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8. Biodiversity

8.1 Introduction

This Chapter of the ESIA describes the applicable legislative and policy framework for biodiversity conservation, the terrestrial flora, fauna and habitats in the biodiversity study area and protected areas near the Öksüt Project. This chapter evaluates the Öksüt Project in accordance with good international practice and EBRD's Performance Requirement 6: *Biodiversity Conservation and Sustainable Management of Living Resources* (PR6).

The Chapter describes potential impacts on biodiversity associated with the construction, operation and closure phases of the Öksüt Project. The Chapter describes the direct measures which have been implemented to avoid or minimise adverse impacts through design as well as specific management measures aimed to minimise and restore project-related impacts.

8.1.1 Objectives

In line with good international practice, the biodiversity baseline conditions of the Öksüt Project are characterised to a level that is proportional and specific to the anticipated risk and to the significance of the impacts. The baseline also identifies the sensitivity of the different biodiversity components and the presence of any potential priority biodiversity features and critical habitats.

Potential environmental impacts associated with the construction, operation and closure of the Project are evaluated as part of the impact assessment with particular attention to key biodiversity features and critical habitat. Appropriate mitigation and monitoring measures are proposed based on the mitigation hierarchy.

8.1.2 Compliance with Turkish EIA Requirements

Please note that this Chapter, and the whole ESIA, supplements the Turkish EIA prepared to comply with Turkish regulatory requirements. This ESIA therefore goes beyond the approach adopted for the Turkish EIA in order to meet EBRD requirements. Where additional impacts are identified, or mitigations proposed, these are in addition to those set out in the Turkish EIA and form additional commitments by OMAS and do not replace the core regulatory requirements as set out in the Turkish EIA.

8.2 Summary of Policy Context

8.2.1 International Standards: EBRD Performance Requirement

EBRD Performance Requirement 6 (PR6) sets out the key requirements for the assessment of biodiversity features and the risks and impacts connected to a project.

A baseline assessment, in addition to the identification of the general biodiversity condition, may identify the potential presence of priority biodiversity features and critical habitats as specified in PR6.

Priority biodiversity features are defined by PR6 (12) as:

- threatened habitats;
- vulnerable species;
- significant biodiversity features identified by a broad set of stakeholders or governments (such as Key Biodiversity Areas or Important Bird Areas);
- ecological structure and functions needed to maintain the viability of priority biodiversity features.

Critical habitat is determined by the presence of the most sensitive biodiversity features that are defined by PR6 (14) as:

- highly threatened or unique ecosystems;
- habitats of significant importance to endangered or critically endangered species;
- habitats of significant importance to endemic or geographically restricted species;
- habitats supporting globally significant migratory or congregatory species;
- areas associated with key evolutionary processes;
- ecological functions that are vital to maintaining the viability of biodiversity features described in this paragraph.

If the assessment identifies potential project-related impacts to sensitive biodiversity and related habitats, mitigation and management measures have to be applied in accordance with the mitigation hierarchy and good international practice (GIP). The assessment should also consider direct, indirect and cumulative impacts and evaluate the effectiveness and feasibility of the mitigation measures to be applied to the project.

The mitigation hierarchy includes the following steps¹:

- Avoidance: 'measures taken to anticipate and prevent adverse impacts on biodiversity before actions or decisions are taken that could lead to such impacts'.
- Minimization: "measures taken to reduce the duration, intensity, significance and/or extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible".
- Restoration: "measures taken to repair degradation or damage to specific biodiversity features and ecosystem services of concern (which might be species, ecosystems/habitats or particular ecosystem services) following project impacts that cannot be completely *avoided* and/or *minimized*".
- Offsets: "measurable conservation outcomes, resulting from actions applied to areas not impacted by the project, that compensate for significant, adverse impacts of a project that cannot be avoided, minimized and/or restored".

In the presence of priority biodiversity features, appropriate mitigation measures are put in place to ensure no net loss and preferably a net gain is achieved over the long term, whilst, in case critical habitats, the project needs to be designed to deliver net gains for critical habitat impacted by the project.

In line with the OMAS ESMS, a Biodiversity Management Plan (OMAS-ESMS-BIO-PLN-001), a Biodiversity Action Plan and a Biodiversity Offset Strategy (OMAS-ESMS-OFF-PLN-001) were developed to manage biodiversity impacts during construction and operations. Issues related to closure are addressed in the Conceptual Closure Framework (OMAS-ESMS-CP-PLN-001).

8.2.2 International Conventions and Treaties

Relevant international agreements, protocols and conventions related to biodiversity protection, and to which Turkey is a party or signatory, are set out in Table 8-1 below.

Table 8-1: Relevant International Agreements

International Convention / Protocol	Date and No of Issuing Turkish Official Gazette
<i>International Convention for the Establishment of the European and Mediterranean Plan Protection Organization</i> ; Paris, 1951	10.08.1965

¹ CSBI 2015 "A cross sector guide for implementing the Mitigation Hierarchy"

International Convention / Protocol	Date and No of Issuing Turkish Official Gazette
<i>International Convention for the Protection of Birds</i> ; Paris, 1959	17.12.1966, 12480
<i>Convention for the Protection of the World Cultural and Natural Heritage</i> ; Paris, 1972	14.2.1983, 17959
<i>Convention on Long-Range Transboundary Air Pollution</i> ; Geneva, 1979	23.03.1983, 17996
<i>The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)</i> ; Bern, opened for signature on 19.09.1979, entered into force on 01.06.1982	Ratification date: 02.05.1984 Enforced: 01.09.1984
<i>Convention on the Control of Transboundary Movements of Hazardous Waste and Disposal</i> ; Basel, 22.03.1989	15.05.1994, 21935
<i>The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar Convention)</i> ; entered into force on 21.12.1975	17.05.1994, 21937
<i>Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)</i> ; opened for signature on 3.3.1973, entered into force on 1.7.1975	20.06.1996, 22672 (entered into force on 22.12.1996)
<i>United Nations Convention to Combat Desertification</i> ; Paris, 17.6.1994, entered into force in December 1996	1997
<i>Biodiversity Convention</i> ; opened for signature at the Earth Summit in Rio de Janeiro on 5.6.1992, entered into force on 29.12.1993	27.12.1996, 22860

8.2.3 European Union Directives

Key EU Directive and Council Decision directly related to biodiversity protection are listed in the table below.

Table 8-2: Key EU Legislation Related to Biodiversity

1) Environmental Issues	
Nature Conservation and Biodiversity	<p><i>Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (EU Habitats Directive)</i></p> <p><i>Council Decision 98/145/EC of 12 February 1998 on the approval, on behalf of the European Community, of the amendments to Appendices I and II to the Bonn Convention on the conservation of migratory species of wild animals as decided by the fifth meeting of the Conference of the parties to the Convention</i></p> <p><i>Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (EU Bird Directive)</i></p>
Impact assessment	<i>Council Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment</i>

Directives that address issues that might have secondary impacts on biodiversity components include air quality, energy conservation, water and wastewater quality, water conservation, hazardous materials management, waste management, noise and soil quality. These Directives are addressed in the respective chapters of this ESIA.

Although Turkey is not an EU Member State, it has established a programme for alignment with the EU “*environmental acquis*”.

As specified in EBRD's Environmental and Social Policy, paragraph 7, EBRD is a signatory to the European Principles for the Environment, and it is committed to promoting the adoption of EU environmental principles, practices and substantive standards. EBRD-financed projects in host countries are expected to meet national and EU regulations and environmental standard, whichever is more stringent.

8.2.4 Turkish Legislation

The Turkish legal framework for environmental protection was developed in line with national and international initiatives and standards, and some of them have been revised recently to be harmonized with the European Union (EU) Directives in the scope of pre-accession efforts of Turkey to the EU.

8.2.5 Key Ministries and Organisations

The Ministry of Environment and Urbanization ("MoEU") is the responsible organization for the issuing and implementation of policies and legislation adopted for protection and conservation of the environment and for sustainable development and management of natural resources.

The affiliated organizations of the MoEU are:

- the General Directorate of Natural Heritage Protection;
- the General Directorate of Environmental Impact Assessment, Permission and Auditing;
- the General Directorate for Environmental Management.

The Ministry of Forestry and Water Affairs ("MoFWA") is the responsible organization for the issuing and implementation of policies and legislation adopted for legally Protected Areas.

The affiliated organizations of the MoFWA are:

- the Directorate of Nature Conservation and National Parks;
- the General Directorate of Forestry;
- the General Directorate of the State Meteorology;
- the General Directorate of State Hydraulic Works (DSI).

The provincial organization of the MoFWA consists of the Provincial Directorates of Forestry and Water Affairs, as well as the regional directorates of the affiliated organizations. The MoFWA unit with primary authority is the General Directorate of Nature Conservation and National Parks, responsible for the management of Protected Areas designated under the National Parks Law, for the conservation of wildlife and for the regulation and supervision of hunting.

8.2.6 Legal Framework

The Turkish *Environmental Law* No. 2872, which came into force in 1983, deals with a very broad range of environmental issues. According to the basic principles that govern the application of the Environmental Law, and as stated in the Constitution, citizens as well as the State bear responsibility for the protection of environment. Complementary to the *Environmental Law* and its regulations, other laws also govern the protection and conservation of the environment, the prevention and control of pollution, and the implementation of measures for the prevention of pollution.

Key relevant environmental laws and regulations are outlined below.

Table 8-3: Current Environmental Laws and Regulations Related to Biodiversity in Turkey

Regulation	Date and No of Issuing Official Gazette
Nature Conservation and Biodiversity	
<i>Regulation on Wildlife Protection and Wildlife Enhancement Areas</i>	08.11.2004, 25637
<i>Forestry Law</i>	31.08.1956; 6831
<i>Law on Fisheries</i>	04.04.1971; 1380
<i>Law on National Parks</i>	09.08.1983; 2873
<i>Law for the Protection of Cultural and Natural Assets</i>	23.07.1983; 2863
<i>Decree-Law Establishing the Special Environmental Protection Agency</i>	19.10.1989; 383
<i>Regulation on Fisheries</i>	10.03.1995; 22223
<i>Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora</i>	27.12.2001; 24623
<i>Terrestrial Hunting Law</i>	01.07.2003; 4915
<i>Regulation for the Protection of Wetlands</i>	04.04.2014; 28962
<i>Law for the Protection of Animals</i>	24.06.2004; 5199
<i>Regulation on Wildlife Protection and Wildlife Enhancement Areas</i>	08.11.2004, 25637
<i>Law on Protection of Soil and Land Use (No: 5403)</i>	19.07.2005, 25880
<i>Regulation on the Implementation of the Law on Protection of Soil and Land Use</i>	15.12.2005, 26024
<i>Regulation on the Collection, Production and Exportation of Natural Flower Bulbs</i>	19.07.2012; 28358
Regulations on Certain Activities	
<i>Regulation on the Obtaining, Processing and Control of the Sand, Gravel and Similar Materials</i>	08.12.2007, 26724
<i>Regulation on the Restoration of the Lands Disturbed by Mining Activities</i>	23.01.2010, 27471
Resources Management	
<i>Regulation on the Improvement of the Energy Sources and the Efficiency in the Energy Usage</i>	25.10.2008, 27035

A Turkish Environmental Impact Assessment (EIA) to meet the requirements of the *Environmental Impact Assessment (EIA) Regulation* has been prepared and this ESIA builds on the biodiversity information and assessment included in the Turkish EIA.

8.2.7 Turkish Biodiversity Plans and Strategies

In addition to the national legislation, Turkey has elaborated various environmental plans and programs. The plans programs and strategies relevant to biodiversity are listed below:

- *National Environmental Action Plan* (1998)
- *National Plan for In-Situ Conservation of Plant Genetic Diversity* (1998)
- *National Agenda 21 Program* (2001)

- *National Wetland Strategy* (2003)
- *Turkish National Forestry Program* (2004)
- *National Science and Technology Policies 2003-2023 Strategy Document* (2004)
- *Turkish National Action Program Against Desertification* (2005)
- *National Environmental Strategy* (2006)
- *National Rural Development Strategy* (2006)
- *National Biological Diversity Strategy and Action Plan* (2007)

8.2.8 Project Standards

The assessment criteria used for the baseline and impact assessment are those required by Turkish law and those set out in EBRD PR6 as described in paragraph 8.2.1.

8.3 Scope and Assessment Methodology

8.3.1 Spatial Scope

Regional Study Area

A Regional Study Area (RSA) corresponding to the “Central Anatolia deciduous tree-steppes” ecoregion (PA0410)² was identified and considered during the initial literature review in order to assess the species and habitats potentially occurring within the vicinity of the Project Area. The RSA is illustrated in Figure 8-1 below.

Local Study Area

For clarity of presentation, the biodiversity Local Study Area (LSA) was divided in two different study areas (Figure 8-2):

- a mine site LSA, including also the access road and the pipeline;
- a powerline LSA.

The **mine site LSA** corresponds to the Develi mountain range, which is also defined as the discrete management unit surrounding the mine site.

The **powerline LSA** is defined by a 1.5 km buffer around the route centre line. The protected areas and KBA crossed by the powerline were also included in the assessment.

² According to Terrestrial ecoregions identified by WWF (<http://www.worldwildlife.org/biomes>)

Figure 8-1: Regional Study Area (RSA) corresponding to the “Central Anatolia deciduous tree-steppes” ecoregion (PA0410)

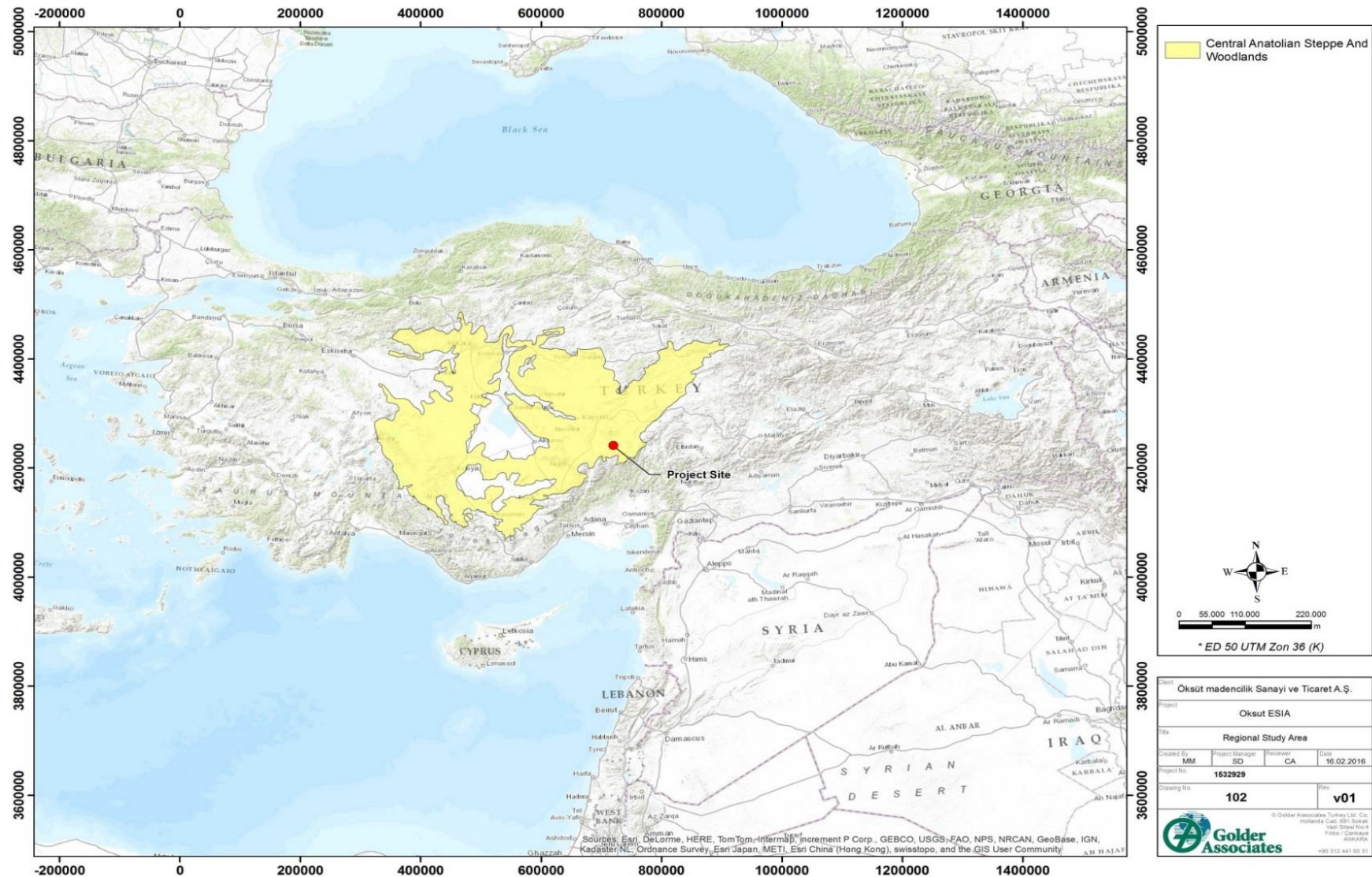
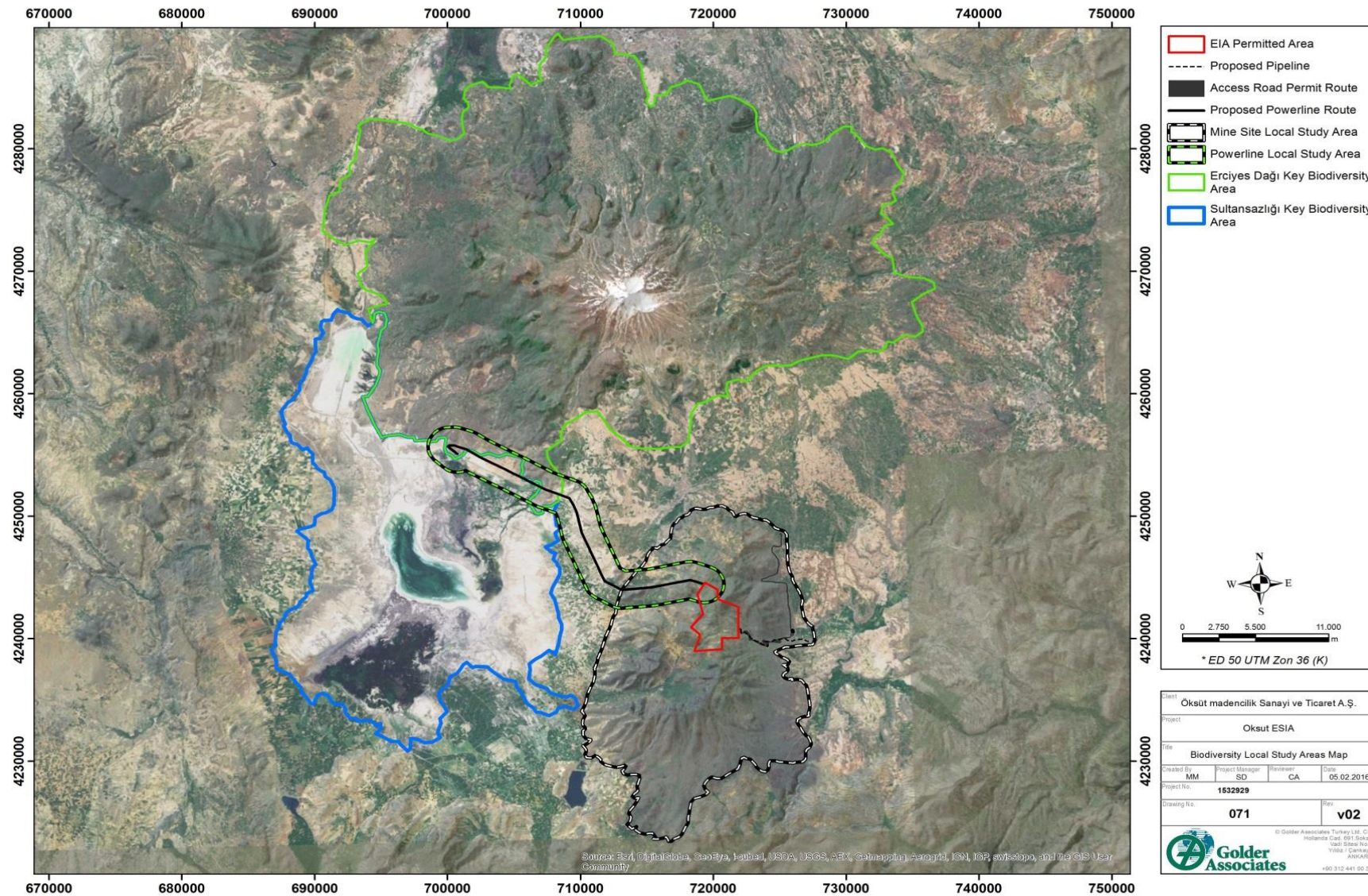


Figure 8-2: Local Study Areas (LSAs)



8.3.2 Temporal Scope

The temporal scope of this assessment covers the full life of the Project. Impacts are discussed for the construction, operational and closure phases of the Project through to the post-mine legacy.

