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Biodiversity Action Plan

for the Hermann Tortoise (*Testudo hermanni*) and the Spur-thighed Tortoise (*Testudo graeca*) at Ada Tepe Project area

DPM Krumovgrad



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Biodiversity Action Plan (BAP) for the Hermann Tortoise (*Testudo hermanni*) and the Spur-thighed Tortoise (*Testudo graeca*) at Ada Tepe Project area

Prepared by **denkstatt Bulgaria**

For **DPM Krumovgrad**

Disclaimer: **BAP will be applied continually throughout DPM project performance**



1 Introduction

Dundee Precious Metals (DPM) has negotiated an amended financial package with a consortium of banks for which the European Bank for Reconstruction and Development (EBRD) acts as environmental agent. According to the EBRD's Environmental and Social Policy (2008), and its associated Performance Requirements (PRs), a project of this type and scale requires a full Environmental and Social Impact Assessment (ESIA). The Project undertook a national environmental impact assessment (EIA) in 2010 and an environmental permit **No. 18-8, 11/2011** was issued. Following an independent review of the EIA reports, the EBRD required a number of supplementary environmental and social studies and documents to fill the gaps necessary to meet the EBRD PRs and international good practice. In addition to the EBRD PRs, some of the consortium banks refer to the Equator Principles and therefore the Project also references the IFC's Performances Standards (2012). The package of supplementary environmental and social documents as well as the local EIA reports together form the Project ESIA. The Project ESIA is summarised in a Non-Technical Summary.

The current report is designed to provide an action plan for conservation actions to mitigate the possible impact of the DPM Krumovgrad project - *Mining and processing of gold ore from Ada Tepe prospect, Khan Krum deposit* (the Project) on two endangered tortoise species – the Hermann Tortoise (*Testudo hermanni*) and the Spur-thighed Tortoise (*Testudo graeca*).

In addition, the BAP includes actions that need to be undertaken to demonstrate a “net gain” for populations of these species affected by the Project within a reasonable timeframe. This requires measures that go beyond those required for government permitting purposes or for the Project's mitigation strategy. Such measures are needed because the Mine will remove some key habitat for both tortoise species and could cause some reduction in their population size within a Natura 2000 protected zone “Eastern Rhodopes” SCI.

Both species are included in the Red List of the International Union for Conservation of Nature (IUCN-2002) as globally threatened reptile species, categorized in the following categories: *T. graeca* - Vulnerable (VU A1cd – ver 2.3), *T. hermanni* – Near Threatened (NT – ver 3.1). The tortoises are also listed in the BERN Convention (included in Annex II), in the Directive 92/43 of EEC for conservation of the natural habitats of the wild flora and fauna (included in Annex II and IV) and in the CITES Convention on international trade with threatened species from the Wild Flora and Fauna (included in Annex II).

1.1 Biological background

1.1.1 Species description, taxonomic classification and habitat

Mediterranean Spur Thigh Tortoise (*Testudo graeca* Linnaeus, 1758)

T. graeca is a daily active species that requires open spaces, covered by herbaceous vegetation. However, during the summer, it often enters into bushes and woods. It lays 2 to 8 round eggs on two to three occasions (in June and July), and buries them in sunny spots.



The eggs hatch after 70 to 100 days. Often the species are found to return for wintering on the territories that they have hatched. The lifespan of *T. graeca* is about 110-120 years. Most commonly *T. graeca* reaches carapace length of 200 to 250 mm. The biggest individual documented in Bulgaria had 389 mm carapace length and weighed 5.860 kg to 7 kg (Beshkov, 1997). The horny scutes of the carapace are mainly coloured in yellow and black, while those of the plastron are predominantly black.

Hermann's Tortoise (*Testudo hermanni* Gmelin, 1789)

T. hermanni, in contrast to *T. graeca*, is likely to be found in forests in low mountain regions overgrown with bushes and low, thinned out woods. *T. hermanni* lays 2 to 5 white eggs two-three times and also buries them in sunny spots. Eggs hatch after 100 to 120 days. During the winter, the species dig out inclined downward holes, 30 to 90 cm deep, usually exposed to the South. Usually the carapace length of *T. hermanni* reaches 150 to 220 mm. The biggest individual reported in Bulgaria had carapace length of 357 mm (Beshkov, 1997).

Both *Testudo* species can be found at sea level up to 1400-1500 m altitude and have similar variety of nutriments as herbaceous plants, windfalls, as well as mollusks and other invertebrates. The morphological characteristics of both species are similar with some differences:

- *T. hermanni* has a longer tail (especially males), ending in a horny spike, compared to the small scales tail of *Testudo graeca*.
- *T. hermanni* differs with 5 scutes along the middle of the carapace, that are relatively narrow, (especially the second, third and fourth scutes; the fifth is wider than the other scutes). In contrast, *T. graeca* has larger row with second, third and fourth scutes, that are wider than longer.
- *T. graeca* has a large conic spurs on thighs, which is lacking in *T. hermanni*.

1.1.2 Distribution and population status

Tortoise population size in international context

Population size and density, based on adult individual numbers, is an important indicator of its present state. Not enough and conclusive recent data are available concerning the population size of the two *Testudo* species across Europe. Research on *T. hermanni* population (van Dijk et al., 2004) argues that the species is declining, most probably due to the widespread habitat loss, and although it is currently listed as a Near Threatened (NT) species, the population trend suggests it soon might be categorized as Vulnerable. Nevertheless, its overall population density is considered better with 6 to 12 ind/ha (Gabriel Buică et al., 2013), compared to the population densities of *T. graeca*, which is reported to vary between 2-6 ind/ha (Hailey, 2000; Díaz-Paniagua et al., 2001).

Geographic Range of both *Testudo* species is as follows:

- *Testudo graeca* Linnaeus



Native: Albania; Algeria; Armenia (Armenia); Azerbaijan; Bulgaria; Egypt; Georgia; Greece; Iran, Islamic Republic of; Iraq; Israel; Jordan; Libya; Macedonia, the former Yugoslav Republic of; Moldova; Morocco; Romania; Russian Federation; Spain; Syrian Arab Republic; Tunisia; Turkey; Ukraine

Introduced: Cyprus; France; Italy

- *Testudo hermanni Gmelin*

Native: Albania; Bosnia and Herzegovina; Bulgaria; Croatia; France; Greece; Italy; Montenegro; Romania; Serbia (Serbia); Spain; Turkey

Introduced: Cyprus

Tortoise population size in a national context

A model of suitable habitats and potential population of both *Testudo* species, verified with survey on real populations, was used to complete the final and consensus version of the NATURA 2000 database. The model was prepared in 2008 by NGOs and Bulgarian Academy of Sciences in cooperation with Bulgarian Herpetological Society and under the coordination of the Ministry of environment and water. It was developed under MATRA PIN Project "Preparation of Bulgarian NGOs for the Biogeographical Seminars, a Cornerstone of the Natura 2000 Designation Process"¹. According to this model the entire Bulgarian population of Spur-thighed Tortoise (*Testudo graeca*) consists of about 2.2 million specimens, while the estimated number of Hermann's Tortoise (*Testudo hermanni*) is 4.0 million. About 50% of all tortoises are located within Natura 2000 protected areas. The population density of adults individuals per ha for *Testudo graeca* and *Testudo hermanni*, based on the described model, are presented in Appendices 6 and 7, respectively.

Tortoise population size in a local context

Information on the actual number and density of tortoise populations and the suitable habitats of both *Testudo* species at the Project area are described in detail in the Project's Appropriate Assessment Report (Table 1-1). Based on the field information, using mark and re-capture method, the average density of *T. graeca* in the most suitable zones (Zone 1: sparse forest type 91MO 5210; Zone 2 and 3: monoculture of *Pinus nigra* and *Rhobinia pseudoacacia*) was estimated at 6-8 ind/ha, while the average density of *T. hermanni* was 5-6 ind/ha. The calculated ratio of both species was 1.26:1, *Testudo graeca* to *Testudo hermanni*. About 3% of the total area (94, 6 ha) were considered as suitable habitats, with 47 ha defined as a key habitats. Currently, most of the key habitats are left out of the Project area.

