



## Environmental & Social Management System

Biodiversity Offset Strategy

Biodiversity Offset Strategy		
Effective Date: 01.04.2016	Document Number: OMAS-ESMS-OFF-PLN-001	Rev: 1

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## APPENDICES

Appendix 1: Habitat Suitability Model Methodology

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### 1 INTRODUCTION

#### 1.1 Document Number

This document is the Biodiversity Offset Strategy for the Öksüt Gold Project. The document reference number for this Management Plan is OMAS-ESMS-OFF-PLN-001.

#### 1.2 Purpose

The purpose of this Offset Strategy is to define the broad objectives and activities to ensure the residual and unavoidable impacts on Priority Biodiversity Features (PBF) and Critical Habitat (CH) resulting from the Project after the application of the mitigation measures will be offset, in accordance with EBRD Performance Requirement 6 (PR6).

#### 1.3 Application

The policy set out in this Biodiversity Offset Strategy applies to all OMAS activities throughout the lifecycle of the Öksüt Gold Project, including those carried out by contractors.

This Offset Strategy is developed in accordance with the requirements of *EBRD PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources*. Based on this, OMAS' biodiversity goal is:

*OMAS seeks to ensure that the biodiversity of the Develi region ultimately benefits from the Project's presence in the region. OMAS' goal is to have a net positive impact on biodiversity of the Develi region. OMAS aims to reach this goal during mine closure but will seek opportunities to achieve net positive impact as early as practicable in the project life.*

This Offset Strategy is the base for the formulation of a Biodiversity Offset Plan as part of the OMAS Environmental & Social Management System Framework (OMAS-ESMS-001), which is owned by the OMAS General Manager. The future development of a Biodiversity Offset Plan may result in changes to the Biodiversity Management Plan.

#### 1.4 Commencement

The Offset Strategy applies from 1 April 2016.

#### 1.5 Authority and Management

The OMAS General Manager approved this Offset Strategy on 31 March 2016.

This Offset Strategy is owned by the OMAS Health, Safety Environment and Training Manager. This Offset Strategy provides the basis for development of a Biodiversity Offset Plan and a review of the Biodiversity Management Plan.

### 2 SCOPE

#### 2.1 Scope of this Offset Strategy

This Offset Strategy covers all OMAS activities, including contractor activities. The Contractor Management Framework (OMAS-ESMS-CM-PLN-001) addresses the implementation by contractors. This Offset Strategy provides the steps to ensure that residual and unavoidable impacts, resulting from the Project after the implementation of mitigation measures, on species and habitats identified in the

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Project ESIA as Priority Biodiversity Features (PBF) and Critical Habitats (CH), will be offset, in accordance with EBRD PR6.

The overall aim of the Offset Strategy is to obtain a no net loss and preferably a net gain for Priority Biodiversity Features (PBF) and a net gain for Critical Habitats (CH) impacted by the Project.

### 2.2 Spatial scope

The **mine site LSA** is defined by the ecological and geographical boundaries of the Develi mountain range, and as such it includes a much broader area than the area expected to be affected directly or indirectly by the project (Figure 1).

The **powerline LSA** is defined by a 1.5 km buffer around the route centre line (Figure 1). The dimension of the buffer is based on the expected impact on the birds using the habitat within the buffer area, moreover the avoidance distance from power line for fauna species is reported as a maximum of 1/1.5 km. The protected areas and KBAs crossed by the powerline were also included in the assessment.



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### 3 RESIDUAL EFFECTS ON PBF AND CH

The ESIA *Chapter 8: Biodiversity* identified the presence of species and habitats determining Priority Biodiversity Features (PBF) and Critical Habitat (CH) and assessed residual effects on these receptors.

The expected loss of habitat for PBF and CH due to the project was quantified using a precautionary approach. The results of this assessment are summarized below.

Further information can be found in the ESIA *Chapter 8: Biodiversity*.

#### 3.1 Flora Species

The following flora species determining PBF and CH are expected to be significantly impacted by the Project:

- vulnerable flora species:
  - *Verbascum luridiflorum* (VU);
  - *Campanula stricta* var. *aladagensis* (VU);
- endangered and critically endangered flora species:
  - *Astragalus vestitus* ssp. nov. (CR);
  - *Cirsium aytatchii* (EN).

Habitat losses for offset purposes were calculated using the following methodology:

- a loss of 100% of the habitat is calculated for direct impact (vegetation clearing and removal/disturbance of topsoil and habitat loss);
- an additional loss of 20% of the habitat is calculated based on the potential for indirect impacts on these species using a 100 m buffer (e.g. indirect impacts could result from changes in morphology and hydrology, emission of gaseous pollutant and dust in the atmosphere and introduction and spreading of alien species).

Table 1 summarises the calculation of habitat surface of the flora species determining PBF and CH that will either be lost or will experience significant residual effects.

**Table 1: Residual effects – Flora Species**

Flora species		Direct impacts	Indirect impact (100 m buffer)		TOTAL LOSS	
		Loss	Total area	Loss		ha
		ha	ha	%	ha	
Endangered and critically endangered flora species	<i>Astragalus vestitus</i> subsp. nov.	9.35	18.22	20	3.64	13.00
	<i>Cirsium aytatchii</i>	3.67	5.03	20	1.01	4.67
Vulnerable flora species	<i>Verbascum luridiflorum</i>	3.67	5.60	20	1.12	38.87
	<i>Campanula stricta</i> var. <i>aladagensis</i>	3.06	5.03	20	1.01	59.98

#### 3.2 Habitats

The EU Habitats Directive Annex 1 threatened habitat "Irano-Anatolian steppe *Quercus* woods" (G1.7A.2) will also be adversely impacted by the Project.



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At closure, the re-establishment of natural morphology and hydrology and the restoration of disturbed areas will allow reclamation of most of this threatened habitat in the mine site to its original state. However, residual impacts to the oak woodland in the location of the proposed footprint of the two mine pits will need to be offset.

Table 2 summarises the calculation of habitat surface of the threatened habitats that will be lost or experience residual effects within the mine LSAs.

**Table 2: Residual effects – Habitats**

Priority Biodiversity Feature (PBF)		Direct impacts	Indirect impact (100 m buffer)			Total Area	TOTAL LOSS
			Total area	Loss			
		ha	ha	%	ha	ha	ha
Endangered and critically endangered flora species	Irano-Anatolian steppe [Quercus] woods (G1.7A.2)	8.62	-	-	-	1137.75	8.62

## 4 OFFSET STRATEGY

The strategy to offset the unavoidable, residual impacts to achieve a no net loss and preferably a net gain for PBF and a net gain for CH impacted by the project, in accordance with EBRD PR6 and BBOP guidelines<sup>1</sup> is presented below for each of the PBF and CH.

In order to achieve the no net loss/net gain goal, a staged approach is proposed for each of the components identified. The identified three main steps of the offset strategy are:

- **Additional studies:** studies will be performed during construction and the first year of operation, in order to better define the distribution area of the PBF and CH species within the mine LSA (e.g. Develi mountain range and EIA Permitted Area depicted in Figure 1). This will assist OMAS in assessing the residual impacts (and quantify residual losses) to these species and help to inform the selection of appropriate offset activities and locations (within and outside of the mine LSA). The Biodiversity Action Plan describes these studies in more detail.
- **Conservation actions:** conservation actions will be carried out in order to prepare for future offset measures starting from the pre-construction phase. These actions are summarised in Section 4.1. Additional detail on these actions and related timelines are detailed in the Biodiversity Action Plan.
- **Offset planning:** based on the results of the additional studies and the outcomes of the planned conservation actions, a Biodiversity Offset Management Plan will be prepared within two years from the beginning of operation. The offset plan will detail the steps of the offset design process (BBOP 2009a)<sup>1</sup> as follows:
  - quantify residual losses (methods to calculate loss / gain and residual losses will be described);
  - review and select appropriate offset locations and activities;
  - assess the biodiversity gains that could be achieved.
- **Offset implementation and management:** after the offset design has been validated governance and adaptive management mechanisms will be put in place. This will be achieved through the implementation of a Biodiversity Offset Management Plan. The management plan will include offset

<sup>1</sup> BBOP, 2009a and c. Biodiversity Offset Design Handbook and Appendices. BBOP, Washington, D.C. <http://bbop.forest-trends.org/guidelines/odh.pdf>

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and monitoring measures to achieve no net loss or net gain within the life span of the project and to maintain it.

While the final selection and detailed description of the offset activities and locations will be included as part of the Biodiversity Offset Management Plan, the different offset options are discussed below.

The feasibility of the options mentioned below will also be discussed with relevant stakeholders and authorities.

#### **4.1 Mine Site offset strategy**

##### **4.1.1 Flora Species**

The additional studies and conservation activities for the flora species determining PBF (*Verbascum luridiflorum* and *Campanula stricta* var. *aladagensis*) and CH (*Astragalus vestutus* ssp. nov. and *Cirsium aytatchii*) will be carried out prior to the development and implementation of the Offset Plan, as described in the Biodiversity Action Plan.

Based on the results of these actions, appropriate offset locations and activities will be selected and detailed within the Biodiversity Offset Management Plan. This phase will also guarantee the availability of a pool of individuals and seeds sufficient to perform offsets measures.

##### **Additional Studies**

Additional studies will be performed in order to assess the presence, distribution, abundance, ecological niche and conservation status of populations within the Develi Mountain Range (Mine Site LSA). This will help to identify to identify offset opportunities and locations.

These studies will be performed during the first vegetative season and the resources are expected to be mainly external specialized contractors and supported by internal OMAS resources.

Within the Mine Site LSA, the areas deemed suitable for hosting the flora species determining PBF and CH (*Astragalus vestutus* ssp. nov., *Cirsium aytatchii*, *Verbascum luridiflorum* and *Campanula stricta* var. *aladagensis*) will be surveyed. The suitability model will be used to guide the survey, together with the expert opinion.

The preliminary habitat suitability models, developed during the baseline study form literature information available and expert judgement, will be used to guide the survey within the Mine Site LSA. The suitability models elaborated for the target species are shown in *Figure 2*, *Figure 3*, *Figure 4* and *Figure 5* and the models methodology is detailed in Appendix 1.