8.3.3 Methodology

The methodology for the preparation of the baseline assessment has included the following steps:

- literature review;
- review of existing reports and studies prepared for the Project (including the Turkish EIA Reports);
- baseline fieldwork.

Literature Review

The literature review focused on the RSA area in order to document species and habitat types potentially present in the study area with particular regard for potential priority biodiversity features and critical habitats criteria. Scientific literature and “grey” literature was considered, together with previous EIA studies, in order to give an overview of the biodiversity present in the area.

The Sultan Sazlığı National Park and Ramsar Site were further the object of a detailed bibliographic review.

The literature review included the following:

- scientific publications:
 - Aytaç, Z., Duman, H. The Steppic flora of high Mounts Ahır, Öksüz and Binboğa (Kahramanmaraş-Kayseri, Turkey). *Flora Medit.* 15:121-178 (2005).
 - Byfield A. Ataay S. Ozhatay N., 2010. Important Plant Areas in Turkey: 122 Key Turkish Botanical Sites. WWF Türkiye, Istanbul.
 - Demirsoy, A. (2002). Genel ve Türkiye Zoocoğrafyası (General and Turkish Zoogeography). ISBN. 975-7746-18-5 Meteksan A.S. Ankara.
 - Davis, P.H. (ed.). *Flora of Turkey and the East Aegean Islands*. Vol.VI:43-44,497. Edinburgh University Press (1978).
 - Eken G., Bozdoğan M., Isfendiyaroglu S., Kilic DT., Lise Y. (editors) 2006. Key Biodiversity Areas of Turkey, Nature Society, Ankara.
 - Ekim, T. et al. (2000). *Türkiye Bitkileri Kırmızı Kitabı* (Red Data Book of Turkish Plants). Türkiye Tabiatını Koruma Derneği. Yayın No:18.
 - Baytop, T. (1994). *Türkiye Bitki Adları Sözlüğü* (Turkish Dictionary for Plant Names). Atatürk Kültür, Dil ve Tarih Yüksek Kurumu, Türkiye Dil Kurumu Yayınları: 578: Ankara.
 - Davis, P.H. (ed.). (1965-1988). *Flora of Turkey and the East Aegean Islands*, vol. 1-10, Edinburgh Univ. Press: Edinburgh.
 - Yıldız, B., Şahin, A., Dirmenci, T., Arabacı, T., Çelenk, S., Kelch, D. Türkiye’de Yetişen *Cirsium* Mill. (Asteraceae) Türleri Üzerinde Taksonomik, Moleküler, Karyolojik ve Palinolojik Araştırmalar. TÜBİTAK, Proje No: TBAG-106T167 nolu proje (2010).
 - Kirwan, G.M, K.A. Boyla, P. Castell, B. Demirci, M. Ozen, H. Welch and T. Marlow., 2008. *The birds of Turkey: a study of the distribution, taxonomy and breeding of Turkish birds*. Christopher Helm. London.
 - Kızıroğlu, I. (2008). *Red Data Book for Birds of Turkey*. Desen Print., Ankara, TR.
 - Kızıroğlu, I. (2009). *The Pocket Book for Birds of Türkiye*, ISBN: 975-7460-01-X, Ankamat Matbbası, Ankara, 564 s.

- Tugay, O., Vural, M., Ertuğrul, K., Dural, H. *Astragalus vestitus*'un (Fabaceae) yeniden keşfi; Kılbasan Geveni; Karadağ'ın (Karaman, Türkiye) local endemic bir türü. *Bahbahçe Bilim Dergisi*. 1(2):24-30 (2014).
- web sources:
 - Bird Life International, 2015. Country profile: Turkey. Available from: <http://www.birdlife.org/datazone/country/turkey>. Checked: 2015-08-18.
 - European Environmental Agency (EEA), 2012. European Nature Information System (EUNIS). Retrieved from: <http://eunis.eea.europa.eu>.
 - Global Biodiversity Information Facility: <http://www.gbif.org/>.
 - International Union for Conservation of Nature (IUCN) 2012. Red List of Threatened Species. Version 2012.2. Retrieved from: <http://www.iucnredlist.org>.
 - The Global Ecoregions: <http://www.worldwildlife.org/biomes>.
 - Turkish Plants Data Service (TÜBİVES): <http://www.tubives.com/>.
- previous EIA studies and baseline reports:
 - AAVV, 2015. Biodiversity Report- Öksüt gold mine project environmental and social impact assessment –September 2015.
 - Golder Associates Turkey Ltd., 2009. Environmental baseline project. Öksüt Property, Develi, Kayseri, Turkey - August 2009.
 - Öksüt Madencilik San. ve Tic. A.Ş., 2015. Öksüt Gold Mine (Open Pits, Heap Leach and Process Plant) Project EIA Report - April 2015.

A list of potential flora and fauna species was created and their global and national conservation status noted. Potential habitats present in the LSA were mapped based on the satellite imagery and literature review information according to the EUNIS classification.

The presence and main characteristics of Protected Areas within 20 km from the LSA was also assessed through a literature review.

Fieldwork

Multiple field studies were conducted within the mine site LSA and powerline LSA during the EIA and ESIA process in order to collect baseline data and ground truth the data deriving from literature review and desktop study.

The field studies performed focused on the sensitivity elements identified during the desktop study and on the areas closest to the project sites and therefore most likely impacted. In particular, field studies were designed to investigate the following aspects:

- presence of potential priority biodiversity features (EBRD 2014);
- presence of potential critical habitat criteria (EBRD 2014);
- presence of protected areas;
- natural or semi natural habitats with potentially high biodiversity levels.

Fieldwork within the mine site LSA

Biodiversity studies in the mine site LSA were conducted in 2009 and in 2015. In 2009 a first survey was conducted during the summer season for the “Environmental baseline project” (Golder, 2009) by Hacettepe University. Flora and fauna surveys were performed by local experts based on direct observations of species presence or signs of presence (e.g. tracks, nests, excrement, feathers, skeletons, shells).

More systematic field studies on flora, fauna and habitats were conducted in the mine site area from March, June and August 2015 by a team of local experts. In October 2015 an additional survey was conducted by

the botanist in order to further investigate the presence of the priority biodiversity features and critical habitats identified. The field report deriving from these studies is provided in *Annex F*.

Additional surveys were conducted in August 2015 by a Golder ecologist.

Fieldwork within the Powerline LSA

Biodiversity studies in the powerline LSA were conducted in August 2015 by a Golder ecologist to assess the biodiversity features of the study area.

An additional survey in the form of a walk-through was conducted by a local biologist in November 2015 in order to collect baseline data for the national powerline EIA study.

In February 2016, community members of the neighbourhoods of Sindelhöyük, Soysallı and Çayırözü were also interviewed during a Land Use Study being undertaken by the University of Ankara. The aim of the interview was to collect additional information on possible impacts on birds from the existing powerlines.

Approach to Field Studies

In general, field studies were performed in order to target flora, fauna and habitat sub-components. The studies concentrate on the terrestrial aspect since:

- in the mine site LSA during the field study, only temporary natural water courses were found within the mine site study area. These temporary streams hold water for a very short time in correspondence of snow melt or heavy precipitation; therefore they do not support aquatic communities.
- in the powerline LSA wetland habitats were found in the south-western portion, within the Sultan Sazlığı wetland, however the 1.5 km buffer area around the powerline is mainly determined by the potential impacts on bird species and no direct or indirect impact deriving from the project is expected on aquatic communities.

Wetland habitats present within the Sultan Sazlığı National Park and Ramsar Site were investigated through in depth literature review.

In general, for every site investigated a GPS point was recorded, notes on the habitat type and flora and fauna species observed were collected together with any other relevant information (e.g. habitat conservation status, presence of disturbances, existing impacts). Photos of the landscape and of species identified and particulars of interest were taken for documentation.

Approach to Terrestrial Flora Field Studies

Terrestrial flora field studies were based on direct observations. If necessary, samples of flora species were collected for identification at Gazi Herbarium after being converted into herbarium material. Plants collected at the Project site were identified using "Flora of Turkey and East Aegean Islands". In identifying endemic and non-endemic but rare species, the main reference was "Red Data Book for Turkish Plants".

As a result of the field studies and literature review a list of terrestrial flora species was created for ferns (Pteridophyta), open-seeded plants (Gymnospermae) and closed-seeded plants (Angiospermae). Family, genera and species are listed alphabetically. The phytogeographic regions, endemism levels (regional, widespread), threat status and preferred habitat of each species were also included whenever available. The threat categories provided in the Red Data Book for Turkish Plants" were re-evaluated by the local expert (Prof. Hayri Duman) considering the latest available information on the species distribution and IUCN 2001 criteria.

To better inform the impact assessment and mitigation strategy, a habitat suitability model was created for the four flora species identified as threatened. The model was based on the following steps:

- Habitat suitability criteria have been defined for each of the four species based on the expert opinion of the local botanist (Prof. Hayri Duman) and on available bibliography;
- Criteria considered were altitude range, slope, aspect (NESW) and habitat;
- Criteria have been mapped using a GIS system;
- Criteria have been weighted based on expert opinion;

- Suitability maps have been generated and suitability ranked in 5 categories based on equal subdivision of the value range (unsuitable, low suitability, medium suitability, high suitability, very high suitability).

The model methodology is fully described in *Annex X*.

Approach to Terrestrial Fauna Field Studies

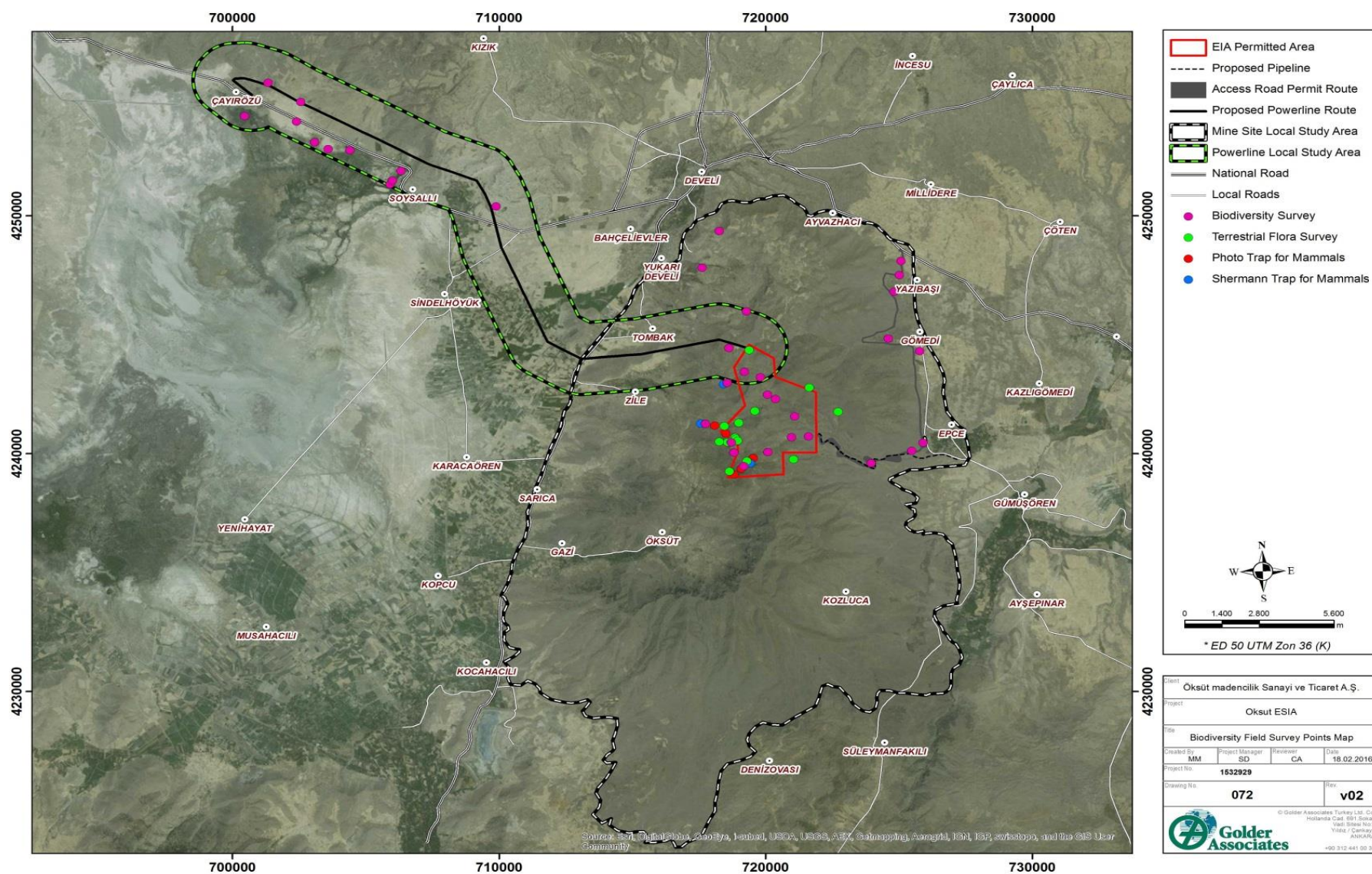
Terrestrial fauna field studies were supported by incidental field observations and specific studies focusing on particular taxa performed by local experts within the mine site LSA. Methodologies applied for each taxa during the field studies are summarized below:

- Amphibia (Amphibians): studies were carried out in habitats suitable for these species, and mostly focused on temporary stream sides (riparian zone), drainage channels, oxbows, humid areas, underneath plants and rocks etc. These areas were searched for nests, eggs, tadpoles and adult individuals. The specimens were identified through direct observation, or caught with a net and released back after being identified and photographed.
- Reptilia (Reptiles): studies were carried out at habitats suitable for these species, and mostly focused on rocky habitats and tree hollows, underneath plants and rocks etc. These areas were searched for nests, eggs, and adult individuals of reptiles. The specimens were identified through direct observation or caught by hand or catcher sticks, and released back after being identified and photographed.
- Aves (Birds): studies were carried out on a variety of habitats, focusing on the habitats more suitable for the threatened species potentially present. These areas were searched for nests, eggs, offspring and adult individuals of bird species. Biological activities of birds (breeding, feeding, flying, etc.) within the area were recorded. Observed individuals were photographed whenever possible.
- Mammalia (Mammals): studies were carried out on a variety of habitats, focusing on the habitats more suitable for the potential threatened species identified. Sampling points included the following methodologies:
 - For large and medium-size mammals 5 photo traps were placed at significant passages utilized by mammals, as well as where vegetation is suitable and recordings were made for a total of 120 days;
 - For small mammals 50 Sherman traps were used at 3 different locations;
 - For bats, sound recording devices were utilized.

Approach to Habitat Field Studies

Habitat field studies were performed by direct observation of the plant communities, morphology and geology of the study area. Habitat maps of the mine site and powerline LSA were created combining the information derived from the literature review, fieldwork and desktop studies. Habitats within the LSAs were evaluated in accordance with the European Nature Information System (EUNIS) classification and linked to habitats listed in Annex I of the EU *Habitats Directive* (92/43/EEC) whenever possible.

Figure 8-3: Biodiversity field survey points



Data collected during the literature review and field studies on terrestrial flora, fauna, and habitats allowed evaluating the presence of significant biodiversity features and critical habitats within the LSAs.

Lists of flora and fauna species potentially present or observed within the LSAs were created. Information on the species taxonomy, national and global protection and conservation status were also added. A legend of the categories used for flora and fauna species is presented in the lists below and Table 8-4 :

IUCN Global Red List Categories

- CR: Critically Endangered.
- EN: Endangered.
- VU: Vulnerable.
- LR: Lower Risk.
- NT: Near Threatened.
- LC: Least Concern.
- DD: Data Deficient.

Bern Convention on the Conservation of European Wildlife and Natural Habitats (Bern):

- Appendix-I: Strictly protected flora species.
- Appendix-II: Strictly protected fauna species.
- Appendix-III: Protected fauna species.
- Appendix-IV: Prohibited means and methods of killing, capture and other exploitation.

Convention on International Trade in Endangered Species of Wild Flora and Fauna. (CITES)

- Appendix-I: species, which are under the threat of extinction. Trade in the specimens of these species is not allowed except extraordinary circumstances.
- Appendix-II: species, which are not threatened with extinction, but trade in specimens is restricted in order to prevent utilization incompatible with their survival.
- Appendix-III: species for which other parties of CITES is applied for assistance in controlling trade and which are conserved at least in one country.

EU Habitat Directive

- Appendix-I: natural habitat types of community interest whose conservation requires the designation of special areas of conservation.
- Appendix-II: animal and plant species of community interest whose conservation requires the designation of special areas of conservation.
- Appendix-III: animal and plant species of community interest in need of strict protection.
- Appendix-IV: animal and plant species of community interest who's taking in the wild and exploitation may be subject to management measures.

EU Birds Directive (Council Directive 2009/147/EC)

- Appendix I: Species subject to special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.
- Appendix II: Species may be hunted under national legislation. Member States shall ensure that the hunting of these species does not jeopardize conservation efforts within their distribution area.
- Appendix III: Species whose sale, transport for sale, keeping for sale and the offering for sale of live or dead birds and of any readily recognizable part or derivatives of such birds is not prohibited provided that the birds have been legally killed or captured or otherwise legally acquired.

