BALKAN MINERAL AND MINING EAD

ZIP: 2087 Chelopech Village, District OF Sofia

NON-TECHNICAL SUMMARY

of the

ENVIRONMENTAL IMPACT STATEMENT

for the Investment Project Proposal

for

Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of Khan Krum Gold Deposit, Krumovgrad

Sofia

December 2010

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Introduction

This Environmental Impact Statement (EIS) for the Investment Project Proposal for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit near Krumovgrad ("the Krumovgrad Gold Project") is prepared on the basis of Letter Ref. OBOC-1402/24.06.2010 from the Ministry of Environment and Waters (MOEW) (Appendix 1).

The EIS is compliant with the requirements under art. 96 par. 1 of the Environment Protection Act ("EPA") (SG issue 91/25.09.2002, last amendment in issue 46/2010) and art. 12 par. 1 and art. 14 par. 1 of the Regulation on the Terms and Procedures for Conducting EIAs ("the EIA Regulation") (SG issue 25/2003, last amendment in SG issue 80/2009).

The decision to conduct an EIA of the Krumovgrad Gold Project was taken after completion of the procedures under art. 4 of the EIA Regulation.

In accordance with the requirements under art. 95 par. 2 and 3 of the EIA, the EIS has bee scoped in compliance with the provisions of art. 10 par. 1 of the EIA Regulation. The EIS scope is compliant with the requirements under art. 10 par. 3 of the EIA Regulation. The EIS and the upgraded EIS scope considers all the directions and recommendations of the MOEW pertaining to the preparation of the EIS, which were provided in writing in Letter Ref. OBOC-1402/06.10.2010, as well as the recommendations of the appropriate authorities, organisations and affected communities received as part of the consultation process under art. 95 par. 3 of the EPA and art. 9 par. 1 of the EIA Regulation.

Dango Project Consult EOOD ("Dango") has been commissioned by Balkan Mineral and Mining EAD ("BMM") to prepare this EIS. Sofia The authors of the EIS are independent experts who meet the requirements under art. 83 par. 1 and 2 of the EPA (last amendment in SG issue 61/6.08.2010), which is certified with appropriate declarations included in the EIS.

1. I. General

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2. Justification for the Proposed Development and Main Objectives of the Project

The Environmental Impact Statement (EIS) for the Investment Project Proposal for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit near Krumovgrad ("the Krumovgrad Gold Project") is required under the Environment Protection Act ("EPA") and the Regulation on the Terms and Procedures for Conducting Environment Impact Assessments ("the EIA Regulation").

According to art. 22 par. 3 of the Underground Resources Act ("URA"), promulgated in SG issue 23/12.03.1999, amended in SG 61/06.08.2010, the Investor has prepared and provided a Mining Waste Management Plan as an integral part of the proposed development. This plan is prepared under the terms of the Regulation on the Specific Requirements to Mining Waste Management, SG issue 10/06.02.2009, and the Underground Resources Act ("URA").

The EIS also incorporates the Assessment of the Compatibility of the Proposed Development with the Scope and Objectives of Protection Set for Rhodopes-East Protected

Site, which is required under the Regulation on the Terms and Procedures for Assessment of the Compatibility of Plans, Programs, Projects and Investment Proposals with the Scope and Objectives of Protected Sites (2007, last amendment in 2010).

The EIS conforms to Bulgaria's current primary and secondary environmental legislation.

The EIA of the Krumovgrad Gold Project aims to define, describe and assess the direct and indirect impacts on the human health and the environmental media including biodiversity and its elements, soil, water, air, climate, landscape, subsurface environment, natural sites, diversity of minerals, and their interactions.

This EIS considers construction, operation and closure stages of the Project. It also considers alternative options with regard to project technology and location as well as the "zero" option, i.e. that the project does not proceed. Recommendations have been made to reduce the impact and to resolve possible environmental issues arising from the implementation of the Project and its closure thus ensuring protection of human health and the environment and providing sustainable municipal development.

3. Location of the Project - Physical Characterisation, Footprint, Distances to Protected Sites and Other Elements of the National Environmental Network

In terms of Bulgaria's current physiographic (geomorphic) division, the project site located within the East Rhodopean sub-region, which is part of the East Rhodopean-Strandzha region. The Krumovgrad District is characterised by a moderate hilly to low-mountainous topography. It is crisscrossed by many valleys and ravines, most of which are completely or nearly dry during the dry months of the year. Despite the low altitude above the sea level (450 to 750 masl.), the area is dominated by sediments and volcanics that are susceptible to erosion, and characterised by large deforested areas and significant precipitation during the cold season, which explains the rugged landscape of the area.

The main site required for the implementation of the Project is located some 3 km south of the town of Krumovgrad in the Municipality of Krumovgrad, which is part of the District of Kardzhali. (Figure 1).

The entire municipality lies within the Eastern Rhodope Mountains. The topography is classified as hilly or low-mountainous.

The Krumovgrad Municipality borders on the Ivailovgrad and Madzharovo Municipalities to the east, the Kirkovo and Momchilgrad Municipalities to the west, the Kardzhali and Stambolovo Municipalities to the north and the Republic of Greece to the south. The total area of the municipality is 843.320 sq. km.

The municipal centre, Krumovgrad, is 360 km from Bulgaria's capital city of Sofia and 48 km from the city of Kardzhali, which is the administrative centre of the district. The closest border check-point is Kapitan Andreevo (to Turkey), which is 130 km north-east of the town. This year has opened a new border checkpoint Slaveevo-Kyprinos near Ivaylovgrad. The nearest railway line is 32 km west of the site in the town of Momchilgrad. Krumovitsa River past the town to drain into the Arda River between the Studen Kladenets and Ivailovgrad water reservoirs.

Some 48.8% of the entire area of the municipality is occupied by forests, 47.8% – by agricultural lands, 2.2% – by towns, villages and hamlets, and 1.2% – by surface water bodies, transport and other infrastructure.

Figure 1. Krumovgrad Municipality

The sites providing statutory environmental protection in the Krumovgrad municipality are: Vulchi Dol (reservation), Dzhelovo (protected site), Oreshari (protected site), Momina Skala (protected site), Ribino (protected site), Vodopada (natural landmark), Peshteri (natural landmark). Al of these are at distances of over 5 km from the project area. The Dayma sage tea habitat (a natural landmark) is located in the southwest some 3 km away from the open pit.

The entire project area lies within the footprint of Natura 2000 protected site known as **BG 0001032 Rhodopes East** under Council Directive 92/43 on the Conservation of Natural Habitats of Wild Fauna and Flora.

BG 0002012 Krumovitsa, which is a protected site under Council Directive 79/409/EEC on the Conservation of Wild Birds, is in close proximity to the project area. Both protected sites were established with Government Decree 122/02.03.2007.

4. Description of the Investment Project Proposal

4.1. Project Overview

The project proposal considers mining and processing of gold ores from the Ada Tepe prospect in the Khan Krum Deposit, Krumovgrad Municipality, District of Kardzhali

The main activities considered herein are:

- Open pit mining of auriferous ores;
- Construction of production facilities for processing of the ore to gold concentrate (a process plant);
- Construction of a mine waste storage facility/facilities;
- Construction of project infrastructure - roads, water and power supply services, materials storage facilities, etc.

The Khan Krum deposit includes several prospects: Ada Tepe, Kuklitsa, Kupel, Sinap, Surnak and Skalak.

The Ada Tepe prospect, which is under consideration, is located approximately 3 km southwest of the town of Krumovgrad and in close proximity to the Krumovitsa River.

BMM EAD has carried out extensive and detailed exploration works to identify gold-silver mineralisation of a style and geometry which is amenable to open pit mining. The most intensive resource definition work has been performed on the Ada Tepe portion of the Khan Krum Deposit; therefore, the project proposal considers only this prospect. Should economic resource determinations be made for other prospects that make up the Khan Krum Deposit, these prospects will be subject to and independent EIA and assessment of their compatibility with the the scope of protection of the East Rhodopes Protected Site.

4.2. Areas Required over Project Construction, Operation and Closure

The EIS contains maps and plans showing the open pit site, the alternative siting options for the ore processing plant, the mine waste storage facilities, project water sources, topsoil stockpiles and associated project infrastructure.

Two project general siting options have been considered. Each option has a different footprint as follows:

Option 1 relates to an overall site area of 85 ha. of land and includes: an open pit (Ada Tepe), a ROM ore stockpile, a facility for the production of gold-silver concentrate (process plant), an Integrated Mine Waste Facility, a soil stockpile, water collecting facilities, roads, and a proprietary abstraction well.

The entire area required for the implementation of the proposed development is state controlled forest fund land. It is included in the footprint of the future concession area.

Option 1 relates to an overall site area of 136 ha. of land and includes: an open pit (Ada Tepe), an ore stockpile (ROM pad), a facility for the production of dore gold alloy, a waste rock stockpile, a tailings management facility ("TMF") and a water storage dam for site fresh water supply.

The area required for the implementation of the proposed development is state controlled forest fund land, municipal and private properties. This area is also included in the future concession.

No additional land will be required during the construction stage.

The closure and rehabilitation stage under both options will extend to all disturbed lands.

4.3. Project Implementation Stages

The project design will be based on solutions that minimise negative environmental impacts from emissions of dust and gas, waste water, solid waste, noise and vibrations on the environmental media, and also ensure rational use of land.

Construction and engineering works are scheduled to commence in the beginning of 2012 and be completed within 24 months, i.e. by the end of 2013, with approximately 200 to 300 positions being created at various stages over this phase. The construction sequence is planned as follows:

- Construction of a site access road connecting to the existing road network, electric power supply and telecommunication services;
- Clearing of the grass and tree vegetation from the sites designated to accommodate the open-pit, the mine waste facility, the ore processing plant;
- Removal and stockpiling of the soil cover for reuse during the closure stage;
- Preliminary removal of overburden sufficient to provide construction material for the base of the mine waste facility and to enable commencement of the mining operations;
- Construction of the process plant;
- Construction of a proprietary fresh water abstraction well;
- Preparation of the ROM ore pad area.

The construction stage will also include construction of site roads to ensure reliable all-weather access for heavy-duty off-road trucks, as follows:

- Site roads between the open pit, the ROM pad, the process plant and the mine waste storage areas;
- Site roads connecting the facilities on the process plant site.

Operation

The Ada Tepe mine plan currently being considered is based on an 850,000 tpa operation extending over a 9 year period (138 tph at 8,000 operating hours per year).

The EIS shows the pit development contour and the access to the mineral resource.

It is expected that approximately 230 permanent jobs will be maintained during the operation stage. The mine will operate on a continuous (three-shift) basis 330 workdays, or 8,000 work hours, in the year.

Decommissioning and Closure. Rehabilitation

The decommissioning and rehabilitation of the mine operation can be successfully achieved in a manner that satisfies the following objectives:

- Establishment of a beneficial afteruse;
- Protection of public health and safety;
- Mitigation or elimination of environmental damages and provision of sustainable environmental development;
- Minimisation of any adverse social and economic impact.

The long-term objective of the closure strategy is that BMM EAD leaves the site in a condition that meets the following criteria:

- Physical stability – any remaining structures must not be an unacceptable hazard to public health or safety, or to the immediate environment;
- Chemical stability – any remaining materials must not be a hazard to future users of the site, or to the public health, or to the immediate environment; and
- Biological stability that enables establishment of an appropriate land-use that is harmonised with the adjacent areas and with the needs and desires of the community.

The closure stage is expected to require approximately 50 permanent job positions.

4.4. Production Process. Main Process Stages

The process has the following main stages:

- Ore mining;
- Ore crushing and grinding, flotation;
- Mine waste disposal.

4.4.1. Mining

The ore at Ada Tepe will be open-pit mined. The mining method will be a conventional open cut drill, blast, load and haul operation.

An explosives manufacturer will supply the blasting materials. No explosive magazine will be constructed and operated on the site. Explosives will be safely delivered from the explosives manufacturing plant to the minesite by a designated MMU vehicle (mobile manufacturing unit). This vehicle will deliver the products to the pit blasting area, where they will be mixed to form explosives and immediately poured into the blast holes.

All rock material without economic gold and silver values and therefore classified as waste will be hauled to a newly designed Integrated Mine Waste Facility (IMWF), which will store both dewatered process tailings and waste rock from mining.

Sprinklers and water trucks will be used to control and reduce dust emissions from the mining activities in the open pit mine and haulage on the roads between the mine and the ROM pad and stockpiles. A protective green belt will be maintained around roads and operational areas

4.4.2. Ore Processing

The EIS discusses the flotation process flowchart, which includes the following main stages:

Crushing

A dust collection system is planned to be installed to ensure dust collection at the ore transfer points and treatment by a bag filter.

The crusher product will be discharged onto a fully enclosed inclined belt conveyor leading to the grinding section.

Grinding

The grinding section of the plant will be located inside the main plant building. The crushed product will be ground using a three-stage wet grinding circuit (no dust emissions are expected). It will report to a screening section for removal of any trash, mostly wooden and plastic waste, from the ore feed.

After the screening section, the ore feed slurry, which is a mixture of ground ore with water, will be advanced to a gravity separation circuit for recovery of part of the free and exposed gold particles. The recovered gravity concentrate will be combined with the final flotation concentrate to form the final product of ore processing. The discarded slurry from this first gravity separation stage will form the feed to the flotation circuit.

Flotation

Flotation will be the main process for recovery of the gold and silver values from the ore. The discarded slurry from the first gravity separation stage will form the feed to the flotation circuit. The process will be performed in flotation banks, where the recovery of the payable components from the waste rock is achieved by conditioning the surfaces of mineral grains based on the different surface chemistry of the gold and rock particles. A direct selective flotation flowsheet consisting of one rougher stage, three cleaner stages and two scavenger stages is considered. Different reagents will be used in the flotation process: copper sulphate, potassium amyl xanthate, dithiophosphate, frother, and sodium silicate (also known as water glass).

The Au and Ag recoveries are expected to be circa 85% and 70% respectively.

Gravity Separation

The process involves selective separation of the lighter from the heavier products in the process based on their different densities. It is usually performed on separation tables using water, which washes the light particles while the heavy ones become attached to the table surface and are advanced to one of its ends by forward/backward motion of the deck. Centrifugal machines are also utilised in gravity separation to enhance the gravitational force experienced by feed particles thus enabling separation of materials within narrow size ranges. The project proposal for Krumovgrad considers the use of centrifugal machines for gravity separation due to the relatively small size of the gold particles in the Ada Tepe ore.

It is possible to include a second gravity separation stage downstream of the flotation circuit to improve final concentrate gold grades if this becomes a requirement from marketing point of view. This stage is edged out in dotted line on the process flowchart. The waste from the gravity separation process will be an interim product, which will be fed back to the regrinding ball mill to further expose the gold particles.

Dewatering

The final concentrate will be dewatered and packaged for shipment to a custom smelter for downstream processing to end metals.

The final tailings will be thickened to a final pulp density of 56% solids. The supernatant water from this stage will be collected in a tank for re-use in the process plant. The thickener underflow will be pumped into a tailings delivery pipeline for deposition either into the IMWF cells (Option 1) or into the TMF (Option 2).

4.4.3. Ancillary Plants and Facilities

Additional ancillary plant and facilities will be constructed to ensure the normal operation of the main process circuits.

1) *Xanthate Mixing Plant*
2) *Sodium Silicate (Liquid Glass) Delivery Plant*
3) *Copper Sulphate Mixing Plant*
4) *Dithiophosphate Mixing Plant*
5) *Frother Mixing Plant*
6) *Flocculant Mixing Plant*

4.4.4. Final Product. Qualitative and Quantitative Characterisation

The end product is gold-silver concentrate. It will be either higher gold grade concentrate or lower gold grade concentrate. The expected annual production rate is about 4,000 tpa for higher gold grade concentrate (500 g/t of gold). The expected annual production rate is about 10,000 tpa for lower gold grade concentrate (200 g/t of gold). The quality of the concentrate will depend on the market demands and the available downstream processing options.

4.4.5. Mine Rock and Tailings Characterisation. Management of Mining Wastes

The mining and processing operations will generate mine rock (waste rock from mining) and flotation waste (flotation tailings).

The rock material with no economic gold and silver values is classified as waste rock, which is generated in the process of exposure/access to the ore body.

The flotation tailings are the waste material rejected from the flotation plant after the recoverable valuable minerals have been extracted from the ore feed. The flotation tailings will be dewatered prior to their disposal in the IMWF (Option 1). That will enable co-disposal of tailings and waste rock in the IMWF cells.

The proposed method for co-disposal of mining wastes has the following advantages:

- Reduces the area required for disposal and storage of mining wastes;
- Better utilises the storage capacity of the waste disposal facility;
- The reclaimed water from the tailings will be recycled back to the Process Plant, therefore significantly reducing any losses from evaporation;
- Reduces the risk of spillages during the tailings delivery process;
- Reduces the risk of emergencies resulting in a major uncontrolled discharge during/after a storm event;
- The IMWF drainage will gravity report to two collecting sumps and then pumped to the retention pond;
- Reduces maintenance and closure costs.

The IMWF has a total design footprint area of 41 ha.

The IMWF design footprint lies entirely on state-controlled forestry fund land.

BMM EAD has prepared an Integrated Mine Waste Management Plan, which is attached to this EIS as a separate document. The preparation of this Plan is a requirement under art. 22d par. 2 of the URA.

The Plan contains characterisation of the mine wastes and classification of the proposed mine waste facility. Планът е представен в Приложение към ДОВОС.

The mine rock composition has been compared against the average crustal abundance. Except for the fresh host rock samples, all other rock samples contain elevated concentrations of SiO_2 compared to average crustal abundance. Except for the iron concentrations, the results of the element analysis are similar to the average crustal abundance.

4.4.6. Soil Stockpile

Prior to construction, all areas planned for construction or mining will be stripped of topsoil, which will be stockpiled for further use at the closure and rehabilitation stage. Topsoil layers are generally low in humus and very shallow (less than 10 cm) over the areas to be affected by the operations; therefore, the subsoil layers will also be stripped to ensure sufficient stock of soil materials to meet closure requirements.

A soil stockpile with an area of 2 ha will be set up near the Ada Tepe open pit.

4.5. Project Raw and Other Materials, Natural Resources and Energy Sources

The project will require supply of sufficient quantities of raw materials for the construction, operation and closure of the open pit, the process plant, the IMWF and the associated infrastructure.

Raw and Other Materials Required for the Construction Stage. Qualitative and Quantitative Characterisation

The main construction materials (bricks, concrete, cement, lime, structural steel and steel sheets, reinforcement bars, window/door framework, glass etc.), and the fuel needed for the construction equipment will be purchased in quantities and with quality as specified in the design.

Raw and Other Materials Required for the Operation Stage. Qualitative and Quantitative Characterisation

Raw Materials

The main raw material that will be used in the project is the auriferous ore from the Adá Tepe open pit.

Approved reserves and resources at Ada Tepe prospect, Khan Krum deposit

Zone/Prospect	Category	Ore	Grades		Metals	
		t	Au, g/t	Ag, g/t	Au, kg	Ag, kg
Probable Reserves	122	1,493,000	7.29	4.31	10,892.6	6,440.6
Measured Resources	331	7,292,000	2.37	1.03	17,294.0	7,503.0
Total Ada Tepe		8,785,000	3.21	1.59	28,186.6	13,943.6

The average assay grades of the mineable ore are given in the table below:

Average Concentration of Major and Trace Elements in the Ada Tepe Ore, Khan Krum Deposit

Prospect	Au	Ag	Co	As	Fe	Cu	Zn	Pb	Ni	Cr	Mn	Cd
	g/t	g/t	g/t	g/t	%	g/t	g/t	g/t	g/t	g/t	g/t	g/t
Ada Tepe	5	2	14	145	3.1	10	34	<5	43	250	509	<5

Materials

A licensed explosives manufacturer will supply the blasting materials.

The reagents that will be used in the ore processing must be provided with Safety Data Sheets (SDS), which should contain information about:

- chemical composition;
- emergency response;
- emergency phone;
- other information from the manufacturer.

The fuel used on the site must be certified for concentrations of lead, sulphur and other environmentally hazardous substances. The project considers storage facilities and tanks for storage of raw materials, intermediary products and products under normal operating conditions, and secondary containment arrangements for emergencies. The access to the storage areas will be restricted.

Natural Resources

In addition to the principal natural resource, i.e. the gold ore resources of the Ada Tepe prospect reported in the table above, the use of other resources will be required for the normal operation of the mine.

Two site water supply options have been studied:

Option 1. Installation of a proprietary fresh water abstraction well in the Krumovitsa River gravels where sufficient water resources are available and without any negative impact on the requirements of the local community. The option for installation of a proprietary fresh water abstraction well in the alluvial gravels of Krumovitsa River or Kessibirdere would provide 5 L/s to the site, which is sufficient to meet the project fresh water requirements. This Option will also require a one-off abstraction of about 100,000 m^3 of fresh water from the Krumovitsa River at the start-up of operations.

Option 2. Collection and storage of water from the Kaldzhik valley watershed into a small storage dam, which will normally be self filling from the catchment areas with occasional abstractions from the Krumovitsa River.

The economic, social and environmental studies and the data from hydrological and hydrogeological surveys, however, show that the first option (a proprietary fresh water abstraction well) is the most suitable one.

The expert investigation carried out by the Plovdiv-based Vodokanalproekt AD demonstrates that it is possible to abstract 5 L/s without affecting the existing drinking water abstractions supplying Krumovgrad and the nearby settlements. Currently, the Krumovgrad drinking water supply comes from 2 wells and a third one is on standby. The combined resource of the two lower rate wells is 32.4 L/s. The total amount required to meet the drinking water requirements of the town estimated at 20 L/s according to the Guidelines for the Design of Water Supply Systems. These figures clearly demonstrate that the project will not have a noticeable effect on the available resource. The combined project fresh water usage and public drinking water usage would total some 25 L/s leaving a free resource of 7.4 L/s without counting the third abstraction well, which would add further 29 L/s.

The project would require approximately 2,894,000 m^3 of water per annum from internal and external water sources (based on an annual precipitation forecast approximating the mean annual precipitation levels for the average precipitation year). The project considers that more than 98%, or an average of 2,830,000 m^3/year, of the total demand will be met from recycling (from internal sources). The estimated fresh water requirement for the process and the ablution facilities is 64,000 m^3/year.

<u>Construction</u>

No mining or processing operations will be carried out during the construction stage and the project will have the typical features of a large construction project.

The impact on surface water quality during the project construction means increased content of particulate matter (increased sediment flows). The strongly seasonal flow regime of the Krumovitsa River catchment is a naturally restricting factor for sediment impacts. During dry months there is little tributary flow to carry sediment. and in wet months the rivers are naturally high in sediment loads during periods of higher energy and flows but these loads are largely diluted by the large flow quantities.

Nevertheless, the potential sediment loads will be reduced as much as possible to minimise the impact of the project on the environment.

The following provisions have been made to minimise the risk from pollution of the surface run-off:

- Construct temporary surface interception drains to divert surface run-off from the construction sites;
- Construction of settling ponds to collect the waters containing high sediment level (soil and subsoil material) for precipitation of suspended solids prior to discharge into the receiving water.

Operation

Most of the surface runoff will be diverted from the project area by way of a drainage system which will prevent its contact with process related products, raw materials and waste.

The Ada Tepe Pit will collect seepage and runoff from the surrounding area and pump the water to an open pond, which will provide the process plant water requirements.

Two collection (drainage) sumps will collect surface runoff, seepage, and tailings water release from the IMWF area. The seepage from the IMWF and Ada Tepe sumps will report to a pond with a capacity of 100,000 m^3. Figure 2 shows the project water collection and treatment facilities.

The main facilities are:

- Runoff Storage Pond with a capacity of 100,000 m^3, which will collect seepage from Ada Tepe pit, IMWF and site runoff;
- Reclaimed Water Tank with a capacity of 390 m^3, which will collect the tailings thickener overflow;
- Fresh Water Tank with a capacity of 390 m^3, which will collect the fresh water supplied from the proprietary abstraction well.

Make-up water will be added to the Runoff Storage Pond from the Fresh Water Tank, which will be fed by the proprietary abstraction well to meet household and process demands. Water will be pumped from the Runoff Storage Pond to the Reclaimed Water Tank to provide the process water requirements.

The excess water from the Runoff Storage Pond will report to a Wastewater Clarifier, where it will be subject to additional clarification prior to discharge into the Krumovitsa River. The quality of the discharge from the Wastewater Clarifier will meet the allowable emission levels and will not derogate the river water quality. The discharged quantities of water will not change the river flow regime significantly as they are negligible compared to the river flows in both normal and extremely wet years. No discharges will occur in the first year of operation and in dry years.

The water from the Fresh Water Tank will be used:

- as make-up water, which will be added to the Reclaimed Water Tank;
- for reagents preparation;
- for household purposes.

The project considers that more than 98 % of the total demand will be met from recycling. The freshwater requirement will not exceed 5 L/s.

Effluents from restrooms and bathrooms will be collected using a separate collection sewage system and delivered to a domestic wastewater treatment plant. The treatment process will include passive, chemical and biological treatment stages. The treated effluent will report to the Wastewater Clarifier prior to discharge into the Krumovitsa River.