For *Verbascum luridiflorum* (VU), *Astragalus vestitus* spp. nov. (CR) and *Cirsium aytatchii* (EN) the position of the known populations of the species seems to fit well with the suitability model. The presence of *Verbascum luridiflorum* habitat, Irano-Anatolian steppe Quercus woods (G1.7.2), was considered the main descriptor of habitat suitability.

The model of *Campanula stricta* var. *aladagensis* (VU) seems to fit less well, also the definition between suitable and unsuitable areas is not so clearly defined. This could be explained by the ecology of the species which grows often within rocky outcrops found within the LSA and too small to be include in the habitat mapping.

The surveys will take place in the best season for the observation of the target species, i.e. during the flowering period. As shown in Table 3, two field campaigns will be organized:

- from mid-May to mid-June, targeting *Verbascum luridiflorum* and *Astragalus vestitus* ssp. nov.;



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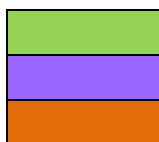
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- from the second week of July to mid-August targeting: *Campanula stricta* var. *aladagensis* and *Cirsium aytatchii*.

**Table 3: Vegetative, flowering and fruiting seasons of endemic flora species**

Month	Week	Species											
		<i>Astragalus vestitus</i> ssp. nov.			<i>Cirsium aytatchii</i>			<i>Verbascum luridiflorum</i>			<i>Campanula stricta</i> var. <i>aladagensis</i>		
May	1												
	2												
	3												
	4												
June	1												
	2												
	3												
	4												
July	1												
	2												
	3												
	4												
August	1												
	2												
	3												
	4												
September	1												
	2												
	3												
	4												



vegetative season

flowering season

fruiting season (seeds available)

A meander search pattern will be used for the survey focusing on suitable habitats. This type of survey targets micro-habitats and eco-tones within the habitat in search of threatened or endemic species. Each meander search should continue until no new species is recorded or when the entire area of habitat type is surveyed, whichever happens sooner.

If population of flora species determining PBF and CH are found they will be mapped and their extension (m<sup>2</sup>) and abundance (number of individuals) will be estimated. Data on the habitat of each population including habitat, soil, morphology, anthropic impact, potential threats etc. will be collected.

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Meander searches are ideal for rare spaces survey in difficult terrain, irregularly-shaped areas, or large search areas. However, depending on the surveyor, meanders may be biased toward areas that are easier to survey and may oversample some areas. The use of a GPS track will help the botanist to adequately survey a site, especially those sites that are large or difficult.

The data derived from this study will help to assess the abundance and conservation status of target species, refine the suitability models and identify potential sites where offset measures can be implemented. Moreover, it will also locate additional population sources for seed collection.

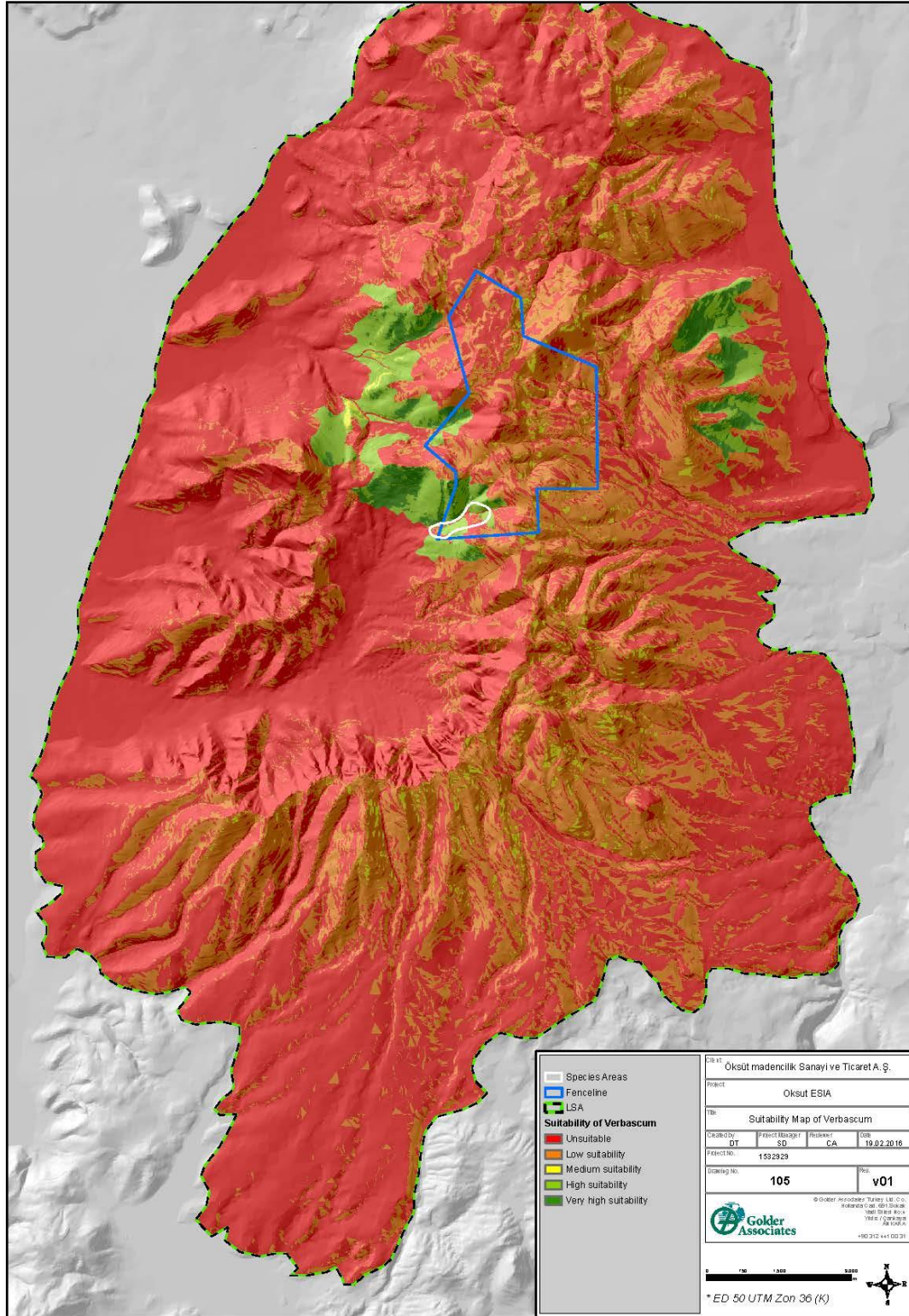
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**Figure 2: Habitat suitability map of *Verbascum luridiflorum* (VU) within the mine site LSA**





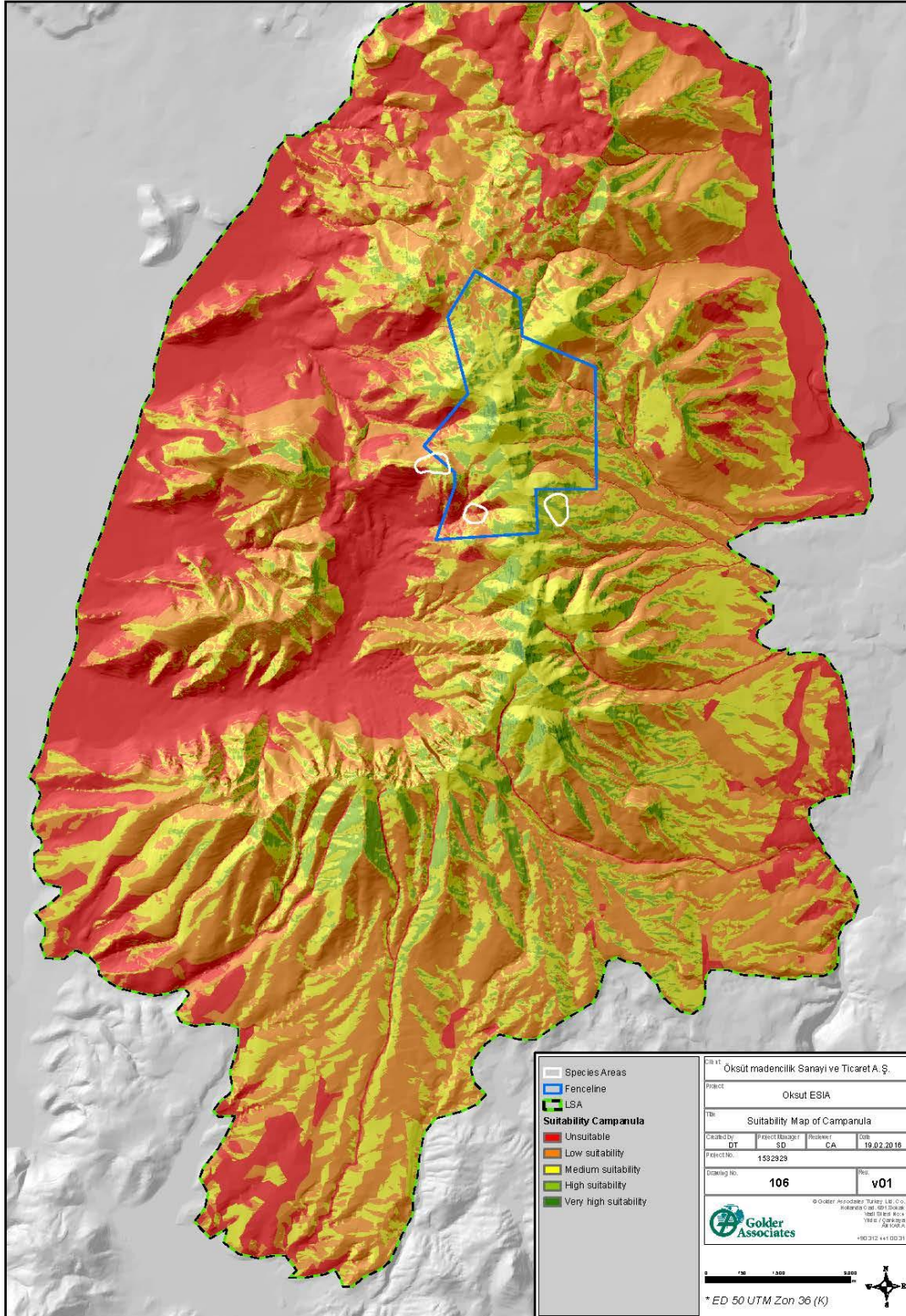
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**Figure 3: Habitat suitability map of *Campanula stricta* var. *aladagensis* (VU) within the mine site LSA**