Central Hunting Commission (CHC) (2014). Resolutions for 2014-2015 Hunting Season

- Appendix I: includes wildlife species which are protected by the Ministry of Forestry and Water Affairs.
- Appendix II: includes game animals which are protected by the CHC.
- Appendix III: includes game animals which are allowed to be hunted in seasons predefined by the CHC.

Demirsoy, A. (2002). General and Turkish Zoogeography. National threat statuses for vertebrates

- Ex: Extinct.
- E: Endangered.
- R: Rare species.
- V: Vulnerable species.
- I: Status of taxon is unknown.
- K: The category of taxon is unknown due to data deficiency.
- O: Species that are not threatened.
- Nt: Widespread, abundant species that are not threatened.

Table 8-4: Kiziroglu, I. (2008). Red Data Book for Birds of Turkey. National threat status for birds

Category A		
A.1.2	(CR)	Critically endangered and breeding species in Turkey
A.2	(EN)	Endangered and breeding species in Turkey
A.3	(VU)	Vulnerable and breeding species in Turkey
A.3.1	(D)	Declining, vulnerable and breeding species in Turkey
A.4	(NT)	Near threatened, breeding species do not face to risk now but are likely to qualify for threatened category in the near future in Turkey
A.5	(LC)	Least concern, breeding species that are widespread in Turkey
A.6	(DD)	Data deficient, breeding species on which there is deficient information in Turkey
A.7	(NE)	Not evaluated, Breeding species which have not been evaluated in Turkey
Category B		
B.1.2	(CR)	Critically endangered and non-breeding species in Turkey
B.2	(EN)	Endangered and non-breeding species in Turkey
B.3	(VU)	Vulnerable and non-breeding species in Turkey
B.3.1	(D)	Declining, vulnerable and non-breeding species in Turkey
B.4	(NT)	Near threatened, non-breeding species do not face to risk now but are likely to qualify for threatened category in the near future in Turkey
B.5	(LC)	Least Concern, non-breeding species that are widespread in Turkey
B.6	(DD)	Data deficient, non-breeding species on which there is deficient information in Turkey

B.7	(NE)	Not Evaluated, non-breeding species which have not been evaluated in Turkey
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8.4 Baseline – Terrestrial Flora

Phytogeographically, the mine site and powerline LSAs are located within the Central Anatolia deciduous tree-steppes ecoregion (PA0410) characterized by a mosaic of steppe and patches of woodlands. The ecoregion is located at the junction of the biogeographic zones of the Lesser Caucasus, the Iranian and the Mediterranean zones and exhibits a great range of altitudinal variation and a diversity of climatic zones. This results in ecological communities with a distinct flora, including many regionally endemic and rare species.

Within the natural and semi-natural habitat of the LSAs, 397 taxa from 60 plant families were identified based on field surveys conducted in 2009 and 2015. The species are listed in Table 8-5.

For most of the species, the typical habitat type is also indicated:

- 1) mountain steppes;
- 2) deciduous oak woodland;
- 3) metamorphic rock cliffs;
- 4) hygic habitats.

The majority of the taxa identified are considered Irano-Turanian (97 species); Mediterranean (31 species) and Euro-Siberian elements (14 taxa) are also present. None of the species identified is listed in the CITES or Bern Convention.

Of the species identified 53 are considered endemic of Turkey; of these taxa 48 are widespread endemic and 5 are regional endemic. The 5 regional endemic taxa were found only at the higher elevation of the mine site LSA and can be defined as follow:

- 1 local endemic subspecies (*Astragalus vestitus* ssp. nov.);
- 2 restricted regional endemic species (*Verbascum luridiflorum*, *Cirsium aytatchii*);
- 2 regional endemic species (*Phryna ortegioides* and *Campanula stricta* var. *aladagensis*).

Four species are considered threatened (CR, EN or VU) according to IUCN 2001 criteria. These species were found only within the mine LSA at high elevations:

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

The distribution and ecology of these four threatened species are further discussed in Section 8.8.1

In addition, 4 species are considered near threatened (NT) (*Centaurea lycopifolia*, *Centaurea paphlagonica*, *Phryna ortegioides* and *Sempervivum brevopilum*). All the other species are considered LC or are not classified. None of the species identified is listed in the CITES or Bern Convention.

Table 8-5: Vascular Flora Species Identified Within the LSAs

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
PTERIDO PHYTA	Aspleniaceae	<i>Ceterach officinarum</i>	2015	-			3
	Hypolepidaceae	<i>Pteridium aquilinum</i>	2015	-			2
GYMNOSPERMAE	Cupressaceae	<i>Juniperus excelsa</i>	2015	-			1; 2
	Cupressaceae	<i>Juniperus oxycedrus</i>	2009; 2015	-		LC	1; 2
	Cupressaceae	<i>Juniperus sabina</i>	2009	Iran-Turan		LC	
DICOTYLEDONES	Acanthaceae	<i>Acanthus hirsutus</i>	2009	-	Widespread	LC	1
	Apiaceae	<i>Anthriscus nemorosa</i>	2015	-			3
	Apiaceae	<i>Astradaucus orientalis</i>	2015	Iran-Turan			1
	Apiaceae	<i>Bifora radians</i>	2009	-		LC	
	Apiaceae	<i>Bupleurum sulphureum</i>	2015	Iran-Turan	Widespread	LC	1
	Apiaceae	<i>Bunium paucifolium</i> Var. <i>paucifolium</i>	2015	-			1
	Apiaceae	<i>Bupleurum falcatum</i> Subsp. <i>cernuum</i>	2015	-			1
	Apiaceae	<i>Bupleurum rotundifolium</i>	2009	-		LC	
	Apiaceae	<i>Echinophora tournefortii</i>	2009	Iran-Turan		LC	
	Apiaceae	<i>Eryngium campestre</i>	2009; 2015	-		LC	1
	Apiaceae	<i>Ferulago platycarpa</i>	2009	Iran-Turan	Widespread	LC	1
	Apiaceae	<i>Grammosciadium pterocarpum</i>	2015	Iran-Turan			1

³ Data deriving from field studies performed in 2009 or 2015⁴ 1) Mountain steppes; 2) Deciduous oak woodland; 3) Metamorphic rock cliffs; 4) Hygric habitats.

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
	Apiaceae	<i>Johrenia porteri</i>	2015	Mediterranean			2
	Apiaceae	<i>Mabaila pastinacifolia</i>	2015	Iran-Turan	Widespread	LC	2
	Apiaceae	<i>Malabaila secacul</i>	2015	Widespread			2
	Apiaceae	<i>Prangos meliocarpoides</i> Var. <i>meliocarpoides</i>	2015	Iran-Turan	Widespread	LC	1
	Apiaceae	<i>Scandix australis</i> subsp. <i>grandiflora</i>	2015	-			1
	Apiaceae	<i>Scandix pecten-veneris</i>	2009	-		LC	
	Apiaceae	<i>Scandix stellata</i>	2009	-		LC	
	Apiaceae	<i>Torilis arvensis</i>	2015	-			1
	Apiaceae	<i>Torilis leptophylla</i>	2009	-		LC	
	Apiaceae	<i>Turgenia latifolia</i>	2009	-		LC	
	Apiaceae	<i>Zosima absinthifolia</i>	2015	-			1
	Apocinaceae	<i>Vinca herbacea</i>	2015	-			1
	Astearaceae	<i>Achillea coarctata</i>	2015	Widespread			2
	Astearaceae	<i>Achillea kotschyi</i> subsp. <i>kotschyi</i>	2015	-			1
	Astearaceae	<i>Achillea millefolium</i> subsp. <i>Milleifolium</i>	2015	Euro-Sibarian			1
	Astearaceae	<i>Achillea sieheana</i>	2009	-		LC	
	Astearaceae	<i>Anthemis cretica</i> subsp. <i>pontica</i>	2009; 2015	-		LC	1
	Astearaceae	<i>Anthemis tinctoria</i> var. <i>tinctoria</i>	2015	-			1
	Astearaceae	<i>Carduus nutans</i>	2015; 2009	-			1; 2
	Astearaceae	<i>Carlina corymbosa</i>	2015	Mediterranean			1
	Astearaceae	<i>Carlina oligocephala</i> subsp. <i>oligocephala</i>	2009	-		LC	
	Astearaceae	<i>Centaurea carduiformis</i>	2009; 2015	-		LC	1

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
	Astearaceae	<i>Centaurea cheirollopha</i>	2015	Mediterranean			2
	Astearaceae	<i>Centaurea drabifolia</i> subsp. <i>cappadocica</i>	2015	-	Widespread	LC	1
	Astearaceae	<i>Centaurea iberica</i>	2015	-			1
	Astearaceae	<i>Centaurea lycopifolia</i>	2015	Mediterranean		NT	2
	Astearaceae	<i>Centaurea paphlagonica</i>	2015	Iran-Turan	Widespread	NT	2
	Astearaceae	<i>Centaurea pulchella</i>	2009	-		LC	
	Astearaceae	<i>Centaurea solstitialis</i> subsp. <i>solstitialis</i>	2009; 2015	-		LC	1
	Astearaceae	<i>Centaurea triumphettii</i>	2015	Mediterranean			1
	Astearaceae	<i>Centaurea urvillei</i>	2009; 2015	Mediterranean		LC	1
	Astearaceae	<i>Centaurea virgata</i>	2009; 2015	Iran-Turan		LC	1
	Astearaceae	<i>Chardinia orientalis</i>	2015	Iran-Turan			1
	Astearaceae	<i>Chondrilla juncea</i> var. <i>juncea</i>	2009; 2015	-		LC	1
	Astearaceae	<i>Cichorium intybus</i>	2009; 2015	-		LC	1; 2
	Astearaceae	<i>Cichorium intybus</i>	2015	Widespread			1; 2
	Astearaceae	<i>Cirsium arvense</i> Scop. Subsp. <i>arvense</i>	2009	-		LC	
	Astearaceae	<i>Cirsium aytatchii</i>	2015	Iran-Turan	Regional	EN	2
	Astearaceae	<i>Cirsium lappaceum</i>	2015	-			1; 2
	Astearaceae	<i>Cirsium vulgare</i>	2015	-			2
	Astearaceae	<i>Conyza canadensis</i>	2009	-		LC	
	Astearaceae	<i>Crepis foetida</i> subsp. <i>rhoeadifolia</i>	2009; 2015	-		LC	1
	Astearaceae	<i>Crepis sancta</i>	2009	-		LC	
	Astearaceae	<i>Crupina crupinastrum</i>	2015	-			1
	Astearaceae	<i>Crupina vulgaris</i>	2009	-		LC	

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
	Astearaceae	<i>Echinops orientalis</i>	2009	Iran-Turan		LC	
	Astearaceae	<i>Ecinops orientalis</i>	2015	Iran-Turan			1
	Astearaceae	<i>Filago eriocephala</i>	2015	Mediterranean			1
	Astearaceae	<i>Filago pyramidata</i>	2009	-		LC	
	Astearaceae	<i>Gungelia tournefortii</i>	2009; 2015	Iran-Turan		LC	1
	Astearaceae	<i>Helichrysum arenarium</i>	2015	Iran-Turan			1
	Astearaceae	<i>Helichrysum plicatum</i> subsp. <i>plicatum</i>	2009	-		LC	
	Astearaceae	<i>Hieracium pannosum</i>	2009	Mediterranean		LC	
	Astearaceae	<i>Jurinea consanguinea</i>	2009	Iran-Turan		LC	
	Astearaceae	<i>Lapsana communis</i> Subsp. <i>alpina</i>	2015	Euro-Sibarian			2
	Astearaceae	<i>Picnomon acarna</i> .	2009; 2015	Mediterranean		LC	1
	Astearaceae	<i>Picris strigosa</i> Subsp. <i>strigosa</i>	2015	Iran-Turan			1
	Astearaceae	<i>Pilosella hoppeana</i> subsp. <i>pilisquama</i>	2009	-		LC	
	Astearaceae	<i>Pilosella piloselloides</i> subsp. <i>megalomastix</i>	2015	-			1; 2
	Astearaceae	<i>Ptilostemon afer</i> subsp. <i>eburneus</i>	2015	Widespread	Widespread	LC	1
	Astearaceae	<i>Scariola viminea</i>	2015	-			
	Astearaceae	<i>Scorzonera suberosa</i> subsp. <i>suberosa</i>	2009	Iran-Turan		LC	
	Astearaceae	<i>Scorzonera cana</i> Var. <i>cana</i>	2015	-			1
	Astearaceae	<i>Scorzonera cana</i> Var. <i>radicosa</i>	2015	-			1
	Astearaceae	<i>Scorzonera laciniata</i> Subsp. <i>calcitrapifolia</i>	2009	-		LC	
	Astearaceae	<i>Scorzonera pseudolanata</i>	2015	Iran-Turan			2
	Astearaceae	<i>Senecio racemosus</i>	2015	Iran-Turan			2
	Astearaceae	<i>Senecio vernalis</i>	2009; 2015	-		LC	1; 2

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
	Astearaceae	<i>Senecio vernalis</i>	2015	Widespread			1; 2
	Astearaceae	<i>Sonchus asper</i> subsp. <i>glaucescens</i>	2009	-		LC	
	Astearaceae	<i>Taraxacum butlerii</i>	2009	-		LC	
	Astearaceae	<i>Taraxacum crepidiforme</i> Subsp. <i>crepidiforme</i>	2009	-		LC	
	Astearaceae	<i>Tragopogon longirostris</i>	2009	-		LC	
	Astearaceae	<i>Tripleurospermum oreades</i> Var. <i>oreades</i>	2009	-		LC	
	Astearaceae	<i>Tripleurospermum sevanense</i>	2015	-			1
	Astearaceae	<i>Xeranthemum annuum</i>	2009; 2015	-		LC	2
	Berberidaceae	<i>Berberis crataegina</i>	2009; 2015	Iran-Turan		LC	1
	Boraginaceae	<i>Alkanna cappadocica</i>	2015	Iran-Turan	Widespread	LC	1
	Boraginaceae	<i>Alkanna orientalis</i> var. <i>orientalis</i>	2009; 2015	Iran-Turan		LC	1
	Boraginaceae	<i>Anchusa leptophylla</i> Subsp. <i>leptophylla</i>	2009	-		LC	
	Boraginaceae	<i>Asperugo procumbens</i>	2015	Euro-Sibarian			1; 2
	Boraginaceae	<i>Buglossoides arvensis</i>	2009; 2015	-		LC	1; 2
	Boraginaceae	<i>Echium italicum</i> L.	2009; 2015	Mediterranean		LC	1
	Boraginaceae	<i>Heliotropium europaeum</i> L.	2009	Mediterranean		LC	
	Boraginaceae	<i>Lappula barbata</i>	2009; 2015	Iran-Turan		LC	1
	Boraginaceae	<i>Moltkia coerulea</i>	2009	Iran-Turan		LC	
	Boraginaceae	<i>Myosotis alpestris</i> subsp. <i>alpestris</i>	2015	-			3
	Boraginaceae	<i>Myosotis ramosissima</i> Subsp. <i>ramosissima</i>	2009	-		LC	
	Boraginaceae	<i>Myosotis stricta</i>	2009	Euro-Sibarian		LC	
	Boraginaceae	<i>Nonea pulla</i> Subsp. <i>scabrisquamata</i>	2009	Iran-Turan		LC	

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	Boraginaceae	<i>Onosma isauricum</i> Boiss. & Heldr.	2009	Iran-Turan	Widespread	LC	2
	Boraginaceae	<i>Onosma tauricum</i> Pallas ex Willd. Subsp. <i>brevifolium</i> DC.	2015	-	Widespread	LC	1
	Boraginaceae	<i>Rochelia disperma</i> var. <i>disperma</i>	2015	-			1
	Brassicaceae	<i>Aethionema arabicum</i>	2015	-			1
	Brassicaceae	<i>Aethionema cordatum</i>	2015	Iran-Turan			1
	Brassicaceae	<i>Alyssum desertorum</i> var. <i>desertorum</i>	2009	-		LC	
	Brassicaceae	<i>Alyssum linifolium</i> var. <i>Linifolium</i>	2009	-		LC	
	Brassicaceae	<i>Alyssum minus</i> var. <i>minus</i>	2009	-		LC	
	Brassicaceae	<i>Alyssum minutum</i>	2015	-			1
	Brassicaceae	<i>Alyssum pateri</i> Subsp. <i>pateri</i>	2015	Iran-Turan	Widespread	LC	1
	Brassicaceae	<i>Arabis caucacica</i> subsp. <i>brevifolia</i>	2009; 2015	Mediterranean		LC	1
	Brassicaceae	<i>Camelina rumelica</i>	2015	-			1
	Brassicaceae	<i>Capsella bursa-pastoris</i>	2009; 2015	-		LC	1
	Brassicaceae	<i>Cardaria draba</i> Subsp. <i>draba</i>	2009	-		LC	
	Brassicaceae	<i>Descurainia sophia</i>	2009	-		LC	
	Brassicaceae	<i>Draba bruniifolia</i> Subsp. <i>hetercoma</i> var. <i>heterocoma</i>	2015	-			1
	Brassicaceae	<i>Erophila verna</i> Subsp. <i>verna</i>	2015	-			
	Brassicaceae	<i>Erysimum alpestre</i>	2009	Iran-Turan		LC	
	Brassicaceae	<i>Erysimum crassipes</i>	2015	-			1
	Brassicaceae	<i>Erysimum kotschyianum</i>	2015	-	Widespread	LC	1
	Brassicaceae	<i>Erysimum smyrnaeum</i>	2015	-			1; 2

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	Brassicaceae	<i>Fibigia eriocarpa</i>	2009; 2015	-		LC	
	Brassicaceae	<i>Hesperis bicuspidata</i>	2009; 2015	-		LC	1
	Brassicaceae	<i>Matthiola longipetala</i> Subsp. <i>bicornis</i>	2009	-		LC	
	Brassicaceae	<i>Sisymbrium altissimum</i>	2009	-		LC	
	Brassicaceae	<i>Thlaspi perfoliatum</i>	2009; 2015	-		LC	1
	Campanulaceae	<i>Asyneuma limonifolium</i> Subsp. <i>pestalozzae</i>	2009	-	Widespread	LC	1; 3
	Campanulaceae	<i>Asyneuma virgatum</i> subsp. <i>virgatum</i>	2015	-			1
	Campanulaceae	<i>Campanula argaea</i>	2015	Iran-Turan	Widespread	LC	3
	Campanulaceae	<i>Campanula cybalaria</i>	2015	-			3
	Campanulaceae	<i>Campanula involucreta</i>	2015	Iran-Turan			1
	Campanulaceae	<i>Campanula stricta</i> var. <i>alidagensis</i>	2015	Iran-Turan		VU	1
	Campanulaceae	<i>Leguosia speculum-veneris</i>	2009	Mediterranean		LC	
	Campanulaceae	<i>Michauxia tchihatchewii</i>	2009, 2015	Mediterranean			1
	Caryophyllaceae	<i>Arenaria acerosa</i>	2015	-	Widespread	LC	1
	Caryophyllaceae	<i>Arenaria ledebouriana</i> Var. <i>ledebouriana</i>	2009; 2015	-	Widespread	LC	1
	Caryophyllaceae	<i>Bufonia tenuifolia</i>	2015	-			1
	Caryophyllaceae	<i>Cerastium dichotomum</i> Subsp. <i>dichotomum</i>	2015	-			1
	Caryophyllaceae	<i>Cerastium perfoliatum</i>	2009	-		LC	
	Caryophyllaceae	<i>Dianthus calocephalus</i>	2015	-			2
	Caryophyllaceae	<i>Dianthus crinitus</i> var. <i>crinitus</i>	2015	Widespread			
	Caryophyllaceae	<i>Dianthus floribundus</i>	2009	-		LC	
	Caryophyllaceae	<i>Holosteum umbellatum</i> Var. <i>umbellatum</i>	2009	-		LC	
	Caryophyllaceae	<i>Minuartia erythrosepala</i> Var. <i>erythrosepala</i>	2015	-			1

