treatment and management infrastructure are designed according to different types of project water class. Levels of treatment and management are defined based on meeting acceptable discharge standards, taking into account site-specific conditions.
- Any physical changes to surface of the plot of project facilities will have effects on the hydrology of surface water and groundwater, and necessary design and monitoring will be carried out to ensure that negative impacts on aquatic environment are minimized.

4.2 Framework

Sustainable water management that takes into account existing requirements of water users and protection of the natural environment is an integral part of the Project. It is also recognized in all elements of the Project that reliable water supply and management are essential to achieve business efficiency.

The WWP sets out the guiding principles for the project in terms of water supply, usage efficiency, discharge requirements, protection of the environment and continued use of water sources by surrounding communities.

Table 4.1: Water Management goals and requirements

Goal	Completed activities	Recommended further management tasks
Manage water abstraction during construction and operation phases in order to protect sensitive habitats and species, water-dependent	Confirm long term sustainability assessment	Conduct life-of-mine monitoring to ensure water supply sources are effectively managed for long-term sustainability.
	Implement measures to maintain minimum ecological flows in surface waters.	
	Implement measures to protect ecosystem services that have water needs.	

Table 4.1: Water Management goals and requirements		
Goal	**Completed activities**	**Recommended further management tasks**
ecosystem services and community users.	Implement measures to protect community water sources.	
Implement cost-effective efficiency measures to reduce water consumption during the construction and operations phases.	Maximize the reuse and recycling of water throughout project life-cycle.	Develop water efficiency goals and implement performance monitoring.
	Develop and implement cost-effective measures to reduce water use.	
Manage water to minimize flooding, ensure sustainable drainage of project infrastructure and minimize impacts on communities and habitats.	Undertake pre-construction evaluation of hydrological conditions to provide project information.	As part of construction management, manage overland flows and ground conditions to minimize sedimentation and prevent pollution of downstream watercourses.
	Develop a water management system to maintain natural flows, prevent sedimentation, protect downstream communities and restore the same quality to pre-disturbance conditions.	
	Design structures to maintain natural flow and habitat conditions, and enable natural regeneration.	Implement maintenance programs to ensure that structures and drainage systems function effectively.
	Design structures that will withstand a 1:100 year flood and that will be resilient to climate change. The hydrology of the TSF from the Project is according to stringent standards (1 in 200 and 1 in 10,000-year flood return intervals).	Implement compliance monitoring to ensure that Project objectives are met.
Implement effective discharge management and monitoring to protect receiving waters in the long term	Conduct pre-construction surveys to inform development of drainage design and monitoring requirements.	Implement effective monitoring procedures to manage long-term potential impacts.
	Develop and implement specific criteria for the protection of sensitive habitats and/or downstream communities.	Ensure compliance with design standards for wastewater discharge.
	Develop Acid Rock Drainage (ARD) plans to effectively control discharge requirements at the critical assets at Rupice.	
Note: Specific requirements are listed as part of the ESIA and are listed in the ESMP		

As stated in the previous section, the Management Plan provides the main reference that articulates how water will be managed, which are key elements to achieve good performance and appropriate project sensitivities, risks and opportunities. The Plan links the corporate strategic requirements from the Strategy with the specific conditions and requirements of location. The plan refers to a number of other specific documents and materials such as specifications for discharge and water quality, design and engineering documents for water infrastructure, specific hydrological models, ESIA and clearly identifies the links to these supporting plans or operational schemes.

This Water Management Plan will be supported by a series of operational water schemes. It is considered that there is a sufficient degree of coherence in the main issues and their management at the sites for one comprehensive plan to be sufficient.

The ESIA project identified a number of key water priorities, as listed below, which the Water Management Plan will address:

- Aspects associated with water quality of the Mala Rijeka which has a Priority Biodiversity Area status and a fresh-water ecological interface;
- Managing water resources and maintaining a reliable supply including adequate storage, balancing water supply and demand and assessing the sustainability of source works including aspects of supply management and recycling; and
- Hydrology, flood defense and drainage that adequately protects project personnel, property and infrastructure while ensuring that hydrological and environmental services to the wider area are not unduly disrupted.