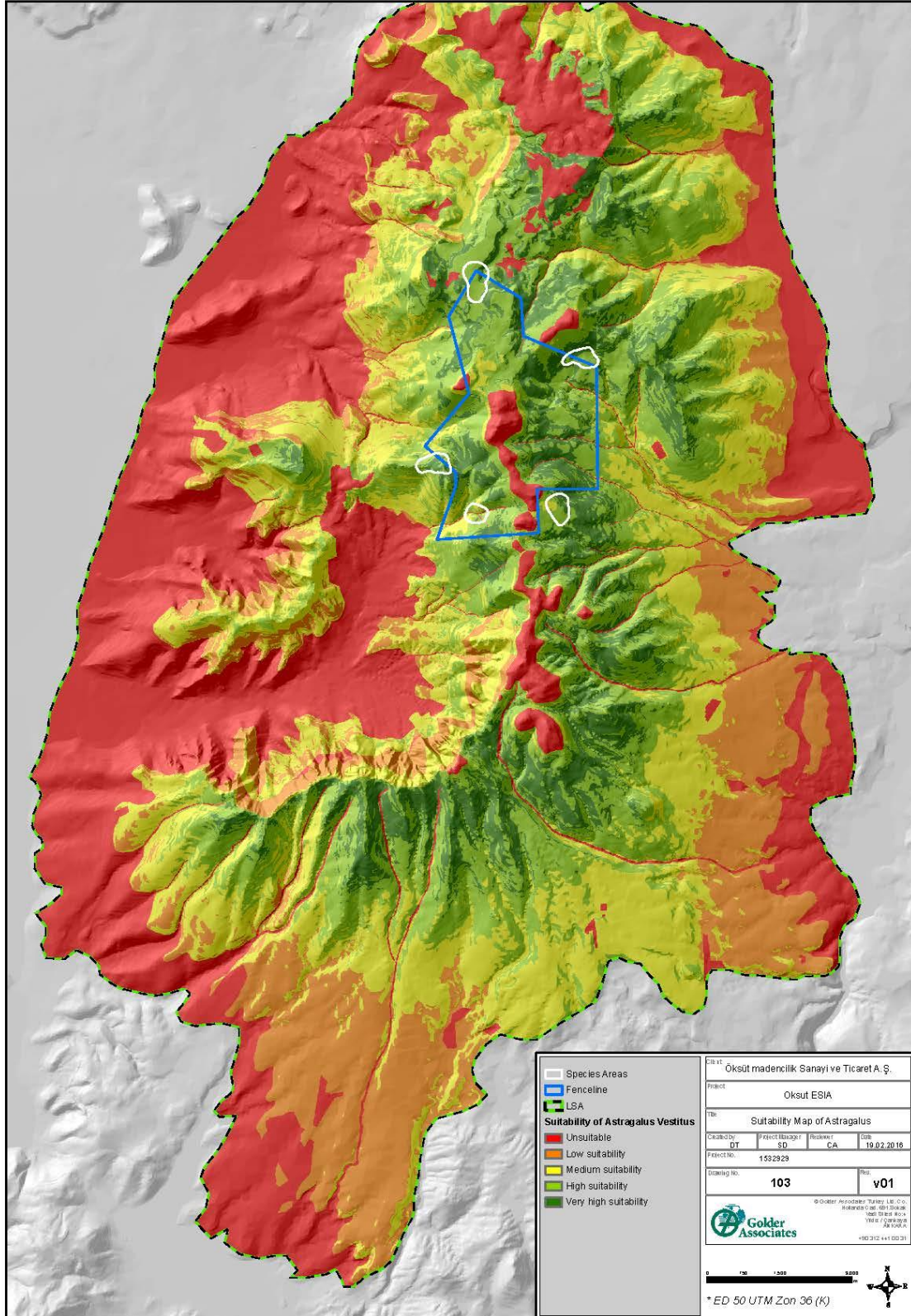
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**Figure 4: Habitat map of *Astragalus vestitus* spp. nov. within the mine site LSA**





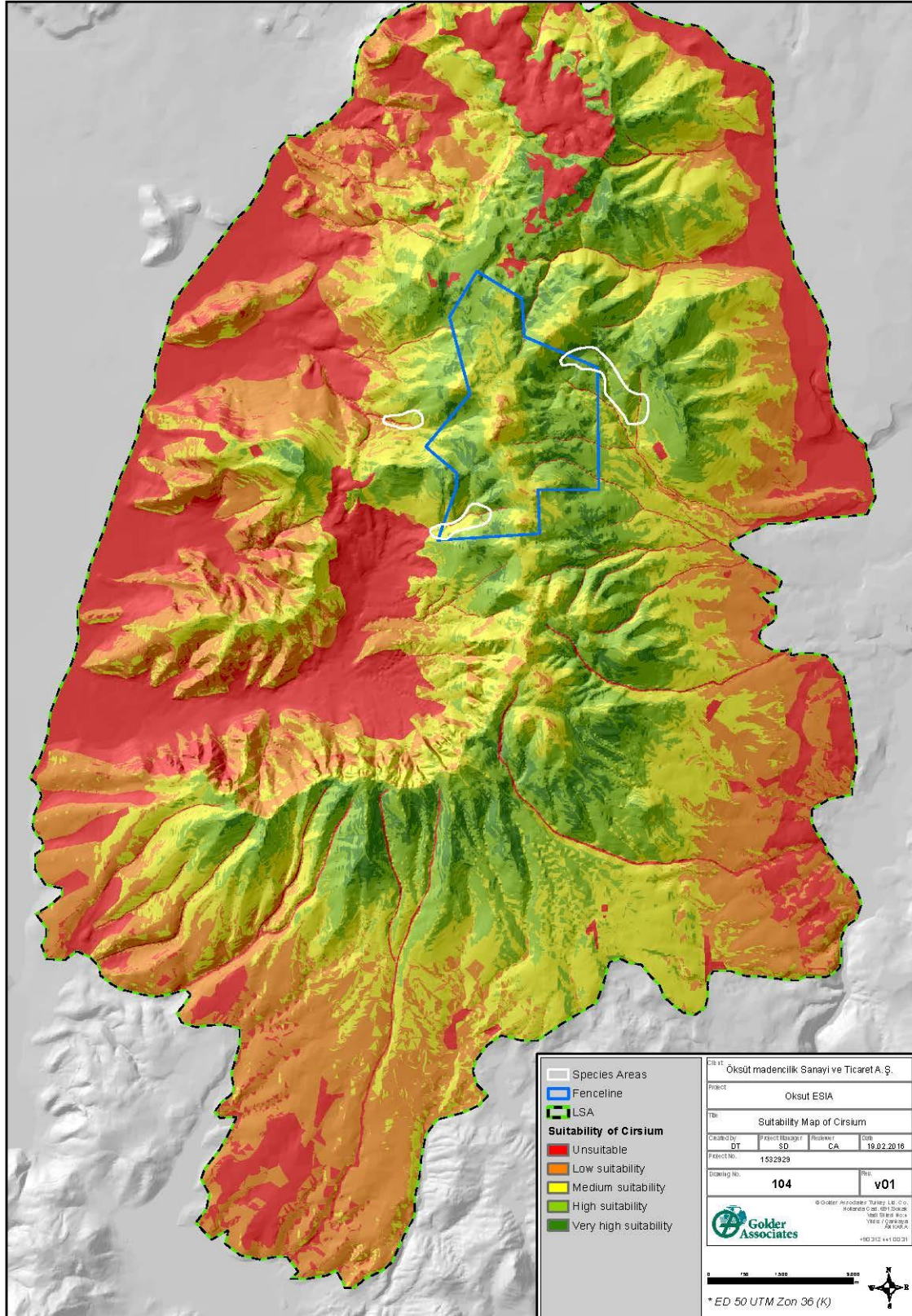
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Figure 5: Habitat map of *Cirsium aytatchii* within the mine site LSA





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### **Conservation actions**

Conservation actions will be performed starting from the pre-construction phase in order to minimize the impacts and guarantee a pool of individuals and seeds sufficient to perform offsets measures and test the applicability of the proposed offset measures. These measures will include:

- salvaging of individuals;
- on-site conservation;
- seed collection from known populations;
- cultivation in a controlled environment;
- translocation tests;
- indirect impact monitoring.

These conservation activities are described in more detail below.

#### **Salvaging of individuals**

Flora individuals belonging to species determining PBF and CH directly impacted by the project will be identified and salvaged prior to construction. This operation will be performed by an expert botanist and OMAS environmental technician in the period that gives the best chances for the identification of each species, i.e. the flowering period.

As shown in Table 3, two field campaigns will be organized:

- from mid-May to mid-June, targeting *Verbascum luridiflorum* and *Astragalus vestitus* ssp. nov.;
- from the second week of July to mid-August targeting: *Campanula stricta* var. *aladagensis* and *Cirsium aytatchii*

For the above mentioned reasons vegetation clearing at the Heap Leach Facilities (ponds and recovery plant) and at the Güneytepe open pit will be scheduled (to start in mid-August 2016) to allow for the salvaging of the endangered and critically endangered flora species directly impacted.

The data regarding date, location, source populations and number of individuals collected will be recorded in an appropriate register. Salvaged individuals will be planted in pots with appropriate soil media (possibly the same soil from their growing sites) and grown in a controlled environment (greenhouse).

#### **On-site conservation**

Within the mine fence line on-site conservation of flora species determining PBF and CH will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted.

This operation will be performed prior to vegetation cleaning (scheduled to start in June 2016) by an expert botanist and OMAS environmental technician prior to the start of any vegetation removal on site based on the data available on the distribution of the species within the mine site fence line.