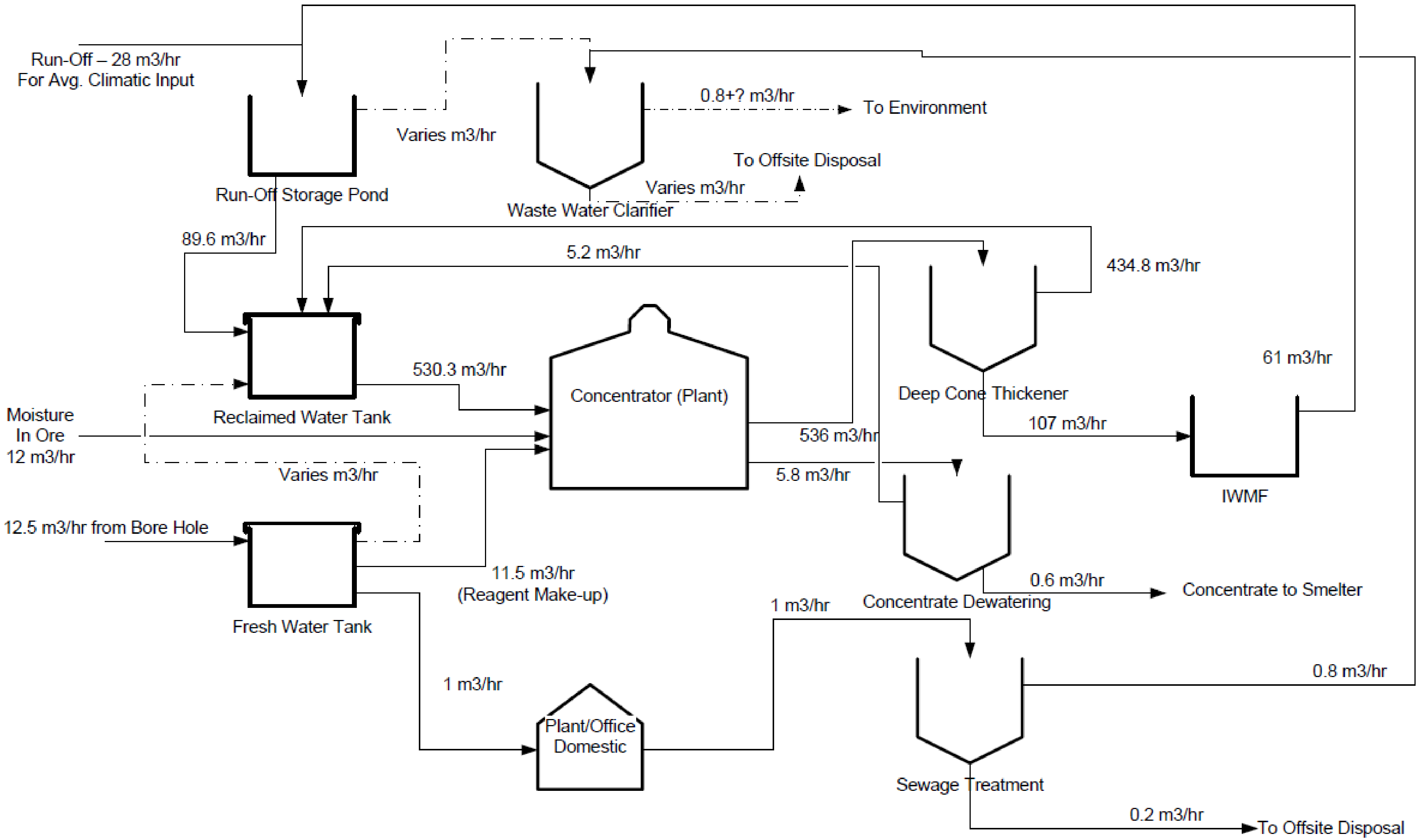
Run-Off – 28 m3/hr
For Avg. Climatic Input
Run-Off Storage Pond
Varies m3/hr
Waste Water Clarifier
0.8+? m3/hr
To Environment
To Offsite Disposal
Varies m3/hr
89.6 m3/hr
5.2 m3/hr
434.8 m3/hr
Reclaimed Water Tank
530.3 m3/hr
Concentrator (Plant)
Deep Cone Thickener
61 m3/hr
107 m3/hr
IWMF
536 m3/hr
5.8 m3/hr
Moisture
In Ore
12 m3/hr
Varies m3/hr
12.5 m3/hr from Bore Hole
Fresh Water Tank
11.5 m3/hr
(Reagent Make-up)
Concentrate Dewatering
0.6 m3/hr
Concentrate to Smelter
1 m3/hr
1 m3/hr
Plant/Office
Domestic
Sewage Treatment
0.8 m3/hr
0.2 m3/hr
To Offsite Disposal

Figure 2.

Closure

In accordance with the closure objectives, the water management will further assist in ensuring the physical and chemical stability of the site and its successful rehabilitation taking into account any land use designations. It is important to complete the following tasks as part of the water management process:

- Consider an option for a wet closure of the open pit provided that the waters have adequate quality;
- The IMWF drainage system established during the construction stage is retained as a permanent system at closure to provide efficient post-closure water management.
- Monitor IMWF drainage flows. The preliminary investigations indicate that the drainage waters will not be polluted and can be discharged into the Krumovitsa River.

The water monitoring over the closure stage is expected to confirm that the rehabilitated areas will not be sources of environmental pollution.

Use of Energy Carriers. Types and Quantities

The main energy carriers that will be used are electric power and diesel fuel.

- **Electric power**

Electric power for the project will be supplied by the NEC-EAD and the power source will be the Krumovgrad substation 110/20kV. NEC EAD will supply electric power to the project site via a single overhead line. A backup supply line will also be available. BMM will construct the site substation and the site distribution system.

Most of the electric power will be used for ore crushing and grinding, and the remainder will be used in the other process stages, the offices and other ancillary facilities. The total installed capacity will be 7.5 MW and the maximum rate of consumption is expected to be 5.1 MW.

- **Diesel fuel**

Diesel fuel will be used by loaders, haul trucks, utility vehicles, mobile mining and ancillary equipment. Liquid fuels will be delivered in tanker trucks. The diesel fuel will be stored in two on-site storage tanks, each with capacity of 50 m^3, located a safe distance from the open pit. The sulphur content in the diesel fuel will be below 0.2%.

5. Description of Siting and/or Process Alternatives Together with Justification for the Selection Made Taking into Account the Impact on the Environment Including the "Zero" Alternative.

Worldwide, mining techniques can be divided into two common excavation types: surface (open pit) mining and sub-surface (underground) mining.

The entire mineral resource of the Khan Krum deposit is found near the surface. Hence, underground mining would not be a practical and safe option for its extraction. Therefore, the project proposal considers open pit mining and the use of modern environmentally sound methods for mine waste management. The proposed options are limited to the alternative for open-pit mining of the Adá Tepe prospect of the Khan Krum deposit and the "zero" alternative, i.e. that the project will not proceed.

When considering the project design and siting options, the EIS takes account of the following:

- the ore mining method and the siting of the project facilities;
- water supply and treatment options;

- requirements for environmentally sound management of mine wastes.

The different options are analysed on the basis of the above considerations and the related environmental impacts. The preferred options and locations of the facilities for the investment proposal are selected from the *Best Available Techniques Reference Document on Management of Tailings and Waste-Rock in Mining Activities, BREF Code MTWR, 2004*). The reference document puts particular emphasis on waste minimization and improved physical and chemical stability. The investment proposal for the construction of the Ada Tepe project infrastructure, its operation and closure is made following the guidelines in the BREF document.

5.1. Mining Method Alternatives

According to BAT, there are two common methods that can be used to mine the deposit - open pit mining and underground mining *(BREF Code MTWR, section 2.1*)

Open pit mining (*BREF Code MTWR, section 2.1 and figures 2.1 and 2.2*) is used when deposits of commercially useful minerals or rock are found near the surface and the grades of the payable components (Au and Ag in this instance) are relatively low. The main disadvantage of this mining method is the formation of a new negative form in the landscape (open pit or borrow), which is a challenge to the rehabilitation of the environment after shut-down of operations. Additionally, another large landscape form may be created – a waste rock stockpile.

Underground mining *(BREF Code MTWR, section 2.1.2*) is used to mine higher grade deposits located at greater depths in the earth's crust. This method often requires backfilling of the mined voids to ensure maximum efficient extraction of the economic resource and improved stability of the surrounding rock thus preventing caving and surface subsidence. The underground mining option facilitates the management of mine wastes (flotation tailings and waste rock) as it involves partial reclaim and reuse of waste products as fill materials in the underground backfilling process. In the case of close-to-surface low-grade deposits (such as the placer deposits), this option is economically infeasible because the mine construction and operational costs are very high.

The ore at Ada Tepe will be open-pit mined. The mining method will be a conventional open cut drill, blast, load and haul operation.

5.2. Processing Alternatives

The EIS considers two potential process options for gold recovery from the ore:

- *Option 1:* Processing of the ore to gold-silver concentrate as the end product based on a combined flowsheet of flotation and gravity separation;

- *Option 2:* Processing of the ore to end metals (so-called dore bullion) based on a cyanide leaching process for extraction of Au and Ag.

Production of gold-silver concentrate (Option 1)

The Ada Tepe ore will be processed using a combined flotation and gravity separation flowsheet. The methods to be applied are in conformity with the BAT requirements.

Flotation will be the main process for recovery of the gold and silver from the ore (*BREF Code MTWR, section 2.3.1.5, section 3.3.2.2.2*), which will be performed in state-of-the-art flotation banks. A direct selective flotation flowsheet consisting of one rougher stage, three cleaner stages and two scavenger stages is considered. Highly efficient and extensively used reagents will be employed in the flotation process.

The flotation process will be combined with gravity separation to increase recovery efficiencies and maximize precious metals values in the final concentrate (*BREF Code*

MTWR, section 2.3.1.4). Gravity separation will be performed on separation tables (*BREF Code MTWR, section 2.3.1.4.3*) using water, which separates the heavy particles (rich in gold and silver) from the light particles in the rock. The final gold-silver concentrate will be dewatered and packaged for shipment to a custom smelter.

The tailings flow will be thickened in a radial thickener and the supernatant water (i.e. (thickener overflow) will be pumped back into the process via a process water retention pond. The thickened slurry (i.e. (thickener underflow) at 56% solids on average will be pumped into a tailings delivery pipeline for deposition into the Integrated Mine Waste Facility.

Cyanide leaching of gold (Option 2)

This option comprises a conventional cyanide process for gold and silver extraction (*BREF Code MTWR, sections 4.3.11.8, 4.3.15, and 5.3*), which includes consecutive process stages of leaching in a sodium cyanide solution and carbon adsorption, elution of loaded carbon and electrowinning of dissolved gold followed by filtration, drying and smelting of the cathode sludge to produce doré bullion. The available silver is recovered together with the gold.

Leaching and carbon adsorption. The leaching and carbon adsorption processes take place in several open topped tanks arranged in series – a CIL process (*Carbon in leach* – the carbon adsorbs the gold from the solution as cyanidation of the ore proceeds), or a CIP process (*Carbon in pulp* – the carbon adsorbs the dissolved gold after leaching). The dissolved gold and silver are adsorbed onto activated carbon granules, which are introduced in the train of process tanks.

Elution (carbon desorption) The loaded carbon is first washed with diluted hydrochloric acid and water, and then the adsorbed gold and silver are recovered by elution in an elution column using a 2% w/w stripping solution of sodium hydroxide (caustic soda) and sodium cyanide. The resulting pregnant eluate (gold and silver rich solution) is advanced to the electrowinning plant.

Electrowinning and production of doré bullion The gold and silver are recovered from the pregnant eluate by electrowinning, where the metals are deposited as sludge onto mesh cathodes. The sludge is washed off the cathodes, filtered and dried, and then smelted with addition of fluxes to produce doré bullion. The spent solution is recycled from the electrowinning cells back into the leaching and adsorption tanks.

Carbon regeneration Carbon needs to be reactivated to maintain efficient adsorption/desorption process. To achieve this, the carbon granules are heated to above 650°C in a kiln in a negative oxygen atmosphere. The reactivated carbon from the kiln is quenched with fresh water and then re-introduced into the process.

Destruction of remnant cyanide in waste solutions There are various options for treatment of cyanides (cyanide destruction). The method that is most widely used is known as *the INCO process.* Sodium metabisulphite (($Na_2S_2O_5$ providing the necessary SO_2) and copper sulphate ($CuSO_4$ - acting as a catalyst) are metered into the open topped cyanide destruction tanks and mixed under intensive agitation and aeration.

Tailings Management Facility. The cyanide process option will require construction of a tailings management facility (TMF) for storage of the flotation tailings from the process plant.

The assessment of the process alternatives recommends Option 1 – the non-cyanide method. In terms of the site and area specific conditions, the gold cyanidation process is considered environmentally more inappropriate. In addition, it is not acceptable for the local community.

5.3. Mine Waste Management Options

Two options for disposal of mine waste (flotation tailings and waste rock) from the operation of the Ada Tepe open pit are considered and they both meet the BAT requirements (*BREF Code MTWR, sections 2.4.2 and 2.4.4*). These options are:

- *Option 1:* Co-disposal of waste rock and tailings within a single footprint (IMWF – Integrated Mine Waste Facility).
- *Option 2:* Separate disposal of mine waste - subaqueous (below a pond surface) deposition of the flotation tailings in a TMF and waste rock stockpiling.

Integrated Mine Waste Facility (Option 1)

The rock material with no economic gold and silver values is classified as waste rock, which is generated in the process of exposure/access to the ore body. It mostly consists of breccia conglomerates with occasional boulders of metamorphic rocks – amphibolites, gneiss and schists. The process (or flotation) tailings are the waste material rejected from the flotation plant after the recoverable valuable minerals have been extracted from the ore feed. The flotation tailings will be dewatered and thickened (to a final pulp density at 56% solids) prior to their co-disposal with the waste rock into the IMWF.

The project proposal takes an integrated approach to the management of mine waste in order to minimize the affected area and, respectively, the impact on the environment. The proposed option considers co-disposal of waste rock and flotation tailings in an Integrated Mine Waste Facility (IMWF). The concept for the IMWF is that dewatered tailings at 56% solids are placed within cells constructed from mine rock. Mine rock will be used for construction of the outer face and the internal berms of the facility. The facility will be developed from the bottom up for stability, starting near the Krumovitsa River and building up-hill. The lowest areas of the facility will be stripped of all soils and soft materials to provide a high quality foundation for the facility. An underdrain system will be installed along the base of the ravines and natural drainage channels to collect the rainfall and the water expelled from the tailings during consolidation. The collected seepage will report to two sumps at the toe of the facility and from there it will be pumped to the Runoff Storage Pond. To prevent tailings being carried through the outer mine rock berm, a two zone filter system will be placed. This will consist of a layer of heavy, non-woven geotextile directly against the mine rock and covered by a layer of sand.

The preferred approach is to thicken tailings to approximately 56% solids. The tailings will be transported via pipeline for discharge into the mine rock cells. When a layer of tailings is completed, the tailings discharge will be moved to another area and the tailings allowed to drain. If the tailings are to be covered in a short period of time, a high strength, non-woven geotextile will be placed over the tailings or mine rock will be pushed onto the tailings. The geotextile will act as a drainage layer for the tailings, and that will prevent the mine rock from completely displacing the tailings as it is placed. The load of the new tailings or mine rock on the older tailings will consolidate the tailings. The mine rock will be placed to create nearly continuous ribs within the facility and on the outer face to provide strength and drainage to the deposit. As an alternate method of placement, tailings and mine rock may be placed in alternating lifts, called “layered co-mingling.” As the facility is built in successive lifts, the lower tailings are loaded progressively and therefore have time to drain, consolidate, and gain strength. Based on the results of the consolidation analyses, the thickness of individual layers of tailings should be limited to approximately 2 m to reduce the time for tailings consolidation. The tailings pipeline will require multiple discharge points and pipeline moves. Multiple work areas are required to allow continuous operation of the facility including one area with active tailings discharge, several areas with tailings draining, and one or more areas of cell construction with mine rock. The remaining mine rock would be used to create internal berms and tailings would then be placed within the berms.

The IMWF has a total design footprint area of 41 ha., which is sufficient to accommodate the entire amount of mining wastes generated throughout the mine life of the Ada Tepe portion of the Khan Krum deposit. The co-disposal of waste rock and tailings into IMWF as a waste management method has the following important advantages:

- Reduces the area required for disposal and storage of mine wastes and better utilises the capacity of the IMWF;
- Enables direct recycling of the majority of process waters on the plant site, where the tailings are dewatered;
- Reduces the risk of spillages during the tailings delivery process and the risk of emergencies resulting in a major uncontrolled discharge during/after a storm event.

The proposed option for disposal of mine waste (Option 1) enables the progressive rehabilitation of the IMWF, which will minimise the potential for erosion and dust generation from waste rock disposal. The outer faces of the backfilled cells can progressively be rehabilitated during project operation.

Waste Rock Stockpile and Flotation TMF (Option 2)

The option for separate disposal of mine wastes requires construction of a stockpile for the waste rock and a flotation tailings management facility, which must meet the BAT requirements (*BREF Code MTWR*).

Waste rock stockpile. Option 2 proposes disposal of the waste rock on a stockpile with progressive rehabilitation of the stockpile outer faces, which meets the BAT requirements (BREF Code MTWR, section 2.4.4). Overall, the rock is fresh and can be used as construction material for the construction of the TMF embankments. The waste rock is not expected to pollute the environment (the material is considered non-acid generating) and its proximity to the open pit enables progressive rehabilitation of the stockpile outer faces. However, seepage should be collected and recycled back into the process.

Tailings Management Facility. The TMF option is applicable in both cyanide ore processing and flotation concentration (*BREF Code MTWR, section 2.4.2*). The tailings will be delivered as slurry for deposition into the TMF. The TMF is a conventional upstream design including an impoundment with a main confining embankment, upstream embankments, a tailings delivery pipeline and a drainage system. The BAT reference document for management of tailings (BREF Code MTWR, section 4.3.11.1) requires recycling of supernatant water and placing of a lining system depending on the waste characterisation, the design of the facility and the inherent risks. It is necessary to to take preventive measures against instant release of dust emissions from dry beaches in strong wind conditions (*BREF Code MTWR, section 4.3.4).*

The analysis of the project mine waste disposal options gives preference to Option 1 based on the obvious advantages of IMWF as an environmentally sound method for co-management of mine waste (flotation tailings and waste rock).

5.4. Siting Options for the Project Facilities

The factors dictating the location and geology of the Adá Tepe deposit have no alternative and further consideration is beyond the scope of the analysis. Siting options for the open pit mine cannot be considered because of the unique location of the mineralisation, which can be mined and processed only from the deposit on the hill known as Adá Tepe In this particular case, the Khan Krum gold deposit is close to the surface and underground mining would not be an efficient method for extraction of the mineral resource. The pit siting is dictated by the location of the orebody and only alternative siting options for the associated facilities for flotation, gravity separation and mine waste disposal can be considered. Hence, a comparative analysis was made of the potential sites for the main project facilities:

- *Option 1* with separate sites for a process plant, an IMWF and an abstraction well for raw water supply;

- *Option 2* with separate sites for a dore gold production facility, a waste rock stockpile, a flotation TMF and a water storage dam for raw water supply.

The project sub-sites locations under the two siting options are shown on the General Site Plan (Appendix 2).

Based on the comparative analysis, the preferred option for development is Option 1. The entire area required for the implementation of the proposed development is state controlled forest fund land. This area is included in the future concession. No additional land will be required during the construction stage. The closure and rehabilitation stage will extend to all disturbed lands.

5.5. Options for Water Supply and Reduction of Water Use

One of the more important project directives is to provide the water supply without any negative impact on the requirements of the local community and downstream users, which are particularly important during the dry season of the year. The site process water supply design should meet two major criteria: ensure normal project operation and minimise fresh water consumption. Two options for water supply have been studied.

- *Option 1*: installation of a proprietary abstraction well in the Krumovitsa gravels, which will also require a one-off abstraction of fresh water from the Krumovitsa River at the start-up of operations;

- *Option 2:* water supply from a storage dam constructed in the Kaldzhik gully valley watershed.

The economic, social and environmental assessment and the data from hydrological and hydrogeological studies show that the abstraction well option is more suitable and has been given priority for detailed designing. The alluvial gravels of Krumovitsa River have sufficient water resources available and the construction of an additional abstraction well is not expected to affect the drinking water supply requirements of the local community. The one-off abstraction from the Krumovitsa, which is expected to be about 100,000 m^3, will take place during a period of high river flow.

The operation of the open pit, the process plant and the IMWF will use the water in a closed cycle, where the reclaimed water will be recycled back into the process at the rougher flotation stage, which meets the BAT requirements (*BREF Code MTWR*, *section 4.3.11.1*). The water balance model provides a good basis for possible minimisation of the industrial water use over the 9-year operational period based on a water recycling system. Water consumption in ore processing is minimised through systems and facilities that are capable of achieving a high level of recycling. The project considers that more than 98 % of the total demand will be met from recycling. The waters in the Runoff Storage Pond, which are chemically unpolluted, and the treated domestic effluent are assumed to have adequate water quality and will be discharged into the environment after additional clarification without affecting the flow regime or the water quality of the Krumovitsa River.

5.6. Comparison of the Proposed Process with the BAT Requirements

As early as this stage of EIA procedure, a comparison between the proposed technology and the conclusions of the BREF documents has been made in accordance with the requirements. There is no formalised BAT document for mining and processing of gold ores. The BREF notes specific for the mining sector are covered by the following reference document (the so-called ”vertical” BREF notes – **http://eippcb.jrc.es**; Sevilla - Spain): *Best*

Available Techniques Reference Document on Management of Tailings and Waste-Rock in Mining Activities (BREF Code MTWR, 2004).

The EIS considers various alternative options within the context of proven processes, whose environmental, technical and economic advantages are proven worldwide. The selection of the preferred alternatives and locations of the facilities for the investment proposal is based on the above-mentioned BAT reference document *(BREF Code MTWR, 2004).* This document mainly considers options for TMF and waste rock management since they are the most significant factor in mining and processing activities. The reference document puts particular emphasis on waste minimization and improved physical and chemical stability.

BAT in Mining. The ore at Ada Tepe will be open-pit mined. The mining method will be a conventional open-cut, drill, blast, load and haul operation followed by flotation and gravity concentration for recovery of the metal values from the mined ore. The mining operations will be carried out in compliance with the BAT requirements. The proposed option for open pit mining of gold-silver ore meets the BAT requirements (*BREF Code MTWR, section 2.1 and figures 2.1 и 2.2*). The open pit mining method involves separation of the excavated material in accordance with the requirements for downstream processing – placement of the uneconomic rock material (waste rock) on a stockpile or heap (*BREF Code MTWR, section 2.4.4 and chapter 3 - table 3.2*) and a combined flotation (*BREF Code MTWR, sections 2.3.1.5 and 3.3.2.2.2)* and gravity separation (*BREF Code MTWR, section 2.3.1.4)* flowsheet for production of gold-silver concentrate as a final saleable product. The open pit mining method requires post-operation rehabilitation of the pit and the adjacent areas in order to mitigate the negative impact to the local topography and landscape *(BREF Code MTWR, section 2.6).*

BAT in Ore Processing

The gold-silver ore processing flowsheet will include proven processes that meet the BAT requirements:

- *Ore comminution* (BREF Code MTWR, section 2.3.1.1) composed of *crushing* (BREF Code MTWR, section 2.3.1.1.1 – two or more crushing stages in cone, jaw and other types of crushers), *grinding* (BREF Code MTWR, section 2.3.1.1.2 and figures 2.4 and 2.5 – multistage dry and wet grinding in ball mills, rod mills and autogenous mills), *pulp classification* (BREF Code MTWR, section 2.3.1.3 – wet classification in hydrocyclones or spiral classifiers).

- *Ore flotation.* The proposed flotation flowsheet includes one rougher stage, three cleaner stages and two scavenger stages, which is in conformity with BAT requirements (*BREF Code MTWR, section 2.3.1.5, section 3.1.7.2.2 plus figure 3.45* – multistage flotation in mechanical and pneumatic banks, and *section 3.3.2.2.2).*

Gravity separation. The gravity separation method on shaking separation tables has been adopted after review of the various methods used in mineral processing (*BREF Code MTWR, section 2.3.1.4.3).* The light particles from the gravity separation process will form an interim product, which will be recycled back to the grinding and flotation stages.

BAT in Mine Waste Management

The investment proposal includes effective and environmentally sound method for mine waste storage, which is more protective to environment and excels the traditional methods for separate disposal – waste rock on stockpiles (*BREF Code MTWR, section 2.4.4*) and flotation tailings in various types of tailings management facilities. (*BREF Code MTWR, section 2.4.2*). The proposed method is disposal in an Integrated Mine Waste Facility

(IMWF), where the flotation tailings (thickened to 56% solids) will be placed together with the waste rock from the open pit development. The IMWF design is based on the *"thickened tailings"* method *BREF Code MTWR, section 2.4.3 and figure 2.47),* and further developed to achieve accelerated dewatering and consolidation of tailings by placement of waste rock over it. The requirements of the *BREF* document for deposition of tailings (at 50 to 70 % solids) and arrangement of drainage systems have been implemented. Drainage water will be recycled back into the main process. The important advantages of IMWF as a method and facility for mine waste management are presented above.

5.7. „Zero" (No Action) Alternative

The Project Proposal for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of Khan Krum Deposit provides an acceptable solution in terms of feasibility and requirements to environmental protection during the operation. The open pit will be sited on a relatively small area, the ore will only be primary processed on the site at an acceptable recovery of the precious metals values to the gold-silver concentrate, which is the end product for toll treatment. The investment proposal includes effective and environmentally sound method for mine waste storage, which includes co-disposal of the waste rock and the flotation tailings in an Integrated Mine Waste Facility (IMWF). The proposed solutions and measures will reduce the emission levels that have an impact on the environment and the local communities considerably below the respective regulated limits.

The "zero" ("no-action") alternative is associated with the following principal potential socio-economic impacts:

- Loss of significant macroeconomic benefits to the Municipality and the state;
- Loss of revenues to the state and municipal budgets;
- Deterioration of living standards of the population and supply of social services;
- Continued migration undermining the sustainable development and the outlook for the local economy.