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	Caryophyllaceae	<i>Minuartia hamata</i>	2015	-			1
	Caryophyllaceae	<i>Minuartia hirsuta</i>	2009	-		LC	
	Caryophyllaceae	<i>Minuartia urumuensis</i>	2009	Iran-Turan		LC	
	Caryophyllaceae	<i>Phryna ortegoioides</i>	2015	-	Regional	NT	1
	Caryophyllaceae	<i>Silene alba</i> subsp. <i>divaricata</i>	2009	-		LC	
	Caryophyllaceae	<i>Silene cappadocica</i> Boiss. & Heldr.	2015	Iran-Turan			1
	Caryophyllaceae	<i>Silene marschallii</i> C.A.Meyer	2015	Iran-Turan			1
	Caryophyllaceae	<i>Silene stenobotrys</i>	2009; 2015	Iran-Turan		LC	1
	Caryophyllaceae	<i>Silene supina</i> Subsp. <i>pruinosa</i>	2015	-			1; 2
	Caryophyllaceae	<i>Telephium imperati</i>	2015	Iran-Turan			1
	Chenopodiaceae	<i>Noaea mucronata</i> Subsp. <i>mucronata</i>	2009; 2015	-		LC	1
	Chenopodiaceae	<i>Salsola ruthenica</i>	2009	-		LC	
	Cistaceae	<i>Fumana procumbens</i>	2009; 2015	-		LC	1
	Cistaceae	<i>Helianthemum canum</i>	2009; 2015	-		LC	1
	Cistaceae	<i>Helianthemum ledifolium</i> var. <i>microcarpum</i>	2015	-			1
	Convolvulaceae	<i>Convolvulus arvensis</i>	2015	-			2
	Convolvulaceae	<i>Convolvulus arvensis</i>	2009	-		LC	
	Convolvulaceae	<i>Convolvulus assyricus</i>	2015	Iran-Turan	Widespread	LC	1
	Crassulaceae	<i>Rosularia aizoon</i>	2009; 2015	Iran-Turan		LC	3
	Crassulaceae	<i>Rosularia libanotica</i>	2015	Iran-Turan			3
	Crassulaceae	<i>Sedum album</i>	2009; 2015	-		LC	1
	Crassulaceae	<i>Sedum pallidum</i> Var. <i>pallidum</i>	2015	-			1
	Crassulaceae	<i>Sempervivum brevipilum</i>	2015	Widespread	Widespread	NT	3

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	Cuscutaceae	<i>Cuscuta campestris</i>	2009	-		LC	
	Dipsacaceae	<i>Pterocephalus pinardii</i>	2015	Mediterranean	Widespread	LC	1
	Dipsacaceae	<i>Pterocephalus plumosus</i>	2009	-		LC	
	Dipsacaceae	<i>Scabiosa argentea</i>	2015	-			1
	Dipsacaceae	<i>Scabiosa micrantha</i>	2009	-		LC	
	Dipsacaceae	<i>Scabiosa rotata</i>	2009	Iran-Turan		LC	
	Euphorbiaceae	<i>Andrachne telephioides</i>	2015	-			1
	Euphorbiaceae	<i>Chrozophora tinctoria</i>	2009	-		LC	
	Euphorbiaceae	<i>Euphorbia denticulata</i>	2015	Iran-Turan			2
	Euphorbiaceae	<i>Euphorbia herniariifolia</i>	2015	-			1
	Euphorbiaceae	<i>Euphorbia macroclada</i>	2009; 2015	Iran-Turan		LC	1
	Euphorbiaceae	<i>Euphorbia szovitsii</i> szovitsii var. szovitsii	2009	Iran-Turan		LC	
	Fabaceae	<i>Alhagi pseudolhagi</i>	2009	Iran-Turan		LC	
	Fabaceae	<i>Astragalus acicularis</i>	2015	Iran-Turan	Widespread	LC	1
	Fabaceae	<i>Astragalus angustifolius</i> Subsp. longidens	2009	-		LC	
	Fabaceae	<i>Astragalus commixtus</i> Bunge	2009	Iran-Turan		LC	
	Fabaceae	<i>Astragalus gummifer</i>	2015	Iran-Turan			1
	Fabaceae	<i>Astragalus hirsutus</i>	2015	-	Widespread	LC	1
	Fabaceae	<i>Astragalus microcephalus</i>	2015	Iran-Turan			1
	Fabaceae	<i>Astragalus pinetorum</i>	2015	Iran-Turan	Widespread	LC	1
	Fabaceae	<i>Astragalus</i> sp. nov.	2015	Iran-Turan	Regional	CR	1
	Fabaceae	<i>Coronilla varia</i>	2015	Iran-Turan			1
	Fabaceae	<i>Coronilla varia</i> Subsp. varia	2009	-		LC	

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	Fabaceae	<i>Dorycnium pentaphyllum</i> Subsp. <i>anatolicum</i>	2009; 2015	-		LC	2
	Fabaceae	<i>Lathyrus brachypterus</i> var. <i>brachypterus</i>	2009	Iran-Turan	Widespread	LC	1
	Fabaceae	<i>Lathyrus nissolia</i>	2015	-			2
	Fabaceae	<i>Lotus corniculatus</i> Var. <i>corniculatus</i>	2009	-		LC	
	Fabaceae	<i>Medicago lupulina</i>	2009	-		LC	
	Fabaceae	<i>Medicago sativa</i> Subsp. <i>sativa</i>	2009	-		LC	
	Fabaceae	<i>Medicago x varia</i>	2015	-			1; 2
	Fabaceae	<i>Onobrychis armena</i>	2015	-	Widespread	LC	1; 2
	Fabaceae	<i>Onobrychis sulphurea</i> Var. <i>pallida</i>	2015	Mediterranean	Widespread	LC	2
	Fabaceae	<i>Pisum sativum</i> Subsp. <i>Eeatius</i> Var. <i>elatius</i>	2009	-		LC	
	Fabaceae	<i>Trifolium arvense</i> Var. <i>arvense</i>	2015	-			1; 2
	Fabaceae	<i>Trifolium campestre</i>	2015	-			1
	Fabaceae	<i>Trifolium lucanicum</i>	2009	-		LC	
	Fabaceae	<i>Trifolium pannonicum</i> Subsp. <i>elongatum</i>	2009	-	Widespread	LC	1
	Fabaceae	<i>Trigonella brachycarpa</i>	2015	Iran-Turan			1
	Fabaceae	<i>Trigonella fischeriana</i>	2009	Iran-Turan		LC	
	Fabaceae	<i>Trigonella fischeriana</i>	2015	Iran-Turan			1
	Fabaceae	<i>Trigonella monantha</i> Subsp. <i>monantha</i>	2015	Iran-Turan			1
	Fabaceae	<i>Trigonella procumbens</i>	2009	-		LC	
	Fabaceae	<i>Vicia cracca</i> Subsp. <i>stenophylla</i>	2009; 2015	-		LC	1
	Fabaceae	<i>Vicia villosa</i> subsp. <i>villosa</i>	2009	-		LC	
	Fagaceae	<i>Quercus cerris</i> Var. <i>cerris</i>	2015	-			2
	Fagaceae	<i>Quercus infectoria</i> subsp. <i>infectoria</i>	2009	-		LC	

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	Fagaceae	<i>Quercus petraea</i> Subsp. <i>pinnatiloba</i>	2015	-	Widespread	LC	2
	Fagaceae	<i>Quercus pubescens</i>	2009; 2015	-		LC	2
	Geraniaceae	<i>Erodium acaule</i>	2009	-		LC	
	Geraniaceae	<i>Erodium cicutarium</i> Subsp. <i>cutarium</i>	2009	-		LC	
	Geraniaceae	<i>Geranium divaricatum</i>	2009	-		LC	
	Geraniaceae	<i>Geranium tuberosum</i> Subsp. <i>tuberosum</i>	2009	-		LC	
	Geraniaceae	<i>Pelargonium endlecherianum</i>	2009	-		LC	
	Globulariaceae	<i>Globularia trichosantha</i>	2009; 2015	-		LC	1; 2
	Hypericaceae	<i>Hypericum elongatum</i> Subsp. <i>elongatum</i>	2015	Iran-Turan			1
	Hypericaceae	<i>Hypericum heterophyllum</i>	2015	Iran-Turan	Widespread	LC	2
	Hypericaceae	<i>Hypericum scabrum</i>	2015	Iran-Turan			1
	Illecebraceae	<i>Paronychia kurdica</i>	2009; 2015	-		LC	1
	Illecebraceae	<i>Scleranthus uncinatus</i>	2015	-			1
	Lamiaceae	<i>Acinos rotundifolius</i>	2009; 2015	-		LC	1
	Lamiaceae	<i>Ajuga chamaepitys</i> Subsp. <i>chia</i> Var. <i>chia</i>	2009	-		LC	
	Lamiaceae	<i>Ballota larendana</i>	2009	Iran-Turan		LC	
	Lamiaceae	<i>Lamium garganicum</i> subsp. <i>reniforme</i>	2015	-			1
	Lamiaceae	<i>Lamium purpureum</i> Var. <i>purpureum</i>	2009	Euro-Sibarian		LC	
	Lamiaceae	<i>Marrubium astracanicum</i> Subsp. <i>Astracanicum</i>	2009; 2015	-		LC	1
	Lamiaceae	<i>Marrubium globosum</i> subsp. <i>globosum</i>	2015	Iran-Turan	Widespread	LC	1
	Lamiaceae	<i>Marrubium parviflorum</i> subsp. <i>parviflorum</i>	2009	Iran-Turan		LC	
	Lamiaceae	<i>Mentha longifolia</i>	2015	-			4

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	Lamiaceae	<i>Nepeta nuda</i> subsp. <i>albiflora</i>	2015	-			1
	Lamiaceae	<i>Phlomis armeniaca</i>	2015	Iran-Turan	Widespread	LC	1
	Lamiaceae	<i>Phlomis sieheana</i>	2009	Iran-Turan	Widespread	LC	1; 3
	Lamiaceae	<i>Plomis capitata</i>	2015	Iran-Turan	Widespread	LC	1
	Lamiaceae	<i>Salvia aethiopis</i>	2015	-			1
	Lamiaceae	<i>Salvia caespitosa</i>	2015	Iran-Turan	Widespread	LC	1
	Lamiaceae	<i>Salvia cryptantha</i>	2015	Iran-Turan	Widespread	LC	1
	Lamiaceae	<i>Salvia multicaulis</i>	2015	Iran-Turan			1; 2
	Lamiaceae	<i>Salvia recognita</i>	2015	Iran-Turan	Widespread	LC	1
	Lamiaceae	<i>Salvia sclarea</i>	2009	-		LC	
	Lamiaceae	<i>Scutellaria orientalis</i> subsp. <i>pinnatifida</i>	2015	-			1
	Lamiaceae	<i>Scutellaria rubicunda</i> Subsp. <i>brevibracteata</i>	2009	-		LC	
	Lamiaceae	<i>Scutellaria salviifolia</i>	2015	-	Widespread	LC	1
	Lamiaceae	<i>Sideritis libanotica</i> Subsp. <i>linearis</i>	2009; 2015	-	Widespread	LC	1
	Lamiaceae	<i>Sideritis montanasubsp. montana</i>	2015	Mediterranean			1
	Lamiaceae	<i>Stachys annua</i>	2009	-		LC	
	Lamiaceae	<i>Stachys byzantina</i>	2009	Euro-Sibarian		LC	
	Lamiaceae	<i>Stachys woronowii</i>	2015	Iran-Turan			1; 2
	Lamiaceae	<i>Teucrium chamaedrys</i>	2009; 2015	-		LC	1
	Lamiaceae	<i>Teucrium polium</i>	2009; 2015	-		LC	1
	Lamiaceae	<i>Thymus sipyleus</i> Subsp. <i>rosulans</i>	2009	-		LC	
	Lamiaceae	<i>Thymus sipyleus</i> Subsp. <i>sipyleus</i> var. <i>sipyleus</i>	2015	-	Widespread	LC	1

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	Lamiaceae	<i>Wiedemannia orientalis</i>	2009	Iran-Turan	Widespread	LC	
	Lamiaceae	<i>Ziziphora capitata</i>	2015	Iran-Turan			1; 2
	Linaceae	<i>Linum austriacum</i> subsp. <i>austriacum</i>	2015	-			1
	Linaceae	<i>Linum nodiflorum</i>	2009	-		LC	
	Linaceae	<i>Linum tenuifolium</i>	2009	-		LC	
	Loranthaceae	<i>Viscum album</i> subsp. <i>album</i>	2009	-		LC	
	Lythraceae	<i>Lythrum slicaria</i>	2009	-		LC	
	Malvaceae	<i>Malva neglecta</i>	2015	-			1
	Malvaceae	<i>Malva sylvestris</i>	2009	-		LC	
	Morinaceae	<i>Morina persica</i>	2009; 2015	Iran-Turan		LC	1
	Oleaceae	<i>Jasminum fruticans</i>	2009; 2015	Mediterranean		LC	1
	Onagraceae	<i>Epilobium angustifolium</i>	2009	-		LC	
	Onagraceae	<i>Epilobium hirsutum</i>	2009	-		LC	
	Orobanchaceae	<i>Orobanche nana</i>	2009	-		LC	
	Papaveraceae	<i>Glacium corniculatum</i> Subsp. <i>corniculatum</i>	2009	-		LC	
	Papaveraceae	<i>Hypecoum imberbe</i>	2009	-		LC	
	Papaveraceae	<i>Papaver rhoeas</i>	2009	-		LC	
	Plantaginaceae	<i>Plantago lanceolata</i>	2009	-		LC	
	Plantaginaceae	<i>Plantago major</i> Subsp. <i>intermedia</i>	2009	-		LC	
	Plumbaginaceae	<i>Acantholimon acerosum</i> var. <i>acerosum</i>	2015	Iran-Turan		LC	1
	Polygonaceae	<i>Atraphaxis billardieri</i> var. <i>billardieri</i>	2015	Iran-Turan			1
	Polygonaceae	<i>Polygala comosa</i>	2015	-			1
	Polygonaceae	<i>Polygonum arenastrum</i>	2009	-		LC	

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	Polygonaceae	<i>Polygonum cognatum</i>	2015	-			1
	Polygonaceae	<i>Rumex acetosella</i>	2015	-			1
	Polygonaceae	<i>Rumex tuberosus</i> Subsp. <i>tuberosus</i>	2009; 2015	-		LC	2
	Potamogetonaceae	<i>Potamogeton</i> sp.	2015	-			4
	Primulaceae	<i>Androsace maxima</i>	2009; 2015	-		LC	1
	Ranunculaceae	<i>Adonis annua</i>	2009	-		LC	
	Ranunculaceae	<i>Adonis flammea</i>	2009	-		LC	
	Ranunculaceae	<i>Ceratocephalus falcatus</i>	2009; 2015	-		LC	1
	Ranunculaceae	<i>Consolida raveyi</i>	2015	Iran-Turan	Widespread	LC	1
	Ranunculaceae	<i>Ranunculus arvensis</i>	2015	-			1
	Ranunculaceae	<i>Ranunculus constantinopolitanus</i>	2009	-		LC	
	Ranunculaceae	<i>Ranunculus demissus</i>	2015	-	Widespread	LC	1
	Ranunculaceae	<i>Ranunculus illyricus</i> Subsp. <i>illyricus</i>	2009; 2015	-		LC	1
	Ranunculaceae	<i>Ranunculus repens</i>	2009	-		LC	
	Resedaceae	<i>Reseda lutea</i> var. <i>lutea</i>	2009	-		LC	
	Rhamnaceae	<i>Rhamnus libanotica</i>	2009	Mediterranean		LC	
	Rosaceae	<i>Cerasus mahaleb</i>	2015	-			2
	Rosaceae	<i>Cotoneaster nummularia</i>	2009; 2015	-		LC	1
	Rosaceae	<i>Crataegus orientalis</i>	2009; 2015	-		LC	1
	Rosaceae	<i>Malus sylvestris</i> subsp. <i>mitis</i>	2009	-		LC	
	Rosaceae	<i>Potentilla recta</i>	2009; 2015	-		LC	2
	Rosaceae	<i>Potentilla reptans</i>	2009	-		LC	
	Rosaceae	<i>Pyrus elaeagnifolia</i>	2009; 2015	-		LC	1

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	Rosaceae	<i>Rosa canina</i>	2009; 2015	-		LC	1
	Rosaceae	<i>Rubus canescens</i> var. <i>canescens</i>	2015	-			2
	Rosaceae	<i>Sanguisorba minor</i> Subsp. <i>muricata</i>	2009; 2015	-		LC	1
	Rubiaceae	<i>Asperula arvensis</i>	2009	Mediterranean		LC	
	Rubiaceae	<i>Asperula orientalis</i>	2015	Iran-Turan			1
	Rubiaceae	<i>Cruciata taurica</i>	2009; 2015	Iran-Turan		LC	1; 2
	Rubiaceae	<i>Galium aparine</i>	2009	-		LC	
	Rubiaceae	<i>Galium incanum</i> subsp. <i>elatus</i>	2015	Iran-Turan			1
	Rubiaceae	<i>Galium verum</i>	2009; 2015	-		LC	2
	Salicaceae	<i>Populus nigra</i> Subsp. <i>nigra</i>	2009	-		LC	
	Salicaceae	<i>Salix alba</i>	2009; 2015	-		LC	2; 4
	Salicaceae	<i>Salix</i> sp.	2015	-			2; 4
	Scrophulariaceae	<i>Anarrhinum orientale</i>	2015	Iran-Turan			1
	Scrophulariaceae	<i>Linaria corifolia</i>	2009; 2015	Iran-Turan	Widespread	LC	1
	Scrophulariaceae	<i>Odontites aucheri</i>	2015	Iran-Turan			1
	Scrophulariaceae	<i>Scrophularia libanotica</i> Subsp. <i>libanotica</i>	2015	Mediterranean			3
	Scrophulariaceae	<i>Scrophularia scopolii</i> Var. <i>scopolii</i>	2009	-		LC	
	Scrophulariaceae	<i>Verbascum cheiranthifolium</i> Var. <i>cheiranthifolium</i>	2015	-			1
	Scrophulariaceae	<i>Verbascum luridiflorum</i>	2015	Iran-Turan	Regional	VU	1
	Scrophulariaceae	<i>Verbascum varians</i> Var. <i>varians</i>	2009	-		LC	
	Scrophulariaceae	<i>Veronica gentianoides</i>	2009	Euro-Sibarian		LC	
	Scrophulariaceae	<i>Veronica multifida</i>	2015	Iran-Turan	Widespread	LC	1; 2