Inadvertent disturbance to on-site conservation areas adjacent to construction sites should be monitored daily during construction and monthly during operation.

#### **Seed collection from known populations**

Seed collection will be performed on the populations of species determining PBF and CH identified within the mine site LSA.

The source populations are known only for the area surrounding the EIA Permitted Area, more populations will likely be identified within the LSA based on the additional field studies described above.

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The seed collection and conservation will follow the best practice indicated by the Millennium Seed Bank<sup>2</sup>. The appropriate season for performing seed collections is:

- in mid-July targeting *Astragalus vestitus* ssp. nov. and *Verbascum luridiflorum*;
- in mid/late August targeting *Campanula stricta* var. *aladagensis*;
- in mid-September targeting *Cirsium aytatchii*.

Seed collected will be separately stored for each species and sub population using clearly identifiable codes. The number of seeds collected, their viability and growing conditions will be tested after collection. All the data collected will be registered.

The resources are expected to be mainly external specialized contractors and supported by internal OMAS resources.

Part of the seeds collected will be used as propagation materials during trial cultivations. The need of additional seed collection campaigns to be performed in the following years will be assessed based on the results of the collection and cultivation trials.

#### Cultivation in a controlled environment

The salvaged flora individuals of species determining PBF and CH (*Astragalus vestitus* ssp. nov., *Cirsium aytatchii*, *Verbascum luridiflorum* and *Campanula stricta* var. *aladagensis*) will be temporary grown in a controlled environment (greenhouse) starting from May 2016.

During construction, the green house will be established in an open area close to Develi site office. During operation, the decision of moving the greenhouse within the project fence line, using some of the space occupied by temporary facilities, will be made based on the results of the cultivation and on the species acclimation.

Multiplication trial programs will be elaborated based on the species characteristics and on the number of individual and viable seeds collected.

Cultivated individuals will be monitored at least weekly in order to check their status, soil moisture, pests, invasive species etc.

The monitoring will be performed by OMAS internal resources with the supervision of expert contractors.

#### Translocation tests

Depending on the number of seeds and plant available, translocation tests will be performed in order to assess the feasibility of the proposed measures.

These tests will be performed in areas considered suitable based on the model and expert opinion and preferably situated within the EIA Permitted Area has to guarantee and access and constant monitoring.

The translocation will be performed at the beginning of the vegetative season by expert contractors with the support of OMAS internal resources.

#### Indirect impact monitoring.

Flora species determining PBF and CH present within 100 m from the project facilities, and therefore potentially subject to indirect impacts, will be monitored monthly during construction and every three months during operation and closure.

The monitoring will be performed by the field technicians with the supervision of the environmental coordinator.

<sup>2</sup> (<http://www.kew.org/kew-science/people-and-data/resources-and-databases/millennium-seed-bank-resources>).

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### **Offset measures**

Based on the results of the additional studies and the outcomes of the planned conservation actions, a Biodiversity Offset Management Plan will be prepared within two years from the beginning of operation. The offset plan will detail the next steps of the offset design, including

- quantify residual losses (methods to calculate loss / gain and residual losses will be described);
- review and select appropriate offset locations and activities;
- assess the biodiversity gains that could be achieved.

At present, possible offset measures identified within the mine site and more broadly across the mine LSA include:

- protection of existing populations (e.g. onsite/offsite set asides/protection);
- reinforcement of existing populations (e.g. onsite/offsite enhancement/rehabilitation);
- creation of new populations (e.g. reintroduction within the species' range).

### **Protection of existing populations**

Grazing pressure in the mine site LSA is reported to be high in the baseline studies although further studies are required to confirm this. If additional studies confirm this threat, OMAS will consider fencing existing populations within the EIA Permitted Area (that are outside the operational fence line) that are impacted by grazing will positively affect those populations, protecting them from excessive grazing and trampling.

OMAS will also explore the feasibility of fencing off additional areas outside the EIA Permitted Area.

This offset measure could help to increase population density and fitness, creating source populations for both seed collection and natural propagation both within and outside the fenced area.

Temporary fencing may also be required to protect the areas eventually interested by reinforcement and reintroduction activities.

In all these cases, land accessibility will need to be secured in agreement with relevant local and regional stakeholders. If necessary and feasible, compensation and eventual land acquisition will be carried out in accordance with national requirements and EBRD performance requirements and consistently with the land acquisition policy of OMAS.

### **Reinforcement of existing populations**

Some of the populations identified within the Mine Site LSA seem to show a low population density. In other areas, these populations have been impacted by grazing and/or human activities. In these cases, it may be possible to translocate individuals and seeds within an existing population, i.e. reinforcement.

Reinforcement aims to enhance the viability of populations with low population density by increasing population size, genetic diversity and representation of specific age groups<sup>3</sup>.

These actions can be carried out using collected seeds, salvaged individuals or individuals grown in a nursery from seeds, cuttings or rhizomes.

The advantage of this action in respect to the creation of a new population is that seeds and individuals are translocated in a habitat known to be suitable for the species and therefore it has more possibility of success.

<sup>3</sup> IUCN/SSC (2013). Guidelines for Reintroductions and Other Conservation Translocations. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission, viiii + 57 pp.

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#### Creation of new populations (introduction within the species' range)

Based on present knowledge, very few populations of the species determining PBF and CH are present on the mine site. Additional studies will allow to better access the abundance and conservation status of these species within the Mine Site LSA.

The creation of new populations can lower the risk of extinction of rare and locally endemic species since it enhances the species resilience toward stochastic events. However, reintroduction of new populations within the species' range usually have low success rate in the long term and requires substantial ecological studies (e.g. preferred water, sun/shade, soil conditions etc.). Therefore the feasibility and opportunity of this offset measure needs to be carefully evaluated.

To limit this risk, the suitability model already elaborated within the ESIA will be further refined using data collected during the additional studies described above in order to identify potential candidate areas for introduction. Moreover, translocation tests will be performed in the areas identified in order to ensure the suitability of the areas selected.

The preliminary suitability models (Figure 2, Figure 3, Figure 4, Figure 5) seem to indicate that within the mine site LSA there are areas characterized by high suitability or very high suitability for the reintroduction of these species, as showed in the table below.

**Table 4: Habitat suitability for each flora species within the mine site LSA**

Species	<i>Verbascum luridiflorum</i> (VU)		<i>Campanula stricta</i> var. <i>aladagensis</i> (VU)		<i>Astragalus vestitus</i> spp. nov (CR)		<i>Cirsium aytatchii</i> (EN)	
	ha	%	ha	%	ha	%	ha	%
Unsuitable	19730.62	63	8756.88	28	10732.72	34	10732.72	23
Low suitability	9936.23	32	12568.14	40	4682.66	15	4682.66	26
Medium suitability	407.8	1	7753.38	25	6815.86	22	6815.86	26
High suitability	802.58	3	2068.79	7	6525.74	21	6525.74	20
Very high suitability	313.7	1	43.74	<1	2433.95	8	2433.95	4
<b>Total</b>	31190.93	100	31190.93	100	31190.93	100	31190.93	100

#### **4.1.2 Habitats**

The additional studies and conservation activities, for the threatened habitat "Irano-Anatolian steppe *Quercus* woods" (G1.7A.2) determining PBF will be carry out prior to the development and implementation of the Offset plan, as described in the Biodiversity Action Plan.

Based on the results of these actions, appropriate offset location(s) and activities will be selected and detailed within the Biodiversity Offset Management Plan. Possible offset measures identified are present below.

#### **Additional Studies**

Additional studies will be performed on threatened habitat "Irano-Anatolian steppe *Quercus* woods" (G1.7A.2) in order to: assess the distribution, abundance, characteristics and conservation status of the habitat within the Mine Site LSA. This will help to identify offset opportunities and locations.

The studies will be performed during the vegetative season (June to July 2016) by external specialist contractors with the help of OMAS internal resources.

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A survey plots of 20x20 m will be established and surveyed within the Mine Site LSA. Data on GPS plot location, vegetation strata and high, estimated density of tree stands, dominant and characteristic species, morphology, soil, conservation status and potential threats will be collected together with photographic documentation.

Surveyed areas will include the area to be occupied by the Güneytepe mine pit.

### Conservation actions

Conservation actions will be performed starting from the pre-construction phase in order to minimize the impacts and guarantee a pool of individuals and seeds sufficient to perform offsets measures and test the applicability of the proposed offset measures. These measures will include:

- oak salvaging;
- on site conservation;
- indirect impact monitoring;
- progressive restoration.

These conservation actions are described in more detail below.

#### Oak salvaging.

Before the vegetation cleaning and topsoil removal of the Güneytepe mine pit (planned for August 2016) the feasibility of salvaging young oak individuals will be evaluated.

Salvaged oak individuals will guarantee an ideal pool of plants to be used for progressive restoration, enrichment and eventually reforestation of the forest areas of the LSA. Locations of enrichment and reforestation will be evaluated based on the results of the additional studies.

Reforested areas will be monitored at least monthly in the first year after translocation during the vegetative period. After the first year and for the next two years they should be monitored every three months.

In case signs of stresses or other problems are observed during the monitoring, adaptive management measures will be put in place (e.g. watering, fencing etc.).

#### On site conservation

Within the mine fence line on-site conservation of Irano-Anatolian steppe Quercus woods, G1.7A.2 will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted.

This operation will be performed prior to vegetation cleaning (scheduled to start in June 2016) by an expert botanist and OMAS environmental technician prior to the start of any vegetation removal on site based on the data available on the distribution of the species within the mine site fence line.

Inadvertent disturbance to on-site conservation areas adjacent to construction sites should be monitored daily during construction and monthly during operation.

#### Indirect impact monitoring

Irano-Anatolian steppe Quercus woods, G1.7A.2 present within 100 m from the project facilities, and therefore potentially subject to indirect impacts, will be monitored monthly during construction and every three months during operation and closure.

The monitoring will be performed by the field technicians with the supervision of the environmental coordinator.