Responsibility for water management is shared between project entities with associated monitoring, compliance and resource expectations outlined in this document.

The plan is organized to include the following management measures:

- Special operating conditions required to meet water permits and authorisations;
- Local community water requirements;
- Site social and environmental characteristics; and
- Operational programs and management plans required for site water management.

There are key aspects of the Project's interaction with the water environment that present risks to the Project (ie flood risk and water supply management) as well as opportunities that can be realized for the Project (ie improved stakeholder relations through long-term sustainable protection of water resources). Water management is a key issue for integrity of operations in relation to water environment and there are a number of obligations established under the ESIA project relating to water management to protect public and environmental health, obtain and maintain water, permits and licenses and demonstrate competence and high standard in water handling, i.e. discharge control, treatment and pollution prevention

4.3 Principles

The goals and objectives of the Water and Wastewater Management Plan are best achieved by incorporating key guiding principles into engineering design, which are listed below:

- Water supply - manage water abstractions during construction and operations phases to protect other water users, including communities and water dependant ecosystem services;
- Usage efficiency - implement cost-effective efficiency measures to reduce water use during construction and operations phase;
- Discharge requirements - implement effective discharge management and monitoringing to protect receiving waters in the long term;

- Environmental protection and continued use of water sources by surrounding communities - manage water to minimize flooding, ensure sustainable drainage of project infrastructure and minimize impacts on communities and habitats.
- Closure and post-closure mine phases must ensure wet infrastructure (drainage and ponds), return water level, i.e. mine dewatering, hydrochemistry and other aspects of water quality (erosion and sedimentation) do not leave effects that would cause the water environment not to meet the objectives of the EU Water Framework Directive. The project should ensure that post-closure hydrology emulates pre-project hydrological regime as closely as possible and there should be no requirement for permanent managed interventions such as dewatering or active treatment to be carried out continuously.

4.4 Links to other plans

The water and waste water management plan should be used together with the following documents:

- ZT520182 - MM1477 Vareš Project, Environmental and Social Impact Assessment (ESIA), WAI, September 2021;
- ZT520186 – MM1498 Rev 2.0, Basics of Designing Water Supply Systems, WAI, August 2021; and
- ZT520182 - MM1477 Rev 2.0, Biodiversity Action Plan, WAI, September 2021.
- Surface Mineral Waste Disposal Plan,, Adriatic Metals, September 2021

4.5 Roles and responsibilities

Throughout the life of the project, there will be multiple entities that will be responsible for the monitoring and management of water. Responsibilities will depend on the phase of the project, which is divided into Construction, Commissioning and Operations phases.

The nominated undertakers involved in this management plan are identified below:

- Adriatic Metals – owner/operator;
- Eastern Mining – Bosnian operational branch with environmental and operational teams;
- Construction contractor(s) – multiple local contractors engaged during mine construction phase; and
- Contract Company - mine development is carried out by an international mining contractor with control of Eastern Mining.

It is the responsibility of each designated contractor to use this Management Plan to develop detailed procedures for each of management and monitoring requirements outlined herein. Adriatic Metals will be responsible for the following activities related to water management, water supply, hydrogeological research in connection with development of the Project, as follows:

- Research, projects and studies;
- Infrastructure;
- Water supply/hydrogeological research;
- Environmental research and reports;
- External relations;
- Landowner liaison and access;
- Community awareness and media;
- Community Relations and Development Programs;
- Project permits and consents.

The contractor will be responsible for the following activities related to water management:

- Verification of locally compliant engineering design;
- Compliance with DFS technical specifications and design standards when implemented in the construction phase;
- Engineering discipline (all);
- Engineering management;
- Project management including Project estimating which may be considered to include water demand and water discharge estimating; and
- Construction and commissioning services.

The contract mining company will be responsible for the following activities related to water management:

- Initial mine development;
- Life of mine operations, including resource/ore reserves and waste planning and scheduling;
- Management of KPIs and risk registers;
- Systems and procedures including HSEC; and
- Demand management and use of utility services such as water and waste services by third parties.