Table 1-1 Numbers of tortoise species per zone prior to relocation.

Information sourced from the Appropriate/Compatibility Assessment (2010)

¹ <http://www.ceie.org/index.php?cID=51>



	Average density numbers / ha (<i>Testudo graeca</i>)	Average density numbers / ha (<i>Testudo hermanni</i>)	Zone area ha direct
Zone 1/Area I	8	6	47
Zone 2/Area II	6	5	43
Zone 3/Area III	0.1	0.1	4,5
Number of directly affected tortoises	635	498	94.6 (total hectares)

Gender structure – adults

The ratio between male and female adult specimens of both species in the study area is within the optimum.

Age class structure

The difficulty to find the smallest specimens – young and newly hatched, makes the assessment on this criterion almost impossible over such a short time. However, judging on the number of laying females and on the probability for a successful hatching, an approximate estimation of the situation can be made. Between 24-30 May 2008 at Zone 2 and the rest of the IP area not observed any tortoise nests, dug up from predators. This is probably due to the large number of suitable places for laying and to their small area. This makes them more difficult to be found and therefore, they are better protected. In Zone 1 during the same period the situation is radically different. During the observation of 5 laying female specimens and the conducted monitoring of nests, it was established that within 3 days after laying all 5 nests were destroyed. Judging from the found traces this was probably done by a small predator – a polecat or a domestic cat, or both. During the second visit to the field, between 11-13 August 2008 nests were found where young tortoises had successfully hatched. The question whether the same predators feed on newly hatched tortoises and what proportion of them survives still remains. The strong pressures by predators in Zone 1 makes it especially vulnerable to all kinds of biotope fragmentation and to influx of foreign species to the zone.

1.1.3 Optimal habitat

Based on the data from the Project "Mapping and Identification of the Conservation Status of Natural Habitats and Species - Phase I" for Bulgaria, and following the classification of Palearctic habitats (Devillers and Devillers, 1996) the optimal (key) habitat for Mediterranean Spur Thigh Tortoise (*Testudo graeca*) and Hermann's Tortoise (*Testudo hermanni*) is defined as:

- Coastal sand dunes and sand beaches – the overgrown with shrubs and thin oak forests along the shores of the Black Sea
- Temperate heath and scrub – at many places in the lower and hilly parts of the country



- Sclerophyllous scrub – *Phyllirea*, *Cistus incanus*, primarily at the Eastern Rhodopes, Sakar Derventski Heights, Sandanski-Pleven Valley
- Steppes and dry calcareous grasslands - at many places in the lower and hilly parts of the country
- Dry siliceous grasslands
- Thermophilous and supra-Mediterranean oak woods
- Mixed thermophilous forests

1.1.4 Current existing habitat

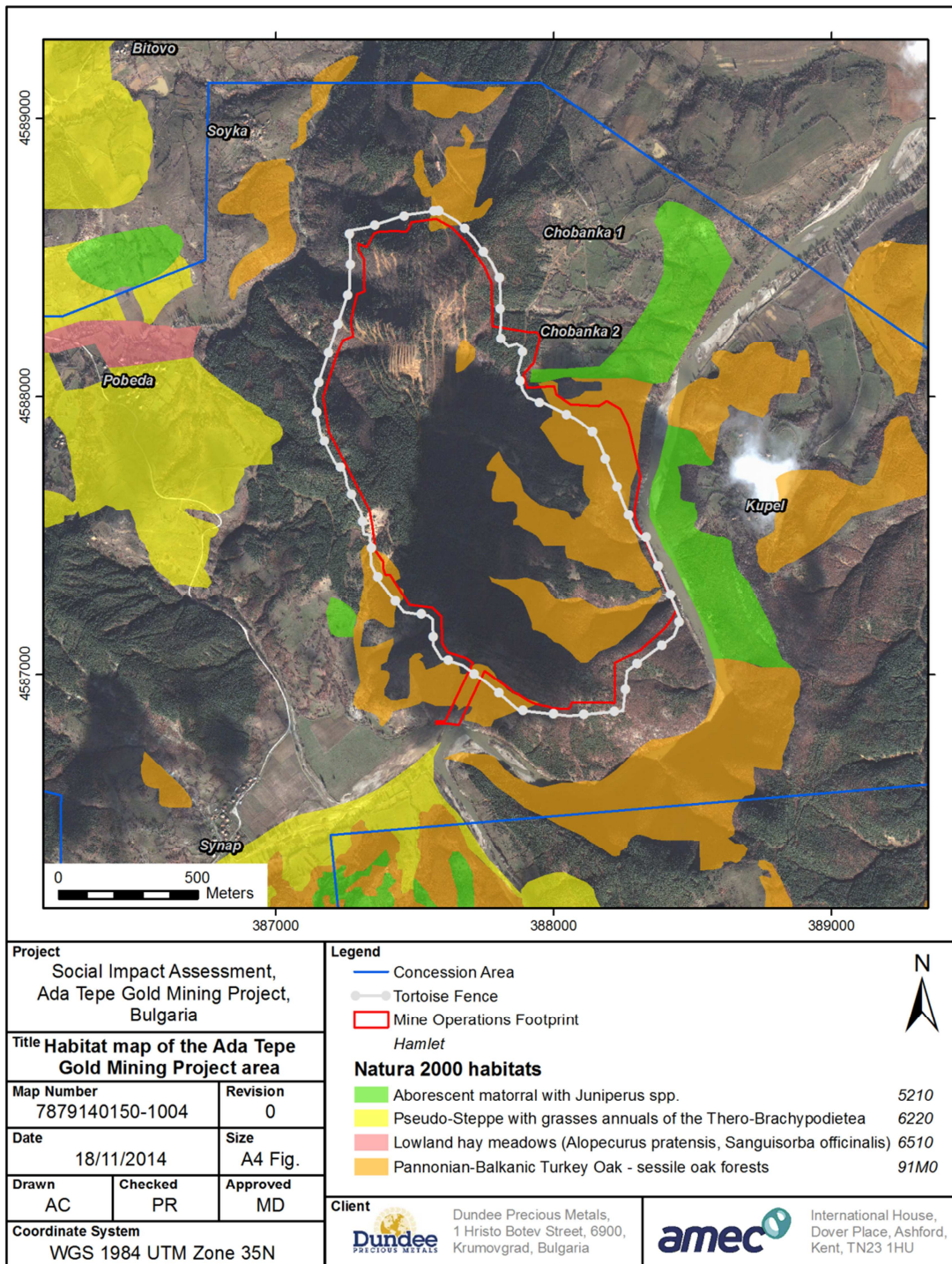
The project area is within the Macedonian-Thracian province of the European broadleaved forest district. The province includes the Eastern Rhodopes and part of the Thracian lowland. The project site belongs to the Krumovgrad region of the Eastern Rhodopes. The Eastern Rhodopes are generally dominated by xerothermal vegetation represented by formations of Italian oak (*Querceta frainetto*), pubescent oak (*Querceta pubescentis*) and common oak (*Querceta virgiliana*). Moesian beech formations (*Fageta moesiaca*) 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 *Quercus thracica*, *Verbascum humile* ssp. *Juruk*, *Eriolobus trilobata*, strawberry madrone (*Arbutus unedo*) and *Arbutus andrachne* are found in this region alone. The plant communities in the project area are represented by primary and secondary vegetation and include:

- Secondary forest – dominated by Austrian pine (*Pinus nigra*)
- Secondary forest - Scots pine-Austrian pine-Italian oak (*Pinus sylvestris*; *Quercus frainetto*)
- Grass habitats
- Heath and scrub
- Afforested/commercial forest (*Pinus nigra*, *Robinia pseudoacacia*)
- Denuded and degraded areas caused by deforestation

Figure 1-1 shows a map of Natura 2000 habitats within and surrounding the project area.