#### Progressive restoration

Progressive restoration and rehabilitation of areas disturbed during construction and during exploration will focus on reforestation of suitable areas not subjected to the placement of permanent facilities using tree species typical of "Irano-Anatolian steppe Quercus woods" (G1.7A.2).

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This action will be performed at the end of the construction phase, using internal OMAS resources with the advice of external specialist contractors.

### **Offset measures**

Based on the results of the additional studies and the outcomes of the planned conservation actions, a Biodiversity Offset Management Plan will be prepared within two years from the beginning of operation. The offset plan will detail the next steps of the offset design, including:

- quantify residual losses (methods to calculate loss / gain and residual losses will be described);
- review and select appropriate offset locations and activities;
- assess the biodiversity gains that could be achieved.

At present, possible offset measures identified within the mine site and more broadly across the mine LSA include:

- protection of existing forested areas;
- enrichment planting of existing forested areas;
- reforestation of suitable areas.

The main strategy is to support and enhance the evolution of the existing residual forested land towards a mature stage. Reforestation of new areas outside the EIA Permitted Area is more problematic since it could affect local stakeholder that actively use the grassland as pasture, therefore this option will be considered only if it is not possible to obtain no net loss with the first two offsets.

### **Protection of existing forested areas**

Forested areas present in the Mine Site LSA have a low oak tree density and show signs of degradation probably due to over grazing and woodcutting. In order to eliminate excessive grazing pressure and allow the natural renovation of the forested area, sections of this habitat situated in the EIA Permitted Area could be fenced off.

According to literature, demonstration plots in which cutting and grazing was excluded for a number of years have shown a remarkable ability to regenerate naturally. However, this offset measure could affect the stakeholders using the area for pasture and needs to be discussed further.

An alternative could be the protection of individual oak saplings with metal mesh fences. In this case, the risk of damaging the saplings is removed, while the livestock can still graze around them.

Temporary fencing may also be required to protect the areas eventually interested by enrichment planting and reforestation activities.

In all these cases, land accessibility will need to be secured in agreement with relevant local and regional stakeholders. If necessary and feasible, compensation and eventual land acquisition will be carried out in accordance with national requirements and EBRD performance requirements and consistently with the land acquisition policy of OMAS.

### **Enrichment planting of existing forested areas**

Enrichment planting means increasing the density (i.e., the numbers of plants per hectare) in an already growing forest stand. It could be applied in the forested area present near the mine fence line that seems to show a low oak tree density.

Young oak individuals salvaged during the development of the Güneytepe mine pit could be used for enrichment planting of existing forested areas. The temporary protection of planted individuals against grazing using metal mesh fences might be necessary.



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### Reforestation of suitable areas

From a biogeographical point of view, the great majority of climax vegetation in the mine site LSA is probably represented by oak forest. However excessive grazing, woodcutting and fire pressure have drastically reduced the presence of forest in the entire ecoregion.

Therefore, a possible offset could be the reforestation of selected areas of the mine site LSA using the same three species naturally occurring in oak woods. Since the erosion of fertile soil has probably occurred, areas with deeper, more humid soil should be selected for reforestation.

Young oak individuals salvaged during the development of the Güneytepe mine pit, together with plant of the appropriate species grown and multiplied in a nursery, could be used for this offset measure. The temporary protection of planted individuals against grazing using metal mesh fences might be necessary.

### **4.2 Powerline offset strategy**

Considering the implementation of the proposed mitigation measures on the powerline described in the ESIA, Biodiversity Management Plan (BMP) and Biodiversity Action Plan (BAP), residual impacts to protected areas and species of conservation concern (SCC) are not expected. However, if the mitigation measures proposed in the above mentioned plan are not deemed to be technically feasible then additional offset measures may need to be explored.

Data deriving from construction and operation monitoring will help to inform the Company's adaptive management strategy and allow the evaluation of necessity, typology and location of additional offset measures.

The additional studies aimed to identify the presence and abundance of SCC species within the powerline LSA and the Sultan Sazlığı National Park will be performed. Monitoring will also continue during operation to assess the potential impact of the powerline on the SCC species and the protected area.

### **Additional Studies**

Additional studies will be performed in order to assess the presence, distribution, and abundance bird species within the Powerline LSA and assess the impacts of the powerline in particular on SCC species. This will also help to identify to identify offset opportunities and locations.

The studies planned are:

- bird additional studies along powerline route (construction);
- bird presence monitoring along powerline route (operation);
- bird mortality monitoring along powerline route (operation).

These monitoring, together with the monitoring performed along the powerline route and in the National Park/Ramsar site during construction and operation, will help to better assess the conservation status of the area and bird species and the potential impacts deriving from the project.

Data deriving from construction and operation monitoring will help to inform OMAS' adaptive management strategy and allow the evaluation the necessity and typology of additional mitigation measures.

### **Bird additional studies along the planned powerline route (construction)**

Prior to construction monitoring of bird and nest present, will be performed along the planned powerline route prior to construction starting from April 2016. The monitoring will be focused in particular on the SoC species identified.

Bird presence will be monitored using two different techniques:

Distribution and Abundance Surveys. These surveys will record numbers and distribution of breeding, wintering and migrant birds using the area potentially impacted by the powerline.

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Vantage Point Surveys. These surveys will comprise a series of watches from a fixed location to quantify the flight activity of birds within the area potentially impacted by the powerline, which provides data to estimate the collision risk.

### Bird presence monitoring along powerline route (operation)

Monitoring of bird presence will be performed along the portion of the powerline route that overlaps with the National Park buffer area.

Bird presence monitoring will be performed every three months by an expert ornithologist. Bird presence will be monitored using two different techniques:

- Distribution and Abundance Surveys: these surveys will record numbers and distribution of breeding, wintering and migrant birds using the area potentially impacted by the powerline.
- Vantage Point Surveys: these surveys will comprise a series of watches from a fixed location to quantify the flight activity of birds within the area potentially impacted by the powerline, which provides data to estimate the collision risk.

### Bird mortality monitoring along powerline route (operation)

Monitoring of bird mortality will be performed along the portion of the powerline route that overlaps with the National Park buffer area.

Bird mortality will be assessed weekly during pick migration periods (May/April and September/October and monthly outside migration periods by an environmental technician that will collect photographic documentation the carcasses found, date of the finding and GPS location. The photographic documentation will be analysed by an expert biologist and the data will be collected in an appropriate register. The carcasses found will be removed from the powerline route in order to avoid the risk of double counting.

## **Conservation Actions**

OMAS will help the National Park and the Ramsar site to perform monitoring of bird populations within the wetland area as an “additional conservation measure”.

### Survey in the Sultan Sazlığı National Park

This survey will record numbers and distribution of breeding, wintering and migrant birds using a selection of habitats representative of the Sultan Sazlığı National Park. The monitoring will be focused in particular on the SoC species identified in the baseline.

The surveys will start in April 2016 and cover all the seasons with particular regard for migration and nesting peak periods. If mitigation measures proposed for the powerline during operation are found not to be technically feasible, the monitoring will be performed annually for the entire operation phase.

This monitoring, together with the monitoring performed along the powerline route during construction and operation, will help to better assess the conservation status of the area and bird species and the potential impacts deriving from the project.

These data will help inform the Company's adaptive management strategy and allow the evaluation of additional mitigation measures.

## **Offset measures**

Residual impacts to protected areas and species of conservation concern (SCC) are not expected. However, if the mitigation measures proposed in the BMP and BAP are not deemed to be technically feasible then additional offset measures may need to be explored. In this case a Biodiversity Offset Management Plan, including offset measure for the powerline, will be prepared within two years from the beginning of operation. The offset plan will detail the next steps of the offset design, including

- quantify residual losses (methods to calculate loss / gain and residual losses will be described);
- review and select appropriate offset locations and activities;

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- assess the biodiversity gains that could be achieved.

Possible offset measures identified at the moment for the powerline are:

- positioning of additional nest boxed and platform;
- surveys in the Sultan Sazlığı National Park;
- collaborate to improve the surveillance against illegal hunting in the Sultan Sazlığı National Park/ Ramsar site;
- sustainable development of tourism activities connected to the Sultan Sazlığı National Park/ Ramsar site.

#### Positioning of additional nest boxed and platform

One of the most critical components of wildlife habitat is the availability of safe nesting areas. The placement of artificial boxes and platforms within the Sultan Sazlığı National Park/ Ramsar site, away from the powerline, could help to increase habitat suitability of the overall area for bird species.

These artificial nests will be studied in particular for the species or group of species that are expected to be most impacted by the powerline. The design and positioning of the nest boxes and platforms will be decided together with the authorities responsible for the management of the Sultan Sazlığı National Park/ Ramsar site.

#### Surveys in the Sultan Sazlığı National Park

The surveys could be performed annually for the entire operation phase and cover all the seasons with particular regard for migration and nesting peak periods.

This survey will record numbers and distribution of breeding, wintering and migrant birds using a selection of habitats representative of the Sultan Sazlığı National Park. The monitoring will be focused in particular on the SoC species identified in the baseline.

This monitoring will help to better assess the conservation status of the area and bird species and the potential impacts deriving from the project. The data will help inform OMAS' adaptive management strategy and allow the evaluation of additional mitigation measures.

#### Collaborate to improve the surveillance against illegal hunting in the Sultan Sazlığı National Park/ Ramsar site

Illegal hunting seems to be a recurrent problem within the wetland area although the exact numbers are not known.

OMAS could support the capacity building, resources and networking of government institutions to increase prevention, detection and conviction of wildlife related crimes.

This support could include training, capacity building, and possibly payment for some additional operational costs. Payment of some operational costs, if deemed appropriate, would necessary be done with caution, based on transparent need-assessment through an independent institution and demanding transparent accountability.

#### Sustainable development of touristic activities connected to the Sultan Sazlığı National Park/ Ramsar site

A number of activities connected to the presence of the National Park and Ramsar area are present however tourism activities and facilities developed in the area do not seem to be planned or regulated. The annual number of visitors to the Sultan Sazlığı is estimated to be around 1500 depending on the condition of the site. Two birdwatching towers are present in the site for the visitors and boat tours are organized on Eğri, Bağınaltı and Sarp Lakes within the conservation site.