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
	Scrophulariaceae	<i>Veronica orientalis</i> subsp. <i>orientalis</i>	2015	-			1
	Scrophulariaceae	<i>Veronica praecox</i>	2009	-		LC	
	Scrophulariaceae	<i>Veronica pusilla</i> var. <i>pusilla</i>	2015	Iran-Turan			1
	Thymelaceae	<i>Daphne oleoides</i> subsp. <i>oleoides</i>	2009; 2015	Iran-Turan		LC	1
	Ulmaceae	<i>Celtis tournefortii</i>	2009	-		LC	
	Urticaceae	<i>Parietaria judaica</i>	2009	-		LC	
	Urticaceae	<i>Urtica dioica</i>	2015	Euro-Sibarian			2
	Valerianaceae	<i>Valeriana officinalis</i>	2015	-			2
	Zygophyllaceae	<i>Peganum harmala</i>	2009	-		LC	
MONOCOTYLEDONES	Cyperaceae	<i>Carex oreophilus</i>	2009	Iran-Turan		LC	
	Cyperaceae	<i>Carex stenophylla</i> Subsp. <i>stenophylloides</i>	2015	-			2
	Cyperaceae	<i>Scirpoides holoschoenus</i>	2015	-			4
	Iridaceae	<i>Crocus ancycensis</i>	2009; 2015	Iran-Turan	Widespread	LC	3
	Iridaceae	<i>Crocus pallasii</i> subsp. <i>pallasii</i>	2015	-			1
	Iridaceae	<i>Gladiolus anatolicus</i>	2009	Mediterranean	Widespread	LC	2
	Iridaceae	<i>Iris galatica</i>	2015	Iran-Turan	Widespread	LC	1
	Juncaceae	<i>Eleocharis palustris</i>	2009	-		LC	
	Juncaceae	<i>Juncus inflexus</i>	2009; 2015	-		LC	2; 4
	Juncaceae	<i>Luzula spicata</i>	2009	-		LC	
	Liliaceae	<i>Allium paniculatum</i> Subsp. <i>paniculatum</i>	2009	Mediterranean		LC	
	Liliaceae	<i>Allium pseudoflavum</i>	2015	Iran-Turan			1
	Liliaceae	<i>Allium rotundum</i>	2015	-			1
	Liliaceae	<i>Asphodeline damascena</i> subsp. <i>damascena</i>	2015	Iran-Turan			1

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
	Liliaceae	<i>Asphodeline globifera</i>	2009	Mediterranean		LC	
	Liliaceae	<i>Colchicum triphyllum</i>	2009; 2015	Mediterranean		LC	1
	Liliaceae	<i>Gagea fistulosa</i>	2009	-		LC	
	Liliaceae	<i>Muscari armeniacum</i>	2015	-			1
	Liliaceae	<i>Muscari neglectum</i>	2009	-		LC	
	Liliaceae	<i>Ornithogalum narbonense</i>	2009	Mediterranean		LC	
	Liliaceae	<i>Ornithogalum oligophyllum</i>	2015	-			1
	Orchideaceae	<i>Cephalanthera damasonium</i>	2015	Euro-Sibarian			2
	Orchideaceae	<i>Comperia comperiana</i>	2015	Iran-Turan			2
	Orchideaceae	<i>Orchis tridentata</i>	2015	Mediterranean			2
	Poaceae	<i>Aegilops biuncialis</i>	2015	Iran-Turan			2
	Poaceae	<i>Alopecurus arundinaceus</i>	2015	Euro-Sibarian			2
	Poaceae	<i>Avena sativa</i>	2015	-			2
	Poaceae	<i>Bromus intermedius</i>	2009	-		LC	
	Poaceae	<i>Bromus japonicus</i> subsp. <i>japonicus</i>	2015	-			1
	Poaceae	<i>Bromus squarrosus</i>	2009	-		LC	
	Poaceae	<i>Bromus tectorum</i>	2009	-		LC	
	Poaceae	<i>Bromus tomentellus</i>	2015	Euro-Sibarian			1
	Poaceae	<i>Cynodon dactylon</i>	2015	-			1
	Poaceae	<i>Cynosurus echinatus</i>	2015	Mediterranean			1
	Poaceae	<i>Dactylis glomerata</i> subsp. <i>hispanica</i>	2015	Mediterranean			1
	Poaceae	<i>Elymus hispidus</i> subsp. <i>hispidus</i>	2015	-			1
	Poaceae	<i>Elymus lazicus</i> subsp. <i>divaricatus</i>	2015	Iran-Turan	Widespread	LC	1

Group	Family	Taxon	Information Source ³	Phytogeography	Endemic (Regional / Widespread)	IUCN Red List Categories	Habitat Type ⁴
	Poaceae	<i>Festuca gigantea</i>	2009	-		LC	
	Poaceae	<i>Festuca valesiaca</i>	2015	-			1
	Poaceae	<i>Hordeum bulbosum</i>	2015	-			1
	Poaceae	<i>Hordeum murinum</i> Subsp. <i>Leporinum</i> var. <i>leporinum</i>	2009	-		LC	
	Poaceae	<i>Koeleria cristata</i>	2009; 2015	-		LC	1
	Poaceae	<i>Lolium perene</i>	2009	-		LC	
	Poaceae	<i>Phleum alpinum</i>	2009	Euro-Sibarian		LC	
	Poaceae	<i>Phleum exaratum</i> Subsp. <i>exaratum</i>	2015	-			1
	Poaceae	<i>Phleum phleoides</i>	2015	Euro-Sibarian			1
	Poaceae	<i>Phragmites australis</i>	2009	Euro-Sibarian		LC	4
	Poaceae	<i>Poa alpinasubsp. fallax</i>	2015	-			1
	Poaceae	<i>Poa bulbosa</i>	2009; 2015	-		LC	1
	Poaceae	<i>Poa pratensis</i>	2009	-		LC	
	Poaceae	<i>Polypogon monspeliensis</i>	2009	-		LC	
	Poaceae	<i>Stipa holosericea</i>	2015	Iran-Turan			1
	Poaceae	<i>Stipa lessingiana</i>	2015	-			1
	Poaceae	<i>Taeniatherum caput-medusae</i> subsp. <i>crinitum</i>	2015	Mediterranean			1; 2
	Poaceae	<i>Triticum aestivum</i>	2009	-		LC	
	Typhaceae	<i>Typha latifolia</i>	2015	-		LC	4

8.5 Baseline - Terrestrial Fauna

The fauna community expected in this area is typical of the Central Anatolia deciduous tree-steppes ecoregion (PA0410), characterized by a mosaic of steppe and patches of woodlands. In particular, the studies focused on the following taxa:

- amphibian species;
- reptiles species;
- bird species;
- mammal species.

Lists of terrestrial fauna species potentially present or observed within the mine site and powerline LSAs were created as a result of literature review and fieldwork studies on terrestrial vertebrate fauna undertaken in 2009 and 2015.

The results of these studies, presented in more details within this chapter, are summarised as follows.

- number of species identified as present or potentially present within the LSAs for each taxonomic group:
 - 4 amphibian species;
 - 19 reptile species;
 - 397 bird species;
 - 24 mammal species.
- the fauna potentially present within the two LSAs is similar since the study areas partially overlap, however the powerline LSA is richer in those species typically connected to wetland habitat (e.g. pond tortoise, water birds)
- 6 of the species are considered threatened at global level by IUCN:
 - two species are considered critically endangered (CR):
 - *Vanellus gregarius* (Sociable Lapwing)
 - *Numenius tenuirostris* (Slender-billed Curlew)
 - three species are considered endangered (EN):
 - *Oxyura leucocephala* (White-headed Duck)
 - *Falco cherrug* (Saker Falcon)
 - *Neophron percnopterus* (Egyptian vulture)
 - ten species is considered vulnerable (VU)
 - *Testudo graeca* (Common tortoise)
 - *Aythya ferina* (Pochard)
 - *Branta ruficollis* (Red-Breasted Goose)
 - *Marmaronetta angustirostris* (Marbled Teal)
 - *Melanitta fusca* (Velvet Scote)
 - *Aquila heliaca* (Imperial Eagle)
 - *Clanga clanga* (Greater Spotted Eagle)
 - *Otis tarda* (Great Bustard)
 - *Acrocephalus paludicola* (Aquatic Warbler)

- *Pelecanus crispus* (Dalmatian Pelican)
- no endemic species were found or are expected to be present within the LSAs.

8.5.1 Amphibians

Four different amphibian species were observed within the LSAs during the baseline studies in 2009 and 2015. The species in this group depend on water at least for their reproduction period. For this reason, particularly marshy and moist areas were analysed. Moreover, the suitable habitats of the frog species, which prefer living on land except for their reproduction period, were carefully evaluated and analysed.

The species observed are not considered threatened at international or national level. However, according to the International IUCN Threat Categories, at a global level *Bufo variabilis* and *Bufo variabilis* (Figure 8-4) are considered data deficient (DD). For this species, previously considered within *Bufo viridis* species, the taxonomic status remains controversial and is currently not widely accepted.

No endemic species were found or are expected to be present within the LSAs. All amphibian species present within the LSAs and their conservation status are provided in Table 8-6.

Table 8-6: Amphibian species present within the LSAs

Order	Family	Species	Info Source	End.	International Threat Categories				National Threat Categories		Observ. / Literat. data	
					IUCN	BERN	CITES	Habitat Dir.	CHC	Red List	Mine site	Power line
Anura	Bufonidae	<i>Bufo variabilis</i>	2009	-	DD	Ann II	-	-	-	-	O	L
		<i>Bufo variabilis</i>	2015	-	DD	Ann II	-	-	-	nt	O	L
	Ranidae	<i>Pelophylax ridibundus</i>	2009; 2015	-	LC	Ann III	-	Ann V	-	nt	O	O
		<i>Rana macrocnemis</i>	2009	-	LC	Ann III	-	-	-	-	O	L

Figure 8-4: *Bufo variabilis*



8.5.2 Reptiles

Based on the literature review and the field surveys performed in the LSA, a total of 19 reptile species were identified and are listed with their conservation status in Table 8-7 below. Of these species three were not observed in the LSA but they are considered as potentially present based on literature review.

Of these species *Testudo graeca* (Common tortoise) is the only one considered vulnerable (VU) at a global level: according to the IUCN Red List. All the reptile species listed, with the exception of *Lacerta media* (Figure 8-6) and *Elaphe sauromates* (Figure 8-7), are protected by the Bern Convention and under the General Directorate of Nature Conservation and National Parks Central Hunting Commission's 2014-2015 Resolutions.

The only endemic species identified in the LSA is the Anatolian Lizard (*Apathya cappadocica*, LC) as shown in Figure 8-5, mainly distributed in central south-eastern Turkey but also present in the nearby countries of Iran, Iraq and Syria.

Figure 8-5: Cappadocian Lizard (*Apathya cappadocica*)



Figure 8-6: Sivas Lizard (*Lacerta media*)



Figure 8-7: Yellow Snake (*Elaphe sauromates*)



Figure 8-8: Dwarf Snake (*Eirenis modestus*)



Table 8-7: Reptile Species Present Within the LSAs

Order	Family	Species	Info Source	English name	Endem.	International Threat Categories				National Threat Categories		Observ. / Literat. data	
						IUCN	BERN	CITES	Habitat Dir.	CHC	Red List	Mine site	Power line
Squamata	Agamidae	<i>Stellagama stellio</i>	2009; 2015	Hardim Lizard		LC	Ann II	-	Ann IV	Ann I	nt	O	L
		<i>Trapelus ruderatus</i>	2009	Common Ground Agama		LC	Ann III			Ann I		O	L
	Colubridae	<i>Platycephalus najadum</i>	2009	Dahl's Whipsnake		LC	Ann II			Ann I		O	L
		<i>Dolichophis caspius</i>	2009	Large Whip Snake		--	Ann III			Ann I		L	L
		<i>Dolichophis schmidtii</i>	2009	Whip Snake		LC	Ann III			Ann I		L	L
		<i>Eirenis modestus</i>	2009; 2015	Ring-headed dwarf snake		LC	Ann III	-	Ann IV	Ann I	nt	O	L
		<i>Elaphe quatuorlineata</i>	2009	Four-lined snake		NT	Ann II			Ann I		L	L
		<i>Elaphe sauromates</i>	2015	Yellow snake			-	-	-	-	-	O	L
		<i>Natrix natrix persa</i>	2009	The Grass Snake		LC	Ann III			Ann I		O	O
	Gekkonidae	<i>Mediodactylus kotschyi</i>	2015	Kotschy's Gecko		LC	Ann II	-	Ann IV	Ann I	nt	O	L
	Lacertidae	<i>Apathya cappadocica</i>	2015	Anatolian Lizard	Widespread	LC	Ann III	-	-	Ann I	nt	O	L
		<i>Darevskia rudis</i>	2009	Wall Lizard		LC	Ann III			Ann I		O	L
		<i>Lacerta media</i>	2015	Sivas Lizard		LC	-	-	-	-	-	O	L

		<i>Lacerta viridis</i>	2015	Green lizard		LC	Ann II	-	Ann IV	Ann I	nt	O	L
		<i>Ophisops elegans</i>	2009; 2015	Wester sanke-eyed lizard		--	Ann II	-	Ann IV	Ann I	nt	O	L
		<i>Parvilacerta parva</i>	2009	Dwarf Lizard		LC	Ann II			Ann I		O	L
	Typhlopidae	<i>Typhlops vermicularis</i>	2009	Eurasian Blind Snake		--	Ann III			Ann I		O	L
Testudes	Testudinidae	<i>Testudo graeca</i>	2009; 2015	Spur-thighed Tortoise		VU	Ann II	Ann II	Ann II/IV	Ann I	nt	O	O
		<i>Emys orbicularis</i>	-	European Pond Turtle		NT	Ann II	-	Ann II	Ann I	nt	-	O

8.5.3 Birds

On the basis of the literature review a total of 306 bird species were identified as potentially present within the mine and powerline LSA, of which 74 species were identified during the field studies in the mine site LSA and 5 during casual observations along the powerline LSA. The large number of birds potentially present in the LSA is mainly related to the overlap with the Sultan Sazlığı Wetland KBA. The complete list of species is provided in Table 8-8 below.

According to IUCN criteria 14 of the species potentially present in the LSAs are considered threatened, and in particular:

- two species are considered critically endangered (CR):
 - *Vanellus gregarius* (Sociable Lapwing)
 - *Numenius tenuirostris* (Slender-billed Curlew)
- three species are considered endangered (EN):
 - *Oxyura leucocephala* (White-headed Duck)
 - *Falco cherrug* (Saker Falcon)
 - *Neophron percnopterus* (Egyptian vulture)
- nine species are considered vulnerable (VU):
 - *Aythya ferina* (Pochard)
 - *Branta ruficollis* (Red-Breasted Goose)
 - *Marmaronetta angustirostris* (Marbled Teal)
 - *Melanitta fusca* (Velvet Scote)
 - *Aquila heliaca* (Imperial Eagle)
 - *Clanga clanga* (Greater Spotted Eagle)
 - *Otis tarda* (Great Bustard)
 - *Acrocephalus paludicola* (Aquatic Warbler)
 - *Pelecanus crispus* (Dalmatian Pelican).

In addition, 14 species are considered near threatened (NT):

- *Aythya nyroca* (Ferruginous Duck)
- *Vanellus vanellus* (Northern Lapwing)
- *Glareola nordmanni* (Black-winged Praticole)
- *Haematopus ostralegus* (Oystercatcher)
- *Calidris ferruginea* (Curlew Sandplover)
- *Numenius arquata* (Curlew)
- *Coracias garrulus* (European roller)
- *Aegypius monachus* (Black Vulture)
- *Circus macrourus* (Pallid Harrier)
- *Falco vespertinus* (Red-footed Falcon)
- *Tetrax tetrax* (Little Bustard)
- *Anthus pratensis* (Meadow Pipit)

- *Limosa lapponica* (Bar-tailed Godwit)
- *Limosa limosa* (Black-tailed Godwit)

To complete the list of species of conservation concern potentially present in the LSAs, it is useful also to consider the species included among the designation criteria for the Sultan Sazlığı Ramsar area. This list includes:

- Significant concentrations in summer-winter migrations for:
 - *Ardea cinerea* (Grey heron)
 - *Microcarbo pygmaeus* (Little cormorant)
 - *Tadorna ferruginea* (Ruddy shelducks)
 - *Circus aeruginosus* (Western marsh harrier)
 - *Alcedo atthis* (Common kingfisher)
- Significant concentrations over migration:
 - *Phoenicopterus roseus* (Flamingo)
 - *Platalea leucorodia* (Eurasian Spoonbill)
 - *Ciconia ciconia* (White stork)

The majority of bird species of concern is linked to the presence of the Sultan Sazlığı IBA, and therefore they are mainly associated to the powerline LSA, with the exception of the Egyptian vulture (*Neophron percnopterus*, EN) that was observed also within the mine site LSA.

No endemic species were found or are expected to be present within the LSAs.

The list of species of conservation concern that will be retained for the assessment of impacts and the design of mitigation and monitoring measures will therefore include the 36 species listed above.