Figure 1-1 Habitat Map of the Project Site



1.2 Conservation status

1.2.1 Legal protection and international listings

Both tortoise species *T. hermanni* and *T. graeca* are priority for conservation in the following **International Conventions and Directive** (see Table 1-2):

- Convention for Conservation of the European Wild Flora and Fauna and natural habitats /BERN/



- Convention on International trade with threatened species from the Wild Flora and Fauna (CITES)
- Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive)

In Bulgarian legislation both tortoise species are under law protection of the Biodiversity Act and the Criminal Code of the Republic of Bulgaria. They are also listed in the Red Data Book of the Republic of Bulgaria (RDB) in Volume 2 – Animals as endangered (EN) species.

Table 1-2 Conservation status of *Testudo* species

Species	BERN ²	IUCN ³	CITES ⁴	92/43 ⁵	BDA ⁶	RDB ⁷
<i>Testudo hermanni</i>	II	VU	II	II, IV	II, III	EN
<i>Testudo graeca</i>	II	NT	II	II, IV	II, III	EN

1.2.2 Regulation and policy framework

EU policy and regulations concerning biological diversity and conservation are successfully transposed in the Bulgarian national policy through:

Biodiversity Act (BDA)

BDA regulates the protection and sustainable use of biodiversity in Bulgaria. The Act postulates the requirements for monitoring at habitat and species level and settles the coordination between the State, the municipalities, the juridical and physical persons, in terms of the biodiversity protection. It has a special focus on the EU and national NATURA 2000 network of protected areas (which constitutes about 34% of the territory of Bulgaria) and the regulation of their protection regime. Currently, no regional offices or other management bodies have been appointed for regulation of individual NATURA 2000 areas. The responsible authority controlling the implementation of legislation regarding NATURA 2000 areas is the Ministry of environment and water (MOEW) through the Regional inspectorates of environment and water (RIEWs). The NATURA 2000 network protected sites include:

- Special Protected Areas (SPAs), as defined by the Directive 2009/147/EC for the conservation of wild birds;
- Sites of Community Importance (SCIs), as defined by the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.

Environment Protection Act (EPA)

² <http://conventions.coe.int/Treaty/en/Treaties/Html/104.htm>

³ <http://www.iucnredlist.org>

⁴ <http://www.cites.org/>

⁵ http://www.central2013.eu/fileadmin/user_upload/Downloads/Document_Centre/OP_Resources/HABITAT_DIRECTIVE_92-43-EEC.pdf

⁶ http://www3.moew.government.bg/files/file/Nature/Legislation/Zakoni/ZAKON_za_BR_last_am._3.08.2012-EN.pdf

⁷ <http://e-ecodb.bas.bg/rdb/en/>



EPA regulates the protection of the environment on the territory of Bulgaria and conservation of the biodiversity. EPA also regulates the establishment and management of the National Environmental Monitoring System and the control and management of factors damaging the environment. EPA provides the framework for EIA/AA assessments.

Protected Areas Act (PAA)

PAA regulates the regime of protection, use and management of the national protected areas. It defines the interactions between the institutions, responsible for their management. The protected area categories under PAA are:

- Strict nature reserves
- National parks
- Natural monuments
- Maintained nature reserves
- Nature parks
- Protected areas

The responsible state administrative bodies that control and coordinate biodiversity issues are:

Ministry of Environment and Water (MOEW)

MOEW is the competent authority for nature and biodiversity, and for reviewing environmental impact assessments (EIA/ESIA). The specialized departments under MOEW responsible for the environmental permitting procedures are the National Nature protection Service and the Preventive Activities Directorate. The regional structures of the MOEW that are responsible for permitting the EIA procedures of local scope are the Regional Inspectorates for Environment and Water (RIEW).

Executive Environment Agency (ExEA)

ExEA is the national reference centre within the European Environmental Agency (EEA). ExEA designs and manages the National System for Environmental Monitoring, which provides information on the state of environmental components and factors on the territory of Bulgaria. Managed by the ExEA is the **National biodiversity Monitoring System (NBMS)**, which evaluates the effectiveness of the national conservation policy. NBMS provides the basis for systematic monitoring on elements of biodiversity as well as identifies trends for biodiversity processes and measures to prevent biodiversity loss. It appraises the country's obligations under the Convention on Biological Diversity and other international treaties.

1.2.3 Conservation efforts

In Bulgaria the tortoises are strictly protected since 1981. The main strategic document where both tortoise species have been listed as priority species is the National Biodiversity Conservation Plan (MOEW 2000). As priority species, both tortoises need to be protected by means of preparing action plan for their conservation. "National Action Plan for the conservation of tortoises in Bulgaria" for the period 2005-2014 was initiated by Bulgarian Society for the Protection of Birds (BSPB) in partnership with experts by National Museum of



Natural History and Science (NMNHS) and Zoological Institute at Bulgarian Academy of Science (BAS). The plan was prepared with the financial support of the Bulgarian-Swiss Biodiversity Conservation Programme (BSSCP). It systematizes the available information on tortoises in Bulgaria, defines the tendency in population dynamics and institutional responsibilities. It also suggests a budget frame for implementation of conservation actions for both globally threatened species. Although the National action plan should be achieved by 2014, currently the outcome of all planned measures is not sufficient. In addition, cooperation efforts between RIEWs, Regional Forest Directorate and State Forestry have also contributed to the conservation measures on tortoise populations in Bulgaria.

Below are listed the main activities for tortoise conservation in Bulgaria as described in the National Action Plan:

- Legislative – revising the Biodiversity Act as well as the Criminal Code of the Republic of Bulgaria to tackle poaching
- Policy implementation – (i) Developing and maintaining of National Data Base related to the illegal collection and trade of tortoises; (ii) Effective coordination for conservation measures implementation between the responsible administrative bodies and stakeholders; (iii) Developing capacity for tortoises conservation in Bulgaria
- International cooperation with organizations and institutions working on tortoises conservation
- Regional planning - implementation of conservation activities in the Municipal plans for environment protection and in the Forest management plans
- Monitoring and scientific research
- Direct conservation measures
- Increasing the knowledge and conservation culture of different target groups
- Carrying out educational programmes on conservation of Bulgarian herpetofauna and in particular tortoises conservation

1.2.4 Current threats

Main threats on a global international scale:

- Intensive agriculture - Agricultural expansion and intensification of monocultures planting is a primary factor for tortoise species habitat loss.
- Urbanisation and tourist infrastructure development – The urbanisation of towns and villages and construction of infrastructure facilities, for example for touristic resorts, are significant factor for tortoise species extinction. This factor can cause destruction, fragmentation and direct loss of the tortoise habitats.
- Agro-chemicals and other pollution impacts – Research on the effects of spraying herbicides on tortoise populations reveal significant lowering survival rates of tortoises 10 cm or larger and causing change in the population structures with proportion of juveniles in samples decreasing by half (Willemsen & Hailey, 2001)



- Wildfires – They are significant limiting factor negatively affecting tortoise populations. The subsequent reforestation with atypical species could possibly lead to change in the tortoise habitats.
- Collection for pet trade (live souvenirs) and food – Sometimes tortoises are taken away from nature to be kept as pets, for private zoo- collections, or for attraction at restaurants or other public places.
- Road mortality – no consistent data are currently available on the mortality rate of tortoises due to road traffic incidents, however, this threat has to be considered as contributing to the overall tortoise populations decline.
- Predation – Tortoises are part of the nutrition spectre of some birds of prey (Egyptian Vulture, Bearded Vulture, Golden Eagle) and mammals (Wild Pig). Eggs of the tortoises are often destroyed by Marten species, European red fox, European badger, Ravens, etc.)

Additional threats on a national and local scale:

- Poaching for traditional consumption (tortilophagia) and sale - due to lack of control on the field. There is evidence that the caught tortoises are directed mainly to areas with Catholic population (around city of Plovdiv), but also to areas in the Eastern Rhodopes near the southern border, including municipalities as Krumovgrad, Harmanli and Ivajlovgrad. Tortoises illegal trading and consumption poses high to critical risk for the population density of local *Testudo* populations. Other consequence can be a decrease in the breeding potential, both increasing the species vulnerability and extinction of the populations inhabiting specific regions.
- Predation – There is indirect evidence that the population of *Marten* species at the project site destroying tortoises eggs, is relatively high. Possible disturbance of the suspected predators is likely during realization of the project, as this species is vulnerable to disturbance from human presence which will naturally lead to a reduction in the destruction of tortoise eggs. However, it is likely to displace the martens to other areas.
- Pine monocultures also account for the existing anthropogenic impact on both tortoise local populations.