Loss of significant macroeconomic benefits for the Municipality and state due to:

- - Decrease in foreign direct investment capital into Bulgaria with attendant impacts on Bulgaria's balance of payments;
- - Decrease in national revenues from the payment of production royalties, custom duties and profit taxes;
- - Decrease in municipal revenues through payment of property and asset taxes on project infrastructure, and revenue derived through the sale of municipal property;
- - Loss of revenues from taxes and social security contributions from direct and indirect employment generated by the implementation of the investment project proposal.

Loss of revenues to the state and municipal budgets due to:

Both the state and municipal budget would have received about 11 million BGN, and another 30 million BGN would have been paid for salaries over the project designing and construction stages.

Deterioration of living standards of the population and supply of social services due to:

- Loss of investment in the municipal infrastructure and provision of additional services (education, health, communications, etc.) due to the low potential for investment by the Municipality and local businesses in times of economic crisis;

- Loss of employment opportunities - Approximately 300 jobs at the peak of the 2-year construction stage, approximately 230 full-time jobs for the 9 years of operation and approximately 50 jobs for at least 3 years of closure and rehabilitation.
- - Limited employment opportunities especially considering the high official and hidden unemployment rates. Maximum priority will be given to local residents for employment at the mine. They will receive adequate training and qualifications;

- The cumulative negative effect from the non-implementation of the project proposal would be that the living standards of the population would continue to be low with all the associated negative consequences - declining purchasing power, even stronger decline of the already restricted local economy, deteriorating social services, with a final result - migration of local population.

Continued migration undermining the sustainable development and the outlook for the local economy

Now, the migration rate in the municipality, which is four times higher than that in Kardjali District and mainly covering groups under 39 years of age, continues to be one of the most serious problems the local authorities are faced with.

The "zero" alternative would not only be incapable of stopping that most negative trend in the sustainable municipal development, but would also intensify it. Practice shows that a negative spiral is formed in such cases. The more people, especially young people in active age, depart from an area, the more downward the trend of economic outlook, quality of services and living standards. As a result, a new wave of emigration is encouraged, which leads to greater economic stagnation, etc. A powerful 'engine' is required to break out of this vicious circle and boost the municipal economy, encourage groups to remain in the area and those that have left to consider returning and thus create conditions for sustainable development in the coming years.

Environmental balance - the project proposal of the Company considers a relatively small mine footprint and promotes modern methods and strict measures to control any adverse impacts on the environment and local community. Any risk from a human activities would be minimised by achieving compliance with the relevant standards and meeting the closure and rehabilitation commitments.

Limited opportunities for development of alternative tourism and agriculture - essentially, the project proposal will not cause limitations because the available data strongly suggests that the current development of these sectors is more than limited. The number of registered farmers engaged in alternative farming or agriculture is extremely low and the poor road/hotel infrastructure and declining human resource practically neutralise any potential for expansion of these sectors in the coming years under the existing economic and demographic conditions. The financial analysis clearly indicates that these sectors have not been developed even during times of relative economic prosperity. Now, such development is even more problematic. Just the other way round, the investment in infrastructure, services, more skilled labour, higher consumption and living standards, and return of people as a result of the implementation of the project proposal would create realistic conditions for further development of these sectors. Here, we have to mention that the local communities are highly dependent on tobacco growing for their living, and this business is going to be further restricted by the EU regulations. The need to improve the employment structure becomes more pressing. The above sectors cannot ensure sufficient employment because they require substantial municipal and private investment (such investment is not currently considered in the Municipal and District Development Plan).

The expectations for positive effects of the project are related mainly with the areas of greatest concern in the municipality. The realistic views of the people in the municipality consider the circumstance that there aren't any serious prospects to overcome the economic backwardness and the dependence of the region on tobacco production in the near future. A substantial investment such as that of BMM would not only have a direct positive economic effect, but could also create conditions and help accumulate resources for subsequent development of other businesses.

The "zero" alternative is not only an unrealistic option for the development of the region, but it would also cause significant losses and limitations on the economic development, fiscal revenues, direct and indirect employment, living standards and income, development of local economy and continued migration. Provided that all environmental, economic and social commitments are met, the Company's project will become the "engine" driving the development of the region and its future sustainability.

Based on the analysis and assessment of the impacts on the environmental media and human health, the compliance of the proposed mining and processing methods with the BAT, and the social justification of the benefits from the project implementation, there is sufficient reason not to recommend selection of the "zero" alternative.

6. Description and Analysis of the Environmental Media and Factors, and the Expected Impacts from the Project Implementation

6.1. Air

The Khan Krum deposit includes six prospects: Ada Tepe, Kupel, Kuklitsa, Sinap, Surnak and Skalak. The prospects are located close to one another but not in a compact group. There are no other operating quarries or open pits around Ada Tepe now, so no increase in the background levels of dust or other pollutants that are typical of quarrying operations is expected in the base level of the atmosphere in the region. Background air measurements were undertaken at several locations: Krumovgrad, Pobeda, Vurhushka, Chobanka and Kupel. The air sampling at the above locations around Ada Tepe showed that the background levels of fine particulate matter and gas pollutants are way below the average annual limits for protection of human health.

The Ada Tepe prospect development includes open pit mining and processing of gold ore at a rate of 850,000 tpa.

The development of the remaining prospects near the villages of Kuklitsa, Surnak, Sinap, Skalak and Kupel will not have cumulative effects because the prospects will be mined in sequence, i.e. there will be no two or more prospects in operation at the same time. Exploration activity will continue at the adjacent prospects to improve the understanding of the mineral resource.

6.1.1. Air Pollution Sources

The ore at Ada Tepe will be open-pit mined. The mining method will be a conventional open cut drill, blast, load and haul operation. The mined ore will be loaded into dump trucks hauling the ore to the ore stockpile (ROM pad). ROM ore will be fed to the jaw crusher feed bin by a front-end loader (FEL). Ore processing will include: crushing, grinding, gravity separation, flotation and dewatering.

The Ada Tepe mine plan currently being considered is based on 850,000 Mtpa production over a 9-year period (excluding the overburden removal), which gives a process plant throughput rate of 106 tph at 8,000 operating hours per annum. The project will be a 3-

shift based, 24/7 operation, 12 months or 330 days per year (8,000 operating hours per year). A total of 230 employees is planned to support the production process.

The harmful substances that will be emitted by those pollution sources during the operation of the Ada Tepe prospect of the Khan Krum deposit are: - dust from excavation, loading and unloading operations in the open pit after blasting; - dust generated by the heavy truck traffic across the minesite; nitrogen oxides, carbon monoxide; - dust generated by the drill rigs during blasthole drilling.

All rock material without economic gold and silver values and therefore classified as waste will be hauled to a waste dump area located approximately 200 m south-southeast of the open pit. Option 1 considers co-disposal of waste rock and dewatered flotation waste, while Option 2 considers construction of an additional waste rock dump. The ROM pad will ensure continuous ore feed to the grinding circuit, which is necessary to maintain a constant grind quality, which is generally not possible to achieve by direct feed from the open pit due to the specifics of mining. A front-end loader will deliver ore from the ROM pad to the feed hopper of the jaw crusher. The ore material with low economic gold and silver values will be hauled to a separate low-grade ore stockpile, where the material will only be unloaded and the stockpile will be re-profiled from time to time. The harmful substances that may be generated by the ROM pad operations include: - dust – from ore handling and feeding to the crusher. Sprinklers and water trucks will be used to control and reduce dust emissions from the mining activities in the open pit mine and haulage on the roads between the mine and the ROM pad and stockpiles.

Ore crushing is an intensive source of fugitive dust emissions. A front-end loader will deliver ore from the ore stock pile (ROM pad) to the feed hopper of an outdoor jaw crusher, whose production capacity will be 200-250 tph, discharge end diameter approx. 150mm, which will ensure crushed ore size suitable for SAG Mill grinding. The crusher product will be discharged onto a fully enclosed inclined belt conveyor leading to the grinding section. This circuit will also have a small cone crusher handling the pebbles recycled from the semi-autogenous grinding mill in the grinding section. The pebble crusher product will discharge onto the mill feed conveyor belt.

Grinding. The grinding section of the plant will be located inside the main plant building and will use a three-stage wet grinding circuit with a primary SAG mill and secondary and tertiary (regrinding) ball mills. The SAG mill will operate in an open circuit, where the oversize from the mill will be discharged onto a rubber-belt conveyor leading back to a cone crusher in the

Grinding of crushed ore, crushing and gravity separation will be based on a wet process and therefore no potential dust emissions are expected. A dust collection system is not considered for the Grinding and Flotation sections of the process plant. Those processes involve material with high moisture content and do not generate dust.

Flotation. Flotation will be the main process for recovery of the gold and silver values from the ore. The process is performed in flotation banks, where the recovery of the payable components from the waste rock is achieved by conditioning the surfaces of mineral grains based on the different surface chemistry of the gold and rock particles. A general ventilation system will be installed in the facility, which will enable triple air exchange within the facility to ensure normal work conditions. Suction and blowing fans will be installed on the walls and rooftop of the facility.

Reagents Facility The nature of the floated material requires extended conditioning of the surfaces prior to discharge into to the flotation banks, which is achieved by: - Addition of reagent for sulfidizing the particles' surface (Copper Sulphate) at the preceding stage - SAG mill grinding; - advancing of collector reagents to an agitator for conditioning prior to flotation. A dust collecting system having a rated capacity of 4,000 Nm^3 will be installed above the xanthate mixing deck. To minimise dust emissions, the xanthate will be delivered as pellets in 200 kg lots in PET bags enclosed in steel drums.

The rock material with no economic gold and silver values is classified as waste rock, which is generated in the process of exposure/access to the ore body. It mostly consists of breccia conglomerates with occasional boulders of metamorphic rocks - amphibolites, gneiss and schists. A total of 8 Mt are expected to be generated over the life of Ada Tepe mine.

The process (or flotation) tailings are the waste material rejected from the flotation plant after the recoverable valuable minerals have been extracted from the ore feed. About 7 to 8 Mt of tailings are expected to be generated by the end of the project life. The flotation tailings will be dewatered by thickening prior to their disposal in a waste storage facility (Option 1). The tailings will be thickened in a deep-bed thickener (DBT), which is capable of delivering a thickened product with the required paste consistency. That will enable co-disposal of tailings and waste rock. The capacity of the IMWF is sufficient to accommodate the entire amount of mining wastes generated throughout the mine life of the Ada Tepe portion of the Khan Krum deposit. Under Option 2, the waste rock will be stockpiled separately while the flotation tailings will be deposited into a conventional TMF. The harmful substances that are expected to be emitted from the IMWF are: - dust generated by construction; - dust - excavation and handling as part of the disposal operations; - dust generated by heavy equipment traffic to the respective active cell; nitrogen oxides, carbon monoxide.

The drilling and blasting operations will be undertaken at high intensity rate in view of the rock classification as "hard", which is a requirement for initial rock fragmentation. Multiple ring blasting or mass blasting will be the dominant method of blasting, which requires the use of large amounts of explosives. The blasting of such an explosive generates nitrogen and carbon oxides. The project schedules 100 blasts per year, or two blasts per week. The total charge per blast is 7,000kg, or a total of about 700t per year.

Dust emissions from fugitive sources have the following typical features: - dust emissions from excavation of topsoil, its handling and stockpiling in a designated open area come from the release of small amounts of dust depending on the soil structure and the vegetation cover that binds the particles; - uneven seasonal distribution - dust emissions may increase in dry weather and strong wind conditions; - dust emissions generated by overburden removal, handling and stockpiling on the soil stockpile are also associated with the release of small amounts of dust due to the presence of clay and other mineral components in the material, which have substantial adhesion properties and retain the small particles which would otherwise be carried away by the air flow - dust may become airborne in dry weather and strong wind conditions.

As a result of the operation of internal combustion engines of heavy trucks and equipment that will be used in the development and operation of the deposit, exhaust gas and dust will be emitted into the air.

6.1.2. Air Impact Assessment According to the National Standards and Legal Requirements

<u>Mining:</u> The estimates demonstrate that air pollution levels in particular critical zones (Chobanka 1, Chobanka 2, Kupel, Soyka and Pobeda) during the project operation will heavily depend on the selected option for management of the mine waste and the location of respective active production area in the open pit.

The 24-hour average **PM_{10}** concentrations in the model of the critical zone are as follows:

- under Option 1: – at Chobanka 1 and Chobanka 2 – approximating and below the average daily limit for protection of human health (depending on the location of the active operational area in the open pit); - at Kupel, Soyka and Pobeda - approximating and below the average daily limit for protection of human health; - Taynik, Bitovo, Belagush, Koprivnik and Dazhdovnik - below the background level;

- under Option 2: – at Chobanka 1 and Chobanka 2 – approximating and exceeding the average daily limit for protection of human health (exceeding when the active operational area is in the north part of the open pit); - at Kupel, Soyka and Pobeda - approximating and below the average daily limit for protection of human health; - Taynik, Bitovo, Belagush, Koprivnik and Dazhdovnik - below the background level;

The strategy developed to mitigate the impacts has the objective to improve controls and minimise the adverse effects on the surrounding centres of population and the environment. The Company considers the following controls: - Maintain the haulage road surfaces wet in dry conditions; - All site drilling equipment will operate under the reverse circulation (RC) method and will be equipped with three dust collection and suppression systems (two dry filters for larger dust particles and a water mist system to suppress the dust particles smaller than 10 μm); - Progressively rehabilitate the roads that have been made redundant; - Establish and maintain a protective green belt around roads and operational areas.

In terms of **nitrogen oxides (NOx)**, the selection of either option will not make a difference on the ABL concentrations: – at Chobanka 1 and Chobanka 2 – approximating and below the average daily NOx limit for protection of human health (depending on the location of the active operational area in the open pit); - at Kupel, Soyka and Pobeda (also in the critical zone) - approximating and below the average daily limit for protection of human health;

The other emitted pollutants do not demonstrate any values above the allowable limits: - the 24-hour average concentrations of sulphur dioxide are below the average daily limit for protection of human health; - the 24-hour average concentrations of ammonia are way below the MAC for a 24-hour period. The sprinkling-based dust suppression in the active operational area of the open pit will mitigate the dust pollution in the deposit area, while site roads must be wetted regularly, especially in windy and dry/warm weather conditions.

Area of impact: The impact on the ASL quality will be direct at Ada Tepe and in the areas within 500-600m distance from the deposit (around operational areas) but on a local scale; the anticipated levels that may potentially exceed the respective average annual limits for protection of human health are: - aproximating or below the limits for Chobanka 1 and Chobanka 2 under Option 1; and - aproximating or above the limits for Chobanka 1 and Chobanka 2 under Option 2. The impact on the soils and vegetation will be indirect within 10-30m from the active operational area in the open pit, the ore stockpile and the waste rock strockpile. *Severity of impact*: moderate to significant (medium to high); *Duration of impact*: over the 9-year concession period; *Occurrence of impact*: continuous throughout the day, 330 workdays per annum; *Cumulative impacts* – none expected. *Transboundary impacts* – none expected.

Blasting: The model demonstrates that air pollution from blasting in the identified zones (Sinap, Shturbina and Labovo, north to south direction) will be below the maximum allowable (not-to-exceed) concentrations of harmful substances in the ambient air of populated areas.

Area of impact: Direct air impact on the minesite and the adjacent areas in downwind direction, which is north to south for the site. At prevalent wind direction from the north, the nearest populated areas, namely Chobanka 1, Chobanka 2, Kupel, Soyka and Pobeda, will remain outside the zones of concentration levels exceeding the emission limits (1-hour average limits for protection of human health). Indirect impact on soils and vegetation on a local scale – occasionally, along the path of the blasting plume. *Severity of impact:* moderate (medium); *Duration of impact*: Over the life of the operation, during blasting operations; *Occurrence of impact*: Occasional Instant release of pollutants, twice per week, 12 months per year; *Cumulative impacts* – none expected; *Transboundary impacts* – none expected.

Realistically, the blasting operations in the open pit are likely to impact the air quality in the nearest populated areas only when the wind blows from the east or from the west. The likely change of the prevalent wind direction will reduce the effect of the potential air transport of pollutants to those areas. Coarser particulates may have a negative impact as they deposit on the vegetation along the path of the blasting plume.

6.2. Surface and Ground Waters

The project site is within the area of responsibility of the East Aegean Catchment Directorate based in the city of Plovdiv.

In terms of the project area, **Order No РД-292 /22.03.2010** by the Minister of Environment and Waters approves the *River Basin Management Plan (RBMP) for the East-Aegean Region***,** which is the main water management tool.

Therefore, the characterisation of both surface water and groundwater bodies that may be affected by the project development or are located in the project area takes into account the data and requirements set out in Volume 1 "General" and Vol. 2 "Arda River" of the RBMP. It also takes into account the baseline studies commissioned by the Investor to investigate the status and characterise the waters in the project area, as well as third-party studies that are considered important for improving the understanding of the water status and impacts, e.g. Technical Assistance for Water Quality Management of Arda River - PROJECT PHARE BG 2003/005-630.05.

An Overview of the Hydrological and Hydrogeological Conditions and Factors of the Water Resources in the Project Area

- Surface Water Characterisation

The project area is located in the west watershed of the mid-stream portion of Krumovitsa River, a right-hand tributary of Arda River between the Studen Kladenets and Ivailovgrad water reservoirs. The Arda River is a the Arda River lies entirely in the Rila-Rhodopean morphographic zone, Rhodopean region, and its watershed is almost entirely in the East-Rhodopean sub-region. The Arda watershed is subject to strong Mediterranean influence and its climate is typical of a Continental-Mediterranean climate,

featuring mild winters and hot summers, small annual temperature variance, maximum precipitation in the autumn and winter and minimum precipitation in the summer, and impermanent snow-cover in the low land areas.

This creates a very good correlation of the annual river flow patterns with the annual precipitation distribution, snow cover and air temperature. The Mediterranean influence is most notable in the easternmost and south-easternmost parts, where the maximum outflow levels occur as early as February and the low flows are typical of the summer. This pattern is typical for the southern tributaries of the Arda River. The river typology of the Arda River basin indicates that the entire watershed of Krumovitsa River - the main watercourse and its tributaries, belongs to a uniform water body. The more important tributaries are the Virovitsa (Kessebir) River, the Vetritsa (Elbassan) River and the Kaldzhikdere River.

The main surface water body that may be affected by the project development is the Krumovitsa River, which is the nearest one and the main receiving stream of project wastewater after treatment.

The Investor has commissioned a hydrological investigation and assessment of the project area. The assessment provides the expected most likely condition of the surface waters in the project area during the project life based on the available factual information.

The average multiannual level of the runoff coefficient, which is the ratio of the average flow expressed as depth of water and the the average precipitation depth, varies between 0.36 and 0.72.

The minimum flow modulus averages between 0.3 and 0.5 $L/s.km^2$.

The status of surface water is assessed by the magnitude of the anthropogenic pressures and impacts.

For the basin of the Arda River these are grouped as follows:

- point sources - urban wastewater;
- water flow regulation and morphological alterations;
- point sources - industry;
- diffuse sources - agriculture;
- other diffuse sources - diffuse pollution by wastes;
- water abstraction;
- other pressures - watershed erosion, pollution from old mines, dry spells and deficiency of water or unknown pressures.

The major impact on the water body including Krumovitsa and its tributaries is from the direct discharge of untreated municipal effluents and extraction of gravels from the riverbed. There are no sources of industrial wastewaters nor areas that are identified as potentially impacted by agricultural sources.

The Krumovitsa watershed There are no surveillance and operating monitoring stations in the Krumovitsa watershed. Currently, only one station is maintained as part of the investigative monitoring network - this is Station BG3AR00021MS0050 located downstream of confluence of Krumovitsa with its right tributary Dyushundere Rivier.

Krumovgrad has a sewer system (except for the Izgrev area) and the majority of wastewater discharge directly reports to the Krumovitsa River, while the remainder reports to cesspits.

The Kessebir, Kaldzhikdere, Elbassan and Krumovitsa rivers are Category II receiving streams according to the Categories of Surface Waters in Water Bodies approved by the Minister of Environment and Waters (Order RD-272/03.05.2001).

Surface water sampling was performed in the Ada Tepe area as part of the site survey. The samples did not return concentrations exceeding the allowable limits.

The impact from the project development on the surface waters will affect an area equal to the operational footprint of the project. Practically, the water courses and flow regime in that zone will be modified. This mostly applies to the diversion of waters to sumps and their use in the process. Their subsequent re-use (recycling) into the process would create conditions that increase water losses (mostly from evaporation) and consequently change the natural water balance – reduce the runoff flows from the operational area to the Krumovitsa River. Another type of impact is the discharge of treated wastewaters into. the Krumovitsa River.

Groundwater Characterisation

The project area is located in the East-Rhodopean sub-region, which is part of the Rila-Rhodopean region. Groundwater availability and resources depend on the physiographic conditions - climate, landscape, hydrology, soil cover, vegetation, etc., and on the geological setting of the area - geology, lithology and structures. These are the natural factors. On the other hand, groundwater quality and quantitative status are highly dependent on non-natural factors defined by anthropogenic activity - abstractions for various uses, discharge of wastewaters from various activities, developments on groundwater recharge areas, e.g. agriculture.

Interstitial and fissure-flow groundwaters are the dominant types that occur in the project area. The interstitial groundwaters occur in the valley of Krumovitsa and some of its tributaries, while fissure-flows are practically found across the rest of the area.

The project footprint partly overlaps the aquifer identified as BG3G00PtPg2023 - Fissure-flow groundwaters, Krumovgrad-Kirkovo zone.

This aquifer has the lowest water potential - its modulus is 0.5 $L/s.km^2$. Water abstractions from this aquifer primarily meet local requirements.

Of particular interest in the project area are the waters accumulated in the Quaternary deposits (aquifer code BG3G000000Q010) of the Arda River.

Continuous alluvial deposits are formed along the middle and lower stretches of Arda, where the landscape flattens. This aquifer includes the alluvial deposits of both Arda and its major tributaries: Perperek, Varbitsa and Krumovitsa.

Water in the alluvial aquifers is recharged by precipitation, by inflowing tributary or fissure flow water along the river valleys, by river water penetrating into the floodplains and by high water along the rivers. An unconfined groundwater flow has been formed in the alluvials, which generally flows in the direction of the hydraulic gradient of the river watershed.

The alluvial aquifer is drained by the rivers and artificially by the existing water abstractions.

It has relatively good permeability.

The interstitial groundwaters in the Quaternary deposits are mostly calcium-sodium-bicarbonate type of water with average mineralisation of about 0.5 to 0.6 g/L.

The fissure-flow groundwaters in the Paleogene sediments are associated with the weathering zone of the overlaying volcanic rocks, which comprise rhiolites, andesites, dacites, their laval breccias, as well as with the consolidated sedimentary rocks.

The fissure-flow groundwaters in the Proterozoic rocks are associated with the zone of weathering and tectonic jointing of metamorphic rocks.

In general terms, the project area is relatively less abundant in groundwater resources due to the specific conditions that control the water exchange balance.

The Investor commissioned geotechnical and hydrogeological investigations of the concession area and the region.

The objective of the first investigation was to identify the preferred site for construction of the IMWF, which was one of the process waste management option considered as part of the selection of the preferred ore processing alternative.

The following conclusions can be made on the basis of the investigation results:

- The site of the proposed IMWF is in the south and south-east parts of the Ada Tepe hill. The facility will occupy two small valleys on the south-east slope of the hill.
- The site is underlain by basement rocks comprising Pre-Palaeogene metamorphic rocks – various gneisses overlain by small-size, angular to subangular in shape, pebbles within the sandy matrix, which forms the deluvial cover on the slopes of both valleys.
- In terms of permeability, the tested lithological types are low permeable to permeable at the refusal depths recorded during the investigation.
- Fissure-flow groundwaters are the most frequently occurring type in the area. They are associated with the jointing systems and tectonic structures in the metamorphic basement.
- The investigation did not record any physio-geologic processes such as landslides, rockslides, screes, bogs, etc. on the site of the proposed IMWF.

- Based on the Map of Geological Hazards of Bulgaria, the area defined as a degree VII shakeability area and the seismic design coefficient for this area is 0.10 g.

  Detailed information about the preliminary site investigations is provided in the EIS.

The objective of the second investigation was to identify the preferred site for construction of a TMF (Option 2) as an alternative process waste management option considered as part of the selection of the preferred ore processing alternative.

The assays of the water samples taken from boreholes BH 09-06, BH 09-06A and BH 09–10 characterise the water as fresh with total mineralisation <1 g/L and pH = 7.1 to 8.3. The water samples from boreholes BH 09-01, BH 09-04, BH 09-07, BH 09-11 and BH 09-12 are characterised by higher mineralisation – from 1.2 to 1.8 g/L and pH = 7.9 - 9, and elevated sulphate concentrations. The waters are richer in minerals, occur and flow at greater depth and, respectively, are recharged and drained at a slower pace. Elevated antimony concentration is typical of all the groundwater flows in the TMF siting area.

Another conclusion made is that a 12m thick zone is identified, where the rocks have low geotechnical properties on one hand and transmissivity varying from moderate to high on the other.

Detailed information about the investigations is provided in the EIS.

The investigations also studied the abstractions of water in the Krumovitsa watershed.

The construction of abstraction wells in the Krumovitsa gravels began as early as 1950, when the first Krumovgrad drinking water supply facility was set up.

The second well for drinking water supply to Krumovgrad was constructed in 1973. Two springs were cased in 1975 for drinking water supply to Zvunarka Village.

Additional hydrological investigations were carried out near the Krumovgrad water abstraction field in 1982. Based on their results, additional four "perfect" abstraction wells were completed in 1982/83 to augment the Krumovgrad drinking water supply and feed the Ovchari WSG.

The Guliika WSG was designed in 1966 and, consequently, two abstraction wells were completed. The typical rapid flows and response of rainfall in that part of the Krumovitsa watershed eroded off the first well, which forced the construction of the second one. A third well had to be constructed in 1997 to replace the old one, which had been washed off by the river thus cutting the supply to the Guliika WSG.