OMAS could contribute to the maintenance and development of infrastructures for the fruition of the park, including watchtowers, paths and explanatory boards, in accordance with the conservation purposes of the area.

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The project could also help to fund the creation of management plan for the area. An independent institution, probably a non-government organization, could write this plan to ensure that an eco-friendly tourism is developed as to advantage both local people and the protected area.

## 5 STAKEHOLDER ENGAGEMENT

The implementation of the measures included in the Biodiversity Offset Strategy will require the involvement of several stakeholders including potentially affected parties and interested parties. The stakeholder engagement activities listed in this strategy will align with the broader Stakeholder Engagement Plan (SEP) for the Öksüt mine (OMAS-ESMS-SEP-PLN-001) and therefore the list of stakeholders and issues will likely change following the evolution of OMAS stakeholders' engagement activities.

### Preliminary stakeholder list

The key stakeholders to engage for the implementation of the Biodiversity Offset Strategy include:

- Land owners and pastureland land users within the EIA Permitted Area.
- Land owners and land users along the route of the powerline.
- Shepherds who use land within the EIA Permitted Area.
- Residents, businesses and local government of the communities around Develi Mountain.
- Öksüt mine employees and contractors.
- TEIAS.
- Powerline construction contractors.
- Sultan Sazlığı National Park administration (General Directorate of Nature Conservation and Natural Parks, 7th Regional Directorate of the Ministry of Forestry and Water Affairs, Kayseri Provincial Directorate).
- Doga Derneği (BirdLife International in Turkey).

### Stakeholder issues

Issues that will need to be discussed with the various Stakeholder will include:

- **Limitations to sheep grazing:** the protection of the flora species of concern will require the fencing-off of selected areas, possibly outside the EIA Permitted Area if this is feasible, and this will pose some restrictions to grazing. Compensation mechanisms will need to be discussed.
- **Forestry Management:** one of the objectives will be the protection and enhancement of the oak forest and therefore protection of the existing trees will need to be achieved possibly with the preservation of mature seed-producing individuals.
- **Road kill prevention:** to protect the fauna species of concern and particularly the Common Tortoise it will be necessary to implement speed limits and train workers and affected shepherds to respect and protect animals crossing the access road and internal road.
- **Hunting activities:** illegal hunting is reported as an issue in the Sultan Sazlığı National Park, and hunting in the EIA Permitted Area (outside the fence line) is a possibility. Employees and contractors will be trained in line with OMAS Policy of zero hunting.
- **Powerline mitigation measures:** the implementation of the mitigation measures along the powerline will require discussion with TEIAS and the powerline construction contractors. The installation of birds nesting platforms may require the involvement of landowners.
- **Strengthening of protected areas:** various options for supporting the National Park will need to be discussed to identify the best options in case offset measures relating to the powerline will need to be implemented.

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### Engagement mechanisms

Consistently with the SEP, the methodologies for stakeholder engagement specific to the Biodiversity Offset Plan will include:

- Individual meetings with economically displaced shepherds
- Focus Group Discussions and Workshops
- Surveys and Interviews
- Meetings with TEIAS and contractors
- Meetings and Sessions with Turkish governmental authorities
- Meetings with NGOs and interest groups
- Info sheets, newsletters and magazine
- OMAS Website
- Annual Reports

## 6 FINANCING MECHANISM

OMAS is committed to the implementation of agreed measures arising from the implementation of this Biodiversity Offset Strategy.

OMAS will budget for Offset Expenditure for the years 2016, 2017, and 2018 US\$250,000 each financial year (calendar year) for a total Offset Expenditure of US\$ 750,000. The budget will be updated by OMAS as actions are confirmed in the Biodiversity Offset Management Plan.

OMAS will investigate various options of financial assurance mechanisms (including, but not limited to, conservation funds, cash accruals, biodiversity accounting provision) and will put in place a mechanism to ensure that OMAS has sufficient funds and management resources to complete the actions required by the Biodiversity Offset Management Plan.

## 7 RISK TO ACHIEVING NO NET LOSS (NNL) OR NET GAIN (NG)

### 7.1 Uncertainty

Appropriate offset activities and locations have not been identified in detail at this stage. Moreover, there are large uncertainties in the estimates of the NNL and NG forecast, notably the lack of models enabling accurate estimation of the gains predicted from the proposed mitigation and offset measures.

The additional studies and conservation actions proposed aim to bridge these gaps and to assess the feasibility of the proposed offset measure. Based on the results of the additional studies and the outcomes of the planned conservation actions, the Biodiversity Offset Management Plan will be prepared within two years from the beginning of operation. The offset plan will detail the steps of the offset design process including:

- quantify residual losses (methods to calculate loss / gain and residual losses will be described);
- review and select appropriate offset locations and activities;
- assess the biodiversity gains that could be achieved.

This will be coupled with continue monitoring and evaluation to refine the estimates of uncertainties and to inform the Company's adaptive management strategy and allow the evaluation of eventual additional offset measures.

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## 7.2 Socio-political risks

The Project recognises the potential risk posed if there is a lack of ownership from senior management and/or lack of financial and human resourcing for the Offsets Management Plan. Although OMAS General Manager has ultimate responsibility for ensuring the overall outcome of Net Gain (and hence compliance with PS6 / PR6), the project will also need to ensure adequate staffing and resourcing at lower levels to ensure achievement of these outcomes.

The need of an agreement with local stakeholder and authorities for land accessibility in the Mine Site LSA is another potential risk. The relevant issues are included in the Stakeholder Engagement Plan.

## 7.3 Technical risks

Technical risks are connected mainly to the current limited knowledge on the cultivation, propagation and translocation techniques of the flora species determining PBF and CH.

The following conservation action are planned to assess the feasibility and techniques to be used, including:

- salvaging of individuals;
- seed collection from known populations;
- cultivation in a controlled environment;
- translocation tests.

The results of this phase are important to guarantee the availability of a pool of individuals and seeds sufficient to implement the planned offsets measures.

## 8 IMPLEMENTATION SCHEDULE

The preliminary schedule of the additional studies and conservation actions to be performed during the next years are described in the chart below. The schedule covers the period from the start of the first additional studies (April 2016) until the beginning of the Biodiversity Offset Management Plan (expected in December 2018).

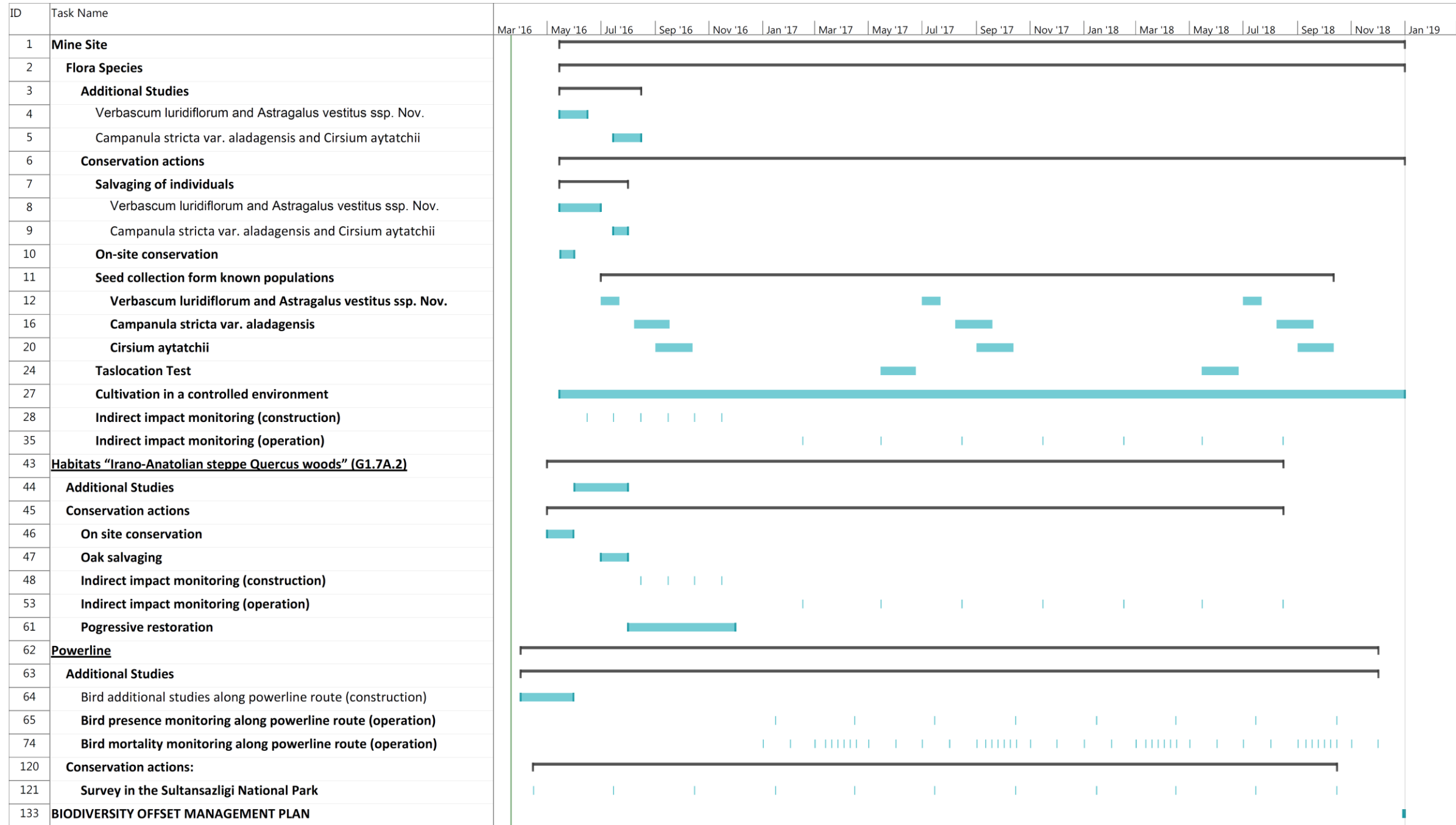


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Project: Offset Strategy Schedule Date: Mon 21/03/16	Task		Inactive Task		Manual Summary Rollup		External Milestone	
	Split		Inactive Milestone		Manual Summary		Deadline	
	Milestone		Inactive Summary		Start-only		Progress	
	Summary		Manual Task		Finish-only		Manual Progress	
	Project Summary		Duration-only		External Tasks			

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### 9 DOCUMENT CONTROL

File Name	Biodiversity Offset Strategy
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## **Appendix 1: Habitat Suitability Model Methodology**



DATA 18-02-2015

### HABITAT SUITABILITY MAPS FOR TERRESTRIAL FLORA THREATENED SPECIES

#### 1.0 INTRODUCTION

Four flora species identified within the Mine site LSA define priority biodiversity features (PBF) and critical habitat (CH) according to PR6 (EBRD, 2014). These species are listed in Table 1.