Table 8-8: Bird Species Identified Within the LSAs

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Anseriformes	Anatidae	<i>Anas acuta</i>	Northern Pintail	2015		LC			Ann II	A.5	-	L
Anseriformes	Anatidae	<i>Anas crecca</i>	Teal	2015		LC			Ann II	A.5	-	L
Anseriformes	Anatidae	<i>Anas platyrhynchos</i>	Mallard	2015		LC			Ann II	A.5	-	L
Anseriformes	Anatidae	<i>Anser albifrons</i>	White-Fronted Goose	2015		LC			Ann II	B.5	-	L
Anseriformes	Anatidae	<i>Anser anser</i>	Greylag Goose	2015		LC				A.4	-	L
Anseriformes	Anatidae	<i>Anser brachyrhynchus</i>	Pink-Footed Goose	2015		LC			Ann II	B.6	-	L
Anseriformes	Anatidae	<i>Anser fabalis</i>	Bean Goose	2015		LC				B.3	-	L
Anseriformes	Anatidae	<i>Aythya ferina</i>	Pochard	2015		VU				A.5	-	L
Anseriformes	Anatidae	<i>Aythya fuligula</i>	Tufted Duck	2015		LC				A.5	-	L
Anseriformes	Anatidae	<i>Aythya nyroca</i>	Ferruginous Duck	2015		NT			Ann I	A.3	-	L
Anseriformes	Anatidae	<i>Branta bernicla</i>	Brent Goose	2015		LC			Ann II	B.1.2	-	L
Anseriformes	Anatidae	<i>Branta ruficollis</i>	Red-Breasted Goose	2015		VU		Ann II	Ann I	B.1.2	-	L
Anseriformes	Anatidae	<i>Cygnus cygnus</i>	Whooper Swan	2015		LC			Ann I	A.3	-	L
Anseriformes	Anatidae	<i>Cygnus olor</i>	Mute Swan	2015		LC				A.3.1	-	L
Anseriformes	Anatidae	<i>Mareca penelope</i>	Eurasian Wigeon	2015		LC				A.5	-	L
Anseriformes	Anatidae	<i>Mareca strepera</i>	Gadwall	2015		LC				A.4	-	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Anseriformes	Anatidae	<i>Marmaronetta angustirostris</i>	Marbled Teal	2015		VU				A.3	-	L
Anseriformes	Anatidae	<i>Melanitta fusca</i>	Velvet Scoter	2015		VU			Ann II	A.3	-	L
Anseriformes	Anatidae	<i>Mergus albellus</i>	Sinew	2015		LC			Ann I	B.3	-	L
Anseriformes	Anatidae	<i>Mergus merganser</i>	Goosander	2015		LC			Ann II	B.1.2	-	L
Anseriformes	Anatidae	<i>Netta rufina</i>	Red-Crested Pochard	2015		LC			Ann II	A.5	-	L
Anseriformes	Anatidae	<i>Oxyura leucocephala</i>	White-headed Duck	2015		EN		Ann II	Ann I	A.2	-	L
Anseriformes	Anatidae	<i>Spatula clypeata</i>	Northern Shoveler	2015		LC				A.4	-	L
Anseriformes	Anatidae	<i>Spatula querquedula</i>	Garganey	2015		LC				A.4	-	L
Anseriformes	Anatidae	<i>Tadorna ferruginea</i>	Ruddy Shelduck	2015		LC	Ann II		Ann I	A.4	-	L
Anseriformes	Anatidae	<i>Tadorna tadorna</i>	Shelduck	2015		LC	Ann II			A.3.1	-	L
Apodiformes	Apodidae	<i>Apus apus</i>	Common Swift	2009; 2015	--	LC	Ann III			A.3.1	O	L
Apodiformes	Apodidae	<i>Apus pallidus</i>	Pallid Swift	2015		LC	Ann II			A.2	-	L
Caprimulgiformes	Caprimulgidae	<i>Caprimulgus europaeus</i>	Nightjar	2015		LC	Ann II			A.1.2	-	L
Charadriidae	Charadriidae	<i>Vanellus gregarius</i>	Sociable Lapwing	2015		CR				A.3	-	L
Charadriidae	Charadriidae	<i>Vanellus spinosus</i>	Spur-winged Lapwing	2015		LC				A.3	-	L
Charadriidae	Charadriidae	<i>Vanellus vanellus</i>	Northern Lapwing	2015		NT			Ann II	A.5	-	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Powe r line
Charadriiformes	Burhinidae	<i>Burhinus oedicnemus</i>	Eurasian Thick-knee	2015		LC	Ann II		Ann I	A.2	-	L
Charadriiformes	Charadriidae	<i>Charadrius alexandrinus</i>	Kentish Plover	2015		LC			Ann I	A.4	-	L
Charadriiformes	Charadriidae	<i>Charadrius dubius</i>	Little Tinged Plover	2015		LC				A.3	-	L
Charadriiformes	Charadriidae	<i>Charadrius hiaticula</i>	Ringed Plover	2015		LC				B.3	-	L
Charadriiformes	Charadriidae	<i>Charadrius leschenaultii</i>	Greater Sandplover	2015		LC				A.2	-	L
Charadriiformes	Charadriidae	<i>Eudromias morinellus</i>	Dotterel	2015		LC			Ann I	B.3.1	-	L
Charadriiformes	Charadriidae	<i>Pluvialis apricaria</i>	Golden Plover	2015		LC			Ann I	B.4	-	L
Charadriiformes	Charadriidae	<i>Pluvialis squatarola</i>	Grey Plover	2015		LC				B.3	-	L
Charadriiformes	Glareolidae	<i>Glareola nordmanni</i>	Black-winged Praticole	2015		NT	Ann II		Ann I	A.2	-	L
Charadriiformes	Glareolidae	<i>Glareola pratincola</i>	Colored Praticole	2015		LC	Ann II		Ann I	A.3	-	L
Charadriiformes	Haematopodidae	<i>Haematopus ostralegus</i>	Oystercatcher	2015		NT	Ann II			A.3	-	L
Charadriiformes	Laridae	<i>Chlidonias hybrida</i>	Whiskered Tern	2015		LC	Ann II			A.4	-	L
Charadriiformes	Laridae	<i>Chlidonias leucopterus</i>	White winged Black Tern	2015		LC	Ann II			A.4	-	L
Charadriiformes	Laridae	<i>Chlidonias niger</i>	Black Tern	2015		LC	Ann II			A.3	-	L
Charadriiformes	Laridae	<i>Gelochelidon nilotica</i>	Gull-billed Tern	2015		LC	Ann II			A.4	-	L
Charadriiformes	Laridae	<i>Hydroprogne caspia</i>	Caspian Tern	2015		LC	Ann II			A.2	-	L

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Charadriiformes	Laridae	<i>Sterna albifrons</i>	Little Tern	2015		LC	Ann II			A.3.1	-	L
Charadriiformes	Laridae	<i>Sterna hirundo</i>	Common Tern	2015		LC	Ann II			A.3	-	L
Charadriiformes	Laridae	<i>Thalasseus sandvicensis</i>	Sandwich Tern	2015		LC				A.3	-	L
Charadriiformes	Recurvirostridae	<i>Himantopus himantopus</i>	Black-winged Stilt	2015		LC	Ann II		Ann I	A.3	-	L
Charadriiformes	Recurvirostridae	<i>Recurvirostra avosetta</i>	Avocet	2015		LC	Ann II		Ann I	A.4	-	L
Charadriiformes	Scolopacidae	<i>Actitis hypoleucos</i>	Common sandpiper	2009	--	LC	Ann II			A.3	O	L
Charadriiformes	Scolopacidae	<i>Arenaria interpres</i>	Ruddy Turnstone	2015		LC				B.3	-	L
Charadriiformes	Scolopacidae	<i>Calidris alba</i>	Sanderling	2015		LC	Ann II			B.3	-	L
Charadriiformes	Scolopacidae	<i>Calidris alpina</i>	Dunlin	2015		LC	Ann II			B.5	-	L
Charadriiformes	Scolopacidae	<i>Calidris falcinellus</i>	Broad-billed Sandpiper	2015		LC				B.3	-	L
Charadriiformes	Scolopacidae	<i>Calidris ferruginea</i>	Curlew Sandplover	2015		NT	Ann II			B.4	-	L
Charadriiformes	Scolopacidae	<i>Calidris minuta</i>	Little Stint	2015		LC	Ann II			B.5	-	L
Charadriiformes	Scolopacidae	<i>Calidris pugnax</i>	Ruff	2015		LC	Ann II			B.4	-	L
Charadriiformes	Scolopacidae	<i>Calidris temminckii</i>	Temminck's Stint	2015		LC				B.3	-	L
Charadriiformes	Scolopacidae	<i>Gallinago gallinago</i>	Snipe	2015		LC			Ann II	B.3.1	-	L
Charadriiformes	Scolopacidae	<i>Gallinula chloropus</i>	Moorhen	2015		LC				A.3.1	-	L
Charadriiformes	Scolopacidae	<i>Numenius arquata</i>	Curlew	2015		NT			Ann II	B.3	-	L

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Charadriiformes	Scolopacidae	<i>Numenius phaeopus</i>	Whimbrel	2015		LC			Ann II	B.1.2	-	L
Charadriiformes	Scolopacidae	<i>Numenius tenuirostris</i>	Slender-billed Curlew	2015		CR	Ann II	Ann II	Ann I	B.1.2	-	L
Charadriiformes	Scolopacidae	<i>Scolopax rusticola</i>	Eurasian Woodcock	2015		LC			Ann II	B.3	-	L
Charadriiformes	Scolopacidae	<i>Tringa erythropus</i>	Spotted Redshank	2015		LC				B.4	-	L
Charadriiformes	Scolopacidae	<i>Tringa glareola</i>	Wood Sandpiper	2015		LC	Ann II		Ann I	B.3	-	L
Charadriiformes	Scolopacidae	<i>Tringa nebularia</i>	Greenshank	2015		LC			Ann II	B.3.1	-	L
Charadriiformes	Scolopacidae	<i>Tringa ochropus</i>	Green Sandpiper	2015		LC	Ann II			B.2	-	L
Charadriiformes	Scolopacidae	<i>Tringa stagnatilis</i>	Marsh Sandpiper	2015		LC	Ann II			B.3	-	L
Charadriiformes	Scolopacidae	<i>Tringa totanus</i>	Redshank	2015		LC			Ann II	A.4	-	L
Ciconiiformes	Ardeidae	<i>Ardea cinerea</i>	Grey Heron	2015		LC				A.3.1	-	O
Ciconiiformes	Ardeidae	<i>Ardea purpurea</i>	Purple Heron	2015		LC	Ann III		Ann I	A.2	-	L
Ciconiiformes	Ardeidae	<i>Ardeola ralloides</i>	Suquacco Heron	2015		LC				A.3	-	L
Ciconiiformes	Ardeidae	<i>Botaurus stellaris</i>	Eurasian Bittern	2015		LC	Ann III		Ann I	A.2	-	L
Ciconiiformes	Ardeidae	<i>Bubulcus ibis</i>	Cattle egret	2015		LC	Ann III			A.2	-	L
Ciconiiformes	Ardeidae	<i>Egretta alba</i>	Great White Egret	2015		LC			Ann I	A.3	-	O
Ciconiiformes	Ardeidae	<i>Egretta garzetta</i>	Little egret	2015		LC	Ann III		Ann I	A.3.1	-	O

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Ciconiformes	Ardeidae	<i>Ixobrychus minutus</i>	Little Bittern	2015		LC			Ann I	A.2	-	L
Ciconiformes	Ardeidae	<i>Nycticorax nycticorax</i>	Night Heron	2015		LC			Ann I	A.3.1	-	L
Ciconiformes	Ciconidae	<i>Ciconia ciconia</i>	White Stork	2009	--	LC	Ann II		Ann I	A.3.1	O	L
Ciconiformes	Ciconidae	<i>Ciconia nigra</i>	Black Stork	2015		LC	Ann II	Ann II	Ann I	A.3	-	L
Ciconiformes	Threskiornithidae	<i>Platelea leucorodia</i>	Spoonbill	2015		LC	Ann II		Ann I	A.3	-	L
Ciconiformes	Threskiornithidae	<i>Plegadis falcinellus</i>	Glossy ibis	2015		LC	Ann II		Ann I	A.3.1	-	L
Columbiformes	Columbidae	<i>Columba livia</i>	Common Pigeon	2009; 2015	--	LC	Ann III		Ann II	A.5	O	O
Columbiformes	Columbidae	<i>Columba oenas</i>	Stock Dove	2015		LC				A.3.1	-	L
Columbiformes	Columbidae	<i>Columba palumbus</i>	Woodpigeon	2015		LC			Ann II	A.4	-	L
Columbiformes	Columbidae	<i>Streptopelia decaocto</i>	Collared Dove	2015		LC			Ann II	A.5	-	L
Columbiformes	Columbidae	<i>Streptopelia turtur</i>	European Turtle-dove	2009; 2015	--	LC	Ann III		Ann II	A.3.1	O	L
Coraciiformes	Alcedinidae	<i>Alcedo atthis</i>	Kingfisher	2015		LC	Ann II		Ann I	A.2	-	L
Coraciiformes	Meropidae	<i>Coracias garrulus</i>	European roller	2009	--	NT	Ann II		Ann I	A.2	O	L
Coraciiformes	Meropidae	<i>Merops apiaster</i>	European Bee-eater	2009; 2015	--	LC	Ann III			A.3.1	O	L
Coraciiformes	Upupidae	<i>Upupa epops</i>	Common Hoopoe	2009; 2015	--	LC	Ann II			A.2	O	L
Cuculiformes	Cuculidae	<i>Clamator glandarius</i>	Great Spotted Cuckoo	2015		LC	Ann II			A.1.2	-	L

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Cuculiformes	Cuculidae	<i>Cuculus canorus</i>	Common cuckoo	2009	--	LC	Ann II			A.2	O	L
Falconiformes	Accipitridae	<i>Accipiter brevipes</i>	Levant Sparrowhawk	2015		LC	Ann II	Ann II	Ann I	A.2	-	L
Falconiformes	Accipitridae	<i>Accipiter gentilis</i>	Goshawk	2015		LC	Ann II	Ann II		A.1.2	-	L
Falconiformes	Accipitridae	<i>Accipiter nisus</i>	Eurasian Sparrowhawk	2015		LC	Ann II	Ann II		A.3	-	L
Falconiformes	Accipitridae	<i>Aegypius monachus</i>	Black Vulture	2015		NT	Ann II	Ann II		A.2	-	L
Falconiformes	Accipitridae	<i>Aquila chrysaetos</i>	Golden eagle	2009	--	LC	Ann II	Ann II	Ann I	A.1.2	O	L
Falconiformes	Accipitridae	<i>Aquila heliaca</i>	Imperial Eagle	2015		VU	Ann II	Ann I	Ann I	A.1.2	-	L
Falconiformes	Accipitridae	<i>Aquila pomarina</i>	Lesser spotted eagle	2009	--	LC	Ann II	Ann II		A.3	O	L
Falconiformes	Accipitridae	<i>Aquila rapax</i>	Steppe Eagle	2015		LC	Ann II	Ann II		A.1.2	-	L
Falconiformes	Accipitridae	<i>Buteo buteo</i>	Buzzard	2009	--	LC	Ann II	Ann II		A.3	L	L
Falconiformes	Accipitridae	<i>Buteo buteo vulpinus</i>	Step Buzzard	2015		-	Ann II	Ann II		A.3	-	L
Falconiformes	Accipitridae	<i>Buteo lagopus</i>	Rough-legged Buzzard	2015		LC	Ann II	Ann II		A.1.2	-	L
Falconiformes	Accipitridae	<i>Buteo rufinus</i>	Long-legged Buzzard	2009; 2015	--	LC	Ann II	Ann II	Ann I	A.3	O	L
Falconiformes	Accipitridae	<i>Circaetus gallicus</i>	Short-toed Snake-eagle	2015		LC	Ann II	Ann II	Ann I	A.4	O	L
Falconiformes	Accipitridae	<i>Circus aeruginosus</i>	Marsh Harrier	2015		LC	Ann II	Ann II	Ann I	A.3	-	L
Falconiformes	Accipitridae	<i>Circus cyaneus</i>	Hen Harrier	2015		LC	Ann II	Ann II	Ann I	A.1.2	-	L

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Falconiformes	Accipitridae	<i>Circus macrourus</i>	Pallid Harrier	2015		NT	Ann II	Ann II	Ann I	A.1.2	-	L
Falconiformes	Accipitridae	<i>Circus pygargus</i>	Montagu's Harrier	2015		LC	Ann II	Ann II	Ann I	A.1.2	-	L
Falconiformes	Accipitridae	<i>Clanga clanga</i>	Greater Spotted Eagle	2015		VU	Ann II	Ann II		B.1.2	-	L
Falconiformes	Accipitridae	<i>Gyps fulvus</i>	Griffon Vulture	2015		LC	Ann II	Ann II	Ann I	A.2	-	L
Falconiformes	Accipitridae	<i>Hierraaetus pennatus</i>	Booted Eagle	2015		LC	Ann II	Ann II	Ann I	A.3	-	L
Falconiformes	Accipitridae	<i>Milvus migrans</i>	Black Kite	2009	—	LC	Ann II	Ann II	Ann I	A.3	O	L
Falconiformes	Accipitridae	<i>Neophron percnopterus</i>	Egyptian vulture	2009	--	EN	Ann II	Ann II	Ann I	A.3	O	L
Falconiformes	Accipitridae	<i>Otus scops</i>	Eurasian Scops Owl	2015		LC	Ann II	Ann II		A.2	-	L
Falconiformes	Accipitridae	<i>Pandion haliaetus</i>	Osprey	2015		LC	Ann II	Ann II		A.1.2	-	L
Falconiformes	Accipitridae	<i>Pernis apivorus</i>	Honey Buzzard	2015		LC	Ann II	Ann II		A.3	-	L
Falconiformes	Falconidae	<i>Falco biarmicus</i>	Lanner Falcon	2015		LC	Ann II	Ann II		A.2	-	L
Falconiformes	Falconidae	<i>Falco cherrug</i>	Saker Falcon	2015		EN	Ann II	Ann II	Ann I	A.1.2	-	L
Falconiformes	Falconidae	<i>Falco columbarius</i>	Merlin	2015		LC	Ann II	Ann II		B.1.2	-	L
Falconiformes	Falconidae	<i>Falco eleonora</i>	Eleonora's Falcon	2015		LC	Ann II	Ann II		A.1.2	-	L
Falconiformes	Falconidae	<i>Falco naumanni</i>	Lesser Kestrel	2015		LC	Ann II	Ann II	Ann I	A.2	-	L
Falconiformes	Falconidae	<i>Falco peregrinus</i>	Peregrine	2015		LC	Ann II	Ann I		A.1.2	-	L
Falconiformes	Falconidae	<i>Falco subbuteo</i>	Eurasian hobby	2009	--	LC	Ann II	Ann II		A.3.1	O	L
Falconiformes	Falconidae	<i>Falco tinnunculus</i>	Common Kestrel	2009; 2015	--	LC	Ann II	Ann II		A.2	O	L

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Falconiformes	Falconidae	<i>Falco vespertinus</i>	Red-footed Falcon	2015		NT	Ann II	Ann II		B.3	-	L
Galliformes	Phasianidae	<i>Perdix perdix</i>	Grey Partridge	2015		LC				A.2	-	L
Galliformes	Phasianidae	<i>Alectoris chukar</i>	Chukar	2015		LC	Ann III		Ann II/III	A.2	O	L
Galliformes	Phasianidae	<i>Coturnix coturnix</i>	Quail	2015		LC			Ann II	A.3	-	L
Gruiformes	Gruidae	<i>Grus grus</i>	Crane	2015		LC	Ann II		Ann I	A.3	-	L
Gruiformes	Rallidae	<i>Crex crex</i>	Corncrake	2015		LC	Ann II			A.1.2	-	L
Gruiformes	Rallidae	<i>Fulica atra</i>	Coot	2015		LC	Ann II		Ann II	A.5	-	L
Gruiformes	Rallidae	<i>Porphyrio porphyrio</i>	Purple Gallinule	2015		LC				A.1.2	-	L
Gruiformes	Rallidae	<i>Porzana porzana</i>	Spotted Crake	2015		LC	Ann II		Ann I	A.2	-	L
Gruiformes	Rallidae	<i>Rallus aquaticus</i>	Water Rail	2015		LC			Ann II	A.3	-	L
Gruiformes	Rallidae	<i>Zapornia parva</i>	Little Crake	2015		LC				A.1.2	-	L
Otidiformes	Otididae	<i>Otis tarda</i>	Great Bustard	2015		VU	Ann II	Ann II	Ann I	A.2	-	L
Otidiformes	Otididae	<i>Tetrax tetrax</i>	Little Bustard	2015		NT	Ann II	Ann II		A.2	-	L
Passeriformes	Acrocephalidae	<i>Hippolais icterina</i>	Icterine Warbler	2015		LC				A.3	-	L
Passeriformes	Acrocephalidae	<i>Hippolais olivetorum</i>	Olive-tree Warbler	2015		LC				A.2	-	L
Passeriformes	Acrocephalidae	<i>Hippolais pallida</i>	Olivaceous Warbler	2015		LC				A.3	-	L
Passeriformes	Aegithalidae	<i>Aegithalos caudatus</i>	Long-tailed Tit	2015		LC				A.2	-	L
Passeriformes	Alaudidae	<i>Alauda arvensis</i>	Skylark	2015		LC			Ann II	A.4	-	L