5 KEY ACTIVITIES

5.1 WWP.01 - Assurance of Water Supply Sustainability, Vareš Processing Plant

Background

The VPP operations will use a dedicated water supply provided by the utility company JKP using existing pipeline infrastructure from the Lalića Mlin source, which has a reported capacity of 9 l/s, and which also supplies water to the neighbouring villages: Pržići, Tisovci, Bijelo Broje, Mir and Stupni Do. Project water requirements are expected to be 8 l/s, which is within network capacity. The contract with the JKP provides water supply from the Lalića Mlin public water supply system, with consent obtained for the connection of the Processing Plant to the public system.

However, considering that the project demand for water represents a significant part of the total capacity of the source, and in addition, it is understood that the works at the source seasonally and in dry years affect availability of groundwater replenishment, it is of essential importance that the JPC obtains additional confirmation that both project areas are reliably supplied with water and that redistribution of supply through JKP network with a reported total excess capacity of 40 to 60 l/s can be applied in times of need by the JPC throughout the municipality of Vareš and individually in the villages.

Actions

1. The project water demand at Vareš Processing Plant is almost entirely consumable, i.e. net negative water demand, as water is used along with flotation reagents in the processing plant and is continuously lost in the moisture content of the concentrate product and tailings leaving the plant. The scope for increasing water efficiency and water conservation within the facility is limited. The JKP should provide sufficient amounts of water in drought conditions, planned and unplanned maintenance and increased external demand from other watershed users.
2. System maintenance is imperative in terms of works on water abstractiond (rehabilitation of wells, secondary back-up pumps and line infrastructure.
3. Monitoring: Water measurement at the work site, inlet pipeline to the site, inlet pipeline to the Processing Plant should be maintained at all times. This is necessary to ensure that water consumption, unaccounted for losses (leakage) and total system demand can be monitored and corrected as necessary. The JKP has a drought water management plan that includes a contingency plan to meet water demands and confirm that there is a sustainable sufficient amount of water during low flow or high demand conditions.

5.2 WWP.02 - Assurance of Water Supply Sustainability, Rupice

Background

Operations at Rupice require 10 l/s (m^3/d) - which is also the maximum water demand and will use water supply from their own springs Sastavci and Vrući potok with dedicated water supply from the utility company JKP, from renovated pumping station and new pipeline's infrastructure from water source Mrestilište Studenac.

Water from water source Mrestilište Studenac will be pumped along a length of 8 km to the Rupice concession and discharged into a reservoir with a capacity of 180 m^3 (6 hours of water supply), which is on top of the Kiprovac ridge, and provides a collector reservoir for balancing inflows and outflows and gravity drainage to various users of the mine. In addition, existing pipelines and pumps from the system used in exploitation process already established by Eastern Mining Company, will be retained.

Actions

1. The project water demand in Rupice is mainly consumable, as the water is mainly used for backfilling, dust suppression, mine operations and shotcrete batching. The scope for increasing water efficiency and water conservation in Rupice is therefore limited.

2. System maintenance is imperative in terms of source works (secondary standby pumps and line infrastructure).

3. Monitoring: Water monitoring at the work site, the inlet pipeline to the site reservoir, as well as the outlet pipeline from reservoir must be maintained at all times. Smaller sources of supply also require measurement. This is necessary to ensure that water consumption, unaccounted for losses (leakage) and total system water demand can be monitored and corrected as necessary. The use of these smaller systems should be regulated in order to control the rules related to minimum ecological flows in Vrući potok and Borovički potok. Minimum flows, or environmentally acceptable flows (called 'EPP'), are maintained in streams and rivers, especially after dam construction and water abstraction works, but also in connection with other development activities such as sedimentation and catchment alteration, to ensure that streams and rivers continue to provide sufficient flow for ecological services. EPPs are calculated for each watercourse and are presented in the water base of the Project. Continuous flow monitoring was established to confirm that the EPP values were reliable.

4. In order to prove that the mining activities at Rupice have no impact on the surrounding hydrological system, detailed hydrogeological research was carried out, which included field tests and preparation of an Elaborate on the possible impacts of pollutants on the surrounding hydrological system of Bukovica catchment. These researches proved that mining activities will not affect the surrounding hydrological system of Bukovica.