A few populations of these species were found within the study area. However, local specialist surveys were limited to EIA permitted area, therefore their total distribution within the Mine Site LSA is unknown at present.

**Table 1: Flora species triggering critical habitat and priority biodiversity features**

Species	IUCN Red List Categories	Endemism	PBF/CH
<i>Astragalus vestitus</i> ssp. nov.	CR	local endemic	CH
<i>Cirsium aytatchii</i>	EN	restricted regional endemic	CH
<i>Verbascum luridiflorum</i>	VU	restricted regional endemic	PBF
<i>Campanula stricta</i> var. <i>aladagensis</i>	VU	regional endemic	PBF

#### 2.0 SCOPE

The aim of the analysis is to develop preliminary habitat suitability maps of the Mine Site LSA for each one of the four flora species that define priority biodiversity features (PBF) and critical habitat (CH).

Their main scope is to guide future studies, conservation actions and offset measures.

#### 3.0 METHODOLOGY

The suitability maps are developed with ArcGIS (ESRI), a geographic information system software, used to manipulate, analyze and manage geographic information, compile geographic database, and create maps.

The suitability models use simple mathematical expressions for calculating a zero-dimensional index of habitat suitability as a function of one or more environmental variables based on the species known ecological preferences.

The advantage of using GIS software, in this case, is that the index values can be analyzed and mapped to show areas of high suitability for a species. Moreover, these models could be continuously refined as new data on populations are available.

It is important to note that habitat classified as “highly suitable” in the model may provide higher chances of supporting the presence of that particular species. However model results only show potentially suitable areas for a species and not the actual distribution.



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### 3.1 Selection and analysis of the parameters

The four parameters considered in the analysis to describe the species ecological niche are:

- elevation;
- aspect;
- slope; and
- habitat.

These parameters were selected based on the data available from literature review and prof. Hayri Duman expert opinion on. The range for each species is showed in the table below.

**Table 2: parameters considered for each species based on literature review and expert opinion**

Criteria	Species			
	<i>Astragalus vestitus</i> ssp. nov.	<i>Cirsium aytatchii</i>	<i>Verbascum luridiflorum</i>	<i>Campanula stricta</i> var. <i>aladagensis</i>
<b>Elevation range (m a.s.l.)</b>	1730-1950 m (project site)	1350-1800 m	900-1950 m	1250-2200 m
<b>Prevalent aspect (E, W, N, S)</b>	E,W,N, S	E,S,W	E,S	W,E
<b>Prevalent slope inclination</b>	5-25°	5-25°	5-25°	25°-45°
<b>Habitat type</b>	E1.2E. Irano-Anatolian steppes G1.7.2. Irano-Anatolian steppe [Quercus] wood	E1.2E. Irano-Anatolian steppes G1.7.2. Irano-Anatolian steppe [Quercus] woods	G1.7.2. Irano-Anatolian steppe [Quercus] woods	E1.2E. Irano-Anatolian steppes (100%) H2.2. Cold limestone screes G1.7.2. Irano-Anatolian steppe [Quercus] woods

In the GIS models the parameters were interpreted and analyzed as follows based on a standard raster cell of 10 x 10 m. The description of each parameter is given below and the interpretation as a function is summarized in Table 3.

**a) Elevation range:**

A digital elevation model (DEM) was used to calculate the elevation values. A digital model is a representation of a terrain surface, created from terrain elevation data.

**b) Prevalent Slope:**

This parameter was generated from continuous elevation surfaces and it was measured in degrees from horizontal (0–90) for each raster cell using the appropriate slope tool on ArcGIS.

This tool calculates the maximum change in elevation over the distance between the cell and its neighbors and identifies the steepest downhill descent from the cell.



## MEMORANDUM

### c) Prevalent Aspect:

This parameter was generated for the entire Mine Site LSA from continuous elevation surfaces. The value of each cell in an aspect dataset indicates the direction that cell faces. It can be considered as the slope direction.

It is measured clockwise in degrees from 0 (north) to 360 (again north) considering a full circle. Therefore, the values of each cell in the output raster indicate the compass direction that the surface faces at that location. Flat areas have no downslope direction and are given a value of -1.

### d) Habitat type:

The starting input data was the vectorial habitat map of the Mine Site LSA prepared during the baseline study. The vectorial layer was converted into a raster continuous data using the spatial analysis raster tools.

Different suitability percentages were given to the habitats mapped based for each species as indicated in the table above.

**Table 3: parameters considered for each species**

Criteria	Species			
	<i>Astragalus vestitus</i> ssp. nov.	<i>Cirsium aytatchii</i>	<i>Verbascum luridiflorum</i>	<i>Campanula stricta</i> var. <i>aladagensis</i>
<b>Elevation range (m a.s.l.)</b>	Triangular function: 1350 and 2110 (0%) with the max 1825 (100%)	Triangular function: 1350 and 2110 (0%) with the max 1800 (100%)	Triangular function: 900 and 2110 (0%) with the max 1950 (100%)	Linear function: 1250 m (0%) and 2200 m (100%)
<b>Prevalent aspect (E, W, N, S)</b>	From 0-360° (100%)	Triangular function: E 45° and 135° (0%), 90° (100%); S 135° and 225° (0%), 180° (100%); W 225° and 315° (0%), 170° (100%)	Triangular function: E 45° and 135° (0%), 90° (100%); S 135° and 225° (0%), 180° (100%)	Triangular function: E 45° and 135° (0%), 90° (100%); W 225° and 315° (0%), 170° (100%)
<b>Prevalent slope</b>	Triangular function: <5° and >25° (0%) with the max 15° (100%)	Triangular function: <5° and >25° (0%) with the max 15° (100%)	Triangular function: <5° and >25° (0%) with the max 15° (100%)	Triangular function: <25° and >45° (0%) with the max 35° (100%)
<b>Habitat type</b>	E1.2E. Irano-Anatolian steppes (100%) G1.7.2. Irano-Anatolian steppe [Quercus] wood (80%)	E1.2E. Irano-Anatolian steppes (100%) G1.7.2. Irano-Anatolian steppe [Quercus] (100%)	G1.7.2. Irano-Anatolian steppe [Quercus] woods (100%)	E1.2E. Irano-Anatolian steppes (100%) H2.2. Cold limestone screes (80%) G1.7.2. Irano-Anatolian steppe [Quercus] woods (50%)





## MEMORANDUM

### 3.2 Calculation of weights

The four parameters used to describe the suitability were weighted for each species based on the literature review and expert judgement.

This procedure was performed using ArcGIS Weighted Sum tool. This tool weights and combines multiple input values to create an integrated analysis.

The table below shows the different weights assigned to each species in percentage.

**Table 3: ecological parameters weighted for each species (in percentage)**

Criteria	Species			
	<i>Astragalus vestitus</i> ssp. nov.	<i>Cirsium aytatchii</i>	<i>Verbascum</i> <i>luridiflorum</i>	<i>Campanula stricta</i> var. <i>aladagensis</i>
Elevation range (m a.s.l.)	50%	0.5 %	16.67%	25%
Prevalent aspect (E, W, N, S)	0%	16.67%	16.67%	25%
Prevalent slope	25%	16.67%	16.67%	25%
Habitat type	25%	16.67%	50%	25%

### 3.3 Classification method and classes

A data classification method for Equal interval with five classes was used in this model. This classification scheme divides the range of attribute values into equal-sized subranges. The color scale selected shows the classes from red to dark green according to the following categories:

- unsuitable: red
- low suitability: orange
- medium suitability: yellow
- high suitability: light green
- very high suitability: dark green