Anticipated threats:

- Climate change – No current data are yet available on the impact of climate change on the tortoise populations of *Testudo* species. Nevertheless, it can be anticipated that the extreme climate related events can have an effect on the reproductive success of the populations. Long dry periods, for example, caused by the change in the climate, increase the risk of wildfires that are direct limiting factor for tortoise populations.



1.3 Over of the Project and its impacts

1.3.1 Summary of Project activities

The Project of DPM Krumovgrad is an investment project for the mining and processing of gold ores from the Khan Krum field, Ada Tepe section, Krumovgrad Municipality, Kardzhali Region. The construction of an open pit mining operation comprised of a process plant, employing conventional crushing, grinding and flotation processing for gold extraction, with an expected ore treatment rate of about 0.85 million tons per year and expected gold/silver concentrate production of about 10 000.

The production process will have three main stages (as per Alternative 1 of the investment proposal):

- Ore 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;
- Ore crushing, grinding & flotation – after primary crushing, grinding is to happen within the process plant with fully enclosed transfer. Flotation using reagents, followed by gravity separation and dewatering will produce the end product - gold-silver concentrate;
- Mine waste disposal - co-disposal of tailings and waste rock in the IMWF cells of a total design footprint area of 41 ha.

The main facilities for the production process will be:

- Open pit (AdaTepe);
- ROM ore stockpile;
- Facility for the production of gold-silver concentrate (process plant);
- Integrated Mine Waste Facility;
- Soil stockpile;
- Water abstraction and piping facilities, roads and other support infrastructure.

1.3.2 Summary of Project Impacts

The Project area falls entirely within the borders of SCI BG0001032 Eastern Rhodopes, protected under the Habitats Directive 92/43/EEC and includes territory of SPA BG0002012 Krumovitsa, protected under the Birds Directive 79/409/EES.

The possible impacts of the Project, as well as the proposed conservation actions and measures to mitigate the potential impacts throughout all phases of the Project have been analysed and are described in detail in the Assessment on the Compatibility Report (Appropriate Assessment – AA), carried out under the national EIA procedure.

Alternatives for the project are considered and analysed within the AA and it has been concluded that except for the Zero alternative, only Alternative 1 (project footprint of 85 ha included integrated mine waste facility) is acceptable for implementation, considering the objectives of the protected zone and the compliance with Biodiversity Act and Directive 92/43/EEC.



As indicated in these reports, the Project will remove 28 ha of suitable habitat for both species with an average tortoise density of 3 - 4 adult animals per ha. Further indirect impacts are possible due to effects on distribution and behaviour of predators such as Pine martens and on the activities carried out in the area by local communities. Tortoises have already been relocated out of the mine area and it has been fenced to prevent their re-entry.

1.3.3 Progressive Rehabilitation during Mining Phases

Progressive rehabilitation involves rehabilitating the integrated mine waste facility and other disturbed areas as soon as these areas become available. Commencing early with rehabilitation may lead to a number of advantages, for example, vegetation and plant ecosystems can establish quicker, improving soil conditions, reducing dust and soil erosion, improving visual surrounds. Starting rehabilitation earlier also means there is less to undertake at mine closure therefore potential cost-savings could arise.

A Mine Closure and Rehabilitation Plan has been developed, which provides extensive details on biological aspects of mine rehabilitation.

In the early phases of progressive rehabilitation and mine closure rehabilitation, the land and newly seeded areas will be unsuitable to return tortoises due to insufficient cover and habitat suitability. Progressive phases would not integrate tortoise reintroduction due to ongoing mining operations.

Mine closure and rehabilitation would enable return of suitable tortoise habitat and the Project will plan to ensure that biological rehabilitation includes sufficient design to ensure that the correct habitat is returned. Further revisions of the Mine Closure and Rehabilitation Plan may be required to integrate rehabilitation of previous tortoise habitat.



2 Progress on permitting and monitoring

2.1 Permitting

The possible impacts of the Project, as well as the proposed conservation actions and measures to mitigate the potential impacts throughout all phases of the Project have been analysed and are described in detail in the Assessment on the Compatibility Report (Appropriate Assessment – AA), carried out under the national EIA procedure. The EIA procedure was completed and approved by the competent authority in November 2011. Mitigation measures for the different project stages, as required to comply with the requirements of the EU Habitats Directive and national permitting requirements, are listed below for the two tortoise species:

1. **Construction:** At least one year before the implementation of the IP should start the relocation of the tortoises inhabiting the area and their repopulation at suitable habitats, sufficiently far from the IP. For these activities to be effective, a fence should be built which will prevent the repopulation by tortoises. The relocation of all animals must be finished before the beginning of the construction.
2. **Operation:** During this stage it is obligatory to keep in good condition the fences built in the previous stage. Continuous monitoring on the populations of both species of tortoises is necessary, and adequate measures to reduce the negative impact should be taken, if needed.
3. **Reclamation:** Full restoration of the habitats of tortoises, where this is possible, is a complex task which might take more than 10 years and which would require solid financial resources.

Alternatives for the project are considered and analysed within the AA and it has been concluded that except for the Zero alternative, only Alternative 1 (85ha footprint included integrated mine waste facility) is acceptable for implementation, considering the objectives of the protected zone and the compliance with Biodiversity Act and Directive 92/43/EEC.

Tortoise resettlement was carried out during 2012 and 2013 in compliance with a condition set out in clause V.9 of EIA Resolution № 18-8, 11/2011 on the approval of the investment project. In order to undertake resettlement activities, the Company obtained Permit № 464/25.06.2012 on the use of an exemption from the restrictions under the Biological Diversity Act of the MOEW. Relocation of the tortoises has been completed in June 2013. This was confirmed with a Protocol №727/1.08.2013 issued by the competent authority RIEW – Haskovo (pursuant to Art. 155, par.1 of EPA).

IFC's PS6 requires a net gain for tortoises to be demonstrated with the Project in place (EBRD PR 6 requires no net loss and preferably a net gain). This means that resettlement and other activities require careful monitoring to show that there is no decline in either the availability of suitable habitat or the population sizes of the two tortoise species during the lifetime of the Project. To achieve this, a monitoring plan is in place, as outlined in Section 2.3, together with further positive conservation actions that have been identified as described in Section 3.2 of this plan.