The quality of the abstracted water (from the Krumovitsa gravels and the springs at Zvunarka Village) in terms of physical, chemical and radiological properties meets the requirements under Regulation 9/16.03.2001 on the Drinking and Household Water Quality (SG issue 30/2001, amended 30/2001), amended in SG issue 87/2007).

The natural (dynamic) resources in the alluvial deposits in the Krumovitsa watershed are relatively low. Given an average transmissivity of 1500 m^2/d, average hydraulic gradient of 0.002 and average floodplain width of 750 m, **the dynamic groundwater draw is 26 L/s**. Therefore, the groundwater abstraction is dependent on the recharge from the Krumovitsa river flow. Between 60 and 80% of the local abstraction resource comes from the river recharge. На територията на всички вододайни зони, както и по целия водосбор в горното течение на р. Крумовица, до вливането й в р. Very strict control over industrial and agricultural activities should be exercised in all water abstraction fields and in the entire Krumovitsa valley downstream to confluence with the Arda River.

- Monitoring of the waters in the project area

Groundwater samples were also collected together with the surface water samples. BMM EAD has developed an Environmental Monitoring Plan, which includes water monitoring.

The impact on the groundwaters will mainly be a reduction of the volume of circulation of the fissure flows within the pit footprint due to the removal of substantial amounts of overburden and ore, and the major consequence will be that the drainage elevation of these flows will be reduced to the final pit bottom (RL 340m).

Project Sources of Surface Water and Groundwater Pollution

The impact on surface water quality during the project construction means increased content of particulate matter (increased sediment flows). Elevated suspended solids sediment loadings in rivers and streams are generally detrimental to aquatic ecologies because they can blanket stream beds and vegetation and reduce light reception. Nevertheless, the potential sediment loads will be reduced as much as possible to minimise the impact of the project on the environment. The following provisions have been made to minimise the risk from pollution of the surface run-off:

- Construct temporary surface interception drains to divert surface run-off from the construction sites;
- Construction of settling ponds to collect the waters containing high sediment level (soil and subsoil particulate matter) for precipitation of suspended solids prior to discharge into the receiving water.

Most of the surface runoff over the operation stage will be diverted from the project area by way of a drainage system, which will prevent its contact with process related products, raw materials and waste. The Runoff Storage Pond, which will be sited near the open pit, will be the main water collecting facility. It will also receive the drainage from the IMWF. It is the combined stream from the two collection (drainage) sumps, which will collect surface runoff, seepage, and tailings water release from the IMWF area. This pond will also collect pit runoff from direct precipitation and other mining operations.

The Runoff Storage Pond will be the main source of water for the mining and processing operation. The water collected in the pond is assumed to have adequate water quality (chemically unpolluted waters). A discharge facility will be installed to enable discharge of water from the pond into the Krumovitsa river system. Water will be discharged into the environment mostly in case of storm events, i.e. extreme precipitation. The excess water will report to a Wastewater Clarifier, where it will be subject to additional clarification prior to discharge. The discharge quality will meet the allowable emission levels and will not derogate the river water quality. The discharged water volume will not cause a significant change in the river flow rate as that volume will be negligible compared to the river outflow. The project considers that more than 98 % of the total demand will be met from recycling. No discharges into the environment will occur during the first year of project operation. Water will be discharged from year 2 and thereafter only in wet months.

Effluents from restrooms and bathrooms will be collected using a separate collection sewage system and delivered to a domestic wastewater treatment plant. The treatment process will include passive, chemical and biological treatment stages. The treated domestic effluent will report to a Wastewater Clarifier for discharge into the Krumovitsa River.

Site Wide Water Balance

A site wide water balance model is developed for the proposed gold mining project, which includes the open pit, the process plant and the mine waste disposal facility (the Integrated Mine Waste Management Facility). The water balance features are grouped into three main categories:

- Water collection facilities including the open pit;
- Integrated Mine Waste Management Facility (IMWF); and
- Process Plant.

A total of three water balance scenarios are modelled, which provide a range of required external freshwater flows and discharges to the environment for an average precipitation year, a 100-year wet year and a 100-year dry year.

The project would require approximately 2,894,000 m³ of water per annum from internal and external water sources (based on an annual precipitation forecast approximating the mean annual precipitation levels for the average precipitation year). The project considers that more than 98%, or an average of 2,830,000 m^3/year, of the total demand will be met from recycling (internal sources) as follows:

- Internal recycling of tailings thickener overflow – about 2,170,000 m^3/year (248 m^3/h);
- Drainage from the IMWF – about 660,000 m^3/year (75 m^3/h);

External water sources will supply:

- Fresh water – 64,000 m^3 per year (7 m^3/h);

The project drinking water requirements of about 0.8 m^3/h (or about 6,500 m^3/year) will be met from a proprietary abstraction well.

3. Water Use – Amounts and Sources

Two site water supply options have been studied:

- Installation of a proprietary fresh water abstraction well in the Krumovitsa River gravels where sufficient water resources are available and without any negative impact on the requirements of the local community.

- Collection and storage of water from the Kaldzhikdere valley watershed into a small storage dam, which will normally be self filling from the catchment areas with occasional abstractions from the Krumovitsa River.

The economic, social and environmental studies and the data from hydrological and hydrogeological surveys completed by Vodokanalproekt-Plovdiv show that the first option (a proprietary fresh water abstraction well in the Krumovitsa gravels) is the most suitable one. the Krumovitsa River. The project fresh water requirements are minimal and therefore will not derogate existing abstractions used for drinking water supply for the centres of population in the river valley. The water balance results indicate that more than 98%, or an average of 2,830,000 m^3/year, of the total demand will be met from recycling. Freshwater makeup of 64,000 m^3/year will be supplied from an external source. The project drinking water requirement will be met from the proprietary abstraction well after obtaining the relevant permit.

Impact on Surface and Ground Waters

The EIS addresses and assesses the potential impacts on surface waters and groundwaters during project construction, operation and closure.

No derogation of the water resources and their quality is expected *over the construction stage* because there will be no major water abstractions or discharges. Possible negative impacts will be mitigated by appropriate control and management of construction activities, and sediment-carrying runoff to the natural surface water environment will be minimised by appropriate drainage diversion (temporary or permanent) and settlement ponds. Suitable portable chemical toilets will be provided for ready sanitation at the construction sites.

The groundwater resources and quality will not be derogated by the construction of the individual operational facilities considered in the project. The diversion of the surface flows away from the project construction sites may slightly alter the recharge of groundwater from precipitation but the impact will be on a minor-local scale and will not derogate groundwater resources and flows.

The project operation is not expected to have a negative impact on the local community in terms of derogation of the surface water resource for two reasons: insignificant modification of the surface water resources and limited water abstraction from the well at relatively low rates. Most of the project fresh water requirements will be met from surface runoff collected from the open pit and other plant areas. 98% of the annual process water requirement of the project will be met from recycling. So, the impact of the project operation on the natural water flow regime and other water users will be insignificant. Geochemical testing and modelling studies indicate that the drainage from the stockpiles will be suitable for direct discharge following solids settlement and ensuring that their chemistry meets the specific emission limits for discharges into the environment. During operation, domestic wastewater from the offices, showers, toilets and the canteen will be treated on-site in an wastewater treatment plant. So, there will be no impact on the natural water environment from such waste effluents. The proposed technical solutions ensure minimal discharge of process wastewaters. Thus their current status will practically be sustained.

There is no manifestation of "fissure karst" in the project area. All groundwater flows in the mine project area, whether in fracture systems or alluvial aquifers, are ultimately controlled by the topography of the Krumovitsa, which provides the basal discharge level. Pit development is expected to intersect some minor groundwater flows. Preliminary investigations indicate that the water is of generally high quality and meets the emission requirements for discharge to the Krumovitsa (after clarification in a clarifier). So, there will be no impact on the natural water environment from the dewatering of the Ada Tepe open pit.

A *site closure and rehabilitation plan* will be prepared together with the Life of Mine Plan. The closure plan will include measures that ensure the long-term physical and chemical stability of the areas thus preventing any significant negative impacts on surface water resources and quality after cessation of operations on the site. The closure planning for the mine will include long-term monitoring of surface water quality and flows as part of the aftercare activities with a view to assessment of any required additional measures. The Ada Tepe pit will fill with groundwater forming a lake-type of surface water body, whose water will be of good quality. The rehabilitation of the rest of the operational areas/sites will be achieved in a manner that ensures establishment of a sustainable vegetation cover and surface drainage system to prevent further erosion. After the project closure, the proprietary abstraction well may be used for augmentation of community water supply to Krumovgrad and nearby villages.

Surface water impact forecast
Impact influence – local;
Type and significance of impact – direct, insignificant;
Duration of impact – over the entire operation period;
Occurrence of impact – every day;
Cumulative impacts on the environment – none expected;
Transboundary impacts – none expected.

Impacts on groundwaters

Impacts over the construction stage

There are no significant aquifer resources developed within the footprint of the project and therefore project site groundwater is not subject to abstraction. The most significant local aquifer is the alluvial gravels of the Krumovitsa valley, which is used for water supply. This aquifer is at a significant distance from the project operational areas and will not be affected by the project construction and operation.

The groundwater resources and quality will not be derogated by the construction of the individual operational facilities considered in the project. The diversion of the surface flows away from the project construction sites may slightly alter the recharge of groundwater from precipitation but the impact will be on a minor-local scale and will not derogate groundwater resources and flows.

Impacts over the operation stage

The only significant aquifer in the project area is in the alluvial gravels in the the Krumovitsa River. No fissure karst (limestone) structures occur within the project footprint. The limestone outcrops occurring to the north-west of the project minesite are at a higher elevation and will not be affected by facilities of activities. All groundwater flows in the mine project area, whether in fracture systems or alluvial aquifers, are ultimately controlled by the topography of the Krumovitsa, which provides the basal discharge level.

Pit development is expected to drain the affected rock mass. Preliminary investigations indicate that the drainage water is of generally high quality and meets the emission requirements for direct discharge to the Krumovitsa (after clarification in a clarifier). So, there will be no impact on the natural groundwater environment from the dewatering of the Ada Tepe open pit.

According to project estimates, domestic wastewater is expected to be generated at a rate of up to 18 m^3/day. Following appropriate treatment in an on-site site treatment plant to meet legal discharge standards, the effluent may be discharged to the Krumovitsa.

It is necessary to ensure high-quality coupling of the sewer pipes to minimise the risk of breakdowns and leaks that may affect the local groundwaters.

The conclusion is that the implementation of the project proposal will not have a significant impact on the groundwater quality. Nevertheless, the site monitoring plan will incorporate a long-term groundwater monitoring program covering the operation and post-operation stages.

Impacts over the closure stage

The proposed activities and methods for closure of the project areas and rehabilitation of their footprints are not expected to result in a significant impact to the groundwater quality. The groundwater monitoring plan will ensure continued evaluation of the groundwater quality to enable adequate assessment of their status over the project closure stage.

Conclusions and impact forecasts

It is expected that the project construction will have no significant impact on the local groundwater status. The significant aquifers are either at a greater distance from the project site or at a lower elevation. It is therefore concluded that the impacts over the construction stage will be insignificant, of short duration and without a cumulative effect.

The project implementation is not expected to result in a significant impact on the existing surface water resources as the fresh water requirements will be met from site runoff and makeup from an abstraction well. There are no project interactions with groundwater that present any specific significant impact to the groundwater resources and quality over the 9-year operation period. The proposed design solutions such as an underdrain system and insulation layer combining in-situ compacted clays and a lining system ensure high level of safety and protection of groundwaters from mixing with process wastewater - above all, flotation waters. The site monitoring plan, which includes groundwater monitoring as well, will ensure continued evaluation of the groundwater status over the project operation stage.

The proposed closure activities and methods are not expected to result in a significant impact to the groundwater status. The closure planning for the mine will include long-term monitoring of groundwater water quality and flows as part of the aftercare activities with a view to assessment of any required additional measures.

Groundwater impact forecast

Impact influence – local;
Type and significance of impact – direct and indirect, insignificant;
Duration of impact – over the entire operation period;
Occurrence of impact – every day;
Cumulative impacts on the environment – none expected;
Transboundary impacts – none expected.

6.3. Geological Setting

Brief Geological Characterisation

The main lithostratigraphic units that are recognised and defined in the project area are Quaternary, Palaeogene and Palaeocene.

Continental terrigene-limestone complex - Krumovgrad Group (1Pg1)

What is specific of this unit is the prevalence of coarse psephitic rocks – accumulation of coarse to fine breccia and breccia-conglomerates often including up to 50 m thick and 400 m long olistoliths. Some olistoplates laterally transitioning into monogenic breccias are found on several levels, which was probably caused by syn-sedimentation thrusting along the the profile of the complex.

PRECAMBRIAN

Pra-Rhodopean Supergroup

The lithostratigraphic units of the Pra-Rhodopean Supergroup occur in the Biala Reka core complex and the Krumovgrad Anticline. The Pra-Rhodopean Supergroup comprises three groups: Strazhetska, Boturchenska and Arda. The Arda Group is represented by the Byalo Pole Formation in the project area.

Rhodopean Supergroup

It forms the arms of the Krumovgrad Anticline and the Avren Syncline. It is represented by the Chepelare Formation, which belongs to the Rupcha Group.

Project Geology

The Khan Krum deposit includes the following ore deposits (prospects): Ada Tepe, Kuklitsa, Kupel, Sinap, Surnak and Skalak. The Ada Tepe prospect, which is under consideration, is located approximately 3 km southwest of the town of Krumovgrad and in close proximity to the Krumovitsa River. The deposit was explored in full compliance with the Bulgarian laws. The exploration project followed the standard formal procedure including licensing and permitting, exploration, interim and final geological reporting, and issuance of a Commercial Discovery Certificate.

Deposit Structures

In structural terms, the deposit is hosted within the eastern periphery of the Momchilgrad Depression. It is strongly sheared by faults, which is further complicated by the Lidetinski graben, which deeply extends in SE direction. The deposit is located on the north-south elongated Ada Tepe ridge, which rises about 100 m above the basal contact with basement rocks. It is a fragment of the Kessebir block structure of the para-autochtone in the NE periphery of the graben and consists of metagranites of the Gneiss-migmatite complex.

They are unconformably overlain by rocks of the allochtone represented by amphibolites and and irregular marble bodies. This big package is in turn overlain by the neo-autochtone Paleocene sedimentary rocks of the Krumovgrad group. The sedimentary rocks have a complex coarse-grained mosaic texture resulting from a continuous and multi-stage process of tectonic shearing as part of the evolution of the East-Rhodopean Paleogene Depression.

The dominant structure in the Ada Tepe prospect is is a regionally developed low-angle detachment fault and the associated steep extensional faults.

Mineralogical characterisation of the ore zones:

Ore minerals

The gold in the deposit is contained in electrum, Au-Ag tellurides. Hessite, greenockite. The major silicification, the intensive pyritisatioin with gersdorphite and deposition of native gold is associated with the hydrothermal stage. Other secondary minerals include pyrite, marcasite, gallena and sphalerite. They occur sporadically.

The gangue minerals include quartz, quartz polymorphs, adularia, plagioclase, calcite, etc.

Morphology of the Orebodies

The morphology of the tectonic structures is complex and they can be interpreted as both feeder structures for the mineralizing fluids and ore bearing structures. The intersections with suitable lithological strata form complex stockwork orebodies and zones of hydrothermal alteration with strictly controlled gold-bearing mineralisation. One major orebody has been identified, which is morphologically very well hosted within the base of the sedimentary rocks.

The Ada Tepe deposit can be classified as a high-grade, shallow, low-sulphidation epithermal style gold-silver deposit. Two major styles of gold-silver mineralisation are apparent at Ada Tepe:

Wall Zone - a shallow-dipping (15 degrees north) tabular (9 metres average thickness) zone developed directly above the basement-sediment contact;

Upper Zone - a series of east-west trending steep-dipping vein sets with ancillary vein sets in other orientations, occurring as complimentary structures;

Reserves and Resources

Based on the interpretation of the results, i.e. structural and morphological characterisation of mineralisations, the prospect can be classified as a Class 2 deposit with a complex geological composition, irregular orebody thickness and very uneven gold distribution.

Table 6.3-1 below presents the Mineral Resource and Reserve Estimate for the Ada Tepe prospect of the Khan Krum deposit, 01.09.2004.

Table 6.3-1

Prospect	**Code**	**Cut-off grade**	**Tonnage (t)**	**Table of Contents**		**Metals**	
				Au (g/t)	**Ag (g/t)**	**Au (kg)**	**Ag (kg)**
Ada Tepe	Probable Reserves 122	0.9	1,493,000	7.3	4.3	10,892.6	6,440.6
	Measured Resources 331	0.9	7,292,000	2.4	1	17,294	7,503

Mining and Processing of the Mineral Resource

The mineable reserve of Ada Tepe will be mined within a single footprint and processed (concentrated) via a combined flotation and gravity separation flowsheet to a final gold-silver concentrate. This approach will minimise the areas that will be affected by the project implementation and, respectively, substantially minimise the risk of affecting the rest of the environmental media – air, waters, soils, flora and fauna, etc.

Two alternative options for the development of the deposit, which are discussed in the beginning of the EIS, have been examined and the main difference between them is whether a conventional TMF will be operated (Option 2) or not (Option 1) together with the associated road, piping and drainage infrastructure.

The main problem can be defined as how to control and manage the mining and processing wastes. The remaining project activities, i.e. initial development, mining and processing, are practically identical under both options.

The Ada Tepe mine plan currently being considered is based on 850,000 Mtpa production.

The Au and Ag recoveries are expected to be circa 85% and 70% respectively.

Assessment of the Changes to the Geological Setting Brought by the Implementation of the Project Proposal

The project will have a visual impact on the geological setting by changing the local topography with the removal and relocation of some 22.5 million m3 of rock material. A negative form, which is the open pit, and a positive form, which is the IMWF, will be created.

The rational recovery of the mineral inventory is a key factor that influences the assessment of the impact on the local geology. This will be ensured by strict compliance with the Life of Mine Plan and the annual mining projects. These plans and projects must be implemented only with the prior approval of the competent authorities.

It is therefore concluded that the proposed methods of mining and processing of Ada Tepe mineral resource to concentrate will not have a significant impact on the environment.

The negative impacts will be limited to the zone included in one part of the concession area, which is something that is important and not easy to achieve by a mining operation.

Therefore, the selection of Option 1 as the preferred option is obvious.

6.4. Lands and Soils

Three soil types are identified in the project area: shallow soils - rendzinas, leached cinnamon and sedimentary – alluvial, alluvial-meadow, alluvial-talus soils.

The leached forest cinnamon soil is the prevalent soil type in the project area. The intrazonal soils – rendzinas are rare and the alluvial soils are even much rarer.

The cinnamon soils will be the most affected by the project implementation while the alluvial-talus soils and rendzinas will be affected to a lesser extent. Most of the cinnamon soils are gravelly, shallow and erosional, and do not react with hydrochloric acid. Despite that, the soil floor beneath the forest canopy is well covered with decaying forest litter, while the flat surfaces without tree vegetation are covered with turf. The average topsoil thickness at Adá Tepe is 20 - 25 cm. These soils are used in the forest fund.

The soils and lands in the region have been characterised by analysing samples of soils that will be directly affected by the project implementation.

The results of the soil testwork indicate:

- The values of analysed parameters at the individual forest sampling locations vary significantly depending on the specific combination of soil formation factors. The climate, topography, soil parent materials and anthropogenic activities have dictated the formation of vegetation habitats of varying fertility. The factors that limit the fertility of the soils most are the soil depth, moisture and erosion. Despite the low fertility of the steeper areas, the soil conditions may be suitable for certain non-demanding tree species.

- No pollution or acidification, salinisation, or other anthropogenic impacts on the Ada Tepe soils have been identified.
- Certain forest soils in the Ada Tepe area contain elevated concentrations of arsenic, chromium and nickel due to the soil natural chemistry.
- Despite the prevalence of favourable conditions for high soil resistance to anthropogenic impacts such as soil solution pH and content of clay and organic matter, the soils are considered sensitive to impacts. The elevated concentrations of heavy metals and metalloids has raised the sensitivity of these soils to acidification, which could increase the mobility of metals to other media.

The forest soils at Adá Tepe are a potential source of pollution to other media due to the elevated levels of certain heavy metals in them. The soils removed and stockpiled during the open pit mining may only be selectively re-used for rehabilitation. It should be noted that their use for agricultural rehabilitation will cause pollution of the agricultural crops. Soils that are rich in heavy metals are suitable only for forestry rehabilitation, where they are not expected to have any negative environmental impacts.

Land and Soil Derogation Impact Assessment

The entire area required for the implementation of the proposed development under Option 1 is state controlled forest fund land represented by leached cinnamon forest soils and shallow soils (rendzinas).

The project also considers Option 2, which in addition to the forestry fund lands requires another 52 ha of municipal and private lands (for the construction of a TMF and a water storage dam).

The land requirements under each option are shown in the Table 6.4-1 below:

Table 6.4-1

Item	Elements of the Investment Project Proposal	Land Requirement (ha)	
		Option 1	Option 2
1	Open pit (Ada Tepe)	17	17
2	ROM ore pad	3	3
3	Process Plant	6	-
4	Dore Gold Production Facility	-	2
5	Integrated Mine Waste Facility	41	-
6	Flotation TMF	-	45
7	Waste rock stockpile	-	44
8	Soil Stockpile	2	2
9	Raw and process water reservoir and collecting sumps	4	1
10	Roads	12	15
11	Water storage dam	-	7
	Total	85	136

The data suggests what physical damage will be caused to the soils in the area after the start of project implementation. The negative impacts will be continuous and cannot specifically be time-bound. The overburden removal will go in parallel with the construction of the stage-1 roads and facilities: offices, a workshop, a mobile equipment parking area, i.e. the entire area will become a big construction site. The commencement of ore production will also mark the beginning of the construction of the low-grade ore, waste rock and soil stockpiles.

The selected mineral resource mining method involves extraction of ore for subsequent downstream processing. The mining operation will result in complete anthropogenisation of the site. The development and extraction of the mineral resource will strongly transform the landscape and seriously affect the soil resources within the project footprint. The mining operation will have a negative impact on the soil cover, which is mechanical disturbance of the soil profile across the open pit footprint. A mined void will be created, where the most extensive damage will occur. The excavation will be deep, permanent and irreversible. The soil profile, the overburden and the reserves will be extracted and the soils will be stockpiled for re-use for subsequent rehabilitation.

The construction of the remaining facilities: the process plant, the waste rock stockpile, the mine waste storage facility and the roads, will additionally damage the soils.

The direct impacts over the project preparation and operation stages will involve:

Removal: Physical disturbance of the soil genetic profile as a result of the topsoil removal and the related losses in terms of quality and quantity. Topsoil layers are generally low in humus and very shallow (less than 10 cm) over the areas to be affected by the operations; therefore, the subsoil layers will also be stripped to ensure sufficient stock of soil materials to meet closure requirements. The total amount of soil materials is about 150,000 m^3.

Stockpiling and Disposal: Related to the construction of the IMWF and the waste ore stockpile. Mine rock will be co-disposed with the dewatered process waste (tailings) under Option 1. The estimated waste rock amount is about 15 Mt and the estimated tailings amount is about 7 Mt.

Sources of Soil Pollution

The mine operations will affect the soils through ground-level (ABL) pollution with and subsequent deposition of dust and harmful substances.

Deposition of Dust:

- From mining (dust emissions of short duration and small impact radius);
- During stockpiling (the geologic materials normally have sufficient moisture content and such an impact could be expected only in the dry months – small impact radius);
- Soil pollution from open line sources (pit haulage roads) - small impact radius, mostly on both sides of the roads;
- Dust emissions from mining and stockpiling operations do not differ in chemical composition from the soil parent materials in the region and therefore they do not create any risk of altering the local soil properties.

The sources of fugitive emissions at the phase of preparation of operational work areas include: construction works, which emit dust of various particle size from the inert material; and internal combustion engines of the project equipment, which will emit exhaust gas and soot during the construction phase.

The harmful substances that will be generated by the mining operations will include: - dust emissions of various particle size (including PM_{10}) from earthworks (manual and mechanised). Depending on the chemical composition of the mineable rock, the particulate matter may contain different levels of silica, aluminum dioxide, magnesium oxide, calcium oxide and iron oxide. At the same time, the equipment operation will generate typical exhaust gases such as: nitrogen oxides, carbon oxide, sulfur dioxide, non-methane volatile organic compounds (NMVOC), soot, heavy metals, polycyclic aromatic hydrocarbons (PAH), persistent organic pollutants (POP), polychlorinated biphenyls (PCB), etc.

Impact Assessment

Area of impact: A total of 85 ha of soils will be directly affected by earthworks, dust and gas emissions and change of land use designation as part of the project implementation (lands disturbed by mining and processing operations). The area of potential indirect impact (e.g. from dust and gas emissions) around the operational sites can also be added.

Severity of impact: significant - the open pit development will alter the surface profile by converting a positive landscape form into a negative one over the mine life period of 9 years. The low-grade ore and waste rock stockpiles will create new positive landforms. Land use will change after the mine closure under the influence of these on the landscape, soil and basement rocks.

Duration of the impact: over the mining and processing stage.

Occurrence of impact*:* During operation, the impact will occur within the shift work hours based on a 3-shift schedule.

Cumulative and synergistic impacts on the environment: Reduction of the ground level, pollution of surrounding lands with non-toxic particulate matter, alteration of the water regime and increased erosion until the beginning of biological rehabilitation, changing of the existing land use. A successful and viable biological rehabilitation may convert the disturbed lands into an environmentally more valuable landscape.

Synergistic impacts on the environment are not expected.