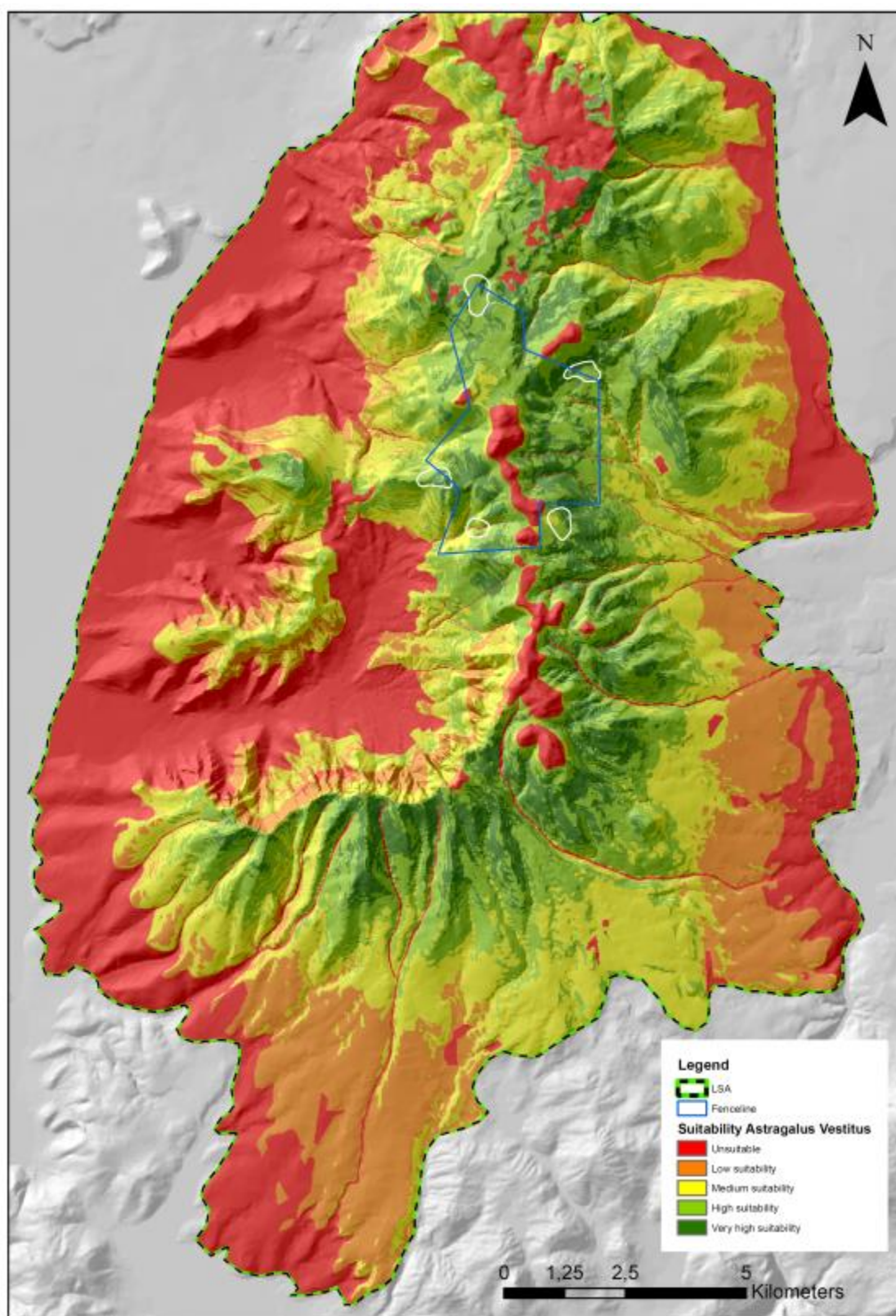
## 4.0 RESULTS

The maps resulting from the analysis are showed below for each species. The areas where the species were identified within the study area are also represented for comparison.



## MEMORANDUM

*Astragalus vestitus* ssp. nov.

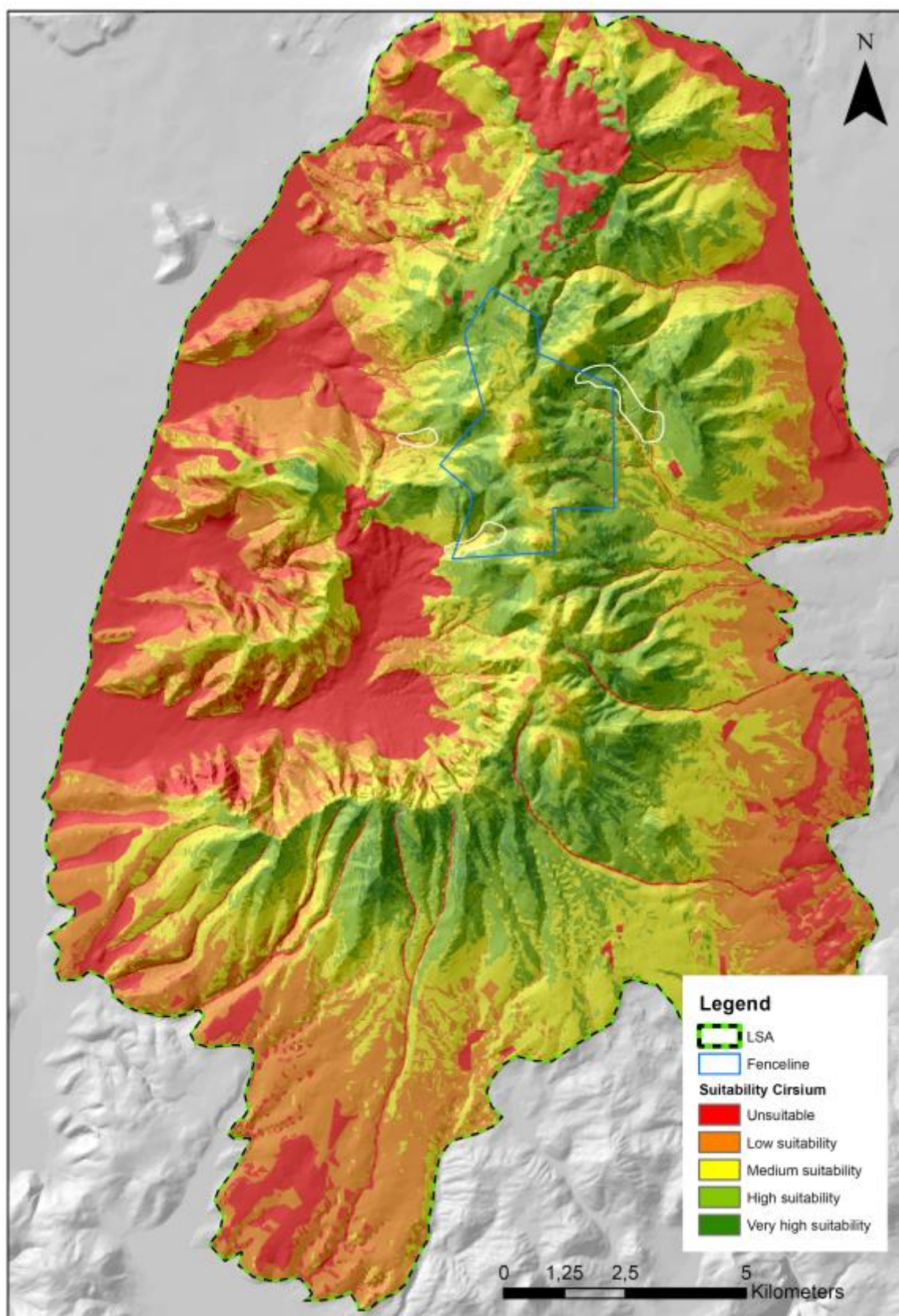






## MEMORANDUM

### *Cirsium aytatchii*

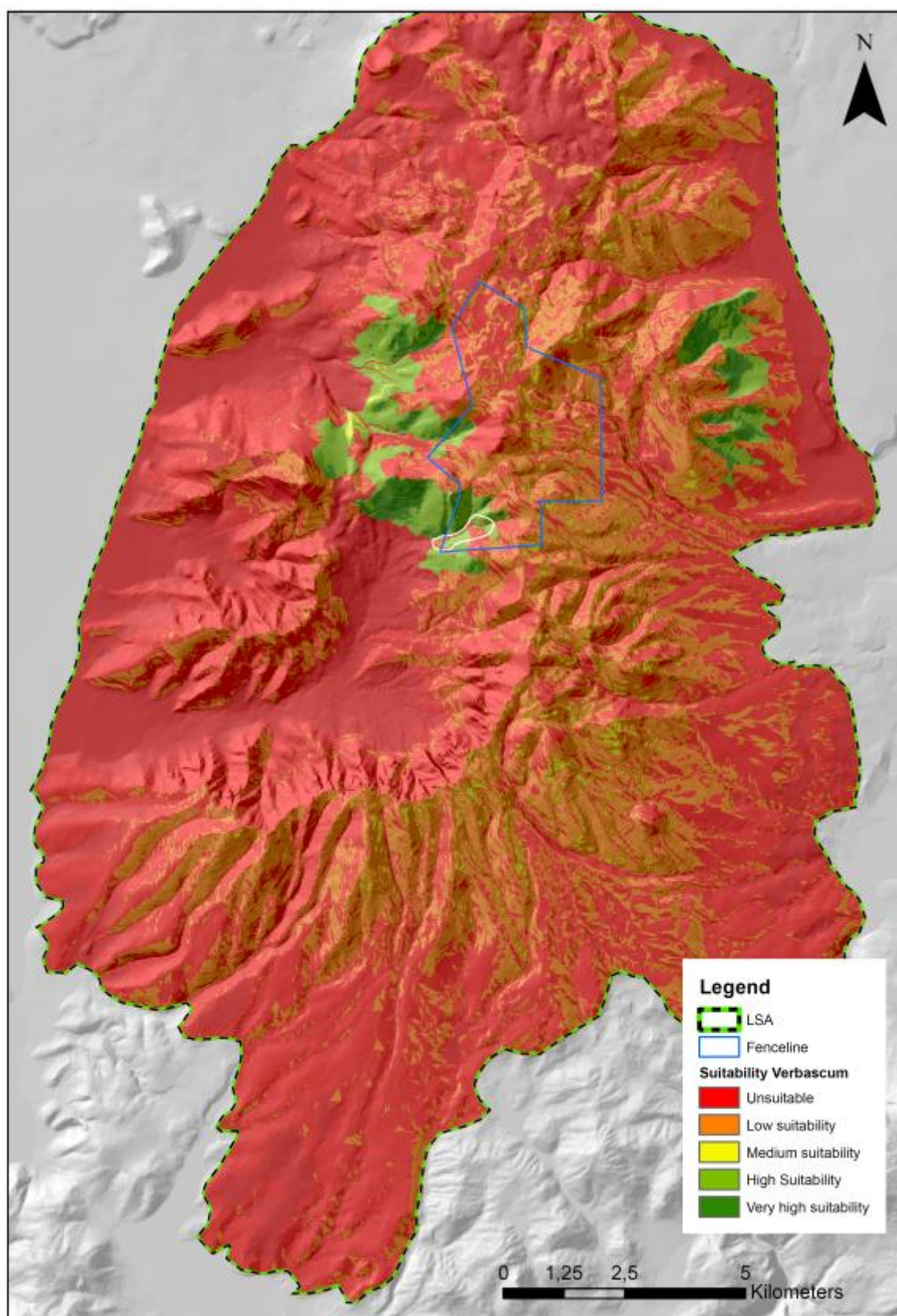






## MEMORANDUM

### *Verbascum luridiflorum*







## MEMORANDUM

### *Campanula stricta* var. *aladagensis*