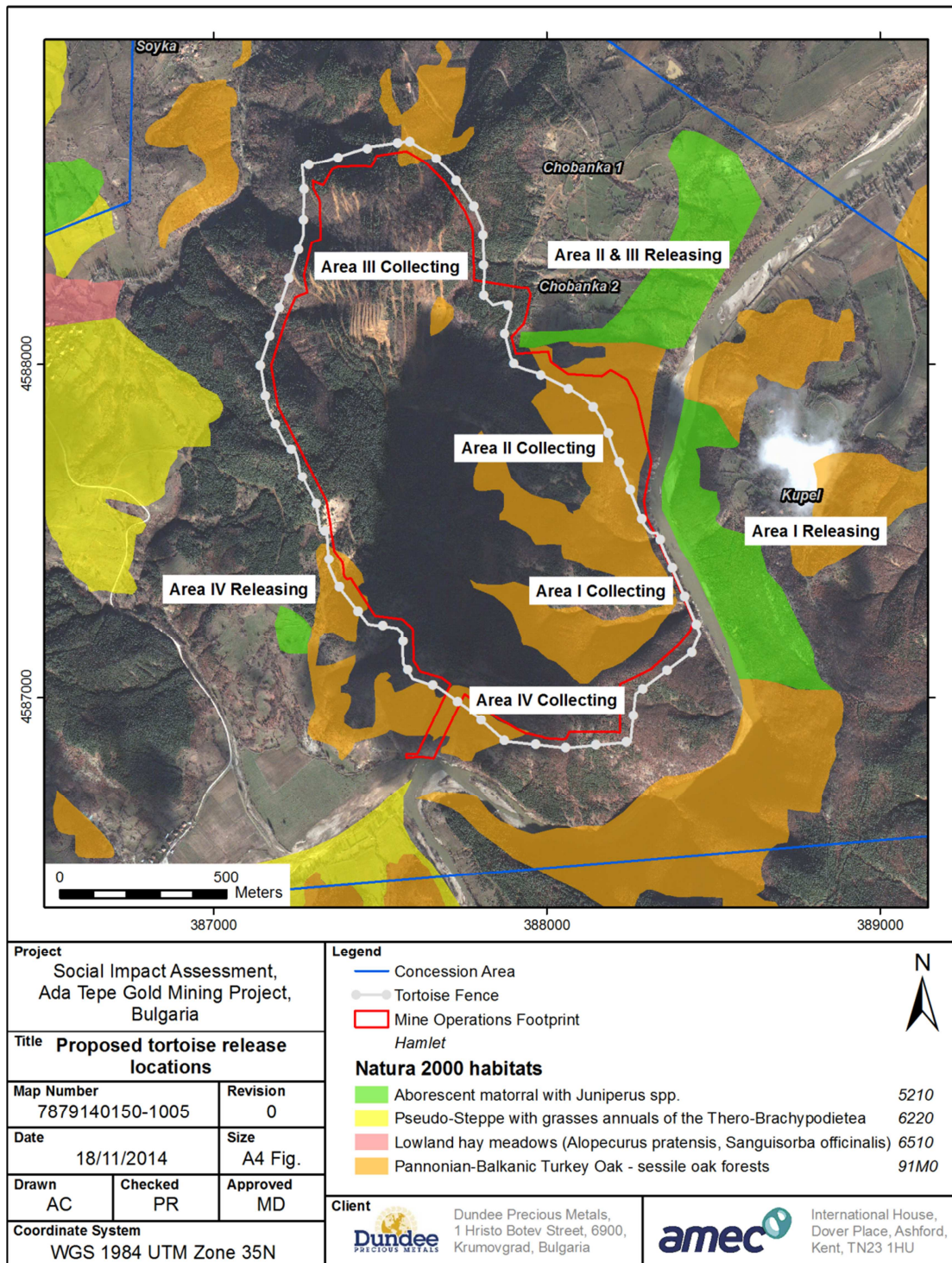
2.2 Resettlement

An important criterion of the successful relocation of individuals is the comparison of the relocated individuals against the local sub-population. If the observed behaviour, health status, survival rate, reproduction, mortality rates, etc. are comparable and do not impose a risk on the co-existence of the new and local tortoises, we could speak of successful relocation.

Tortoise relocation took place in two stages - before and after the setting up of a fence. In 2012 119 tortoises were relocated from the central parts of the project area, and were released at a relatively big distance in order to prevent their quick return. Still, the release perimeter remained within maximum 2km from the original location on a straight line. The Krumovitsa River was assumed to serve as a natural barrier to potential tortoise returns. In September 2012 a fence (7 km length and 80 cm height) around the project area was constructed, preventing possible return of the species to their initial area on the territory of the IP. The fence is to be maintained throughout the entire project operation stage. The availability of the fence increased the intended resettlement outcomes and facilitated the subsequent monitoring efforts. During the resettlement in 2013, 284 adult tortoises from both species were additionally relocated (see Figure 2-1).



Figure 2-1 Areas where both tortoise species were collected and released.



The total area of the territory where tortoises were reallocated is about 130 ha. 10 hectares out of these 130 ha include land disturbed from the archaeological excavations. In the northern part and on the ridge of the IP there are lush tall pine forests with no permanently living tortoises. Only in the warmest months some passing species have been spotted. The most suitable habitats are located along the southern and eastern slope in the lowest parts relatively close to the fence. These are mostly low-growing, coppice oak forests interspersed with pine, and open grassy areas - meadows. From the area of the IP as a result of the carried out field work the total of 403 adult individuals have been relocated, i.e. the average



density (403/130) of the two species was 3 individuals/ha. This number is low and is due to the high percentage of areas that are poorly suitable. Reduction in habitat quality is primarily due to the disappearance of open places in the forests that are necessary for tortoises for warming up, wintering and incubation of eggs. The grass cover in these areas is a food resource that is absent in the pine monocultures. The significant differences in population density in 2012-2014 (3 ind/ha) compared to 2010 data collected for the EIA procedure (6-7 ind/ha) is based on the fact that most of the areas with the highest population density (key habitats) have been subsequently excluded from the Project area, which directly resulted in observed decrease in the average number of population density.

The territory immediately outside the fence (monitoring zone Ada Tepe) was used as a main area for relocation. The suitability of adjacent areas to accommodate additional individuals was also estimated. A major limiting factor in the western part of the area was the overly dense forests, while water shortage in July and August was a limiting factor for the entire relocation area.

2.3 Monitoring

The baseline documents for undertaking monitoring actions for both *Testudo* species in the area of the Project are the *Assessment of Project Compatibility with the Conservation Objectives of the East Rhodopes Protected Site and the Krumovitsa Protected Site* for the above mentioned investment project proposal, as well as the documented tortoise resettlement activities in 2012 and 2013. As of January 2014, DPM Krumovgrad EAD has an approved by the competent authority (RIEW-Haskovo and ExEA) *Environmental Monitoring Plan* with a specific section on "Biological monitoring" (Appendix 3). Monitoring is planned to be carried out between April and September.

2.3.1 Monitoring Methodology

A detailed methodology for monitoring actions is presented in the *Reptile Monitoring Report for the Ada Tepe Prospect of the Khan Krum Deposit* from June 2014 (Appendix 2). The monitoring of both tortoise populations takes into account all the stages of species development - eggs, juveniles, adolescent and adult individuals. During the monitoring the population density and health condition is surveyed in order to identify trends and design strategy for mitigating possible impacts on the tortoise populations.

During field work the monitored areas are carefully screened for tortoise individuals. After finding an individual, its location is recorded by a GPS point. If the tortoise has not been marked yet, it is done by cutting part of its carapace, following the common practice. When found within the IP area and after all relevant data has been recorded, the tortoise is released outside the existing fence, at a location closest to the one where it was found. The release spot is also documented via a GPS point that serves as an indication of tortoise mobility upon subsequent recapture. All procedures are to be performed with maximum efficiency and speed to avoid animal stress. If dead tortoises are found, this information is noted and in case of a recent death, a tissue sample can be taken for DNA analysis and an



autopsy performed to identify the cause of death, stomach contents, reproductive status, parasites, age, etc.

The data collected for each captured individual are carefully filled in a Standard approved templates called National Standard Monitoring Biodiversity Form. This is one of the conditions specified in the obtained Permit № 464/25.06.2012 on the use of an exemption from the restrictions under the Biological Diversity Act of the Minister of Environment and Water. The other forms that were used in parallel are "Catch form", which contains general information (date, initial and final temperature, start and end time, number of the start and end point, track length, name or number of the used GPS device, names of participants and initials of the surveyed area) and specific information for each individual (name of the GPS point, total Carapace length, Breast-plate length, body width and length, and weight). In addition, photos are taken of each individual's breast-plate, carapace and (if any) malformation, illness, injury, etc.

Upon releasing of the captured individual, a "Release form" is filled in containing general information (date, number and name of the used GPS device, names of participants and initials of surveyed areas) and individual information (the number of the released individual with abbreviation for species and gender (Tgf, Tgm, Thf, Thm), as well as the release point.

Field data from the respective forms are subsequently converted to Excel spreadsheet. Further analytical methods to analyse the collected data include the weight index (Jackson ratio) - widely used method for evaluating the condition of both tortoise species, and the Age profile, which can give information about population reproduction rate. The monitoring data are finally entered into the Information System of the National Biodiversity Monitoring System.

2.3.2 Spatial scope for monitoring

Dazhdovnik monitoring area

The area (approx. 25 ha) is located close to the quarter. The territory is some 800-1500 m away (in a straight line) from the IP's boundary. The Krumovitsa River is the major linear barrier between the two territories. The river is easy to cross over in the summer when it's shallow.