Assessment of the Planned Closure Activities

A plan for closure of the open pit, the ore processing plant, the IMWF, the ancillary facilities and unnecessary infrastructure will be prepared by BMM EAD together with the construction and operation designs. In order to assess the requirements of stakeholders (principally, the local community), it is envisaged that consultation will be carried out with appropriate community representatives prior to the development of the Closure Plan.

The Company will prepare a Mine Closure Project for the Decommissioning and Rehabilitation of the Minesite and Disturbed Lands (Open Pit, Process Plant and IMWF) and submit it to the responsible authorities (the MEET and the RIEW (MOEW)) for approval and will, in compliance with the provisions of the URA, provide a reclamation bond to the Concessionor.

The lands occupied by mine and construction operations will be rehabilitated after shutdown of operations and therefore no negative impact on the soils is anticipated. Technical and biological rehabilitation will be implemented. The soil material stockpiled over the life of the mine should be re-used selectively due to the elevated levels of heavy metals in it. These soils are suitable only for reforestation. Suitable and resilient tree species should be planted to ensure continuous restoration of the soil forming process and play important soil protection, anti-erosion, and social functions.

6.5. Flora and Fauna

Flora

The project area is within the Macedonian-Thracian province of the European broadleaved forest district. The province includes the Eastern Rhodopes and part of the Thracian lowland. The project site belongs to the Krumovgrad region of the Eastern Rhodopes. The Eastern Rhodopes are generally dominated by xerothermal vegetation represented by formations of Italian oak, pubescent oak and common oak. Moesian beech formations occur in the S-SW end of the Eastern Rhodopes. The Krumovgrad region typically hosts xerothermal Italian oak and Italian oak-Cerris oak forests, as well as xeromesophytic durmast oak and mixed durmast oak and hornbeam forests. Habitats of the rare species Thracian oak, Verbascum humile ssp. Juruk, Eriolobus trilobata, strawberry madrone and Arbutus andrachne are found in this region alone.

The plant communities in the Ada Tepe area are represented by a relatively small number of taxa and syntaxa. The forest vegetation in Adá tepe consists of secondary Austrian pine communities and mixed coniferous species dominated by Austrian pine and Scots pine, which are characterised by dense canopies and good vitality. The forest canopies typically have one-storey and rarely two-storey structure with individual grass species on the ground-level phytocenotic horizon. Also, mixes Italian oak and coniferous communities have formed with manifest mosaic arrangement of mictrogroups of Italian oak, Austrian pine and other tree and brush species.

The vegetation in the project area is strongly affected by human activity. The native vegetation is preserved in limited small areas. Most of the area is occupied by primary and secondary succession vegetation, and by lands that have eroded after deforestation. The tree vegetation at Adá Tepe is strongly affected. The afforestation of large areas with Austrian pine mixed with acacia has changed its natural appearance. The species that naturally occur in the region are represented by flowering ash, Italian oak, common Durmast oak, hawthorn, cornel tree and dogrose. The natural mezo-hydrophilic tree vegetation has remained in the ravines around the hill but its distribution is extremely limited. In general, the vegetation in the area is extremely altered by extensive historic human activity. Secondary succession grass and brush vegetation or introduced tree species now replace the former xerophilic forests in some areas. Tree cutting in other areas has been fatal causing complete erosion and washing away of the soil profile.

According to the forest development plan of the Krumovgrad State Forestry Board (2008), the project area includes the following sections:

- section 600 with a total area of 62,3 ha and a resource of 7,660 m^3;
- section 601 with a total area of 70.9 ha and a resource of 11,320 m^3;
- section 629 with a total area of 79.6 ha and a resource of 8,360 m^3;
- section 630 with a total area of 59.7 ha and a resource of 7,805 m^3.

The analysis of the current status of the vegetation in Krumovgrad Municipality has shown that secondary and mobile floral elements prevail and no habitats of rare, near-extinct or protected plant species have been found. The vegetation is represented mainly by forest plants with prevalent Austrian pine and Scots pine, mixed coniferous-broad-leaved forests dominated by Italian oak, derivative brush and grass communities and agrophytocenoses dominated by tobacco.

The elevated levels of macro and microelements identified in most of the vegetation samples lead to the conclusion that the nutritional balance of the plants is disturbed.

Expected Impacts on the Vegetation from the Project Implementation

Construction

The implementation of the project, which includes development of an open pit and construction of a processing plant and other project facilities, will have an impact on the flora resulting in reduction of the floral diversity across an area of some 85 ha under Option 1 and approximately 136 ha under Option 2.

Item	Elements of the Investment Project Proposal	Land Requirement (ha)	
		Option 1	Option 2
1	Open pit (Ada Tepe)	17	17
2	ROM ore pad	3	3
3	Flotation processing plant (Option 1)	6	-
4	Dore gold production facility (Option 2)	-	2
4	Integrated Mine Waste Facility	41	-
5	Flotation TMF	-	45
6	Waste rock stockpile	-	44
7	Soil stockpile	2	2
8	Raw and process water reservoir and collecting sumps	4	1
9	Roads	12	15
10	Water storage dam	-	7
	Total	85	136

The impact on the vegetation during project construction will be from the clearing of planted forest communities and mixed derivative deciduous communities. Derivative and secondary brush and grass micro formations consisting mostly of widespread mobile and secondary ruderal species will be destroyed. The affected vegetation is renewable.

The construction of the project facilities will affect the following sections and sub-sections:

Item	Elements of the Investment Project Proposal	Affected sections and sub-sections vegetation composition	
		Option 1	Option 2
1	Open pit (Ada Tepe)	Section 600 Sub-sections: г, д, е, ж, з, и, к Austrian pine, Italian oak, oriental hornbeam, acacia, Sessile oak, Scots pine, pubescent oak	Section 600 Subsections: г, д, е, ж, з, и, к Austrian pine, Italian oak, oriental hornbeam, acacia, Sessile oak, Scots pine, pubescent oak
2	ROM ore pad	Section 629 Sub-section - л Austrian pine, Italian oak, acacia	Section 629 Sub-section - м Austrian pine, Italian oak
3	Process Plant	Section 629 Sub-section - н Austrian pine, Italian oak, oriental hornbeam, gumarabic acacia	Section 601 Subsections: б, в Austrian pine, Italian oak, oriental hornbeam, Sessile oak, acacia
4	Integrated Mine Waste Facility	Section 629 Subsections: к, л, м, н, п, с, т, у, ф Austrian pine, Italian oak, oriental hornbeam, gumarabic acacia, acacia	
5	Flotation TMF		Outside forest lands

Item	Elements of the Investment Project Proposal	Affected sections and sub-sections vegetation composition	
		Option 1	Option 2
6	Waste rock stockpile		Section 629 Subsections: к, л, м, н, п, с, т, у, ф Austrian pine, Italian oak, oriental hornbeam, gumarabic acacia, acacia
7	Soil stockpile	Section 600 Sub-section - е, ж Austrian pine, Italian oak, acacia	Section 600 Sub-section - е, ж Austrian pine, Italian oak, acacia
8	Raw and process water reservoir and collecting sumps	Section 600 Sub-section - ж Austrian pine, Italian oak, acacia	Section 600 Sub-section - н Italian oak, pubescent oak, oriental hornbeam
9	Water storage dam		Section 630 Subsections: б Italian oak, Austrian pine, oriental hornbeam

Sources of Air Pollution and Deposition of Pollutants on Vegetation

During project construction, the site will generate only fugitive emissions from the following operations:

- excavation;
- earth backfilling;
- development of temporary haul roads situated at the side of the pit and forming ramps up to the ROM ore pad and the mine rock disposal facility, whose surfaces are graded, cleared and topped with gravel and crushed rock;
- loading, haulage, unloading and disposal of solid waste from the construction process;
- construction of soil stockpiles, ROM ore pad and the respective facilities for mine waste disposal;
- construction of a concentrator plant and a crushing plant. The sources of fugitive emissions at the phase of preparation of operational work areas include: construction works, which emit dust of various particle size from the inert material; and internal combustion engines of the project equipment, which will emit exhaust gas and soot during the construction phase.

The harmful substances that will be generated by the mining operations will include: dust emissions of various particle size (including PM_{10}) from earthworks (manual and mechanised). Depending on the chemical composition of the mineable rock, the particulate matter may contain different levels of silica, aluminum dioxide, magnesium oxide, calcium oxide and iron oxide. At the same time, the equipment operation will generate typical exhaust gases such as: nitrogen oxides, carbon oxide, sulfur dioxide, non-methane volatile organic compounds (NMVOC), soot, heavy metals, polycyclic aromatic hydrocarbons (PAH), persistent organic pollutants (POP), polychlorinated biphenyls (PCB), etc.

Closure

The timely technical and biological rehabilitation of the area during the closure stage of the project is a condition for the successful revegetation of the project footprint. There is a potential risk for direct and indirect impacts on the vegetation and the surrounding areas during site closure. In this regard, a potential risk is the re-use of soils removed during the construction phase that have elevated background levels of heavy metals. Therefore, controlled use of soil materials for bilogical rehabilitation will be required. This requires strict observance of the detailed Closure Plan, which will be implemented in stages during the construction, operation and closure of the project.

Animal Life

The Krumovgrad municipality and the prohject area in particular are in the East-Rhodopean sub-region of the South-Bulgarian fauna region. The fauna in the region belongs to the nemoral fauna complex and is part of the Thracian zoogeographic region including the Eastern Rhodopes. From the zoogeographic perspective, the East-Rhodopean sub-region is characterized by a high percentage of Mediterranean, sub-Mediterranean and Middle-Asian fauna elements and a lower percentage of European and Euro-Siberian elements.

Invertebrates

The habitat distribution of the complexes of invertebrates includes two main groups: terrestrial and aquatic habitats. The terrestrial habitats can be subdivided into open land and forest habitats. The open land habitats are subdivided into the following series: primary natural, secondary successive (derivative), and agricultural arable lands. The subgroup of forest habitats includes the following series: natural autochthonous forests, secondary successive tree plantations (species).

Expected impacts during project construction

The changes to the vegetation will cause abrupt changes to the invertebrate fauna. These changes will result from dramatic habitat modifications caused by the clearing of tree and grass vegetation, and replacement of the edificatory species after the rehabilitation.

The changes in the soil composition will affect the edaphic conditions of the environment and the geobiont, stratobiont and epigeal invertebrate faunas. This stage will include the soil removal and the initial pit development. The habitats within these footprints will be destroyed. The rehabilitation of these areas is a difficult and slow process requiring continuous monitoring and consultations with experts on the affected groups of the animals.

Changes in the invertebrate fauna in the soil stockpile footprint will also occur.

Expected impacts during project operation

Changes in local fauna in the soil and waste rock stockpile footprints will occur. The areas where soil material will be removed and stockpiled will be most affected.

Emergencies or natural disasters may also cause changes in the fauna and the aquatic zoocenoses.

Vertebrates

According to the forest territory zoning, the municipality lies in the lower plain-hilly and hilly-submontane belt of oak forests (RL= 0-900 masl.).

The species composition in the Krumovgrad municipality can be defined as abundant. The highest contribution to this abundance is that of the birds with no less than 191 species, or 46,02% of the total bird species in Bulgaria (415 species according to the most recent official data), i.e. almost half of all local species. The area is home to more than half of the reptile (23 of a total of 36), amphibian (10 of a total of 16) and mammal (58 of a total of 114) species occurring in Bulgaria. Fish species (all of which are fresh-water species) are also abundant here.

Expected impacts during project construction

Since the construction phase will impact the land surface and strata, as well as the vegetation, including forests, the habitats of the species inhabiting the ground surface, the strata underneath and the vegetation will change. Some individuals of small-size and slow-moving species such as small rodents, lizards and ground nesting bird species may also be affected.

Parallel to destruction of plant and animal systems, the initial development of the open pit and any sites associated with its operation will destroy the soil systems and the basement rock in some parts of the ecosystems. The damage of these ecosystems will be permanent but on a small territory and without a cumulative effect. New ecosystems may form after the closure of the operational sites.

Expected impacts during project operation

The forest type habitat in the Ada Tepe area will be affected. It will be altered strongly and will be transformed into a rocky type habitat although a relatively small one.

As noted above, the elevated background levels of heavy metals in the soils removed prior to construction and operation will be an important factor for their future re-use but not a risk of pollution of ecosustems. The practices considered in the project (soil removal on stockpiles that will be vegetated) and the low pollution potential of the soils and the mine wastes will minimise the potential for significant negative impacts.

Fish (Pisces)

The Carps are represented by the largest number of species – 13 species, flollowed by the Loaches - 4 species, and the Perches – 2 species. The remaining families are represented by 1 species each. Of those, 11 species are typical of running waters and further 11 of still or slow-flowing waters.

The most frequently occurring ichtiofauna in the river in the project area – in Krumovitsa River:

Family: Carps (Cyprinidae) - Chub; Maritsa barbel; Lesser vimba; Common roach; Bleak; Gudgeon;

Loaches (Cobitidae) – Spined loach (Cobitis strumicae)

Two of those fish species, the Maritsa barbel and the golden spiny loach, are listed in Annex II of Council Directive 92/43.

The Maritsa barbel is subject to a conservation regime and regular use (Article 41, paragraph 1 of the Biodiversity Act) and is listed in Annex 5 to Directive 92/43.

Expected Impacts

No negative impacts are expected. According to the Traffic Plan, vehicles supplying materials and consumables will not drive across the Krumovitsa River system. This will eliminate the risk of transport incidents involving chemicals.

Amphibians (Amfibia)

All the amphibians - except for two species living most of their life in water: the grass water frog and the yellow-bellied toad, and one tree-brush species, the European tree frog - live on land outside their mating periods. The dominant species are the green toad and the big water frog.

Reptiles (Reptilia).

Of all reptiles, four species - two turtle species and two water snake species - are native to water. Three species may be defined as forest species – the Aesculapian snake, the smooth snake and the slow worm.

Among all species that are subject to protection in the East Rhodopes BG0001032 Protected Site, two species of tortoises will be directly affected - the Hermann's tortoise and the Mediterranean spur thigh tortoise. Tortoises inhabit the whole area of the project site.

Expected impacts - amphibians and reptiles

Among all species that are subject to protection in the protected area, two species of tortoises will be directly affected - the Hermann's tortoise and the Mediterranean spur thigh tortoise. Tortoises inhabit the whole area of the project site.

Yellow-bellied toad – that species occurs at the project site. It is almost exclusively found in troughs of fountains and spill puddles around them. Rapidly multiplying species widespread in the region and throughout the country.

Birds (Aves)

The bird fauna of the Eastern Rhodopes includes 278 species, of which 171 nesting, 82 wintering, 154 migrating, and 15 appearing during their roaming. One characteristic feature is the high diversity of diurnal raptors (Falconiformes). The diversity of southern species is another characteristic feature.

Of the species identified in the region, 11 are listed in the IUCN World Red List, 12 are endangered, 46 are vulnerable, 13 are rare and 32 are species decreasing in Europe.

The project area is the home of representatives of all six ecological groups of birds - tree-brush, terrestrial-arboreal, terrestrial, aquatic, riparian, hunting in or from the air. The number of petrophyllous species (those that inhabit rocky and stony areas) is significant. The same applies to the species typical of forest and brush habitats and the species bound to water impoundments.

With regard to their presence in the area, both permanent and nesting migratory species occur, as well as passing and wintering species.

The dominant species in the open land areas with scattered tree vegetation are the red-backed shrike and the bunting, and the species dominating the forest habitats including the Ada Tepe hill are the chaffinch, great tit, crested tit, coal tit, blue tit, oriole, mountain chaffinch, goldfinch, siskin, cirl bunting, jay, mistle thrush, dipper, robin, turtle dove, green woodpecker, Syrian woodpecker, lesser spotted woodpecker, goshawk. The most frequently occurring scrub community inhabitants (in dense groups of patches of low tree vegetation trees and brush) are the chaffinch, oriole, blackbird, red-backed shrike, cirl bunting, and, in some locations, rock bunting, turtle dove, and rarely other species. The dominant species in the rocky and cliff areas is the wheatear. The house sparrow and the house martin are best established and with numerous individuals in the town of Krumovgrad and the nearby villages, where large numbers of swallows are also typical.

Expected Impacts

The protected species whose habitats may be affected are:

Short-toed eagle. The species was found to nest at the project site during the 2005-2006 monitoring. The SE hillside of Ada Tepe was the nesting territory of one pair in 2005. However, that species was not observed to nest there in 2006. The SW hillside of Ada Tepe is a suitable nesting habitat despite the fact that the species did not nest there back in 2006, 2007 and 2008, and the open areas are the feeding ground of that species. Construction of stockpiles on the southern hillside of Ada Tepe would destroy the nesting habitat of the species.

Black kite. The species has been found to breed within BG0002012 Krumovitsa Protected Area - one pair. The species was not identified in the project area during the

20052006 monitoring campaign; however, a black kite individual was observed flying high above the eastern hillside of Ada Tepe during field observations in 2008. The project is not expected to have a direct negative impact on that species due to the small number and sporadic occurrence of black kites in the area where gold mining will take place.

European roller. The European Roller is a protected nesting species within BG0002012 Krumovitsa Protected Area and it is observed to nest in the project site area. As the only nesting pair found in the project site area is outside the project infrastructure footprint, the expected impact on that species is negligible.

European nightjar. It is a protected species within BG0002012 Krumovitsa Protected Area and is observed to nest in the project site area. One nest was found on the eastern hillside of Ada Tepe during the 2005-2006 monitoring campaign. Not found during the field studies back in 2008. Considering the small number of individuals occurring in the project area, the project development is expected to have a minimal negative impact on that species.

Barred warbler. It inhabits shrub and brush communities, scattered groups of trees with many shrubs in open areas and grazing lands around the Ada Tepe hill. No significant impact on that species is expected.

Red-backed shrike. Similar to the above species, it also inhabits shrub and brush communities and scattered groups of trees with many shrubs in open areas around the Ada Tepe hill and in the Krumovitsa valley. No significant impact on that species is expected.

The anticipated impact at national level is negligible for the above species.

Mammals (Mammalia)

The mammals are the second most abundant class with 58 species, which represent 50,88% of all mammal species in Bulgaria (114 species). Similar to reptiles, mammals also have a group of species that live their lives above and under the ground, and two species, the common mole and the lesser mole rat that practically live their entire life underground. The Bats are represented by the largest number of species (19 in total), followed by Rodents (18 species), Predators (11 species), Cloven-footed (5 species), Insectivores (4 species) and Lagomorpha (1 species). The most frequently registered insectivorous animal was the common mole. The most abundant rodents were the common vole, especially in open areas, the wood mice and the squirrel in the forests, and the forest dormouse at some other locations.

No constant wildlife migration corridors that can be affected by the project have been established in the region.

The field investigations identified the following species:

Family: Hedgehog – hedgehog
Family: Moles – European common mole
Family: Mice – yellow-necked mouse and wood mouse
Family: Dormice – forest dormouse
Family: Shrews – common vole and European pine vole
Family: Otters – badger, weasel and beech marten
Family: Hares – European hare
Family: Squirrels – red squirrel
Family: Canids – jackal
Family: Boars – wild boar

Bats (Chiroptera)

Five bat species listed in Annex II of Directive 92/43/EEC have been identified in the project area. These are the greater horse-shoe bat, the large mouse-eared bat, the lesser mouse-eared bat, the Schreiber's bat and the Geoffroy's bat.

In our opinion, the lack of suitable day-time shelters in the area, i.e. the coniferous vegetation dominates the area, rock formations are practically unavailable, etc., is the main factor for the low diversity of local bat species within the project footprint. The project area is the feeding area of species that mainly inhabit other parts of the Eastern Rhodopes Protected Site.

Expected Impacts

The implementation of the project involves partial or complete transformation of a number of ecosystems, which will cause reduction of the ecosystem diversity in the project area.

The overburden removal work in the open pit will destroy the soil systems and the rock base of the existing ecosystems. Ecosystem degradation in these areas will be permanent but on a small territory and without a cumulative effect. New ecosystems may form after the closure of the operational sites.

The biotic components of the ecosystems within the footprints of the waste rock stockpile, the TMF, the soil stockpiles and the construction sites will be disturbed to a lesser or greater extent. The disturbance of these ecosystems will be permanent and new ecosystems may form after the closure of the operational sites.

Exprcted Impacts during Project Closure

Invertebrates

The edificatory plant species will be replaced after the rehabilitation. This is not a typical succession, which will not promote restoration of the habitats.

The areas where soil material will be removed and stockpiled will be most affected. The initial pit development will require removal of not only soil but also rock material, which will also be stockpiled.

Such changes are usually followed by occurrence of pioneer invertebrate species and communities that are typical of the initial stages of succession.

Vertebrates

The closure stage will include technical and biological rehabilitation of the minesite. The waste rock stockpile site and the disturbed portion of Ada Tepe should be subject to forest-type rehabilitation. A well-developed cover of introduced tree vegetation will gradually transform the rehabilitated operational areas into typical forest habitats, which will have a positive effect on the animal species inhabiting such habitats, and at a certain stage these restored habitats will be re-colonized by typical local species.

Generally, the total project footprint area is not large. Compared to the area surrounding the town of Krumovgrad, the affected site area is a very small percentage. The shape, size and location of the sites demonstrate that they will not obstruct the migrations of the different non-flying animal species and will just impede the movement of some of the smaller species to some extent.

The project operational sites are potentially reproductive habitats of 5 species listed in Annex II to the Biodiversity Act but only one of them, the Middle Spotted Woodpecker, is really rare but not at risk of becoming extinct in Bulgaria.

Protected Sites. Elements of the National Environmental Network

The project area does not affect nor is in close proximity to protected sites within the meaning of the Protected Areas Act.

According to the provisions of art. 8 par. 1 of the BDA, the entire project area lies within the footprint of Natura 2000 protected site known as **BG 0001032** Rhodopes East under Council Directive 92/43 on the Conservation of Natural Habitats of Wild Fauna and Flora. **BG 0002012** Krumovitsa, which is a protected site under Council Directive 79/409/EEC on the Conservation of Wild Birds, is in close proximity to the project area. Both protected sites were established with Government Decree 122/02.03.2007.

An assessment of the compatibility of the proposed development with the conservation objectives of the protected sites has been completed in compliance with the provisions of art. 6 (3) and art. 6 (4) of the Directive 92/43/EEC, art. 31-34 of the Biodiversity Act and the Regulations on the Terms and Procedures for Assessment of the Compatibility of Plans, Programs, Projects and Investment Proposals with the Scope and Objectives of Protected Sites. The assessment results are presented in a separate report, which is an integral part of the EIS.

6.6. Wastes

The project proposal considers mining and processing of gold ores from the Ada Tepe prospect in the Khan Krum Deposit, Krumovgrad Municipality, District of Kardzhali

The project considers construction and operation of an open pit mine and a process plant for mining and processing of auriferous ores to gold-silver concentrate, an Integrated Mine Waste Facility (IMWF) and associated project infrastructure - roads, water and electrical supply services, storage facilities.

Wastes Generated during Project Construction

The construction of the project will involve different activities, which will generate different types of waste (hazardous, operational, construction and domestic wastes).

A/ HAZARDOUS WASTES

Waste hydraulic oils

Waste hydraulic oils will be generated from routine or breakdown change of the oils of vehicles, mobile and construction equipment. Waste composition – petroleum products, high-molecular-weight hydrocarbons.

Mineral-based non-chlorinated engine, gear and lubricating oils

Waste engine and gear oils will be generated from routine or breakdown change of the oils of vehicles, mobile and construction equipment. Waste composition – petroleum products, high-molecular-weight hydrocarbons.

Oil filters

Waste oil filters will be generated from routine or breakdown changes of the oils of vehicles, mobile and construction equipment. Waste composition – petroleum products, high-molecular-weight hydrrocarbons and impregnated cellulose.

Brake fluids

Waste brake fluids will be generated from breakdown changes of brake fluids of vehicles and construction equipment.

Antifreeze fluids

Waste antifreeze fluids will be generated from breakdown change of engine-cooling fluids of vehicles, mobile and construction equipment. Waste composition – ethylene glycol, additives.

Batteries

The waste will be generated from replacement of discarded batteries of vehicles, mobile and construction equipment. Waste composition – lead, sulphuric acid.

Wiping cloths and protective clothing contaminated by dangerous substances

The waste will be generated from cleaning of vehicles, mobile and construction equipment and contamination of workwear of employees. Waste wiping cloths and clothing will be generated in the respective operational area of the pit. The wastes will be stored in steel drums in the area they are generated and kept there until sufficient amount is accumulated for removal and subsequent treatment.

B/ OPERATIONAL WASTE

Excess earth and rock material

Excess earth and rock material (rockfill, soil and stones) from the excavation of foundation pits for project buildings and process facilities will be stockpiled in a designated area and part of it will be re-used for backfilling of foundations. Non-reusable earth material will be stockpiled in a designated area and removed from the minesite by the owner of the wastes for disposal onto a landfill using the construction waste haulage route approved by the mayor of the municipality in accordance with art. 18 of the Waste Management Act.

Mixed construction waste

The construction of buildings and installation of equipment will generate concrete, bricks, tiles, ceramics, etc. Waste composition – bricks, concrete, tiles, mortar, etc.

Iron and steel

Metal wastes – angle steel, pipes, construction steel etc. will be generated from project construction and process equipment installation.

Wood

Wood wastes will comprise discarded formwork from the construction of the foundations of the facilities and wood packaging of delivered equipment units and components for the new plant.

C/ Mining wastes from the open pit development

The development of the open pit and the construction of the mine waste storage facilities will generate typical mining wastes: topsoil and soil materials and mine rock from the overburden removal to access the orebody.

The rock generated from the open-pit construction will be used for the construction of platforms/foundations of the mining waste facilities.

Dredging spoil

Topsoil will be removed during the initial stage of development of the open pit and the excavation works across the site for construction of buildings, infrastructure and process facilities.