5.3 WWP.03 – Water classes and treatment

Background

The water management system is designed to manage a number of different classes of water. Each class of water differs in its composition which dictates how it can be managed to promote water efficiency and optimize water reuse. Water classes for the Project are presented in Table 5.1.

Table 5.1: Project water classes and treatment			
Water class	**Description**	**Main characteristics of water**	**Required Treatment**
Raw water	Raw water (or fresh water) is natural water available for use that is obtained from clean/natural rainfall catchments and includes JKP water sources and existing water abstractions at Rupice.	Depending on the source, it is expected that the JKP (groundwater) sources are of good quality and that there will be no suspended sediment, ionic and microbial load.	Raw water abstracted from the sources will not undergo treatment.
Discharge water management	Water that has been treated (at all levels) and can be discharged into the environment.	The water must meet conditions for discharge into the environment.	Depending on the specific water class and source.
Fire water	Water to be kept in storage for emergency use.	Raw water that requires periodic replenishment after drilling and evaporation losses.	Not required
Potable water	For drinking, cooking and cleaning	It must not be below the drinking water quality criteria according to the World Health Organization.	Disinfection
Service water	Water available for industrial use (eg maintenance, processing, dust suppression)	Low levels of contaminants (if any)	Not required
Non-Contact water	Runoff (or stormwater) collected after contact with low-risk catchments (roads, administrative areas, etc.) resulting in a change in only physical characteristics of the water (without major changes in chemistry).	High sediment load (high content of TSS-total suspended solids)	Attenuation only through sedimentation
Effluent treatment	Waste water from the treatment plant (ARD plant)	Treat to meet discharge criteria	If high concentrations of ions occur in the Vareš Processing Plant, then off-site disposal will be carried out in a suitable reception facility.
Water reuse (or recycled water)	Wastewater that is of suitable quality for recycling and reuse through the industrial water system.	Low levels of contaminants (if any)	Not required
Grey water	Water from different areas of use (domestic or industrial) that can be recycled and reused through an industrial water system with minimal treatment (storage, settling and stabilization)		Not required
Sewage	Water from all forms of ablutions, kitchens, medical facilities, floor drains and domestic cleaning	High concentration of microbes, pathogens and greases	Wastewater treatment (SBR device with quality control)
Rain water	Precipitation and leachate collected after contact with high-risk catchments (eg stockpiles, waste dumps) leading to a significant change in water chemistry.	High sediment load, high metal content and significant change in raw water chemistry.	Treatment through ARD plant, oil separators.

Other process water	Water required for industrial processes on site which then becomes industrial waste and must be contained in a closed drainage system	High level of pollutants, oil	

Actions

1. Project water classes and their respective treatment requirements should be managed to ensure compliance with project standards through a water treatment facility, ARD (to discharge and maintain good water quality and aquatic environment status in the receiving waters).
2. Systems for wastewater treatment and acidic rock drainage are in the phase of detailed design and commissioning.
3. The contractor of construction works is provided for wastewater treatment at the electricity production facilities in Rupice. At Tisovci, sufficient capacities for washing and treatment have been provided from the existing infrastructure.
4. Monitoring: The quality of water within surrounding hydrological system: Mala Rijeka, Vrući Potok, Borovički Potok and Bukovica is monitored during construction phase and operations phase for facilities Rupice, Vareš Processing Plant and Tailing Storage Facility in order to ensure against potential pollutants entering the drainage system.
5. Surface water monitoring points established that need to be maintained during construction and operations phases are identified below:

Table 5.2: Surface water monitoring during construction phase and operations phase

Catchment	Monitoring points	Description
Vareš Processing plant	PPV-4	The Mala Rijeka upstream of VPP and TSF.
	PPV-3	Mala Rijeka below existing TSF and VPP.
	PPV-VI	Veovača, below the main road
	PPV-10	Mala Rijeka upstream of the new TSF
	PPV-11	Mala Rijeka downstream from new TSF
	PPV-x	Bukov Potok below the new TSF
Rupice	PP-I	Borovica - downstream from Sastavci tank
	PP-II	Borovica – downstream from village Donja Borovica
	PP-III	Borovica – upstream of Sastavci tank (east tributary)
	PP-IV	Borovica – upstream of Sastavci tank (west tributary)
	PP-V	Vrući Potok
	PP-VI	The confluence of Borovički potok and Bukovica
	Spring Vrući Potok	Public spring on road
	Spring Donja Borovica	Residential house
	Water abstraction Bukovica	Water abstraction Bukovica
	Bukovica upstream	Bukovica upstream