Ada Tepe monitoring area

It is bound from one side by an almost 7 km long fence raised around the IP area, in order to prevent tortoises from returning into it. Other boundaries include Krumovitsa River, the road from Chobanka to Kaldzhik Dere, the river passing through Kaldzhik Dere, at the foot of Ada Tepe and the forest borderline between Krumovitsa River and Kaldzhik Dere. Approximate area size is 250 ha. After the installation of the fence, all resettled tortoises were released in that territory assuming that a larger percentage of them would find themselves in areas they already know.

Sinap area - reference area



An area of approximately 75 ha located above Sinap quarter was designated as a reference area. The area is bound by Kessebir River and the road leading to the quarter, a black road located below the nearby ridge above the quarter and a protected area that is a sage tea habitat.

2.3.3 Future ongoing monitoring

Monitoring of tortoises will be ongoing throughout the Project construction and operation to secure more precise information on the tortoise populations and hence provide evidence for positive outcomes after their resettlement. Field observations will be carried out between April and September. Monitoring during April and September will depend on the climate conditions as this is directly related to tortoise species activity. During June, July and August the intensity of field observation will be evenly distributed with at least 45 expert man-days / field season. The number of observations should be carefully selected and balanced in order to collect maximum information possible, however, without causing stress for the observed animals. Additionally, information on the health status of individual tortoises, measured by the weight (Jackson) index (Jackson OF, 1980) during the last month before wintering can provide a good estimate for tortoise survival rate after winter, hence evidencing population stability. In case of deviations from good condition for both tortoise species, specific actions will be undertaken as described in 3.2.5.

A monitoring report on the population status and recommendations for appropriate actions for maintaining stable tortoise populations will be prepared annually. In addition, a detailed Monitoring plan will be updated annually based on the monitoring results of the preceding year. In that way the monitoring process will ensure unbiased assessment of the impact of the Project and will allow timely preventive measures in case of negative effects on the local ecosystem, in general, and particularly on the population dynamic of two tortoise species. It should be noted that the collected data will always be analyzed in comparison to the most actual data on national level. In parallel with the monitoring, the monitored areas will be screened for penetration of alien invasive species. If such are established, the land owners will be timely informed and appropriate measures for habitat maintenance and invasive species management will be undertaken. The ongoing monitoring will that way safeguard the spread of alien invasive species continually throughout DPM project performance (see Appendix 3).

2.3.4 Results

846 individual tortoises have been marked in both relocation areas (Dazhdovnik and Ada Tepe) and the reference area (Sinap), a total area of about 350 ha (Appendix 8). The number of captured and recaptured tortoises has been shown on Table 2-1 and Table 2-2). During recapturing the health status of each individual was evaluated based on the weight index. There were no individuals in unfavourable status. It should be noted that the index



has lowest value in August, mainly due to dehydration. Since tortoises are herbivores they need large amounts of water to digest their food. In July and August, when the moisture in the vegetation is lower, this problem is worsening.

Table 2-1 Data of both tortoise species marked, relocated and re-captured between 2012 and 2014.

Location	2012			2013			2014		
	Marked	Relocated	Re-captured	Marked	Relocated	Re-captured	Marked	Relocated	Re-captured
From Zone/Area I (Dazhdovnik)	-	-	-	-	-	-	25	-	-
From Zone/Area II (Ada Tepe)	119	119	-	305	284	148	149+1 ⁸	-	65
From Zone/Area III (Sinap)	-	-	-	177	-	52	70	-	76
TOTAL	119	119	-	482	284	200	245	-	141

Table 2-2 Total number of tortoises from both species marked, relocated and re-captured in the different locations

Location	Total (2012+2013+2014)		
	Marked	Relocated	Re-captured
From Zone/Area I (Dazhdovnik)	25	-	-
From Zone/Area II (Ada Tepe)	574	403	213
From Zone/Area III (Sinap)	247	-	128
TOTAL	846	403	341

Analysing the observed age profiles for the two *Testudo* species it can be clearly stated that the intensity of the population restoration is very low. With over 1400 data entries (initial capture and recapture) only 3 individuals with size less than 12 cm were found. This means that populations are aging and mortality rate is higher than birth rate. This observation is valid for both the relocation areas and the reference area. At this point it cannot be concluded what is the reason for this, hence, it will be beneficial for further surveys to focus on the causes of the low local population restoration. Additionally, no abnormally high mortality rate has been established.

Another apparent result is the considerable decrease of the *T. graeca* population. Monitoring data show that the decrease of *T. graeca* is faster than that of *T. hermanni*. This trend will be

⁸ This individual was juvenile and therefore not marked



followed in the frame of the ongoing monitoring. Forthcoming raw data from the NATURA 2000 project⁹ will be evaluated in comparison to the collected monitoring data and can further provide information on whether the observed decrease in *T. graeca* population is a more general trend or whether it is confined to the local scale, and hence other underlying reasons can account for it. Such analysis is proposed to be carried out by March 2015.

Adult tortoises in the wild have a few enemies. In the region of the Project area, however, it is popular for people to catch tortoises for food. Preferred are large female individuals. This fact can have in short term serious negative impacts on populations.

⁹ Project "Mapping and Identification of the Conservation Status of Natural Habitats and Species - Phase I" for Bulgaria



3 BAP Objectives

As per the EBRD performance requirements (PR6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources) the Project is considered to be within critical habitat for both tortoise species – *Testudo hermanni* and *Testudo graeca*.

Critical habitat is defined as an area with high biodiversity value categorized by the International Finance Corporation (IFC) under Performance Standard (PS6). The objectives of PS6 are:

- To protect and conserve biodiversity
- To maintain the benefits from ecosystem services
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities

Critical habitats must not be converted or degraded, hence the project should not lead to a reduction in the populations of any endangered species.

Accordingly, in addition to the implemented measures (specified under the EIA Resolution), and the developed monitoring plan, the present Biodiversity Action Plan offers conservation actions and measures to avoid, minimise or mitigate potentially adverse impacts, and to achieve a net gain in population size, viability and availability of suitable habitat for the 2 impacted by the Project tortoise species.

In order to identify appropriate biodiversity actions and measures, the current state of the tortoise populations of both *Tortoise* species on the site of the Project, together with the collected data from tortoise resettlement (2012, 2013) and the carried out monitoring (2013, 2014) have been carefully analyzed. Furthermore, based on the monitoring results and identified trends, a strategy has been designed in order address unfavourable influences on the species due to the Project and other threats and pressures so that no net loss (or net gain) outcome can be demonstrated through selected biodiversity conservation actions.

In case that despite the planned and implemented conservation measures no clear outcomes in terms of habitat quality improvement and positive change in the population structure are achieved within 5 years (in respect to habitat improvement) and 8 years (in respect to population restoration) from the start of construction, the current BAP will be evaluated and updated accordingly with defining, if needed, other appropriate measures and indicators to achieve the required outcome. For regulation of the current BAP implementation, the Company will prepare an internal implementation plan, monitored by the Company's internal system for quality control, with concrete instructions to regulate the proper implementation of BAP measures and reporting based on clear indicators. This way possible BAP deficiencies can be established and addressed at an early stage.



3.1 Conservation objectives

Three specific conservation objectives can be outlined: (i) to minimise the loss of tortoises and hence maintain a stable population density, (ii) to improve tortoise habitat, and (iii) to enhance and restore their populations.

The following standards for conservation objectives may be relevant¹⁰:

- be specific - relate to a particular interest feature (species or habitat type) and define the condition(s) required to satisfy the conservation objective;
- be measurable and reportable - enabling monitoring to be undertaken to determine whether the conservation objectives are being met and for the purposes of Article 17 of the Habitats Directive;
- be realistic - given a reasonable time-frame and application of resources;
- be consistent in approach - the structure of conservation objectives should, as far as is possible, be the same across all (UK Natura 2000) marine sites, and at sites supporting the same interest feature, use similar attributes and targets to describe favourable condition; and
- be comprehensive - the attributes and targets should cover the properties of the interest feature necessary to describe its condition as either favourable or unfavourable.