Prior to construction, all areas for construction or mining will be stripped of topsoil, which will be stockpiled for further use over the closure and rehabilitation stage.

Waste Rock

Mine rock will be generated from the overburden removal to access the orebody. Overburden will be removed in a manner that ensures the stability of the open pit slopes and maximum compliance with the requirements for protection of the subsurface and surface environment. The mine rock will be utilized to construct the IMWF.

D/ Solid municipal wastes

Municipal wastes will be generated over the construction stage of the project from the use of everyday items by the site construction and engineering workers.

Wastes Generated during Project Operation Mine Wastes

Mine Wastes Generated during Project Operation

The project operation will generate typical mine wastes: mine rock from the open pit development and ore processing tailings from the process plant. In compliance with the provisions of the URA (art. 22d par. 3), BMM EAD has developed a Mine Waste Management Plan.

The mine rock from the Ada Tepe open pit and the flotation tailings from the process plant for production of gold-silver concentrate can, in compliance with the URA and the provisions of the *Regulation on the Specific Requirements to Mining Waste Management* (SG issue 10/2009), be classified as *non-hazardous, non-inert mining wastes*.

Waste Rock

Waste rock will be generated from the overburden removal to access the mineable reserves for each year of open-pit operation. Overburden will be removed in a manner that ensures the stability of the open pit slopes and maximum compliance with the requirements for protection of the subsurface and surface environment. The mine rock from the development of the open pit will be utilized to construct the IMWF.

The rock material with no economic gold and silver values is classified as waste rock, which is generated in the process of exposure/access to the ore body. It mostly consists of breccia conglomerates with occasional boulders of metamorphic rocks – amphibolites, gneiss and schists. A total of 14,630,000 tons of waste rock are expected to be produced during the life of the Ada Tepe mine.

Flotation Waste (Tailings)

The final tailings will be thickened in a radial thickener to a final pulp density of 56% solids. A diluted flocculant solution will be added to the slurry to facilitate the settling of solids. The thickener overflow (supernatant water) will be pumped back into the process via a retention pond. The thickener underflow will be pumped into a tailings delivery pipeline for deposition either into an IMWF (Option 1) or into a TMF (Option 2).

The process (or flotation) tailings are the waste material rejected from the flotation plant after the recoverable valuable minerals have been extracted from the ore feed. About 7,235,000 tons of tailings are expected to be generated by the end of the project life.

Based on the completed mining waste classification, the geotechnical properties of the facility, the site wide ground conditions, specific environmental conditions and proposed preventive measures and management of the facility, it is classified as a category B facility.

Wastes from Gold-Silver Concentrate Production

A/ HAZARDOUS WASTES

Waste engine, gear and lubricating oils

Waste engine, gear and lubricating oils will be generated from changes of the oils of process and mobile equipment. Composition – high-molecular-weight hydrocarbons.

Waste hydraulic oils

Waste hydraulic oils will be generated from changes of the oils of hydraulic components of process and lifting equipment. Composition – high-molecular-weight hydrocarbons.

Waste insulating and heat transmission oils

Waste mineral-based insulating and transformer oils will be generated from changes of insulating and heat transmission oils of transformers. Waste composition – petroleum products, high-molecular-weight hydrocarbons.

Lead batteries

The waste will be generated from replacement of discarded batteries of mobile and lifting equipment. Solid waste. Waste composition – lead, sulphuric acid.

Fluorescent tubes and other mercury-containing waste

The waste will be generated from discarded mercury and luminescent lights used in the lighting systems across the site. Solid waste.

Packaging containing residues of dangerous substances

Multi-layer paper bag packaging of copper sulphate, plastic and metallic packaging contaminated by dangerous substances will be generated from the consumption of delivered ancillary materials (reagents).

Wiping cloths and protective clothing contaminated by dangerous substances

The waste will be generated from cleaning of process and ancillary equipment and contamination of workwear of employees during work. The wastes will be stored in steel drums in the area they are generated and kept there until sufficient amount is accumulated for removal and subsequent treatment.

Oil from oil/water separators

The oil from oil/water separators generated from the mud and oil trap in the car wash area will be collected in steel drums and then subject to contract delivery to recycling companies certified under art. 37 of the WMA or holding an IPPC Permit for this activity.

Interceptor sludges

The interceptor sludges generated from the mud and oil trap in the car wash area will be scooped and deposited in the IMWF.

B/ OPERATIONAL WASTES

Dust from treatment of the exhaust from ore crushing

The operation of the jaw crusher dust collection system, which will be installed to ensure dust collection at the ore transfer points and treatment by a bag filter, will generate dust from the treatment of the crusher exhaust. Composition – same as the gold ore composition.

Dust bags

Worn filter fabrics will be generated from the replacement of the bag filters in the xanthate solution preparation area and the jaw crusher area.

Scrap

Mixed metal wastes will be generated from replacement of discarded grinding steel and from the repairs and replacement of operational equipment, units and components or decommissioning of equipment and plant. The generated wastes will be subject to collection and temporary storage until sufficient amount is accumulated for contract delivery to recycling companies certified under art. 37 of the WMA, registered under art. 12 of the WMA or licensed under art. 54 of the WMA as scrap metal traders, or holders of IPPC Permit.

Metal filings and turnings

These will be generated from repairs of equipment in the mechanical workshop. The generated wastes will be subject to collection in metallic containers and contract delivery to recycling companies certified under art. 37 of the WMA, registered under art. 12 of the WMA or licensed under art. 54 of the WMA as scrap metal traders.

Waste rubber belts

They will be generated from replacement of worn rubber belts of conveyors. Composition – elastomer, fabrics.

Discarded electronic and electrical equipment

The project operation will generate waste sodium-vapor lamps, sensors, office equipment etc. The wastes will be collected in metallic containers in compliance with the Regulation on the Release of Electrical and Electronic Equipment on the Market and Treatment and Transport of Electrical and Electronic Waste, (promulgated in SG, issue 36/02.05.2006).

Sludges from treatment of household wastewater

The waste will be generated from the household wastewater treatment in the site treatment plant. The deposited sludges will be recovered and removed from the site for disposal on a community landfill.

C/ Generation of construction wastes

Mixed construction wastes will be generated from renovation/rehabilitation of buildings across the minesite. Solid waste. Composition – concrete, bricks, tiles and ceramics, etc.

D/ Solid municipal wastes

Municipal wastes will be generated over the operation stage of the project from the use of everyday items by the mine and process plant employees. Waste composition - organics, plastic, cellulose.

Wastes Generated during Project Closure

The closure of the open pit, ROM pad, process plant, associated infrastructure, IMWF, or the waste rock stockpile and TMF (Option 2), will be carried out over a period of 5 years after shut-down of operations. The aftercare period covering the management of the site once full restoration works are complete is estimated to be about 20 years.

The Company will prepare a Mine Closure Project for the Decommissioning and Rehabilitation of the Minesite and Disturbed Lands (Open Pit, Process Plant and IMWF) and submit it to the responsible authorities (the MEET and the RIEW (MOEW)) for approval and will, in compliance with the provisions of the URA, provide a reclamation bond to the Concessionor.

Over the entire lifetime of the mine, the Closure and Rehabilitation Plan will be regularly updated in view of the projects implementation, in order to ensure that a final Closure and Rehabilitation Plan is in place prior to decommissioning. The Plan will include a detailed strategy of closure according to the arrangements agreed with the Bulgarian authorities and consultations held with the local communities and NGOs on the land use methods, and the objectives and definitions of after care.

The long-term objective of the closure strategy is to leave the site in such a condition that requires minimum care and monitoring.

The works on the closure of the IMWF will commence at the operation stage. The outer face of the facility will progressively be rehabilitated. The proposed mining waste disposal method (Option 1) will allow progressive rehabilitation of the facility over the operation stage. That would enable a relatively long-term monitoring of the rehabilitated areas and possible implementation of additional measures to ensure the long-term stability of facility. The last closure stage considers deconstruction of the associated facilities and infrastructure including access roads, pipelines and pump stations.

Waste Collection and Transport during Project Construction

A/ HAZARDOUS WASTES

Hydraulic, engine and gear oils, brake and antifreeze liquids and oil filters.

The generated hazardous wastes will be subject to collection in sealed steel drums/containers, removal by the project construction contractor, and contract delivery for treatment to companies holding permits under art. 37 of the WMA or relevant IPPC permits.

Lead batteries, which will be generated from the replacement of discarded batteries of vehicles, mobile and construction equipment and will be collected in a designated container in the temporary storage area pursuant to the Regulation on the Release of Lead Batteries on the Market and Treatment and Transport of Discarded Lead Batteries (Council of Ministers Decree 144/ 2005, promulgated in the SG issue 58/2005), and then subject to contract delivery to recycling companies certified under art. 37 of the WMA, or holders of IPPC Permit.

Wiping cloths and protective clothing contaminated by dangerous substances

The generated waste - Wiping cloths, and protective clothing contaminated by dangerous substances by the site equipment and construction personnel will be disposed in a metal container and temporarily stored at a designated area before haulage to the main base of the construction contractor for subsequent collection and treatment under written contract with entities licensed under art. 37 of the WMA.

B/ OPERATIONAL WASTE

Top soil and other soil material

Top soil will be generated as part o the overburden removal, as well as by earth works for the construction of buildings, facilities and infrastructure of the new plant (the process plant). Prior to construction, all areas for construction or mining will be stripped of topsoil, which will be stockpiled for further use at the closure and rehabilitation stage. Topsoil layers are generally low in humus and very shallow (less than 10 cm) over the areas to be affected by the operations; therefore, the subsoil layers will also be stripped to ensure sufficient stock of soil materials to meet closure requirements.

Both Options involve topsoil and other soil material to be stored in a designated area of 2 hectares.

Excess earth and rock material (rockfill, soil and stones) from the excavation of foundation pits for project buildings and process facilities will be stockpiled in a designated area and part of it will be re-used for backfilling of foundations. Non-reusable earth material will be stockpiled in a designated area and removed from the minesite by the owner of the wastes for disposal onto a landfill using the construction waste haulage route approved by the mayor of the municipality in accordance with art. 18 of the Waste Management Act.

Mixed construction waste will be collected and removed from the minesite by the owner of the wastes (the project construction contractor) and disposed of onto a landfill as directed by the local authorities.

Waste metal - structural steel, angle steel, construction steel etc., that will be generated over the construction of the plant. The waste metal will be subject to separate collection and temporary storage in a designated area, and contract delivery to recycling companies that have permits for waste metal activities.

Wood

Wood wastes will comprise discarded formwork from construction and wood packaging of delivered equipment units and components for the new plant. They will be subject to separate collection and temporary storage until sufficient amount is accumulated for contract delivery to recycling companies.

Solid municipal wastes will be generated from the use of everyday items by the site construction and engineering workers and will be collected in mobile waste containers (dumpsters) for subsequent disposal onto a landfill designated by the Krumovgard authorities or for approved recycling.

Waste Collection and Transport during Project Operation Mine Wastes.

Mine Wastes

The project considers two mine waste disposal options.

Waste Rock

<u>Option 1.</u>

Under this option, the waste rock will be disposed in an integrated mine waste facility (IMWF). The IMWF will also accommodate the final tailings (slurry), which will be thickened in a radial thickener to a final pulp density of 56% solids. The thickener underflow will be pumped into a tailings delivery pipeline for deposition into the IMWF.

The proposed mining waste disposal method (Option 1) will allow progressive rehabilitation of the facility over the operation stage.

The outer slopes of the facility will be rehabilitated immediately after their construction. This rehabilitation will allow planting of a vegetation cover that will minimise dust emissions, erosion and visual impacts. The footprint of the IMWF will be 41 hectares.

Option 2.

Under Option 2, the mine rock will be stockpiled on a waste rock stockpile. The waste rock stockpile siting is the same as that of the IMWF.

The mine rock stockpile on Adá Tepe will be rehabilitated in accordance with the type of end use agreed upon shut-down of operations. The soil stripped before the commissioning of the stockpile will be re-placed on the stockpile surface. The stockpile outer surfaces will be prepared for planting of self-sustaining vegetation.

The mine rock stockpile closure design will allow planting of a vegetation cover that will minimise the potential for dust emissions, erosion and negative visual impacts. The waste rock stockpile would have an area of 44 ha;

Flotation Waste (Tailings)

Option 1.

Under Option 1, the tailings will be deposited in the IMWF. The facility will also accommodate the mine rock within the same footprint.

The final tailings will be thickened in a radial thickener to a final pulp density of 56% solids. The thickener underflow will be pumped into a tailings delivery pipeline for deposition into the IMWF.

The proposed mining waste disposal method (Option 1) will allow progressive rehabilitation of the facility over the operation stage.

The outer slopes of the facility will be rehabilitated immediately after their construction. This rehabilitation will allow planting of a vegetation cover that will minimise dust emissions, erosion and visual impacts. The footprint of the IMWF will be 41 hectares.

Option 2.

Under Option 2, the tailings will be deposited in a TMF.

On completion of the ore processing, the TMF will comprise a rockfill embankment (approximately 40 m in height) containing some 7.5 million tons of ore processing tailings. Provisions will be made to allow dry closure of the facility, which will facilitate quick stabilisation of the tailings surface to minimise the potential for wind and water erosion, in line with the objectives of ensuring long-term stability and an appropriate end-use requiring minimal maintenance.

The accepted best closure practice in mining and tailings disposal is to collect data and information consistently throughout the deposition period to ensure that an appropriate closure strategy is adopted. This information will include confirmation of tailings chemical properties, as well as appropriate vegetation types, hydrological and meteorological condition, etc. The data will be incorporated into the closure planning documents. The closure and rehabilitation documents will be prepared within 5 years of start-up and updated on a regular basis throughout the operations.

Upon cessation of tailings disposal, the tailings management facility will be drained and its surface re-profiled (consistent with the requirements), and will be capped with an insulating layer and then soil using the previously stockpiled soil materials.

The surface cover system will be established upon decommissioning and closure of the TMF. The materials required for the cover system would be taken from the waste rock stockpile and from the topsoil stockpiles established during start-up of the construction work and during processing operations.

The TMF surface cover system should be designed to fulfill three main functions:

- ensure adequate environment for vegetation;
- provide a protective/drainage layer between the tailings and the root zone; and

- limit seepage into the tailings to an acceptable level.

All service roads not required for the tailings pond will be ploughed up and cultivated during the closing work to promote vegetation. A long-term monitoring program will be required after the site is capped and a permanent vegetation cover is established.

The TMF will require an area of 45 hectares.

Wastes from Gold-Silver Concentrate Production

A/ HAZARDOUS WASTES

Waste engine, gear and lubricating oils will be subject to separate collection in steel drums until sufficient amount is accumulated for contract delivery to recycling companies certified under art. 37 of the WMA, or holders of IPPC Permits.

Waste insulating and heat transmission oils

Waste mineral-based non-chlorinated insulating and heat transmission oils will be subject to separate collection in steel drums until sufficient amount is accumulated for contract delivery to recycling companies certified under art. 37 of the WMA, or holders of IPPC Permits.

Lead batteries will be collected in a designated container in the temporary storage area pursuant to the Regulation on the Release of Lead Batteries on the Market and Treatment and Transport of Discarded Lead Batteries (Council of Ministers Decree 144/ 2005, promulgated in the SG issue 58/2005), and then subject to contract delivery to recycling companies certified under art. 37 of the WMA, or holders of IPPC Permit.

Fluorescent tubes and other mercury-containing waste

Unusable fluorescent and mercury lamps will be replaced with new ones. The discarded lamps will be re-placed in the packaging of the new ones and stored temporarily in a metal container . The container will be kept in an enclosed storage area the access to which will be restricted to authorized personnel only.

The container will be labelled in compliance with the Regulation on the Release of Electrical and Electronic Equipment on the Market and Treatment and Transport of Electrical and Electronic Waste, (promulgated in SG 36/02.05.2006), and the lamps will be subject to contract delivery to recycling companies that hold an IPPC Permit for waste handling activities. A sulphur package will be kept in the respective storage area for treatment in case of emergency.

Packaging containing residues of dangerous substances

Multi-layer paper bag packaging of copper sulphate, plastic and metallic packaging contaminated with dangerous substances will be collected in a metal container and then subject to contract delivery to recycling companies certified under art. 37 of the WMA.

Oil from oil/water separators

Oils from oil/water separators will be subject to separate collection in steel drums until sufficient amount is accumulated for contract delivery to recycling companies certified under art. 37 of the WMA, or holders of IPPC Permits for this type of waste activity.

Interceptor sludges

The interceptor sludges generated from the mud and oil trap in the car wash area will be scooped and deposited in the IMWF.

B/ OPERATIONAL WASTES

Dust from treatment of the exhaust from ore crushing

The dust from the bag filter will be collected in large bags and then recycled into the mill ore feed.

Dust bags

The discarded filter bags will be collected in a metal container and then subject to contract delivery to recycling companies certified under art. 37 of the WMA.

Mixed metal wastes will be collected and temporarily stored and kept there before shipment for contract treatment and recycling by recycling companies certified under art. 37 of the WMA, registered under art. 12 of the WMA or licensed under art. 54 of the WMA as scrap metal traders.

Metal filings and turnings

The waste will be disposed in a metal container and kept there before shipment for contract treatment and recycling by recycling companies certified under art. 37 of the WMA, registered under art. 12 of the WMA or licensed under art. 54 of the WMA as scrap metal traders.

Waste rubber belts

The waste will be disposed and temporarily kept at a designated area before shipment for treatment by entities licensed under art. 37 of the WMA.

Discarded electronic and electrical equipment

These will be collected in a metal container in compliance with the requirements of the Regulation on the Release of Electrical and Electronic Equipment on the Market and Treatment and Transport of Electrical and Electronic Waste, (promulgated in SG 36/ 02.05.2006), and then subject to contract delivery to recycling companies certified under art. 37 of the WMA or hold an IPPC Permit.

Sludges from treatment of household wastewater

The sludges generated from the household wastewater treatment in the site treatment plant will be recovered and removed from the site for disposal on a community landfill.

Generation of construction wastes

The construction wastes generated from renovation/rehabilitation of buildings across the minesite will be collected and stockpiled in a temporary storage area before being removed for disposal onto a landfill using the construction waste haulage route approved by the mayor of the municipality in accordance with art. 18 of the Waste Management Act.

Generation of solid municipal wastes

The solid municipal wastes will be collected in metal containers for subsequent disposal onto the appropriate municipal landfill.

Re-use and Disposal of Wastes

The project does not consider re-use of wastes generated over the project construction and operation stages.

The Investor will only contract recycling companies certified under art. 37 of the WMA or licensed under art. 54 of the WMA as scrap metal traders to handle the wastes generated by the project.

Waste Detoxification

The project does not consider on-site processing or detoxification of waste generated at the construction and operation stage of the site. Recycling of site-generated waste will be contracted out.

Wastes will be subject to contract delivery to recycling companies certified under art. 37 of the WMA or holders of an IPPC permit.

Other Waste Handling Methods

- solid municipal wastes should be collected separately in containers:

⇒ glass packaging;
⇒ paper packaging;
⇒ plastic packaging
⇒ aluminum packaging from non-alcoholic beverages.

Waste Disposal

The site of the project proposal for mining and processing of gold ores from the Ada Tepe prospect of the Khan Krum Deposit does not consider construction of a landfill (for storage of wastes other than mining wastes) on the minesite.

Under Option 1, all waste rock material is hauled to the IMWF, which is designed to store both dewatered process tailings and waste rock from mining.

Under Option 2, the mine rock is stockpiled on a waste rock stockpile while the flotation tailings are conveyed via pipeline to a TMF.

Areas for temporary storage are foreseen for hazardous, industrial and household waste to be kept prior to collection for subsequent treatment by contracted individuals or corporate entities licensed under art. 37 of the WMA for such operations.

The wastes will be stored in containers as follows:

- waste oils - in designated spill-proof containers made from oil-resistant materials, which will be kept closed and labeled with: "Waste Oils”
- sealed containers;
- heavy-duty and resistant to the substances contained in this type of waste, and the material they are made of does not react with these substances;
- storage containers or in transport packaging that ensure safe storage of the discarded hazardous wastes, pallets and other gear suitable for mechanical handling;
- the waste containers will be stored on waterproof surfaces.

Expected Impacts

The impact of the wastes that will be generated over the construction and operation stages of the project on the environmental components may be classified as **negligible**, **of short duration** (during project construction), **continuous** (during project operation), **reversible**, **on a small local scale**.

Assessment of Impact on the Environment and Human Health

Project construction and operation

Separate waste collection over the construction and operation stages of the project, and waste haulage, temporary storage and removal by contractors that are licensed under art. 37 of the WMA or holders of IPPC permit for waste handling, re-use and/or treatment does not entail negative impact on the environment and human health.

Project decommissioning and closure

At the closure and decommissioning stage, the waste impact on the environmental components and human health will be limited to negligible impacts of various types of construction waste generated by demolition works and household waste from the use of everyday items by the site workers. The Closure Plan will detail the activities and the responsibilities over this stage.

6.7. Hazardous Substances

Types of Hazardous Substances Used during Project Construction and Operation. Classification. Toxicological Characterisation

The classification of the hazardous substances follows the Regulation on the Terms and Conditions for Classification, Packaging and Signage of Chemical Substances and Mixtures (Decree No. 182/20.08.2010, SG issue 68/2010).

Types of Hazardous Substances That Will Be Used during Project Construction

During the mine construction, earth and construction works for construction of the new plant for production of gold-silver concentrate and the site infrastructure, the hazardous substances that will be used primarily include fuel – diesel fuel and LPG for metal cutting.

Toxicological profile of the hazardous substances that will be used during project construction

Petroleum products – high concentrations of hydrogen carbonates can be lethal. Lower concentrations - headaches, nausea and over excitement. Chronic poisoning may can cause functional disorders.

Higher concentrations of hydrocarbon vapors may cause instant poisoning. Caused loss of consciousness and quick death if the victim remains in the poisoned environment.

Alkaline substances (propane and butane) are very strong drugs, but their effect on the human body weakens due to their low blood solubility. They are practically harmless under normal conditions.

Types of Hazardous Substances That Will Be Used During Project Operation

The purpose of the Investment is production and processing of gold ore at the Ada Tepe area of Chan Krum Deposit, Krumovgrad.

The ore at Ada Tepe will be open-pit mined. The mining method will be a conventional open cut drill, blast, load and haul operation. The mined ore will be loaded by two hydraulic back-pull shovels serving up to five 50t off-road dump trucks hauling the ore to the ore stockpile (ROM pad) near the jaw crusher area.

The explosives that will be used include ANFO (Dynolite^{TM}, a mixture of ammonium nitrate and 6% of diesel by weight) for the mining of the oxidized ore in the Upper Zone and waterproof emulsion (Fortis™ Advantage 80 – a mix of 80% matrix and 20% AN prills) for the mining of the ore in the Wall Zone.

The Dynolite (ANFO) explosive is a registered trade mark of DynoNitroMed AD - Panagyurishte for an industrial type of ANFO explosive used for open-cut and underground blasting of dry faces at ambient temperatures from -30 to +50 ^{o}C. Dynolite is a substance that is physically and chemically stable, and has a fire and explosion hazard. It is classified as an explosive of Group II in terms of transport and handling hazard. It is transported in compliance with the provisions of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

The Fortis Advantage 80 explosive is an emulsion-type of explosive for open-cut blasting including wet faces/ under running water at ambient temperatures from -20 to +50°C. According to BNS 14363-90, the Fortis Advantage 80 explosive is classified as an industrial explosive. In terms of hazard, it is classified as an explosive of Group II under the Blasting Safety Code (Bulgaria) and as an explosive of Class 5.1 under the ADR. Fortis Advantage 80 is highly water-resistant, has excellent gas properties and chemical composition, which ensures high efficiency rate.

The mining and processing of the raw material (gold ore) to an end product (flotation concentrate) in the process plant for production of gold-silver concentrate will require the use of the following hazardous reagents and consumables: potassium amyl xanthate, copper sulphate, sodium silicate, dithiophosphate, frother and flocculant.

The mining and processing of the raw material (gold ore) to an end product (flotation concentrate) in the process plant for production of gold-silver concentrate will require the use of the following hazardous ancillary materials: motor oil, grease and diesel fuel.

Toxicological profile of the hazardous substances that will be used during project operation

Dynolite

It contains approx. 95% nitrates; therefore, contact with the eyes may cause irritation. Prolonged contact may cause itching and redness, possibly nausea, vomiting and diarrhea. If swallowed, it may cause nausea, vomiting and diarrhea. If inhaled, remove victim to fresh air and keep at rest. In case of eye contact, flush eyes with plenty of water. If symptoms persist, seek medical attention. In case of skin contact, remove contaminated clothing and wash skin with water. If swallowed, rinse mouth first and then drink a couple of glassfuls of water. If larger quantity is swallowed, seek medical attention.

Fortis Advantage 80

Repeated substance contact, especially after drying-in of the substance, can lead to skin- and eye-irritation.

Medical help necessary in case of symptoms, e. g. irritation of the respiration tract, which might have been caused by inhalation of dust, vapours or combustion gases. Victims must be removed from the danger area as quickly as possible. Symptoms do not necessarily appear immediately with persons who have inhaled combustion gases. Therefore, patients should be kept under medical observation for at least 48 h.

If inhaled, remove the victim to fresh air, consult with a doctor. If possible, administer Dexamethason spray (or other suitable respiration stimulant spray) by oral inhalation. Give oxygen if necessary. If unconscious, hold and transport victim in stable side position. If breathing stops, provide rescue breathing. In case of dust inhalation, remove victim to fresh air. If symptoms persist, e.g. coughing, consult with a doctor.

After skin contact, rinse with water, consult with a doctor if necessary. After eye contact, rinse with water, consult with an ophthalmologist if necessary. After swallowing, flush mouth with plenty of water, consult with a doctor.

Avoid skin and eye contact with unpackaged explosives.