Tabela 5.3: Groundwater monitoring during construction and operation phase		
Catchment	**Monitoring**	**Description**
VPP	Pit 1	Veovaca
	Piezo3	Veovaca
	MW20-TSF	Above older TSF
Rupice	BRW-1	At entrance in worksite
	BRW-2	At entrance in worksite
	BRW-3	Next to the access road to the Rupice site
	REW1	Next to the access road to the Rupice site
	REW2	The lowest point towards the mine
	REW3	Outside from exploitation field
	REW4	Next to the access road

Additional monitoring points that will need to be introduced after operational individual actions:

Rupice:

1. Water coming out of SBR device and before entering to Vrući potok (at least 2x a year)
2. Upper portal: exit from the oil separator
3. Exit from the ARD facility

VPP

1. Water coming out of SBR device and before flowing downstream
2. Exit from the oil separator

Camp Veovača:
It is necessary for the subcontractor to submit reports on analysis of sanitary-fecal water from the Veovača camp.

6. Monitoring should be carried out through planned regular controls, and quarterly during the operations phase, with the results reported in the Annual Environmental Monitoring Report. Monitoring parameters should include organic, inorganic and microbial suite with physicochemical parameters as currently established (current list of parameters). Monitoring modifications should be reviewed on an as needed basis, including frequency and parameters. For example, if indications of contamination are observed, the frequency of monitoring should be increased and additional indicator parameters should be used to identify the source of the contaminant in order to correct the non-compliance.
7. Solid waste generated from the wastewater treatment system will be disposed of in purpose-built facilities.

8. Mala Rijeka is known to support White Clawed Crayfish. It is possible that the river Bukovica contains Stone Crayfish. In order to ensure that there is no net loss of these PBF species, it will be necessary to prevent impacts on water quality and quantity in Mala Rijeka and Bukovica as a result of the project. More details are given in the Biodiversity Action Plan (BAP). One of the key mitigations is the design and construction of settlement ponds at the lowest point of landfill to ensure that construction runoff is captured and treated appropriately before it reaches Mala Rijeka. The settlement ponds will be designed according to the appropriate engineering specification (see TSF project report, water balance).

5.4 WWP.04 – Water storage

Background

The water demand is variable and therefore it is necessary to provide sufficient storage space to be able to ensure supply and to meet short term and long term high demand requirements.
Specific assumptions for sizing of storage facilities are given below, and may be subject to revision and changes through detailed design and selection of water infrastructure.

Actions

1. Raw water tanks are included in the Project, serving as primary storage for make-up water in the system.
2. The raw water tank will follow a construction sequence that includes site preparation, providing adequate foundations and dewatering as needed, lining, placing the tank and installing accessories and corrosion protection.
3. A potable water tank is required which should have capacity to provide enough water to cover short-term supply peaks ie. in the order of days taking into account maximum shelf life for drinking water;
4. The potential supply-demand imbalance and ESIA obligations require the use of recycled water from settlement ponds. Recycled flows must be able to meet dust suppression requirements.
5. At least two fire water storage tanks are needed, one at VPP (one of the settlement ponds of former mine) and the other at Rupice.
6. Pond capacities should be designed to have effective storage and reuse, however it is accepted that extreme rainfall events have potential to exceed capacity, therefore storage tanks cannot be designed to attenuate all runoff and surface water (for example for sediment control). Ponds will be shaped to facilitate settling of suspended solids, and culverts will be used to minimize disruption of existing drainage paths. Slope levels and bank heights must be designed to allow for sufficient water storage and adequate water release during wet conditions.