3.1.1 Minimise loss of tortoises

Maintaining a stable population density is a high priority. The long-term goal is to reach a stable population density of about 3-4 adults species/ha of both *Testudo* species. The main enemy of adult tortoises in the area are the local people that destroy them for food. The real impact of this threat is difficult to estimate as people are aware that this is illegal act prohibited by law and they do not disclose doing it. However, field observations give undisputable evidence for this appalling act. Conversely, the observed low reproduction rates can on a short term account for the reduced tortoise populations even without human intervention. Other factors, such as poor habitat suitability (limited open areas), possible agro-chemicals use, etc. can account for the observed decline of tortoise numbers and the age and gender population structure changes.

3.1.2 Improve tortoise habitat

This objective can be achieved by tackling the existing anthropogenic impacts and threats (described in the previous section) on the suitable habitats of both *Testudo* local populations. Habitat improvement will seek achievement of optimal or close to optimal habitat for both tortoise species in the monitored areas, taking into account land ownership and land use. Managing the existing threats and pressures on the populations and implementation of the planned conservation measures (see 3.2.2 and 4), will result in improved habitat quality and

¹⁰ This approach has been used by UK's Joint Nature Conservation Committee (JNCC) for marine SACs with a view to ensuring consistency across its Natura 2000 network - http://www.ukmarinesac.org.uk/activities/ports/ph2_2_3.htm



should translate into improved population viability over time. Based on monitoring results, expected levels of threat reduction and conservation action implementation will be quantified so that conservation gains can be demonstrated. The progress of these measures will be evaluated and reported annually.

3.1.3 Enhance and restore tortoise populations

The implementation of measures for habitat improvement aims to stabilize and change the trend of aging and low reproduction rate of tortoise populations towards increasing the number of young tortoises and reach growing and stable populations. Further research will be carried out to clarify the possible reasons for the low reproduction rates in the area.

Tortoises reach sexual maturity at 5-8 years (male) and 11-14 years (female). With such slow maturing rates, early resettlement and relocation results cannot be immediately evaluated until after a decade has passed. A sign of a positive trend will be to achieve 45 individual tortoises with size less than 12 cm of both *Testudo* species within 8 years of BAP implementation (found during the monitoring season). This indicator would show a significant growth (15 times¹¹) of the tortoise population and hence serve as evidence for population restoration.

3.2 Conservation Actions

To achieve the conservation objectives, several types of actions are considered, detailed in the following sub-sections:

3.2.1 Habitat Protection and Enhancement Actions

- Thinning the forest

Western parts of Ada Tepe relocation area are covered with pine monoculture, which is not specified as optimal for the tortoises habitat (see 1.1.3). The optimal coefficient of thinning the forest would be between 0.6 and 0.8, i.e. 20% to 40% reduction of the current cover. These percentages (20% to 40%) can serve as an indicator for habitat improvement. They were selected based on the maximum allowed by the Regional Forest Directorate coefficient of thinning and optimal percentage for avoiding erosion and subsequent terrain degradation. The implementation of this activity is in the rights and obligations of the Regional Forest Directorate. According to forest management plans (FMP for 2008-2018 of Krumovgrad State Forestry) such thinning forest activities are envisaged in the next four years. There is a procedure, which if undertaken, these activities can be accelerated and performed in the spring of 2015 which will lead to the desired effect in the most short time. This measure will additionally provide extra places for hibernation during winter and laying eggs during summer.

¹¹ Base value for this indicator is 3 – the number of individuals with size less than 12 cm found during 2014 monitoring season.



- Food provision

Complete drying of the grass and water shortages in July and August can be partially compensated by the presence of juicy fruit. The presence of fruit trees has a positive effect on biodiversity and population density in general (including birds and mammals). In many places at the Project area the soil is thin and the planting of such trees is very difficult. Within the area of relocation Ada Tepe, where planting is still possible, the recommended density is 10 trees or shrubs per hectare. The best trees for planting are wild or semi-wild native varieties dogwood, wild pear, apple, plum, mulberry, grape and others. A suitable indicator can be at least 10 trees or shrubs/ha at suitable areas. However, since from planting to the first fruit bearing are 3-4 years, and to achieve real biotope improvement are necessary even more (5-7 years), it is suggested initially in July and August to implement systematic feeding with appropriate juicy food such as pumpkin, watermelon, pears, apples, tomatoes, grapes, etc.

- Creating an irrigated field for July and August

Often at Krumovgrad's area in mid and late summer it can be observed clustering of tortoises in the fields of pepper (traditional culture) and alfalfa. This is due to the reduction of food resources in the "wild" areas. Such fields can be created at Ada Tepe relocation area, taking into account the specific conditions in the area. Good space for irrigated field can be about 100 m² at 10 hectares. It is recommended where irrigation can be provided that it is performed regularly considering the rainfall in a given year in order to ensure green food in the "dry" months.

- Creating ponds for access to water

Streams that descend the slopes of Ada Tepe have winter-spring maximum. Most often in early summer they are already dry. It is reasonable to build in environmentally friendly way tiered ponds (about one cubic meter volume) along the torrential streams that will on one side limit the erosion and on the other side supply tortoises with water. Their design should consider the needs of the animals. These ponds can be used as well for irrigation of the created irrigated field (see previous measure). The optimum density is one pond at 15 hectares at "Ada Tepe" relocation area, which can serve as indicator for habitat improvement

- Restoration of wells and fountains

The maintenance of small water sources and the improvement of their beds in order to be accessible and safe for tortoises can also have a positive impact on tortoise populations. Mapping of the existing wells and fountains, as a first step, and improvements where necessary, as a subsequent action, is envisaged. An indicator can be mapping of all prospective sites and their improvements/renovation (upon owner's permission).

For all above-mentioned conservation measures in respect to habitat protection and enhancement actions an additional survey should be carried out prior to building activities in order to identify the most appropriate zone within the relocation area of 130 ha to apply the selected measures.



3.2.2 Alien/Invasive plant species

The construction and operation of the mine and especially in the reclamation of sites of this type, the development of green areas, use of buildings and facilities and the movement of large groups of people can lead to the introduction of alien, invasive and synanthropic animals and invasive weed and ruderal plant species that will change the species structure in the habitat and may cause deterioration of the conservation status as they can be enemies and competitors of protected plant and animal species and of plant and an animal species, typical for the habitat.

Prior to and during the Construction and Operation Phases, the Project will incorporate a management procedure to ensure that alien/invasive species are not introduced onto the site. Procedures will also include removal of such species in the event of an introduction.

3.2.3 Disease Management and Protection Actions

When carrying out field observation, each found tortoise is carefully checked to establish its health condition. It is weighed, firstly, and then it is visually inspected for any injuries either on the skin or on the shell. The power and response of the limbs are also assessed. The eyes, mouth, nasal apertures and cloaca are also inspected.

If during the species inspection it is noticed critically low weight of the individual; any trauma (significant wound, fractured shell, heavily injured limb, impairment of the motor functions); infection (eyes, mouth, skin) or symptoms of respiratory tract disease (wheezing, breathing with mouth open, mild to severe nasal discharge), the expert immediately informs the competent authority RIEWs - Haskovo ("Green" line of RIEW) for further directions. If subsequent data analysis suspect or prove epidemic threat, all necessary preventive measures will be taken according to the competent authority instructions.

3.2.4 Stakeholders actions

- Training of local volunteers to supervise the field in order to reduce poaching. Some form of incentive can be considered. A potential indicator can be the increased percentage of alerts and complaints to the competent authority for tortoise poaching.
- Consultations with local authorities – RIEW, State forestry, Municipal administration, in order to coordinate conservation activities for the two *Testudo* species, including sustaining of aggregated database. DPM can initiate such coordination meetings and actively be involved in setting conservation measures listed in strategic documents. These may include the Municipal Plan for Environment Protection or in the Forest Management Plans. A potential indicator can be the number of organised and attained meetings.
- Development of a joint conservation program with environmental NGO to reduce poaching of tortoises in the area. The Bulgarian Society for Protection of Birds (BSPB), for example, has experience in a similar program exactly for the Eastern



Rhodopes. DPM will explore the possibility to engage in such joint conservation program.