Potassium amyl xanthate ($C_2H_5OCS_2K$):

It is dangerous if inhaled. Inhalation of dust can cause irritation of the nose, throat and respiratory tract. Inhalation of decomposition fumes (carbon disulphide) can cause severe behavioral disorder, incl. anxiety, anger, hallucinations. Irritates the mucous membranes and upper respiratory tract. Causes skin irritation. Dust and fumes may be irritating. Xanthate solutions cause severe skin irritation. Harmful when absorbed through the skin. Causes eye irritation and inflammation. Dust and fumes cause irritation. Xanthate solutions cause severe eye irritation. Exposure symptoms: nausea, headache, vomiting.

Chronic exposure can cause irritability, manic behavior, hallucinations, fever, hearing and visual disorders and liver nuisance. Carbon disulphide has severe acute effects on the central nervous system. Xanthate salts may cause respiratory irritation.

Copper sulphate ($CuSO_4.5H_2O$)

Reagent for analysis; chemical production; mineral dyes manufacturing; wood impregnation; pest control; leather industry; medicine; galvanisation: etc.

Harmful if swallowed. Causes skin and eye irritation. Very toxic to aquatic life with long lasting effects. If inhaled, remove victim to fresh air. In case of skin contact, remove contaminated clothes and wash the affected skin with plenty of water and soap. In case of eye contact, flush eyes with plenty of running water for at least 10 min. keeping the eyelids open. Seek medical attention (ophthalmologist). Ingestion may cause stomach ache, nausea, vomiting, diarrhea, blood pressure to drop, tachycardia, and unconsciousness. Immediately make victim drink plenty of water (several litres). Do not induce vomiting. Seek immediate medical attention.

Dithiophosphate

The substance is not classified as hazardous to the environment. It is not readily biodegradable.

May cause burns. Risk of severe eye damage. Contact with acids produces highly toxic gas. If swallowed, immediately call a doctor.

In case of eye contact, immediately flush with plenty of water and seek medical attention. In case of an accident or sickness, immediately seek medical attention (if possible, show the label to the doctor). Do not mix with acids and acid/water solutions as there is a risk of producing toxic and flammable hydrogen sulphide gas. Wear appropriate protective clothing, gloves and eye/face protection.

Diesel fuel

Avoid inhalation of fumes. May cause dizziness and drowsiness. May cause moderate eye irritation and skin rash. Affects the central nervous system. Ingestion may cause gastrointestinal disorders including irritation, nausea, vomiting and intoxication-like effects on the central nervous system. May cause respiratory arrest and death in severe cases.

Motor oils

Composition – high-molecular-weight hydrocarbons. Complex combination of hydrocarbons, obtained by processing of light vacuum gas oil, heavy vacuum gas oil, and by dissolving of de-asphalted residues with hydrogen with added catalyst in two stages, with an interim process of wax removal between the two stages.

Harmful in case of skin contact and if inhaled. Allergens. Affect the nervous system and liver. Mutagens and carcinogens. Contain polycyclic aromatic hydrocarbons. Inhalation of large amount of fumes, gas, or stream may cause throat irritation. Inhalation of small amounts should not cause sickness. Ingestion of large amounts may cause serious stomach damage, diarrhea and severe sickness. No risk is involved under normal conditions.

Grease

Grease (a complex combination of hydrocarbons with long carbon chains (12 to 50 carbon atoms); may contain organic salts of alkaline metals, alkaline earth metals and/or aluminum compounds).

Inhalation of oil mist or fumes when heated irritates the respiratory system and induces coughing.

Product which has penetrated the skin under high pressure may cause serious cell damage or mortification of subcutaneous tissues. Continuous or frequent skin exposure may cause redness, irritation, dermatitis, ichthyosis. Percutaneous absorption during skin contact is not sufficient to produce severe toxic reactions. Eye contact may cause temporary eye irritation. Inhalation causes mild toxic effects. However, inhalation after swallowing and vomiting may cause severe and potentially fatal damage to the lungs.

Substitution of Hazardous Substances

Under the proposed blasting method and technology to be applied at the process plant, no replacement of the hazardous substances described above is planned.

The Ada Tepe operations will not use methyl bromide (CH_3B) or substances listed in Appendix 1 to CoM Decree 254/30.12.1999 (amended with CoM Decree 224/01.10.2002) on the Control and Management of Ozone Depleting Substances.

The project does not consider any use of raw materials, products or materials that are within the scope of the Regulation on the Hazardous Chemical Substances, Preparations and Products That Are Banned for Use and Trade. Furthermore, the project does not consider use of any organic solvents within the scope of Council Directive 1999/13/EC on the Limitation of Volatile Compound Emissions.

The Investor will also comply with the ban on the use of fixed fire suppression systems within the scope of Appendices 2 and 3 to the above-mentioned Decree, portable halon fire extinguishers and specified surfactants and lubricants.

The ore production and processing operations are not classified as "low-risk potential operation” and therefore are not subject to permitting under art.104 of the EPA.

6.8. Physical Factors

The project proposal considers mining and processing of gold ores from the Ada Tepe prospect in the Khan Krum Deposit.

The project site area and adjacent lands are forest fund lands, for which no noise standards are established. Currently, no noise sources exist on the hill and the noise background is the natural environmental noise. The project operational sites are located on the hill top at various distances from the local settlements.

The noise emissions in the environment during the project implementation are associated with three stages - construction, operation and closure.

The construction equipment used for excavation, backfilling, concreting, formwork, assembly, transportation, etc. will be the main source of environmental noise during project construction. The noise levels emitted by the major construction units (excavator, bulldozer, wood cutters, heavy trucks) will vary from 80 to 105 dBA Construction and engineering works will be carried out during the day time. The estimated equivalent noise levels at recipient locations (populated areas) during project construction meet the daytime noise standard of 55 dBA for populated areas.

The main processes during project operation will be mining, processing (crushing, grinding, flotation) and mine waste disposal. The sources of environmental noise during project operation will include the following plant and equipment: drill rig, bulldozer, heavy trucks (haulage) emitting 80 to 91 dBA; jaw and cone crushers, belt conveyors (crushing circuit) emitting 68 to 108 dBA; grinding mills, centrifuges, pumps, flotation banks (flotation circuit). At this stage, there is no noise level data available for the plant and equipment that will be used in the flotation circuit. According to in-situ measurements at Chelopech, the noise levels near the flotation plant are within 60 to 67 dBA.

A dozer and dump trucks will be the main noise sources at the IMWF site during waste disposal operations.

Blasting operations will generate specific noise – instant, high-intensity pulse-like noise, whose level will depend on the blasting method.

All mining equipment will be purchased new and supplied complying with the EU requirements to harmful noise emissions applicable to equipment for outdoor use.

The estimated equivalent noise levels at recipient locations (populated areas) during project operation meet the nighttime noise standard of 45 dBA for populated areas. The estimated levels for the villages of Pobeda and Belagush are closest to the standard.

Therefore, the EIS recommends commissioning of nighttime noise level measurements at these recipient locations at the start-up of operations. Possible exceeding of the allowable limits will require construction of a noise screening structure around the crushing section, which will be the loudest and most frequent noise source in the direction of these villages.

The allowable limit of 70 dBA is expected to be exceeded near operating plant and equipment in the operational areas.

The noise emissions in the environment during closure and rehabilitation will be similar to those during construction. It is not expected to have excessive noise levels reaching the nearest housings.

6.9. Landscape

According to Bulgaria's regional landscape zoning, the project site is in:

- The South Bulgarian mountainous-valley landscape area;
- The Eastern Rhodopes landscape sub-area;
- The Dzhebel-Maglenitsa landscape area.

The formation of the Dzhebel-Maglenitsa landscape area was dictated by the nonuniform stability of the bedrock on one hand and by the significant instability of the Tertiary sediments, which had a differentiated effect on the landscape formation in the Krumovgrad Municipality. The horizontal and vertical landscape features are not uniform across the landscape types and their resource potential, which are grouped in two typological landscape groups according to Bulgaria's horizontal structure of landscapes, namely: 3.9.20.46 and 3.9.20.47.

Assessment of the Expected Landscape Alteration

Construction and Operation

The main anthropogenic impact from the implementation of the project will be on the landscape component. A two-stage process of landscape change will occur during project implementation.

The first stage will occur during the construction (operation) of the open pit and the key contributing process will be ore mining, which will change the existing landforms. Another process that is linked with landscape alteration is the construction of site and access roads, stockpiles, waste facilities, production facilities, etc. A pit with stepped walls will progressively be developed, i.e. the existing physical environment will be affected by changing the surface profile and visual perception and aesthetics. The landscape will be modified to some extent in terms of its functions resulting in limited accessibility due to the relatively steep slopes that will remain after shutdown of operations.

The changes in the landscape will be direct but on a local scale involving significant modification of all landscape components. The natural landscape types will be transformed into technogenic landscapes as the project continues. The changes will essentially be irreversible because the landscape within the project footprint will remain as changed after the mine closure.

The formation of a deep pit may encourage some erosion and landslide but these processes will be confined to the pit only. Neither the ore nor the overburden material contain or generate pollutants. The mining method, rock material handling, ore processing and the mining plant and equipment will not be conducive to pollutant generation either.

The irreversible changes that will occur during project operation will alter the structure of the existing local landscapes. The degraded technogenenic landscape consisting of the open pit, the waste rock and soil stockpiles and the IMWF will have a modified structure and will temporarily be not able to perform its resource and environment regeneration functions. This will be caused mainly by the alteration of the socio-economic functions of the landscape within the project footprint. It should be said that the alteration of landscape functions is linked to the higher public significance of the site due to its potential – the gold deposit. The implementation of the project will not cause critical deterioration of the physical environment despite that the landscape structure on the site will be modified. The neighboring lands will sustain indirect negligible or minor changes, mainly in the bio-component of the physical environment, but the landscape will retain its functional sustainability.

The main impact on the landscape will be on a local scale affecting visual perception and aesthetics.

Closure

The second stage will involve a permanent change in the topography through the creation of a negative landform – an open pit.

The following alterations linked with the project development are expected to have occurred by the end of the concession term:

The depth of the pit on completion of operations will vary according to the location.

- The north end pit bottom is at RL 340 m, which gives final pit depths of 120 m to the east, 100 m to the north, and 40 m to the west.
- The south end haul road exits to the west at RL 380 m, with the southern part of the pit being above the road at RL 400 m. The depths from this point will be 50 meters to the east, 20 meters to the south, and 0 meters (open) to the west.

This stage will cause a direct and lasting change in the environment and significant alteration of the visual aesthetics of the landscape and the dominant landscape features. The new negative landforms will stand out as technogenic disturbances against the natural physical environment with significant changes in the existing spatial structures and resembling urbanised environment to some extent.

The anthropogenic changes occurring in the relatively open landscape after shutdown of operations will primarily have a negative aesthetic impact on landscape appearance.

Appropriate designing and planning of mining and processing operations will limit and mitigate the negative impact of the open pit on the local landscape, and a closure plan will further be developed.

The proposed closure process will involve a set of activities whose objective will be to improve the environmental and aesthetic value of the affected landscapes – the open pit, the IMWF area and other production and ancillary structures.

The successful rehabilitation of the technogenic landscapes will be achieved as a two-stage process. The technical rehabilitation stage will include planning (a landscape design plan), re-profiling of artificial slopes, trucking and placement of soil, construction of hydrotechnical and amelioration facilities.

The biological rehabilitation stage will include application of soil fertility restoration techniques and a set of phyto-amelioration activities whose objective will be to rehabilitate the biological components of the landscape. The immediate full biological rehabilitation of the waste rock stockpiles is not feasible, however, the objective is to establish a self-sustaining vegetative cover that will be gradually recolonized by plant and animal species. The mine closure practices across the world indicate that such sites may become extremely attractive habitats for certain animal and plant species and a valuable nature conservation resource.

Assessment of the Changes in the Landscape Structure and Functions

The deposit will be open-pit mined, which will inevitably involve rock blasting and excavation, and operation of heavy-duty plant and equipment. The project development will substantially modify the physical appearance of the project site by creating a devegetated landform with clearly expressed elevation. Landscape structure and functions will change - the structure will change from horizontal to vertical and will affect the bedrock, topography, soil and vegetation components. The designation of about 85 ha of forest land will be changed to a technogenic landscape for a period of 9 years.

The site rehabilitation will modify the visual perception and aesthetics of the landscape and restore some of its functions.

The negative impacts from the project development will include:

- physical occupation of land;
- devegetation;
- short-term derogation of the quality of environmental media.

The open pit mining will undoubtedly have an irreversible impact on the existing landscape. The footprint of technogenic landscapes will be expanded at the expense of other landscapes during the project operation. The open pit mining will change the topographic forms and land use, and contribute to elevated rates of erosion, pollution of the local environment with non-toxic dust and aerosols, changes in the feeding base of wild fauna and its disturbance. Noise, dust and aerosol pollution of the surrounding areas will disturb the normal life of local populations and may be instrumental for the death of few individuals but not entire populations.

Conclusion:

The implementation of the project will not cause critical deterioration of the physical environment despite that the landscape structure on the site will be modified. The neighboring lands will sustain indirect changes, mainly in the bio-component of the physical environment, but the landscape will retain its functional sustainability.

The main impact on the landscape will be on a local scale affecting visual perception and aesthetics.

Impact forecast:

» *Area of impact* - direct, confined to the pit footprint;

» *Severity of impact* - significant *on the surface topography and the overall appearance of the site. The overall impact will be mitigated after the site rehabilitation;*

» *Duration* - in the long-term;

» *Reversibility* - limited, through rehabilitation and introduction of suitable vegetation in compliance with the landscape zoning;

» *Cumulative impacts:* cumulative impacts within both concession sites.

6.10. Cultural Heritage - Cultural and Architectural Monuments within the Project Area

Comprehensive rescue archaeological surveys have been undertaken at Ada Tepe hill between 2001 and 2010, which discovered a Thracian sanctuary on the hill top and evidence of of ancient mining activity on the hill slopes. The sanctuary site was fully investigated while the ancient mining remains are still being surveyed. The discovered archaeological structures - an adit and two bunds, which are interpreted as an ancient gold mine dating back to the Late Bronze/Early Iron Age, are found high on the hill between RL 380-400 m and the hill top (RL492 m). The project implementation may jeopardize some of these structures.

Preliminary archaeological investigations must be carried out in compliance with art. 161 par. 1 of the Cultural heritage Act because a cultural heritage site has been discovered within the project footprint. Those investigations need to be extended to the footprint of the minesite. Pursuant to art. 148, par. 5 of the Cultural Heritage Act, the rescue field surveys must be funded by the investor engaged in the development on the site.

The nature of the archaeological finds at Ada Tepe requires compliance with art. 161 par. 2 of the Cultural Heritage Act for archaeological supervision of project construction after completion of the archaeological survey works. If new archaeological sites are identified, the provisions of art. 148 and 160 of the same act shall apply.

In accordance with the applicable legislation in the field of protection of cultural assets, rescue archaeological surveys must be undertaken due to the discovery of archaeological cultural assets on the project site. If these surveys must continue, they may be undertaken parallel to the initial development works and even to project construction and operation after a preliminary agreement between BMM and the archaeological survey team.

6.11. Environmental and Occupational Health Aspects and Risks to Human Health

According to Regulation 7 of the MH on the Hygienic Requirements for Health Protection of Urban Environment (1992, last amendment in 1999), 46 от 1992 г., изм. и доп. бр. 46 от 1994 г., бр. 89 и бр. 101 от 1996 г., бр. 101 от 1997 г., бр. the siting of four project operational areas is important for the protective distances:

1. Open pit;
2. Crushing plant
3. Process Plant;
4. Mine waste facility.

In terms of operational areas 2. Crushing plant (governed by section 211 - "Crushing, washing and screening plants") and 3. Process plant (section 194 - "Process plants using wet processes"), the required protective distance of 500 m is met.

The statutory protective distance from the open pit is not met for 17 settlements. The statutory protective distance from the IMWF is not met for 5 settlements.

The project ensures compliance with the provisions of art. 7 of Regulation 7 requiring that the blast concussion and flyrock safety distance from drill&blast operations should not be greater than 50% of the distance to the nearest property subject to sanitary protection.

If the project EIS is approved, the project development could proceed at reduced protective distances only after receiving prior approval from the Ministry of Healthcare.

The major factors that are potential health risks for the population are:

- Noise and vibrations;
- Air emissions of dust and exhaust from vehicles;
- Chemical pollution of soils, surface and ground water

The results obtained from the noise modelling and presented in the Noise section of the EIS do not demonstrate any excessive noise above the acceptable levels.

According to the Air section above, everyday mining operations in the open pit (drilling, crushing, material handling) will contribute most to the emissions of particulate matter as a fugitive emission area source. The next largest source of dust emissions will be the waste rock disposal, while the annual emissions from blasting will have a relatively low contribution to total dust emissions. The air model does not indicate excessive dust and gas pollution, which is favourable from the hygiene perspective.

The process design must give special attention to the prevention of uncontrolled seepage and discharge of heavy-metal contaminated wastewater from the IMWF into the Krumovitsa river system as this will create a potential risk of chemical pollution of local drinking water sources (Guliika and Krumovgrad abstractions in particular), which in turn will potentially jeopardise public health. A good practice would be to perform regular monitoring of the groundwaters downstream of the facility using the piesometers, which would give an early warning in the event of a possible risk of an incident. It is equally important to control the quality of the discharge in the Krumovitsa River to ensure that the individual emission limits are met, which will prevent the deterioration of the river water quality.

The proposed measures for health protection are listed in detail in the EIS.

The Investor has declared its commitment to use the best available techniques and treatment options.

The general characterisation of the health status of the population of Krumovgrad Municipality has returned relatively favourable results. The population of Krumovgrad Municipality enjoys stable levels of demographic indicators that are more favorable than the national average. The dynamics of the reported morbidity rate in Kardzhali district and Krumovgrad municipality is steady for 2007-2008. The socially important oncological morbidity rate according to localisation reflects female breast diseases and diseases of the digestive and respiratory systems. The general oncological morbidity rate is considerably lower than the national average.

7. Cumulative Effects

The Khan Krum deposit includes six prospects: Ada Tepe, Kupel, Kuklitsa, Sinap, Surnak and Skalak. The prospects are located close to one another but not in a compact group. The total area of the deposit based on the prospect footprints is 120 ha, which is broken down by prospects as follows: Ada Tepe – 16.1 ha, Surnak - 20.6 ha, Skalak – 21.3 ha, Sinap – 11.5 ha, Kuklitsa – 31.6 ha, and Kupel - 19.1 ha. There are no other operating quarries or open pits around Ada Tepe now, so no increase in the background levels of dust or other pollutants that are typical of quarrying operations is expected in the base level of the atmosphere in the region.

Cumulative effects are not expected because the prospects will be mined in sequence, i.e. there will be no two or more prospects in operation at the same time.

Additional limitations may be imposed on the prospects if their development threatens to destroy important archaeological sites, is too close to or within the development limits of residential areas, or is likely to affect Natura 2000 sites. Although at a very early stage of resource definition on the remaining prospects, it is expected that their operation will have a significant cumulative effect and therefore it is recommended that they should be developed one at a time to prevent significant negative impacts on the environment and human health.

8. Description of the Measures Planned to Prevent, Mitigate or, Where Possible, Eliminate Significant Negative Impacts on the Environment, and a Plan for Implementation of These Measures:

- **Air**

The measures that will minimise the emissions from pit operations and the dust and fume emissions from blasting include:

- ✓ Use a suitable and efficient blasting method, and explosives that generate smaller quantities of toxic fumes;
- ✓ Ensure personnel health and safety at work when exposed to a potential risk of explosive environment, in compliance with Regulation 11/27.12.2004 (SG issue 6/18.01.2005). Focus on provision of personal protective equipment to employees - dust and gas masks, hearing protection, helmets, work clothing and footwear, gloves.
- ✓ Ensure monitoring of emissions of fumes and dust after blasting to enable assessment of the health risk to employees and residents of Chobanka 1, Chobanka 2, Kupel, Soyka and Pobeda located in the vicinity of the open pit;
- ✓ Apply regular sprinkling-based dust suppression to minimise dust levels in the air in the active areas where mining operations take place – pit operational areas, ROM pad and and the haulage links between them. Roads must be sprinkled consistently at regular intervals;
- ✓ Maintain a protective green belt around roads and operational areas, and rehabilitate redundant roadways.
- ✓ Ensure supervision of dust control in the crusher and process plant, including control over the operating condition and functioning of the sprinkler and/or dust collection systems;
- ✓ Factor the local meteorological features into the blasting schedules in view of limiting the impact on the nearby villages;
- ✓ Ensure that haulage vehicles are not overloaded with bulk material and/or final product, and that they have a cover securely fastened over top;

Plan for Implementation of the Measures to Prevent, Mitigate or Eliminate Environmental Impacts

This plan covers the project operation only – ore mining and processing, and waste rock disposal. Its primary focus is on:

- ✓ Everyday inspections of operating equipment and vehicles to prevent contamination of the project area with petroleum products;
- ✓ Sprinkler-based dust suppression on site roadways in warm and dry weather conditions to minimise dust emissions in the area;
- ✓ Continuous supervision of the blasting operations that are performed by contractors;
- ✓ Use wet drilling systems in the open pit to suppress dust, including particulates smaller than 10µm;

- ✓ Continuous supervision of the trucks loaded with ore and waste rock, and prevention of spills during on-site haulage;
- ✓ Compliance with the procedures for handling and treatment of the waste generated on the minesite and measures to prevent on-site disposal of wastes from other operations or companies.

This plan will be updated on a regular basis over the life of the mine to take account of any specific new conditions that may arise on the minsite.

The plan for implementation of the proposed key measures for prevention of negative impacts on the environment and human health is presented in Table VII-1 below.

♦ **Waters**

1. Any project involving use of water bodies and/or abstraction of water may proceed only after issuance of the relevant permit(s).

2. A water monitoring network must be established to cover both surface and ground water, and the water abstraction systems adjacent to the project site.

3. Due to the high public interest, the monitoring project should be discussed with the local community to clarify any and all issues before its submission and also during its preparation.

4. It is recommended that the existing abstractions of Guliika, Krumovgrad and Ovchari should be included in scope of the Environmental Monitoring Program.

5. All components of the recycling water system such as collecting sumps, pipework and pumps should be maintained in good operating condition.

6. It is recommended to undertake an additional site water supply survey focusing on the siting of the proprietary abstraction well to ensure the facility is adequately protected against the torrential flows of the Krumovitsa River.

7. An intensive monitoring of the quality of the water in the Runoff Storage Pond should be undertaken during the first year of project operation, when no discharges into the Krumovitsa River. The monitoring results should be put together in a report and submitted to the competent authorities, the Plovdiv-based Catchment Directorate and the Haskovo Regional Environment and Waters Inspection, after the first six months of project operation.

8. If the water quality does not meet the allowable limits under the discharge permit the Company should design and implement suitable mitigation measures including an additional treatment stage prior to discharge of water from the pond into the Krumovitsa River.

♦ **Project Geology**

1. Strict compliance with the legal requirements pertaining to protection of the geological environment and primarily:

- the Underground Resources Act (URA) (1999);
- Regulation on the Technical Records of Exploration and Mining Projects (1999);
- Regulation 18 / 07.01.2000 on the Terms and Procedures for Approval of: Annual Prospecting and/or Exploration Projects; Annual Project for Mining and Processing of Underground Resources; Projects for Closure of Exploration and Mining Operations; Projects for Placing Exploration and Mining Operations under Care and Maintenance; Amendments of and Addendums to Such Projects (2000).

2. Strict compliance with the Life of Mine Plan and the annual mining and processing projects and the mine closure and rehabilitation projects.

3. Additional ABA testwork and metal leaching tests on tailings samples to confirm the tailings properties.

♦ **Soils**

Removal of topsoil where possible and placement of the soil material on a dedicate stockpile to enable its re-use for rehabilitation purposes.

Biodiversity

Project construction

• Keep construction works within the respective design footprints. Do not disturb areas outside the approved construction site footprints;

• Vehicles must drive only on approved roads that have clear and permanent signage. Traffic is not allowed off the approved roads and courses to the construction sites;

• Supervise implementation of construction and engineering works to ensure maximum protection of natural vegetation and habitats.

• Ensure that the following impacts are minimised as much as practically possible during project construction: soil stripping and removal, removal of ecotonic communities (transition areas between forest and grassland, plane and hill), grass and brush clearing;

No cutting of the oak woodlands on Ada Tepe north of the open pit and near the low-grade ore stockpile. Reduction of the footprint of this stockpile in SE direction, where it borders on a protected habitat (91M0 Pannonian-Balkanic Turkey Oak and Sessile Oak Forests)

• Employ efficient dust control measures across the project site, especially on the new courses (not having hard surfaces), and prevent pollution on the roads from oils, fuel and hazardous chemicals;

• Prevent spillage of fuels and oils from the construction equipment during project construction and operation;

• Avoid unnecessary clearing of old hollow trees to preserve the existing day-shelters of bats;

• Avoid unnecessary clearing of grass and brush vegetation to preserve the existing feeding habitats of bats;

• Provide training to the personnel engaged in project construction and subsequently in project operation and maintenance of equipment and infrastructure to raise their awareness of the impact mitigation measures;

• Ensure that no aggregate materials are extracted from the Krumovitsa gravels for project construction purposes. Krumovitsa River

Project Operation

• Ensure no blasting occurs outside the approved schedules as part of the Mine Life Plan and the annual mining and processing projects.

• Restrict all traffic of vehicles, mobile equipment and people to the roadways designated for the respective project activities;

• Fire blasts during the daytime hours only;

• Do not dispose of any household waste that could attract animals;

• Observe fire safety rules and regulations, and do not use fire for vegetation clearing.