Table 5.4: Minimum requirements for key water storage facilities	
Item	**Minimum storage**

Raw water supply to treatment plant	1 day
Potable water	2 days
Fire water	120 m^3

5.5 WWP.05 – Discharge Water Management

Background

Treatment systems consist of:

- Sediment control of contact water so that water may be either discharged or recycled as per water operational requirements.
- Potabilization includes treatment of water for household use (in accordance with the World Health Organization guidelines).
- Waste water treatment through STP; and
- Oily water and acidic rock drainage treatment plant

Water that has been treated and is of suitable quality for release into the environment is called controlled release of water. It is important to note that the Project has undertaken not to use natural dilution in receiving watercourses as a means of reducing potentially harmful pollutants. The range of discharges from project activities is varied and may include the following classes:

- Non-contact water – runoff that is not seriously affected and comes into contact only with low-risk catchments;
- Effluent for treatment – treated water that can be discharged;
- Excess Water for Reuse – Retention of water for recycling is an integral part of water balance, extreme storm events are predicted to lead to overflows and managed releases of recycled water kept in storage;
- Grey water - the term grey water is useful to take into account, because it represents a separate class of water from black water or sewage with an undoubtedly greater possibility of reuse, because it requires less treatment and sanitary control. However, this possibility can only be realized if the grey and black water systems work separately;
- Wastewater- from toilet blocks, personnel ablutions water and other sanitary waste flows which may include laundry facilities and food preparation facilities.
- Water impacted by acid rock drainage – mine water and seepage water with potentially low pH will be generated from stockpile and form “contact water”. Control schemes are designed for this form of drainage to meet extreme weather conditions in terms of sufficient storage capacity to reduce peak flows and an active lime treatment system (low density) to neutralize water and sludge deposits, majority of metals; and
- Process water - requires separate treatment from other flows of discharged water due to its chemical origin, which may be incompatible with functioning of other systems (toxic shock).

Further controlled discharge flows include dewatering from the mine. Dewatering options are identified as:

- Reuse and recirculation of water in the mine;

- Infiltration back into the mine system; and

Estimated dewatering discharge requirements are equal to a flow of approximately 750 m^3/day.

Construction phase and operation phase sewage flows require treatment to meet discharge criteria as outlined below. It is necessary to test the quality of this water at least twice a year after treatment.

Table 5.5: IFC guidelines for treated sanitary wastewaters

Pollutant	Unit	Guideline value
pH (acidity)	SU	6 – 9
Biological Oxygen Demand (BOD)	mg/l	30
Chemical Oxygen Demand (COD)	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oils and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	per 100 ml	400

Actions

1. Treatment specifications for other wastewater flows should be designed to protect water quality without dilution. References for environmental water quality criteria are set out in the Basis of Design (WAI, 2021) which will be updated as part of the legal register process.

5.6 WWP.06 – Water balance

Background

Water use during the construction and exploitation/operations phases is presented in the Project Basis and shows how different types of water can interact and determines water input-output-storage balance and areas for improved water efficiency or additional capacity and operational flexibility.

Actions

1. A demand analysis and detailed water balance was developed during the detailed design and construction phases, and will be updated after commissioning and during the operations phase to ensure that there is sufficient water to meet demand and that systems are operating within their optimal capabilities, as well as to ensure sufficient storage.

5.7 WWP.07 – Water Accounting

Background

The variety of water classes and potential water limitations during seasonal and peak activity periods require consideration of recycling and/or alternative sources and promote the use of a project water accounting system. The system would consist of:

- Monitoring and measuring the water balance
- Assessment of actual water use compared to design
- Development of a recirculation system that promotes higher efficiency,
- Annual assessment and analysis of water use demand and improving water efficiency by promoting higher efficiency and ensuring adequate water retention or capacity to meet demand estimates.

Actions

1. The Project will develop and maintain control of water use in accordance with the Project's EMP system, which will include relevant policies, these will include key indicators measured and recorded for each functional area (e.g. processing plant, tailings storage facility, paste backfill storage etc.) measurements and records. Key parameters will be monitored at the appropriate characterization level:

- Water abstraction rate;
- Water recycling rate;
- Water storage rate;
- Net consumption rate (calculated for water losses: evaporation, dust suppression, etc.);
- Water collection rate; and
- Water quality indicators.

2. It is assumed that a framework water account has been established and monitored by Eastern Mining. All necessary corrective measures have been implemented in the contract with the subcontractor.