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Passeriformes	Alaudidae	<i>Calandrella brachydactyla</i>	Short-toed Lark	2015		LC	Ann II		Ann I	A.3	-	L
Passeriformes	Alaudidae	<i>Calandrella rufescens</i>	Lesser Short-toed Lark	2015		LC	Ann II			A.3	-	L
Passeriformes	Alaudidae	<i>Eremophila alpestris</i>	Horned Lark	2009; 2015	--	LC	Ann II			A.3.1	O	L
Passeriformes	Alaudidae	<i>Galerida cristata</i>	Crested Lark	2009; 2015	--	LC	Ann III			A.3	O	L
Passeriformes	Alaudidae	<i>Lullula arborea</i>	Wood Lark	2015		LC	Ann III		Ann I	A.3	O	L
Passeriformes	Alaudidae	<i>Melanocorypha bimaculata</i>	Bimaculated Lark	2015		LC	Ann II			A.3	-	L
Passeriformes	Alaudidae	<i>Melanocorypha calandra</i>	Calandra Lark	2015		LC	Ann II			A.5	-	L
Passeriformes	Alaudidae	<i>Melanocorypha calandra</i>	Calandra Lark	2015		LC	Ann II		Ann I	A.5	O	L
Passeriformes	Alaudidae	<i>Microcarbo pygmaeus</i>	Pygmy Cormorant	2015		LC				A.3.1	-	L
Passeriformes	Cettiidae	<i>Cettia cetti</i>	Cetti's Warbler	2015		LC				A.2	-	L
Passeriformes	Cisticolidae	<i>Cisticola juncidis</i>	Fan-tailed Warbler	2015		LC				A.2	-	L
Passeriformes	Cisticolidae	<i>Prinia gracilis</i>	Greceful Prinia	2015		LC				A.3	-	L
Passeriformes	Corvidae	<i>Corvus corax</i>	Raven	2015		LC				A.5	O	L
Passeriformes	Corvidae	<i>Corvus corone</i>	Carrion Crow	2009; 2015	--	LC	Ann III		Ann II	A.5	O	L
Passeriformes	Corvidae	<i>Corvus frugilegus</i>	Rook	2015		LC			Ann II	A.5	-	L

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Passeriformes	Corvidae	<i>Corvus monedula</i>	Eurasian Jackdaw	2015		LC			Ann II	A.5	-	L
Passeriformes	Corvidae	<i>Garrulus glandarius</i>	Eurasian Jay	2009; 2015	--	LC	Ann III		Ann II	A.3.1	O	L
Passeriformes	Corvidae	<i>Pica pica</i>	Magpie	2009; 2015	--	LC	Ann III		Ann II	A.5	O	O
Passeriformes	Corvidae	<i>Pyrrhocorax pyrrhocorax</i>	Chough	2015		LC	Ann III		Ann I	A.3	-	L
Passeriformes	Corvidae	<i>Pyrrhocorax graculus</i>	Alpine Chough	2015		LC	Ann III			A.3	-	L
Passeriformes	Emberizidae	<i>Emberiza caesia</i>	Cretzschmar's Bunting	2015		LC			Ann I	A.2	-	L
Passeriformes	Emberizidae	<i>Emberiza cia</i>	Rock Bunting	2015		LC	Ann II			A.2	-	L
Passeriformes	Emberizidae	<i>Emberiza cia</i>	Rock Bunting	2009; 2015	--	LC	Ann II			A.2	O	L
Passeriformes	Emberizidae	<i>Emberiza cineracea</i>	Cinereous Bunting	2015		LC	Ann II		Ann I	A.2	-	L
Passeriformes	Emberizidae	<i>Emberiza citrinella</i>	Yellowhammer	2009	--	LC	Ann II			A.2	O	L
Passeriformes	Emberizidae	<i>Emberiza hortulana</i>	Ortolan bunting	2009	--	LC	Ann III		Ann I	A.3	O	L
Passeriformes	Emberizidae	<i>Emberiza leucocephalos</i>	Pine Bunting	2015		LC	Ann II			B.1.2	-	L
Passeriformes	Emberizidae	<i>Emberiza melanocephala</i>	Black-headed Bunting	2009; 2015	--	LC	Ann II			A.4	O	L
Passeriformes	Emberizidae	<i>Emberiza pusilla</i>	Little Bunting	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Emberizidae	<i>Emberiza schoeniclus</i>	Reed Bunting	2015		LC	Ann II			A.3	-	L

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Passeriformes	Emberizidae	<i>Miliaria calandra</i>	Corn Bunting	2015		LC	Ann III			A.4	O	L
Passeriformes	Fringillidae	<i>Carduelis cannabina</i>	Linnet	2009; 2015	--	LC	Ann II			A.3	O	L
Passeriformes	Fringillidae	<i>Carduelis carduelis</i>	Goldfinch	2009; 2015	--	LC	Ann II			A.3.1	O	L
Passeriformes	Fringillidae	<i>Carduelis chloris</i>	European greenfinch	2009	--	LC	Ann II			A.3	O	L
Passeriformes	Fringillidae	<i>Carduelis flammea</i>	Common redpoll	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Fringillidae	<i>Carduelis flavirostris</i>	Twite	2015		LC	Ann II			A.3	-	L
Passeriformes	Fringillidae	<i>Carduelis spinus</i>	Eurasian siskin	2009	--	LC	Ann II			A.3	O	L
Passeriformes	Fringillidae	<i>Carpodacus erythrinus</i>	Common Rosefinch	2015		LC	Ann II			A.2	-	L
Passeriformes	Fringillidae	<i>Fringilla coelebs</i>	Chaffinch	2009; 2015	--	LC	Ann III		Ann I	A.4	O	L
Passeriformes	Fringillidae	<i>Fringilla montifringilla</i>	Brambling	2015		LC				A.3	-	L
Passeriformes	Fringillidae	<i>Rhodopechys obsoleta</i>	Desert Finch	2015		LC				A.3	-	L
Passeriformes	Fringillidae	<i>Rhodopechys sanguineus</i>	Crimson-winged Finch	2015		LC				A.3	-	L
Passeriformes	Fringillidae	<i>Serinus serinus</i>	Serin	2015		LC	Ann II			A.3	-	L
Passeriformes	Hirundinidae	<i>Delichon urbica</i>	Northern House-Martin	2009	--	LC	Ann II			A.3	O	L

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						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Passeriformes	Hirundinidae	<i>Hirundo rupestris</i>	Eurasian crag-martin	2009	--	LC	Ann II			A.5	O	L
Passeriformes	Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	2009; 2015	--	LC	Ann II			A.5	O	L
Passeriformes	Hirundinidae	<i>Riparia riparia</i>	Sand Martin	2015		LC	Ann II			A.5	-	L
Passeriformes	Laniidae	<i>Lanius collurio</i>	Red-backed Shrike	2009; 2015	--	LC	Ann II		Ann I	A.3	O	L
Passeriformes	Laniidae	<i>Lanius exubitor</i>	Great Grey Shrike	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Laniidae	<i>Lanius minor</i>	Lesser Grey Shrike	2015		LC	Ann II		Ann I	A.3	O	L
Passeriformes	Laniidae	<i>Lanius nubicus</i>	Masked Shrike	2015		LC	Ann II			A.2	-	L
Passeriformes	Laniidae	<i>Lanius senator</i>	Woodchat Shrike	2015		LC	Ann II			A.2	-	L
Passeriformes	Laniidae	<i>Larus cachinnans</i>	Herring Gull	2015		LC	Ann II		Ann II	A.4	-	L
Passeriformes	Laniidae	<i>Larus canus</i>	Common Gull	2015		LC	Ann II		Ann II	B.2	-	L
Passeriformes	Laniidae	<i>Larus fuscus</i>	Lesser Black-backed Gull	2015		LC	Ann III		Ann II	B.3	-	L
Passeriformes	Laniidae	<i>Larus genei</i>	Slender-billed Gull	2015		LC	Ann II			B.4	-	L
Passeriformes	Laniidae	<i>Larus melanocephalus</i>	Mediterranean Gull	2015		LC	Ann II			A.3.1	-	L
Passeriformes	Laniidae	<i>Larus minutus</i>	Little Gull	2015		LC	Ann II			B.3	-	L
Passeriformes	Laniidae	<i>Larus ridibundus</i>	Black-headed Gull	2015		LC	Ann II		Ann II	A.5	-	L
Passeriformes	Motacillidae	<i>Anthus campestris</i>	Tawny Pipit	2015		LC	Ann II		Ann I	A.2	-	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Passeriformes	Motacillidae	<i>Anthus cervinus</i>	Red-throated Pipit	2015		LC	Ann II			A.2	-	L
Passeriformes	Motacillidae	<i>Anthus pratensis</i>	Meadow Pipit	2015		NT	Ann II			A.3	-	L
Passeriformes	Motacillidae	<i>Anthus spinoletta</i>	Water Pipit	2015		LC	Ann II			A.3	O	L
Passeriformes	Motacillidae	<i>Anthus trivialis</i>	Tree Pipit	2015		LC	Ann II			A.3	-	L
Passeriformes	Motacillidae	<i>Motacilla alba</i>	White Wagtail	2009; 2015	--	LC	Ann II			A.3.1	O	L
Passeriformes	Motacillidae	<i>Motacilla cinerea</i>	Grey wagtail	2009	--	LC	Ann II			A.2	O	L
Passeriformes	Motacillidae	<i>Motacilla citreola</i>	Citrine wagtail	2015		LC	Ann II			A.2	-	L
Passeriformes	Motacillidae	<i>Motacilla flava</i>	Masked wagtail	2009	--	LC	Ann II			A.3	O	L
Passeriformes	Muscicapidae	<i>Ficedula albicollis</i>	Collared Flycatcher	2015		LC	Ann II		Ann I	A.2	-	L
Passeriformes	Muscicapidae	<i>Ficedula hypoleuca</i>	Pied Flycatcher	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Muscicapidae	<i>Ficedula parva</i>	Red-breasted Flycatcher	2015		LC	Ann II		Ann I	A.2	-	L
Passeriformes	Muscicapidae	<i>Irania gutturalis</i>	White-throated Robin	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Muscicapidae	<i>Muscicapa striata</i>	Spotted flycatcher	2009	--	LC	Ann II			A.3	O	L
Passeriformes	Oriolidae	<i>Oriolus oriolus</i>	Eurasian golden-oriole	2009	--	LC	Ann II			A.2	O	L
Passeriformes	Panuridae	<i>Panurus biarmicus</i>	Bearded Tit	2015		LC				A.3	-	L
Passeriformes	Paridae	<i>Parus ater</i>	Coal tit	2009	--	LC	Ann II			A.3	O	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Passeriformes	Paridae	<i>Parus caeruleus</i>	Blue Tit	2015		LC	Ann II			A.2	O	L
Passeriformes	Paridae	<i>Parus lugubris</i>	Sombre tit	2009	--	LC	Ann II			A.2	O	L
Passeriformes	Paridae	<i>Parus major</i>	Great Tit	2009; 2015	--	LC	Ann II			A.3.1	O	O
Passeriformes	Passeridae	<i>Montifringilla nivalis</i>	White-winged Snow Finch	2015		LC				A.2	-	L
Passeriformes	Passeridae	<i>Passer domesticus</i>	House Sparrow	2009; 2015	--	LC	Ann III			A.5	O	O
Passeriformes	Passeridae	<i>Passer hispaniolensis</i>	Spanish Sparrow	2015		LC				A.3	-	L
Passeriformes	Passeridae	<i>Passer moabiticus</i>	Dead Sea Sparrow	2015		LC				A.2	-	L
Passeriformes	Passeridae	<i>Passer montanus</i>	Eurasian tree sparrow	2009	--	LC	Ann III			A.3	O	L
Passeriformes	Passeridae	<i>Petronia petronia</i>	Rock Sparrow	2015		LC	Ann II			A.3	O	L
Passeriformes	Phylloscopidae	<i>Phylloscopidae</i>	Bonelli's Warbler	2015		LC				A.2	-	L
Passeriformes	Phylloscopidae	<i>Phylloscopus trochilus</i>	Willow Warbler	2015		LC				A.3.1	-	L
Passeriformes	Regulidae	<i>Regulus regulus</i>	Golderest	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Remizidae	<i>Remiz pendulinus</i>	Eurasian Penduline-tit	2015		LC				A.2	-	L
Passeriformes	Scolopacidae	<i>Limosa lapponica</i>	Bar-tailed Godwit	2015		NT				A.3	-	L
Passeriformes	Scolopacidae	<i>Limosa limosa</i>	Black-tailed Godwit	2015		NT				B.4	-	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Passeriformes	Scolopacidae	<i>Phalaropus lobatus</i>	Red-necked Phalarope	2015		LC				B.3.1	-	L
Passeriformes	Scolopacidae	<i>Phoenicopterus roseus</i>	Greater Flamingo	2015		LC				A.3.1	-	L
Passeriformes	Sittidae	<i>Sitta europaea</i>	Wood Nuthatch	2009; 2015	--	LC	Ann II			A.3	O	L
Passeriformes	Sittidae	<i>Sitta krueperi</i>	Kriper's Nuthatch	2015		LC	Ann II		Ann I	A.2	-	L
Passeriformes	Sittidae	<i>Sitta neumayer</i>	Western Rock Nuthatch	2015		LC	Ann II			A.2	-	L
Passeriformes	Sturnidae	<i>Sturnus roseus</i>	Rose-coloured Starling	2015		LC				A.4	-	L
Passeriformes	Sturnidae	<i>Sturnus vulgaris</i>	Starling	2015		LC	Ann III		Ann II	A.5	O	L
Passeriformes	Sylviidae	<i>Acrocephalus arundinaceus</i>	Great Reed Warbler	2015		LC	Ann II			A.3	-	L
Passeriformes	Sylviidae	<i>Acrocephalus melanopogon</i>	Moustached Warbler	2015		LC	Ann II			A.2	-	L
Passeriformes	Sylviidae	<i>Acrocephalus paludicola</i>	Aquatic Warbler	2015		VU	Ann II			A.1.2	-	L
Passeriformes	Sylviidae	<i>Acrocephalus palustris</i>	Marsh Warbler	2015		LC	Ann II			A.3	-	L
Passeriformes	Sylviidae	<i>Acrocephalus schoenobaenus</i>	Sedge Warbler	2015		LC	Ann II			A.2	-	L
Passeriformes	Sylviidae	<i>Acrocephalus scirpaceus</i>	Reed Warbler	2015		LC	Ann II			A.2	-	L
Passeriformes	Sylviidae	<i>Phylloscopus collybita</i>	Common Chiffchaff	2015		LC	Ann II			A.3.1	O	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Passeriformes	Sylviidae	<i>Phylloscopus sibilatrix</i>	Wood warbler	2009	--	LC	Ann II			A.2	O	L
Passeriformes	Sylviidae	<i>Sylvia atricapilla</i>	Blackcap	2009	--	LC	Ann II			A.2	O	L
Passeriformes	Sylviidae	<i>Sylvia borin</i>	Garden Warbler	2015		LC	Ann II			B.3	-	L
Passeriformes	Sylviidae	<i>Sylvia communis</i>	Common whitethroat	2009	--	LC	Ann II			A.3	L	L
Passeriformes	Sylviidae	<i>Sylvia conspicillata</i>	Spectacled Warbler	2015		LC	Ann II			A.1.2	O	L
Passeriformes	Sylviidae	<i>Sylvia curruca</i>	Lesser Whitethroat	2015		LC	Ann II			A.2	-	L
Passeriformes	Sylviidae	<i>Sylvia melanocephala</i>	Sardinian Warbler	2015		LC	Ann II			A.3	-	L
Passeriformes	Sylviidae	<i>Sylvia nisoria</i>	Barred Warbler	2015		LC	Ann II			A.2	-	L
Passeriformes	Troglodytidae	<i>Thryomanes bewickii</i>	Bewick's Wren	2015		LC				A.1.2	-	L
Passeriformes	Troglodytidae	<i>Troglodytes troglodytes</i>	Winter Wren	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Turdidae	<i>Erithacus rubecula</i>	European Robin	2009; 2015	--	LC	Ann II			A.3	O	L
Passeriformes	Turdidae	<i>Erythropygia galactotes</i>	Rufous bush chats	2009	--	LC	Ann III			A.3	O	L
Passeriformes	Turdidae	<i>Luscinia megarhynchos</i>	Nightingale	2015		LC	Ann II			A.2	O	L
Passeriformes	Turdidae	<i>Luscinia svecica svecica</i>	Red-spotted Bluethroat	2015		-	Ann II			-	-	L
Passeriformes	Turdidae	<i>Monticola saxatilis</i>	Rufous-tailed Rock-thrush	2015		LC	Ann II			A.1.2	O	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Passeriformes	Turdidae	<i>Monticola solitarius</i>	Blue Rock Thrush	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Turdidae	<i>Oenanthe isabellina</i>	Isabelline Wheatear	2015		LC	Ann II			A.3	O	L
Passeriformes	Turdidae	<i>Oenanthe finschii</i>	Finsch's Wheatear	2015		LC				A.1.2	-	L
Passeriformes	Turdidae	<i>Oenanthe hispanica</i>	Black-eared Wheatear	2015		LC	Ann II			A.2	-	L
Passeriformes	Turdidae	<i>Oenanthe oenanthe</i>	Northern Wheatear	2009; 2015	--	LC	Ann III			A.3	O	L
Passeriformes	Turdidae	<i>Oenanthe pleschanka</i>	Pied Wheatear	2015		LC	Ann II			A.1.2	-	L
Passeriformes	Turdidae	<i>Phoenicurus ochruros</i>	Black Redstart	2009; 2015	--	LC	Ann II			A.2	O	L
Passeriformes	Turdidae	<i>Phoenicurus phoenicurus</i>	Common redstart	2009	--	LC	Ann II			A.3	O	L
Passeriformes	Turdidae	<i>Saxicola rubetra</i>	Whinchat	2015		LC	Ann II			A.3	-	L
Passeriformes	Turdidae	<i>Saxicola torquatus</i>	Common Stonechat	2015		LC	Ann II			A.3	O	L
Passeriformes	Turdidae	<i>Turdus merula</i>	Eurasian Blackbird	2009; 2015	--	LC	Ann II		Ann II/III	A.3	O	O
Passeriformes	Turdidae	<i>Turdus philomelos</i>	Song Thrush	2015		LC				A.2	-	L
Passeriformes	Turdidae	<i>Turdus pilaris</i>	Fieldfare	2015		LC	Ann II		Ann II	B.2	O	L
Passeriformes	Turdidae	<i>Turdus viscivorus</i>	Mistle thrush	2009	--	LC	Ann III			A.2	O	L
Pelecaniformes	Locustellidae	<i>Locustella fluviatilis</i>	River Warbler	2015		LC				A.1.2	-	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Power line
Pelecaniformes	Locustellidae	<i>Locustella luscinioides</i>	Savi's Warbler	2015		LC				A.2	-	L
Pelecaniformes	Pelecanidae	<i>Pelecanus crispus</i>	Dalmatian Pelican	2015		VU	Ann II	Ann I	Ann I	A.3	-	L
Pelecaniformes	Pelecanidae	<i>Pelecanus onocrotalus</i>	White Pelican	2015		LC	Ann II			A.3	-	L
Piciformes	Picidae	<i>Dendrocopos major</i>	Great Spotted Woodpecker	2015		LC	Ann II			A.3	-	L
Piciformes	Picidae	<i>Dendrocopos minor</i>	Lesser Spotted Woodpecker	2015		LC	Ann II			A.1.2	-	L
Piciformes	Picidae	<i>Dendrocopos syriacus</i>	Syrian Woodpecker	2009; 2015	--	LC	Ann II		Ann I	A.2	O	L
Piciformes	Picidae	<i>Jynx torquilla</i>	Eurasian Wryneck	2015		LC	Ann II			A.1.2	-	L
Podicipediformes	Podicipedidae	<i>Podiceps cristatus</i>	Great Crested Grebe	2015		LC	Ann II			A.5	-	L
Podicipediformes	Podicipedidae	<i>Podiceps grisegena</i>	Red-necked Grebe	2015		LC	Ann II			A.3	-	L
Podicipediformes	Podicipedidae	<i>Podiceps migricollis</i>	Black-necked Grebe	2015		LC	Ann II			A.4	-	L
Podicipediformes	Podicipedidae	<i>Tachybaptus ruficollis</i>	Little Grebe	2015		LC	Ann II			A.3.1	-	L
Podicipediformes	Podicipedidae	<i>Tachymarptis melba</i>	Alpine Swift	2015		LC	Ann II			A.3.1	-	L
Prunellidae	Prunellidae	<i>Prunella modularis</i>	Dunnock	2015		LC				A.1.2	-	L
Prunellidae	Prunellidae	<i>Prunella ocularis</i>	Radde's Accentor	2015		LC				A.2	-	L
Pterocliiformes	Pteroclididae	<i>Pterocles orientalis</i>	Black-bellied Sandgrouse	2015		LC				A.3	-	L