Project closure

• Implement the rehabilitation measures as set out in the Closure Plan after shutdown of operations;

• The selection of plant species for biological rehabilitation must be harmonised with the native vegetation. No invasion of alien plant and vegetation species in the protected areas. Use of native species for rehabilitation always when possible;

• Technical rehabilitation of disturbed areas for revegetation (planting of grass and tree vegetation, fertilizer application and watering) and active aftercare over the first 3 years to ensure a full vegetation cover develops.

• Ensure suitable agricultural rehabilitation (ploughing, harrowing, seed-sowing, rolling, mineral fertilizer application and watering) of disturbed areas designated for agricultural use (mostly roads) and active aftercare over a 5-year period to restore land productivity.

♦ **Wastes**

<u>Project construction</u>

- The contracted construction company must arrange contract delivery of the generated hazardous wastes to persons or companies that hold a permit for transport, temporary storage, re-use and/or treatment (detoxification) of wastes under art. 37 of the WMA or a registration document under art. 12 of the WMA, or an IPPC Permit;
- In case of accidental (uncontrolled) spillage of oil or other pollutants, any contaminated soil and rock must immediately be removed and hauled to a suitable waste disposal site that is permitted to accept such wastes;
- The soil material removed from the pit and the other sites must be placed on a designated soil stockpile;
- The waste rock from overburden removal (during initial development of the pit) must be stockpiled within the IMWF footprint;
- The wastes generated from the construction and engineering works must collected separately and kept in temporary storage areas until removal from the site for subsequent treatment;
- Mineral-based non-chlorinated hydraulic oils and mineral-based non-chlorinated engine, gear and lubricating oils must be collected in a manner that enables their recycling – in closed, chemically resistant and spill-proof containers that are properly labeled and stored indoors.
- Only vehicles and mobile equipment in good operating condition must be used to transport hazardous and process wastes on and out of the construction site;
- Solid household waste must be hauled and disposed of on a landfill that is permitted to accept such wastes;

Project Operation

- The mine waste from the open pit and the process plant must be transported directly to the designated disposal facility;
- The generated wastes must be collected separately and placed in a temporary storage facility in compliance with requirements under Chapter II, Section I of the Regulation on the Requirements for Treatment and Transport of Industrial and Hazardous Waste, adopted with CoM Decree 53/19.03.1999;
- Waste oil must be collected in a manner that enables their recycling – in closed, chemically resistant and spill-proof containers that are properly labeled and stored;
- Wastes must be collected in a structured manner in compliance with the environmental regulations;
- Access to drums/containers for hazardous wastes must be restricted to authorised personnel only;
- Only vehicles and mobile equipment in good operating condition must be used to transport hazardous and process wastes on and out of the site;
- Transport of hazardous wastes - only in closed steel drums/containers;
- Waste shipment for treatment/detoxification must be contracted out only to companies that are certified under art. 37 of the WMA or holders of an IPPC permit for waste handling for treatment.
- Fluorescent tubes and other mercury-containing waste must be stored separately from other waste types, on a temporary storage site where sulfur must be available at all times.

♦ **Hazardous Substances**

The oil of the mining equipment (excavators and drill rigs) must be changed using a service vehicle equipped with an oil-changing unit. The oil-changing unit is be connected to the excavator/drill rig oil/lube system via Euro connectors. The oil is recharged/replaced by extracting the waste oil and pumping fresh oil in via the Euro connectors. Filters must be encapsulated in steel casings. The waste oils must be stored in compliance with the legal requirements until shipment by a contracted company that is certified under art. 37 of the WMA or a holder of an IPPC permit for waste oil treatment.

Heavy equipment must be provided with an oil pressure relief system to prevent spillage of oil in case of a hose failure. The excavator (shovel) must be provided with a centralized lubrication system that is completely sealed to prevent any grease spills.

Only suitable fuel pumping equipment must be used for equipment refueling to minimise the risk of spills and pollution.

♦ **Noise during Project Construction and Operation**

- Carry out construction works during the daytime hours only. Ensure good organisation on the site to reduce the duration of environmental noise impacts (especially when construction works are carried out in close proximity to Pobeda)

- Set a vehicle speed limit of 30 km/h when driving through or past residential areas;

- Ensure mobile fleet and process plant and equipment comply with the *Regulation on the Substantial Requirements and Environmental Noise Compliance Assessment of Equipment and Plant for Use Outdoors* (SG issue 11/2004). The Regulation is compliant with *Directive 2000/14/EC on the Approximation of the Laws of the Member States Relating to the Noise emission in the Environment by Equipment for Use Outdoors*;

- Surveillance monitoring of the noise levels from the crusher that reach Pobeda Village at nighttime. If the noise limits are reported to be exceeded, a noise screening structure should be set up west of the crusher in the direction of the village. A suitable approach is to construct a bund from unused rockfill and earthfill materials. Such a structure is easy to rehabilitate at the closure stage and blends well in the landscape.

♦ **Cultural Heritage**

Preliminary archaeological investigations must be carried out in compliance with art. 161 par. 1 of the Cultural heritage Act because a cultural heritage site has been discovered within the project footprint. Those investigations need to be extended to the footprint of the minesite infrastructure as well.

Rescue archaeological surveys of identified structures related to ancient mining must be carried out. High priority will be given to structures that the leaders of the archaeological team consider to be most important and at high risk of destruction. The team leaders should also have the freedom to select the survey and inter-disciplinary methods that are most suitable to use on the site. Pursuant to art. 148, par. 5 of the Cultural Heritage Act, the rescue field surveys must be funded by the investor engaged in the development on the site.

According to the decisions of the committee appointed by Order R-89/13.10.2009 of the Director of the National Institute for Protection of Immovable Cultural Heritage (NIPICH), once the archaeological survey is completed in 2010, a new committee should be appointed to „evaluate the results of the archaeological surveys and determine the cultural heritage value, and specify measures for preservation of newly uncovered archaeological structures".

If the committee decides that the archaeological surveys should continue, it is recommended that the schedule of these surveys proposed by the archaeological team leaders should be coordinated with the schedule for initial development of the project. In case the archaeological surveys need to be extended further, their schedule may be coordinated with the construction and mining plans for Ada Tepe.

The nature of the archaeological finds at Ada Tepe requires compliance with art. 161 par. 2 of the Cultural Heritage Act for archaeological supervision of project construction after completion of the archaeological survey works. If new archaeological sites are identified, the provisions of art. 148 and 160 of the same act shall apply.

♦ **Health and Hygiene Aspects**

Preventive Measures for Protection of Personnel Health

The following key requirements to occupational health and safety may be listed:

- All excavator and bulldozer operators should wear ear protection;
- Workers should use anti-vibration safety gloves and mats;
- Appropriate protection should be provided to keep hands dry and warm during cold periods;
- Fans should be installed in the cabins of excavators and bulldozers during the warm summer days;
- Workers should be provided with workwear that is appropriate for the season;
- Personnel should undergo regular medical checkups for early identification of work-related diseases.

All preventive care requirements must be complied with in relation to potential health risks, namely:

- Excessive dust levels involve a risk factor for the development of lung diseases due to the irritating effect of dust, e.g. rhinitis, chronic bronchitis and similar complications, and also for the development of occupational dust-related pathology. Implementation of all technical and medical preventive measures will be of utmost importance for employee health protection;
- Compliance with all technical requirements for general vibrations in bulldozers and heavy trucks must be achieved;
- An ergonomic work/rest schedule must be implemented (Regulation 15/1999 of the Ministry of Healthcare);
- A shift-based work cycle demands promotion of certain healthcare measures and ergonomic work/rest schedule for the workers on site including the crusher section (Regulation 16/1999 of the Ministry of Healthcare);
- All preventive measures need to be implemented to ensure employee health and safety by delivery of equipment operating safety instructions;
- Ensure compliance with Regulation 13 on Employee Protection against Risks of Exposure to Chemical Reagents at Work, especially when working with flotation reagents.

Preventive Measures for Protection of Public Health

Based on industrial hygiene experience, the major factors that are potential health risks for the population in areas of open pit ore mining, hauling, crushing, flotation, and tailings disposal, are related to:

- *Noise and vibrations;*
- *Air emissions of dust and exhaust from vehicles;*
- *Potential pollution of soils, surface and ground water.*

The current project is very similar to the existing operational mining and quarrying projects because it involves open-cut mining and primary (flotation) processing of the mineral resource. This type of operation has a typically intensive operational cycle of mining and processing of large resource tonnages to produce concentrate of sufficient quantity that ensures cost-efficiency of the project. That involves extraction of large volumes of rock material, frequent blasting, consumption of relatively large amounts of explosives, continuous site operation (24/7), generation of large quantities of mine wastes, etc. The project proposal considers a relatively small-scale open pit operation with not more than two blasts per week. This substantially minimises the risk to the health of the workers and the local public.

1. The main sources of ***noise and vibration emissions*** are the open pit operations including ore handling and the crushing operations. The hilly topography of the region is not conducive to free propagation of high equivalent noise and vibration levels. The Investor must implement noise mitigation measures to reduce impact on human health:

- The explosive charges must be calculated and designed to ensure compliance with the requirements under art. 7 of Regulation 7/1992 for flyrock safety distance from the blast. That would not only limit the noise generation within the region as a result of the reduction in the mining and throughput tonnage, but also have a positive health effect from the reduction of the dust and exhaust emissions to the adjacent villages.
- The noise protection should be considered and planned separately taking account of the applicable noise limits, the local topography, the type of the site/area subject to protection, its location relative to the noise source, and other factors. Regulation 6/2006 on the Environmental Noise Indicators (MH and MOEW) sets out the limits for "existing residential areas", which are: 55 dBA daytime limit, 50 dBA evening limit and 45 dBA nighttime limit (see Table V.11.1-2).

2. In terms of ***dust and exhaust/fume pollution***

Recommendations:

- The Investor should perform monitoring of dust ($PM_{2.5}$; PM_{10} and total dust) and gas (sulphur and nitrogen oxides) levels in the air prior to commissioning and during project operation. The monitoring should cover nearby settlements including the town of Krumovgrad .
- Regular cleaning and maintenance of the on-site and off-site roadways will considerably lower the concentration of dust including fine particulates in the ambient air.
- Sprinkling of the operational areas and site roadways must be scheduled in dry and windy conditions.
- The existing woodlands must be preserved as much as practically possible. Green belt protection should be considered around project roadways and operational areas.

In terms of the health risk of soil, surface water and groundwater pollution:

From hygiene point of view, it is especially important to control:

- The quality of water in the Runoff Storage Pond in order to meet the individual emission limits, which will prevent the deterioration of the river water quality.
- An intensive monitoring of the quality of the water in the Runoff Storage Pond should be undertaken during the first year of project operation, when no discharges into the Krumovitsa river system will occur. The monitoring results from the first six months of operation should be put together in a report and submitted to the competent authorities. If additional treatment is necessary the Company should design and construct a suitable treatment facility prior to commencement of discharging;
- Monthly monitoring of the groundwaters upstream and downstream of the IMWF, and of the Krumovitsa water quality.

Plan for Implementation of the Measures under Art. 96 Par. 1 Item 6 of the EPA

Item #	Measures	Period	Objective
1	**Air**		
1.1	Control on the operation of heavy equipment: excavators, trucks, dozers, graders, front loaders, etc.	Project construction and operation	Reduce emissions of harmful substances in engine exhaust.
1.2	Dust control in dry weather conditions by sprinkling the operational areas of the open pit, waste rock stockpile and roadways between them, where the roadways must be sprinkled on a regular basis.	Project operation	Reduce dust pollution to adjacent villages.
1.3	Regular monitoring of nitrogen oxide and dust levels after blasts near the open pit and in the adjacent villages – Chobanka 1, Chobanka 2, Kupel, Soyka and Pobeda	Project operation	Identify the composition and optimal amount of explosives per charge.
1.4	Regular monitoring of emissions after the source: - crusher - dust; - process plant – dust and aerosols.	Project operation	Reduce gas and dust pollution in the pit area.
2	**Waters**		
2.1	Issuance and renewal of the required permits for use and abstraction of surface water and groundwater resources.	Continuous over the project life until post-closure monitoring.	Protect surface waters and groundwaters, and mitigate any potential impact in an emergency.
2.2	Monitoring of surface waters and groundwaters	Continuous from site commissioning until after closure as required.	Protect waters, collect raw data and implement adequate measures in case of undesired events
2.3	Strict compliance with the process design requirements for extracting reagents	continuous over the project life	Maintain process flow parameters and facilitate water management
2.4	Availability of sufficient containment capacity to ensure containment of accidental spills from the plant	continuous over the project life	Prevent uncontrolled release of process solutions to the hydrosphere
2.5	Regular inspection and appropriate maintenance of the runoff diversion system that intercepts and diverts surface runoff away from the site.	continuous over the project life	Minimise runoff through the minesite and thus reduce the potential for water pollution.
2.6	Personnel preparation and training to improve their understanding of solution flows and their circulation across the site and the measures that must be implemented in unforeseen situations	continuous over the project life	Enhance site water management controls.
2.7	Water consumption control	continuous over the project life	Ensure efficient water consumption this minimising the amounts potentially subject to pollution
2.8	Continuous communication with representatives of the Krumovgrad local authorities and the Kardzhali Water and Sewage Company, discussion and implementation of measures to prevent	continuous from site commissioning until after closure as required.	Ensure normal water supply to the local population at the level before commencement of the mining operations.

	pollution of public drinking water abstractions.		
3	**Geological Setting**		
3.1	Development of a Life of Mine plan and a Mine Closure Plan	Within 6 months from the date of obtaining concession rights	Ensure efficient extraction of the resource and rehabilitation of the concession area to a condition similar to that before commencement of operations.
3.2	Development of annual mining and processing projects and annual site rehabilitation projects	On an annual basis, over the project life	Ensure efficient extraction of the resource and rehabilitation of the concession area to a condition similar to that before commencement of operations.
4	**Soils**		
4.1	Removal of topsoil where possible and placement of the soil material on a dedicate stockpile to enable its re-use for rehabilitation purposes.	Project operation	Re-use the material for rehabilitation purposes
5	**Flora and Fauna**		
5.1	Construction works are limited to the respective design footprints.	Project construction	Ensure areas outside the approved construction site footprints are not disturbed;
5.2	Vehicles drive only on approved roads that have clear and permanent signage. Traffic is not allowed off the approved roads and courses to the construction sites;	Project construction	Prevent unnecessary devegetation in vehicle operational areas. Minimise nuisance from vehicle operation.
5.3	Supervision of project construction and engineering works.	Project construction	Ensure maximum protection of the native vegetation and habitats
5.4	The following impacts are minimised as much as practically possible: soil stripping and removal, removal of ecotonic communities (transition areas between forest and grassland, plane and hill), grass and brush clearing	Project construction	Protect and not fragment the feeding habitats and shelters of invertebrates.
5.5	No cutting of the oak woodlands on Ada Tepe north of the open pit and near the low-grade ore stockpile. Reduction of the footprint of this stockpile in SE direction, where it borders on a protected habitat (91M0 Pannonian-Balkanic Turkey Oak and Sessile Oak Forests)	Project construction	Avoid the direct impact on a protected habitat (91M0 Pannonian-Balkanic Turkey Oak and Sessile Oak Forests) and, consequently, the impact on the feeding base of the larvas of *Cerambyx cerdo* and *Lucanus cervus*.
5.6	No removal of old or hollow trees unless required	Project construction	Preserve the existing day-shelters of bats.
5.7	Employment of efficient dust control	Project construction	Protect the trophic base of

	measures across the project site, especially on the new courses (not having hard surfaces), and prevention of pollution on the roads from oils, fuel and hazardous chemicals		herbivorous insects (larvae and imagoes).
5.8	Prevention of spillages of fuels and oils from the construction equipment during project construction and operation	Project construction Project operation	Prevent pollution of local soils and waters within the site and the protected area, which may potentially derogate the feeding base and habitats of species under protection.
5.9	No removal of old or hollow trees unless required	Project construction	Preserve the existing day-shelters of bats.
5.10	No unnecessary clearing of grass and brush vegetation	Project construction	Preserve the integrity of the feeding habitats of bats
5.11	Observance of the fire safety rules and regulations, no use of fire for vegetation clearing.	Project construction Project operation	Prevent temporary loss of habitats including the substrate and trophic base of insect species under protection.
5.12	No aggregate materials are extracted from the Krumovitsa gravels for project construction purposes. Krumovitsa River		Protect an important feeding habitat of bats and an abundant source of water insects.
5.13	Training to the personnel engaged in project construction and subsequently in project operation and maintenance of equipment and infrastructure to raise their awareness of the impact mitigation measures	Upon commencement of project construction	Ensure correct and complete implementation of mitigation measures and commitment to environmental protection.
5.14	Rock blasting during the daytime hours only;	Project Operation	Minimise nuisance to birds
5.15	All traffic of vehicles, mobile equipment and people is restricted to the roadways designated for the respective project activities	Project Operation	Prevent devegetation of adjacent lands.
5.16	No disposal of any household waste that could attract animals	Project Operation	Prevent attraction of animal species.
5.17	Implementation of the rehabilitation measures as set out in the Closure Plan after shutdown of operations	Project closure	Partially rehabilitate the soil and vegetation covers.
5.18	The selection of plant species for biological rehabilitation must be harmonised with the native vegetation No invasion of alien plant and vegetation species in the protected areas. Use of native species for rehabilitation always when possible;	Project closure	Mitigate the risk of invasion of alien species in the habitats in the protected area. Prevent possible damage on the feeding base and structure of habitats of species under protection.

5.19	Technical rehabilitation of disturbed areas for revegetation (planting of grass and tree vegetation, fertilizer application and watering) and active aftercare over the first 3 years to ensure a full vegetation cover develops.	Project closure	Rehabilitate disturbed lands designated for revegetation
5.20	Suitable agricultural rehabilitation (ploughing, harrowing, seed-sowing, rolling, mineral fertilizer application and watering) of disturbed areas designated for agricultural use (site areas and roads) and active aftercare over a 5-year period to restore land productivity.	Project closure	Rehabilitate disturbed lands designated for agricultural use.
6	**Noise**		
6.1	Construction works during the daytime hours only. Good organisation on the site to reduce the duration of environmental noise impacts (especially when construction works are carried out in close proximity to Pobeda)	Project construction	Minimise noise impact.
6.2	Vehicle speed limit of 30 km/h when driving through or past residential areas	Project construction and operation	Minimise noise impact.
6.3	Compliance of mobile fleet and process plant and equipment with the Regulation on the Substantial Requirements and Environmental Noise Compliance Assessment of Equipment and Plant for Use Outdoors (SG issue 11/2004). The Regulation is compliant with *Directive 2000/14/EC on the Approximation of the Laws of the Member States Relating to the Noise emission in the Environment by Equipment for Use Outdoors*;	Project designing	Minimise the environmental noise emissions from the operating plant and equipment.
6.4	Surveillance monitoring of the noise levels from the crusher that reach Pobeda Village at nighttime. If the noise limits are reported to be exceeded, a noise screening structure should be set up west of the crusher in the direction of the village. A suitable approach is to construct a bund from unused rockfill and earthfill materials. Such a structure is easy to rehabilitate at the closure stage and blends well in the landscape.	Project Operation	Control noise imission levels at the recipient. Construct a noise screening structure if the noise levels do exceed the allowable limits.
7	**Wastes**		
7.1	The generated wastes must be collected separately and placed in a temporary storage facility in compliance with requirements under Chapter II, Section I of the Regulation on the Requirements for Treatment and Transport of Industrial and Hazardous Waste, adopted with CoM Decree 53/19.03.1999.	Project Operation	Eliminate spills and pollution of soil and water. Manage wastes in compliance with the WMA.

	Wastes must be collected in a structured manner in compliance with the environmental regulations.		
7.2	The generated mine wastes must be transported directly to the IMWF and deposited there.	Initial pit development and project operation	Manage wastes in accordance with Mine Waste Management Plan
7.3	Only vehicles and mobile equipment in good operating condition must be used to transport hazardous and process wastes on and out of the site.	Project Operation	Prevent waste spills.
7.4	Access to drums/containers for hazardous wastes must be restricted to authorised personnel only. Transport of hazardous wastes - only in closed steel drums/containers.	Project operation	Reduce risks associated with hazardous wastes. Manage waste in compliance with the WMA.
7.5	Waste shipment for treatment/detoxification must be contracted out only to companies that are certified under art. 37 of the WMA or holders of an IPPC permit for waste handling for treatment.	Project operation	Manage waste in compliance with the WMA.
8	**Health and Hygiene Aspects: *Measures for Protection of Public Health***		
8.1	*General measures*		
8.1.1	The Investor together with the appropriate state and local authorities should take the necessary steps under the law to revoke the settlement status of Chobanka 1 and Chobanka 2, and change the status of the tourist lodge and the school camp at Ada Tepe.	Prior to commencement of operations	Mitigation and future prevention of public health risk.
8.1.2	Implement a system to ensure good organisation of work, proper operating condition of all construction machines and vehicles, and regular monitoring of the environment and workplace conditions.	Prior to commissioning and during project operation – Investor's responsibility.	Prevention of occupational and public health risk.
8.1.3	Regular comparison of the health status indicators for the residents in the area of the IMWF against the municipal and district average to ensure early detection of any status changes - within the competence of the Kardzhali Regional Healthcare Centre and Regional Public Health Inspection.	Project Operation	Prevention of public health risk
8.2	*Noise and vibrations*		
8.2.1	Technical measures: Fire maximum two blast per week.	Project Operation	Mitigation of the health impact on residential areas caused by pulse noise
8.2.2	Technical measures: Blasting operations should be performed according to approved design layouts using smaller explosive charges and divided/deck charge (hole-by-hole firing), and ensure that flyrock safe distances are compliant with art. 7 of	Project Operation	Prevention of public health risk

	Regulation 7/1992 of the Ministry of Healthcare.		
8.2.3	Monitoring of daytime, evening and nighttime noise levels at Soyka and Pobeda hamlets prior to commissioning and during project operation. The reported levels should be compared, analysed and interpreted.	Before and after project commissioning.	Prevention of public health risk by reducing noise levels.
8.3	*Dust and exhaust gases*		
8.3.1	Technical measures: Before the start of any drilling and blasting cycle in the open pit, measures should be implemented as required to reduce dust and fumes after blasting (minimum explosives per charge, subsequent dust suppression by sprinkling in dry conditions, scheduling of blasts on a calm day or when the wind is favourable);	Project Operation	Prevention of public health risk
8.3.2	Monitoring of dust ($PM_{2.5}$; PM_{10} and total dust) and gas (sulphur and nitrogen oxides) levels in the air prior to commissioning and during project operation, at the recipient (nearby settlements). The reported levels should be compared, analysed and interpreted.	Before and after project commissioning.	Prevention of public health risk by minimising exposure to physical and toxic chemical pollutants.
8.3.3	Regular cleaning and maintenance of the on-site and off-site roadways as this will considerably lower the concentration of dust including fine particulates in the air.	Project operation	Prevention of public health risk
8.3.4	Sprinkling of the operational sites and site roadways in dry and windy conditions.	Project operation	Minimise dust emission generation
8.4	*Pollution of soils, surface and ground water*		
8.4.1	To avoid a cumulative risk of liberating mobile forms of arsenic and other heavy metals, especially in the Krumovitsa River system (the Krumovitsa gravels are the main drinking water source available to the local communities), the following is recommended: • regular monitoring of the groundwaters in the river gravels downstream of the IMWF by increasing the piesometers from two to four and • regular monitoring of the quality of the excess water discharged from the Runoff Storage Pond (it must meet the allowable emission limits).	Project operation	Prevent uncontrolled seepage (infiltration) of polluted water from the site.
8.4.2	Monthly monitoring of Krumovitsa waters upstream and downstream of the discharge point of the Runoff Storage Pond; upstream and downstream of the gravity gradient of the IMWF.	Project operation	Prevent release of polluted water from the site.
8.4.3	Establishment of permanent soil monitoring stations at the toe of the IMWF as part of the environmental monitoring program.	Project operation	Prevent soil pollution.

8.4.4	The Kardzhali District Public Health Inspection should prepare annual reports with historic analysis of the quality of the drinking water supply of the settlements in the Krumovitsa valley (downstream starting from the abstraction of Guliika) to identify the probable cause of potential pollution of the gravels and river waters with heavy metals.	After project commissioning	Prevention of public health risk of drinking water that does not meet the drinking water standards under Regulation 9/16.03.2001 on the Drinking and Household Water Quality.

9. Transboundary Context

The assessment of the impacts on the environmental media does not indicate any transboundary impacts. The impacts will be on a local scale.

10. Conclusions

This Environmental Impact Statement (EIS) for the Investment Project Proposal for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit near Krumovgrad presents a thorough and detailed review and assessment of the possible impacts that the above project may have on the environment and human health.

The EIS has been prepared in accordance with the provisions of the EPA, art. 96 of the EIA Regulation and all other applicable laws and bylaws. The EIS takes into account the feedback from the responsible authorities and the affected public.

The expected impacts that the project may have on the environmental media and factors and human health have been analysed. The risk factors have been identified.

The impact of the pollutants emitted over the project operation stage on the environmental media can be classified as continuous, reversible, on a local scale, without cumulative effects, below the accepted national and EU standards, which does not indicate any significant negative impacts on human health and environment media and factors.

Based on the analysis, measures are proposed to prevent or mitigate any potential significant negative impacts on the environment, which are included in a mitigation plan.

Based on the environment impact assessment and analysis and the current environmental provisions, the EIS authors are of the opinion that the Supreme Expert Environmental Council should approve **Option 1** of the Investment Project Proposal for Mining and Processing of Auriferous Ores from the Ada Tepe Prospect of the Khan Krum Gold Deposit near Krumovgrad.

List of Appendices:

Appendix 1	Letter ref. OBOC-1402/06.10.2010 from the MOEW
Appendix 2	General Site Plan showing the project sub-site locations under the two siting options.