3.2.5 Education actions

- An educational programme and trainings for the conservation of biodiversity and in particular the 2 protected tortoise species will be implemented. The consumption of tortoises by local people can in the short term cause adverse impacts on the tortoise populations. The educational measures should adequately alert and educate about the serious consequences from tortoise consumption, and should promote intolerance for this practice. The educational programme in schools can be implemented as targeting children and young people can possibly achieve the best desired results. In addition, information campaigns targeting elderly people on the biodiversity status of both tortoise species have to be considered. An appropriate indicator could be a questionnaire on the tortoise species biodiversity importance, provided to the stakeholders after the information campaign/training. Another indicator could be the change in the behaviour, measured by the increased signals to the competent authority and the number of imposed sanctions for offenders.

4 Implementation

4.1 Timeframe for completing actions

The suggested conservation actions together with the timeframe for their implementation are summarised in Table 4-1 below:



Table 4-1 Proposed Habitat based conservation improvement actions

№	Action	Indicator	Timeline	Comments
MAIN AIM: Improve tortoise habitat				
By improving habitat quality of up to a total of 250 ha (Ada Tepe monitoring area) within a 5-year period and assessed annually. Completed aim assessed after 5 years of implementation. All planned actions below are designed to improve habitat quality with progress reported annually.				
1	Detailed habitat mapping	Develop a detailed habitat map of the relocated / resettled areas and establish this as the <i>defined area of measurement</i> .	Year 1: achieve detailed map in first year to act as baseline measure. Year 5: reevaluate changes in habitat to establish if favourable habitat status has been achieved.	Develop map using GIS and aerial images follow-up actions to include ground-truthing by an experienced biologist/ecologist.
2	Thinning forested areas	Between 20% to 40% of trees will be removed over an estimated area of 250 ha in order to increase sunlight and temperature thus increasing suitable habitat.	Amount of forest to be thinned and habitat improved: Year 1: 125 ha Year 2: 125 ha	Following procedure for accelerating of these activities and in collaboration with the Regional Forest Directorate.
3	Planting trees, shrubs with additional fruiting capabilities	Up to 10 trees or shrubs per hectare over an estimated area of 250 ha. Suitable trees and shrubs will be planted with additional fruiting capabilities in order to act as a food source.	Area to be planted and habitat improved: Year 1: 125 trees or shrubs per ha Year 2: 150 trees or shrubs per ha	Prior planting activities the previous measure – thinning forested areas has to be implemented. Planting activities should be coordinated with the Regional Forest Directorate.



			<p>Year 3: 150 trees or shrubs per ha</p> <p>Year 4: 150 trees or shrubs per ha</p> <p>Year 5: 150 trees or shrubs per ha</p>	
4	<p>Irrigation of fields</p> <p>Maintained annually in early summer</p>	<p>Up to 100 m² per every 10 ha of fields to be irrigated annually during July and August.</p>	<p>Maintained annually during July and August</p>	<p>Dependent upon seasonal rainfall amounts.</p>
5	<p>Develop new or maintain and/or restore ponds in order to provide access to water</p>	<p>One pond every 15 ha should be made available.</p>	<p>Amount of ponds:</p> <p>Year 1: Mapping and defining the exact places and contacting land owners; Assuming consent is provided, new/restored ponds to commence in Year 2.</p>	<p>The design of the ponds should take into account tortoise species needs. Provision of new ponds or restoration of existing/old ponds can only be carried out upon owner's permission.</p>
6	<p>Restoration of wells and fountains</p>	<p>Mapping of all prospective sites; N^o of improved/renovated wells to be assessed.</p>	<p>Year 1: Mapping and contacting owners Assuming consent is provided, improvements/ renovation of wells to commence in one year upon receiving a consent</p>	<p>Restoration of the wells can be carried out upon owner's permission.</p>



Table 4-2 Proposed Tortoise Population conservation actions

Nº	Action	Indicator	Timeline	Comments
MAIN AIM: To increase the population size of both tortoise species in relocated and resettled areas. This is a long-term plan covering a 10+ year period.				
1	Population numbers monitoring	Establish population numbers of both species in a clearly defined relocation/resettlement area. Provide an ongoing graphical output showing population trends.	Year 1: Data collection for population numbers for both species Ongoing: assess Year 2 against Year 1 and then Year 3 against Year 1 & 2.	Monitoring data will provide consistent information on trends in population stability across and between the years.
2	Age-Sex-Health monitoring	Establish age, sex and health of species within defined area. Provide an ongoing graphical output showing age structure, sex differences.	Year 1: Collect age-sex-health parameters within defined area and compare with following years.	Monitoring data will provide consistent information on trends in age and sex structure of tortoise population in the defined area across and between the years.
3	Tortoise locations	Collect and record GPS data of tortoise locations within defined area of measurement. Establish a GIS database and show graphically through an annual map.	Year 1: Identify tortoise locations. Compare with following years 2,3,4 and so on.	Annual map may show trends such as feeding, drinking hibernation places which will increase knowledge on both species.
4	Enhance and restore tortoise population	45 individual tortoises with size less than 12 cm	Measured within 8 years of BAP implementation	The trends in the population structure will be evaluated annually in the frame of each monitoring season.



Table 4-3 Proposed community based conservation educational actions

Nº	Action	Indicator	Timeline	Comments
MAIN AIM: To increase knowledge and information on both tortoise species as to why conservation is necessary and what conservation measures are to be conducted.				
1	Training volunteers to reduce poaching	Increased percentage of signals and complaints	Ongoing Evaluated annually;	Poaching and using tortoise for food can have severe negative impact on local tortoise populations.
2	Consultations with local authorities	Nº of organised coordination meetings	Ongoing Evaluated annually;	Coordination between responsible authorities is essential to increase the outcome of conservation measures.
3	Educational programmes	Questionnaire to stakeholders, Disperse information leaflets etc.	Ongoing Evaluated annually;	Information campaigns on increasing the knowledge about tortoise species and the need for their conservation.

The indicators outlined in Table 4-1 will be used to develop metrics to show that losses due to the Project are at least comparable with the gains that have been achieved against these indicators (see 4.3). This will take place during 2015.



4.2 Progress evaluation and update

Progress evaluation of the planned biodiversity actions for tortoise populations, and assessment of indicators achievement will be performed annually. The planned measures will be discussed in the light of the ultimate purpose to reach no net loss (and preferably net gain) of both endangered *Testudo* species, and if needed, adequate amendments to the current plan will be made. Consultations with stakeholders and biodiversity experts will be scheduled in the process of evaluation and update of the plan.

4.3 Next steps for BAP finalisation

Further work will be undertaken as part of the BAP to develop forecasts for the gains in tortoise habitat extent and quality and associated gains in population size and viability that can reasonably be expected over the lifetime of the Project. The Project specialists will develop measures of loss and gain that can be used to compare the impacts of the Project with the gains achieved outside the exclusion fence, as a result of the measures and interventions described in this BAP.



Appendixes

Appendix 1 - Guide Book for Relocation of Tortoises: the Hermann's Tortoise (*Testudo hermanni*) and the Mediterranean Spur Thigh Tortoise (*Testudo graeca*) from the Ada Pepe Prospect

Appendix 2 - Reptile Monitoring Report for the Ada Tepe Prospect of the Khan Krum Deposit, June 2014

Appendix 3 – Environmental Monitoring Plan part, VI Biodiversity

Appendix 3' – Schedule for biological monitoring

Appendix 4 – Map of potential habitats of *T. graeca* in Bulgaria

Appendix 5 – Map of potential habitats of *T. hermanni* in Bulgaria

Appendix 6 – Population density of *T. graeca* (adults individuals per ha)

Appendix 7 – Population density of *T. hermanni* (adults individuals per ha)

Appendix 8 – Reptile Monitoring Report for the Ada Tepe Prospect of the Khan Krum Deposit, September 2014



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