5.8 WWP.08 Specific operational requirements for water efficiency and water management

Background

Detailed operational water requirements, including a control and training scheme, are essential to the operation of the site's drainage system itself, which may consist of a series of settlement ponds, dams and weirs to ensure optimal storage and drainage of surface flows.

Additional operational procedures are recommended for use of potentially quality water resulting from operations such as dewatering.

Actions

1. Runoff and discharge control and regulation of water from the drainage system.
2. Monthly water consumption goals are set by the operator in cooperation with the contracted mining company. They will be based on consumption data for previous month and construction activities planned for current month.
3. Eastern Mining has established procedures to monitor usage and status of potable and sanitary water on a daily basis and will act in event of unusually high or low consumption. This includes system walk downs to check for leaks, researching and identifying high water users and other water conservation initiatives as appropriate.
4. Eastern Mining will ensure that, where appropriate, grey water and black water recycling measures are installed and properly maintained to ensure maximum benefit and reduce water demand.
5. Where possible, clean non-contact water will be reused for low-quality practises, such as dust suppression, provided it meets appropriate water quality criteria.

5.9 WWP.09 – Operational monitoring (not environmental)

Background

Water demand will be continuously measured and monitored. Eastern Mining will estimate monthly usage needs, review their usage on a monthly basis and compare it to the estimate.

For all distribution pipelines and equipment, an inspection regime has been established to visually check for possible leaks.

Actions

1. Regular quality testing will be performed on the water distribution network and procedures have been established for periodic water quality sampling of all drainages within their facilities in order to determine the hydrocarbon/contaminant content. Water must meet the requirements of relevant legislation, standards and guidelines. Sampling will monitor levels of BTEX, phenol, gasoline, diesel, fuel oil, kerosene, heat transfer fluid, transformer oil, lube oil and hydraulic oil.

2. Whenever possible, waste water will be reused or recycled. This should be set out in the development plan as part of the Project (Construction Environmental Management Plan) which is responsibility of mine construction company and which will establish procedures to monitor any greywater and blackwater flows at the site. They will also undertake water quality testing of recycled greywater and blackwater to ensure compliance with legal requirements, standards and guidelines.

3. Adequate design, construction and operations controls should be defined to avoid spillage of treated raw and recycled water.

4. Maintenance activities that require drainage of water from pipelines or equipment are undertaken so that the drainage is collected and disposed of in appropriate facilities.

5. Water quality is regularly monitored for compliance with relevant storm water quality standards prior to release of collected surface water. Extreme rain events that exceed tank capacity are expected to be sufficiently diluted and not affect natural watercourses if overflow occurs. The tanks will be shaped to facilitate the settling of suspended solids.

6. Groundwater levels in relation to possible inflow into the underground mine require monitoring. Piezometers have shown rapid responses to precipitation and seasonal events (snow melt), indicating that some rapid infiltration and recharge mechanisms may exist. Water level and groundwater quality monitoring should be maintained during mining to assess hydraulics, indications of potential inflow, and development of water quality changes as a result of mining in groundwater system.

5.10 WWP.10 – Permits and authorizations

Background

The key authorizations relating to water management are listed below. Adriatic Metals will be responsible for obtaining permits, and responsibility of subcontracting companies will be to to maintain operations proficiently so as to maintain the authorisation:

- Permit for water abstraction (temporary) required for drainage and water supply and discharge.
- Pumping Permit along with Memorandum of Understanding to confirm permanent distribution of supply.
- Wastewater discharge permit
- Annual data required to calculate the payment of fees for water usage and wastewater discharge.

Table 5.6. Obtained water permits

Title of consent	Number	Date of issue	Authorized institution
Decision on water consent: For the main project of collection, treatment and discharge of polluted rainwater - Rupice	05-21-05535-1/22	21.06.2022.	ZD canton
Decision on water consent: For the main project of collection, treatment and discharge of polluted rainwater - Rupice	UP-1/21-2-40-543-7/21	28.12.2021.	Sava River Watershed Agency
Decision on water consent: For processing plant and refining	UP-1/21-2-40-604-3/21	20.01.2022.	Sava River Watershed Agency
Decision on water consent: For Main project of water supply and sewerage installation Veovača I-Tisovci I Veovača II	05-21-05901-1/22	20.06.2022.	ZD canton
Decision on water consent: For construction of the Rupice water supply system	02/3-19-2-207/22	15.06.2022.	Municipality of Vareš
Decision on water consent: For Rupice water supply system	02/03-19-5-692-1/22	01.06.2022.	Municipality of Vareš

Actions

1. Act in a way that favors environment protection, and especially take measures to prevent water contamination and protect water resources;
2. Any discharge into environment must comply with requirements specified in the approval for given activity;
3. All wastewater must be treated before discharge;
4. All water consumption/abstraction/pumping must be measured and monitored;
5. All data related to the water resources management must be submitted to legal authority;
6. All water consumers must contribute to the investment and maintenance of national hydraulic facilities, in proportion to their water consumption;
7. In case of unauthorized use of water, penalties will be applied;
8. Water permits may be withdrawn at any time upon failure to meet permit requirements;
9. The data required to calculate the amount of fees related to water use and waste water discharge must be submitted to the competent authority each year before January 31;
10. Water abstraction fees must be paid based on consumption;
11. The fee for discharged water is based on total amount discharged and type and amount of pollutants in the discharged water; and
12. Keep the documentation required to justify usage of water and discharge of wastewater during inspections and audits that can be carried out at any time.

5.11 WWP.11 – Data Management

Background

The contracting company is responsible for ensuring that the data quality is acceptable, reliable and meets the Project's standards for repeatability and certification.

Recorded data on water quality sampling, water use, water discharges, compliance requirements, water estimates and water recycling, together with other hydrometric data, including control levels of major storage facilities, discharge regimes and water accounting systems, must be recorded and updated in the appropriate database data that allows quick access and verification.

5.12 WWP.12 – Risk, Contingency and Emergency Response

Background

A formal water risk identification process has not been undertaken and is recommended to be developed as part of the ESMS (before the construction phase).
The key thematic areas emerging as water risk issues for the Project are listed below (not in any ranked order of risk):

- Supply security - confirmation of supply source under a variety of hydrological and demand scenarios;
- Drought estimation and determination of contingency measures;
- Vulnerability assessment for surface water, groundwater and downstream intakes, including spill modelling, source contamination risk assessment and acid rock drainage/tailings disposal dam breach assessment;
- Further systematic water balance and modelling to determine the risk of exceeding deadlines and compliance with requirements;
- Efficiency management - although low to moderate reliance is given to re-use of water to supply various operational requirements with moderate to low quality requirements. A reliable water efficiency assessment should be undertaken to confirm the recycling and re-use assumptions; and
- Flood risk control and operational control of surface water.

Actions

1. Minimizing interruptions/outages is of utmost importance for continuous uninterrupted operation. After the risk analysis, it is necessary to develop a contingency plan in order to specify necessary aspects of water infrastructure that require additional savings, additional capacity or conceptual alternatives, i.e. additional treatment or storage.
2. Emergency response plan, eg response to flood risk (largely mitigated in design by sizing drainage infrastructure for high-intensity/low-frequency events), leaks detection and/or spills of contaminated liquids, or contingencies to maintain water supplies during dry periods.

3. Flood risk and simulation of extreme events - it is recommended to carry out modelling, including a time-based 2d analysis of climate change effects together with emergency response process including flood timing, analysis of egress and access roads, analysis of critical infrastructure and assets.
4. Contamination and loss of protection - mainly related to the risk of acid rock drainage spillage from collection tank and fuel storage facilities.
5. Sufficient funds should be allocated to ensure training, including outreach to communities using the same water supply source.
6. Community-led programs should be considered in the Environmental and Social Management Plan, which should set goals and monitor progress in achieving community water supply systems, noting the generally poor level of sanitation, infrastructure and water supply assurance during dry season.
7. Appropriate methods should be applied to monitor performance of the assistance programme that may also include indirect support to local government, utilities and development agencies through the training program and campaign to raise awareness in planning and provision of water supply and sewerage in the community.
8. Ensure that there is training and communication to inform employees about the Project, and commit to water conservation practices that this species will gain from forest restoration work, and as such monitoring is unlikely to be necessary.