Order	Family	Species	English name	Info Source	End.	International Threat Categories				National Threat Categories	Obs. / Liter. data	
						IUCN	BERN	CITES	Bird Dir.		Min e site	Powe r line
Strigiformes	Strigidae	<i>Asio flammeus</i>	Short-eared Owl	2015		LC	Ann II	Ann II	Ann I	A.1.2	-	L
Strigiformes	Strigidae	<i>Asio otus</i>	Long-eared Owl	2015		LC	Ann II	Ann II		A.2	-	L
Strigiformes	Strigidae	<i>Athene noctua</i>	Little owl	2009	--	LC	Ann II	Ann II		A.2	O	L
Strigiformes	Strigidae	<i>Bubo bubo</i>	Eurasian Eagle Owl	2015		LC	Ann II	Ann II	Ann I	A.1.2	-	L
Strigiformes	Strigidae	<i>Strix aluco</i>	Tawny Owl	2015		LC	Ann II	Ann II		A.2	-	L
Strigiformes	Tytonidae	<i>Tyto alba</i>	Barn Owl	2015		LC	Ann II	Ann II		A.1.2	-	L
Suliformes	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	Cormorant	2015		LC	Ann II	Ann II		A.3	-	L

8.5.4 Mammals

On the basis of the literature review and the field surveys performed in the LSAs a total of 25 mammal species were identified and are listed in Table 8-9. The presence of all these species apart from three was confirmed by field studies and they were observed within the LSAs.

The mammals identified primarily comprise small mammals such as rodents (12), bats (4) and one species of hedgehog, however medium and large-size mammals such as European hare, wild boar, stone marten (Figure 8-11), golden jackal (Figure 8-10) and red fox (Figure 8-9) were also observed within the LSA. The presence of the carnivores such as the Eurasian Badger, the Least Weasel and the Gray Wolf is also possible based on the literature review.

All the species identified are considered LC by IUCN at global level with the exception of the Anatolian ground squirrel (*Spermophilus xanthoprymnus*) (Figure 8-12) listed as near threatened due to population declines estimated at 20-25% over the last ten years as a result of habitat conversion for agriculture, especially in central Anatolia. This species is a widespread endemic distributed in Anatolian Turkey and extending marginally into Armenia and Iran.

The two mole rat species, *Nannospalax ehrenbergi* and *Nannospalax nehringi*, are listed as DD (data deficient) because of taxonomic problems. If after taxonomic revision the taxon is split into several different species, some of these may warrant listing as threatened.

Figure 8-9: Red fox (*Vulpes vulpes*) from camera trap



Figure 8-10: Golden Jackal (*Canis aureus*) from camera trap

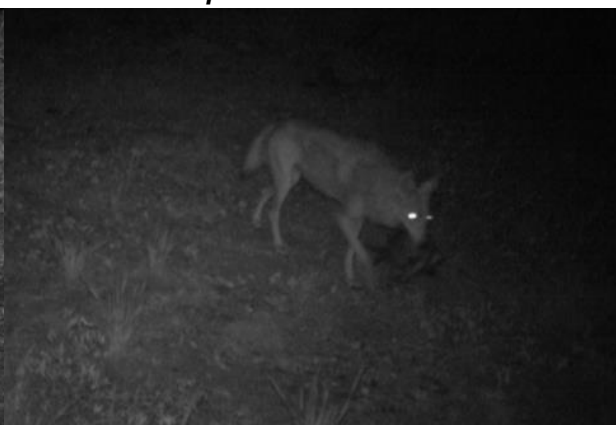


Figure 8-11: Stone marten (*Martes foina*) from camera trap



Figure 8-12: Anatolian ground squirrel (*Spermophilus xanthophyrmnus*)



Table 8-9: Mammal Species Present Within the LSAs

Order	Family	Species	Info Source	English name	End.	International Threat Categories				National Threat Categories		Observ. / Literat. data	
						IUCN	BERN	CITES	Habitat Dir.	CHC	Red List	Mine site	Power line
Rodentia	Cricetidae	<i>Cricetulus migratorius</i>	2009	Grey hamster		LC	--			--		L	L
Rodentia	Cricetidae	<i>Microtus levis</i>	2015	East European Vole		LC				Ann I	I	O	L
Rodentia	Gliridae	<i>Dryomys nitedula</i>	2009	Forest dormice		LC	Ann III			Ann I		O	L
Rodentia	Muridae	<i>Apodemus flavicollis</i>	2009; 2015	Yellow-necked Field Mouse		LC				Ann I	nt	O	L
Rodentia	Muridae	<i>Apodemus mystacinus</i>	2015	Eastern Broad-toothed Field Mouse		LC				Ann I	nt	O	L
Rodentia	Muridae	<i>Chionomys nivalis</i>	2009	Snow vole		LC	Ann III			--		O	L
Rodentia	Muridae	<i>Mus macedonicus</i>	2015	Macedonian Mouse		LC						O	L
Rodentia	Sciuridae	<i>Sciurus vulgaris</i>	2009	Eurasian red squirrel		LC	Ann II			Ann I		O	L
Rodentia	Sciuridae	<i>Spermophilus xanthoprimum</i>	2009; 2015	Asia Minor Ground Squirrel	Widespread	NT				Ann I	nt	O	O
Rodentia	Soricidae	<i>Crocidura leucodon</i>	2009	Bicoloured White-toothed Shrew		LC	Ann III			--		O	L
Rodentia	Spalacidae	<i>Nannospalax ehrenbergi</i>	2015	Palestine Mole Rat		DD				Ann I	nt	O	L
Rodentia	Spalacidae	<i>Nannospalax nehringi</i>	2009	Nehring's blind mole		DD	--			--		O	L

Order	Family	Species	Info Source	English name	End.	International Threat Categories				National Threat Categories		Observ. / Literat. data	
						IUCN	BERN	CITES	Habitat Dir.	CHC	Red List	Mine site	Power line
Eulipotyphla	Erinaceidae	<i>Erinaceus concolor</i>	2009; 2015	Southern White-breasted Hedgehog		LC				Ann I	nt	O	O
Chiroptera	Rhinolophidae	<i>Rhinolophus ferrumequinum</i>	2009	Greater Horseshoe Bat		LC	Ann II			Ann I		O	O
Chiroptera	Rhinolophidae	<i>Rhinolophus hipposideros</i>	2009	Lesser Horseshoe Bat		LC	Ann II			Ann I		O	O
Chiroptera	Vespertilionidae	<i>Myotis myotis</i>	2015	Greater Mouse-eared Myotis		LC	Ann II		Ann II	Ann I	V	O	O
Chiroptera	Vespertilionidae	<i>Pipistrellus pipistrellus</i>	2009; 2015	Common Pipistrelle		LC	Ann III			Ann I	V	O	O
Lagomorpha	Leporidae	<i>Lepus europaeus</i>	2015	European Hare		LC				Ann III	nt	O	O
Artiodactyla	Suidae	<i>Sus scrofa</i>	2015	Wild Boar		LC	Ann III			Ann III	nt	O	L
Carnivora	Canidae	<i>Canis aureus</i>	2015	Golden Jackal		LC	-	Ann III	Ann II/IV /V	Ann I	nt	O	L
Carnivora	Canidae	<i>Canis lupus</i>	2009; 2015	Gray Wolf		LC	Ann II	Ann II	EK II/IV /V	Ann I	R (V)	L	L
Carnivora	Canidae	<i>Vulpes vulpes</i>	2009; 2015	Red Fox		LC		Ann III	Ann III	Ann III	nt	O	L
Carnivora	Mustelidae	<i>Martes foina</i>	2015	Stone Marten		LC	Ann III	Ann III		Ann III	nt	O	L

Order	Family	Species	Info Source	English name	End.	International Threat Categories				National Threat Categories		Observ. / Literat. data	
						IUCN	BERN	CITES	Habitat Dir.	CHC	Red List	Mine site	Power line
Carnivora	Mustelidae	<i>Meles meles</i>	2009	Eurasian badger,		LC	Ann III			Ann II		L	L
Carnivora	Mustelidae	<i>Mustela nivalis</i>	2009	Least Weasel		LC	Ann III			--		L	L

8.6 Baseline - Habitats

The LSA falls within the “Central Anatolia deciduous tree-steppes” ecoregion (PA0410) characterized by a mosaic of steppe and patches of woodlands. In general, at higher elevations the main formation of the ecoregion is montane steppe, lowlands and some other microtopographies support patches of woodlands, dominated by oak species.

The region where the Project is located has semi-arid territorial climate characteristic. Summers are hot and dry, winters are cold and rainy. The annual mean amount of precipitation is 416.4 mm. Mountains and extreme continental climate determine the characteristics of the ecoregion.

Although forests represent the primary natural vegetation type, this region is often referred to as “anthropogenic steppe” because it has lost most of its woody cover due to firewood cutting and cattle overgrazing. In general, the principal threats to this ecoregion are posed by diversion of the water resources, conversion to agriculture and overgrazing.

The habitat map (Figure 8-13) of the LSAs is based on EUNIS habitat classification and was developed combining the information deriving from literature review, fieldwork and desktop study. The habitats found within the LSA can be defined as modified, semi-natural and natural habitats.

Modified habitats are mainly found at lower elevations on plains and valley bottoms and are defined according EUNIS as:

- agricultural habitats:
 - I1.13 - Small-scale intensive unmixed crops
- artificial habitats:
 - J1.2 - Residential buildings of villages and urban periphery
 - J4 -Transport networks and other constructed hard-surfaced areas
 - J5.4 – Highly artificial, non-saline running waters

Semi-natural and natural habitats are defined based on the presence of significant anthropogenic disturbances such as grazing and presence of artificial structures. All the areas present within the LSA showed signs of anthropogenic pressure, and of cattle grazing in particular. Although it is difficult to draw a neat border, the disturbance is higher at lower elevations and in the vicinity of villages.

These habitats defined according to EUNIS classification can be grouped as follows:

- aquatic habitats:
 - C1.2 - Permanent mesotrophic lakes, ponds and pools
 - C1.3 - Permanent eutrophic lakes, ponds and pools
 - C2.5 - Temporary running waters
- Wetlands:
 - D6.2 - Inland saline or brackish species-poor helophyte beds
- grassland habitats:
 - E1.2E - Perennial calcareous grassland and basic steppes
- woodland habitats:
 - G1.7A.2 - Irano-Anatolian steppe [*Quercus*] woods
- rocky habitats:
 - H2.2 - Cold limestone screes

Figure 8-13: Map of the habitat types found within the LSAs according to EUNIS classification

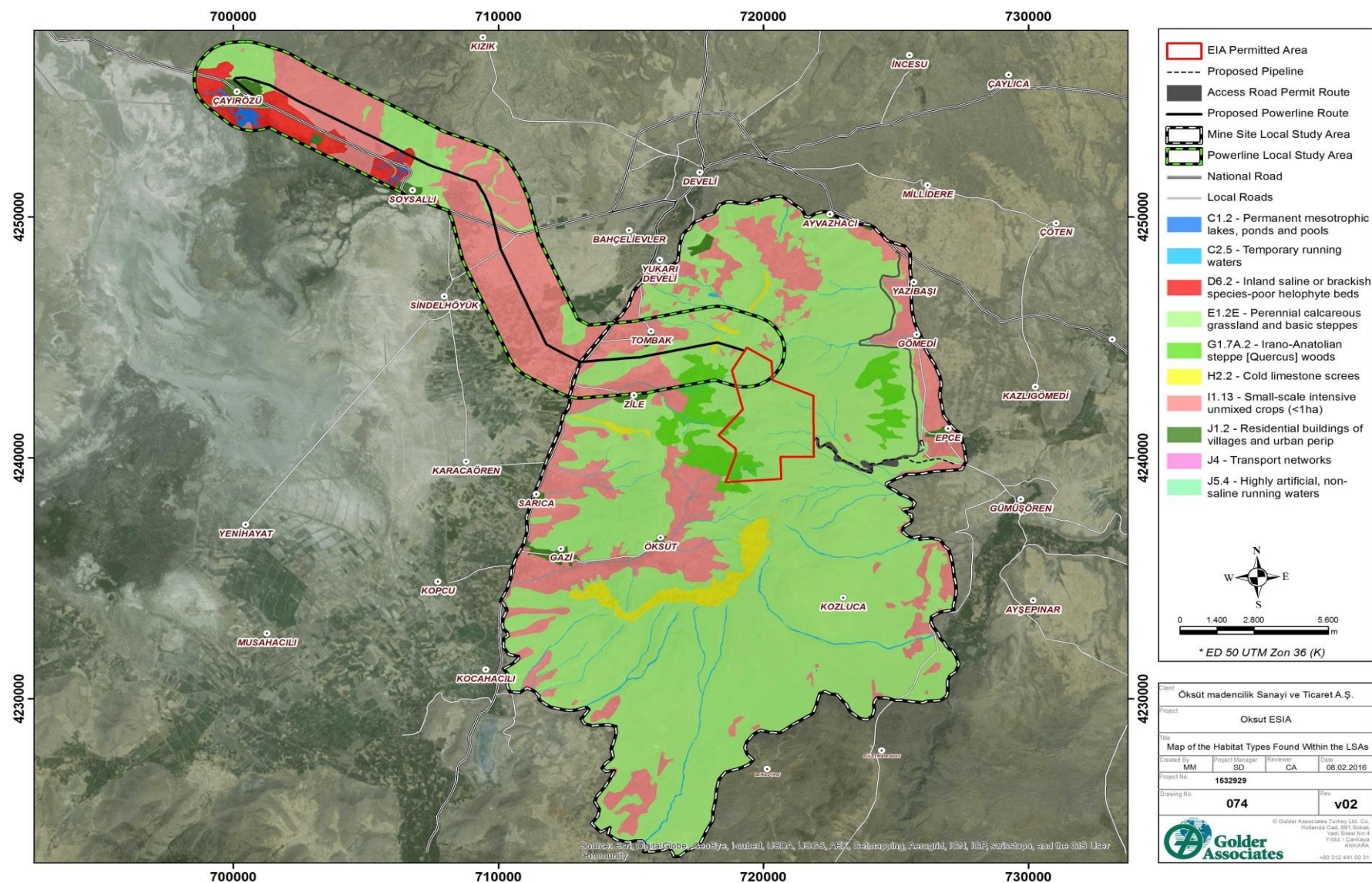


Table 8-10 shows the habitat types found within the LSAs and their respective extension and cover percentage for the mine site LSA, the powerline LSA and the total area.

Table 8-10: Habitat Types Found Within the LSAs, EUNIS Classification

EUNIS Code	EUNIS Description	mine site LSA		Powerline LSA		Total Area	
		ha	%	ha	%	ha	%
<u>Natural and semi natural habitats</u>							
C1.2	Permanent mesotrophic lakes, ponds and pools	0.1	<1	104.81	1	104.91	<1
C2.5	Temporary running waters	426.4	1	16.32	<1	426.4	1
D6.2	Inland saline or brackish species-poor helophyte beds	-	-	766.13	9	766.13	2
E1.2E	Perennial calcareous grassland and basic steppes	22811.12	73	2400.72	29	23961.91	64
G1.7A.2	Irano-Anatolian steppe [Quercus] woods	1137.75	4	135.22	2	1137.75	3
H2.2	Cold limestone screes	680.45	2	30.1	<1	680.45	2
Total natural and semi natural habitats		25055.82	80	3453.3	41	27077.55	72
<u>Modified habitats</u>							
I1.13	Small-scale intensive unmixed crops (<1 ha)	5842.17	19	4642.7	56	9744.28	26
J1.2	Residential buildings of villages and urban periphery	291.92	1	200.34	2	472.96	1
J4	Transport networks and other constructed hard-surfaced areas	0.49	<1	29.34	<1	29.82	<1
J5.4	Highly artificial, non-saline running waters	-	-	27.74	<1	27.74	<1
Total modified habitats		6134,58	20	4900.12	59	10274.8	28
TOTAL		31190,4	100	8353,42	100	37352,35	100

In the **mine site LSA** natural habitats and semi natural habitats cover around 80% of the area. The main habitat category is steppe grassland (E1.2E, 73%), followed by Quercus woods (G1.7A.2, 4%), screes (H2.2, 2%), temporary streams (C2.5, 1%) and permanent ponds (C1.2, <1%). Although these areas are impacted by grazing and firewood cutting the flora is rich and includes many endemic species. Two of those species are priority biodiversity features (PBF) and two determine critical habitat (CH). The Common tortoise (*Testudo graeca*) defined as a priority biodiversity feature (PBF) is also present in the area. Most of the modified habitat within the mine site LSA is small scale agricultural land (C1.2, 19%), followed by villages (J1.2, 1%) and roads (J4, <1%). These structures are mainly located at lower elevations at the bottom of the valleys.

In the **powerline LSA** semi natural habitats cover around 41% of the area. The main habitat category is steppe grassland (E1.2E, 29%), followed by helophyte grasslands (D6.2, 9%), Quercus woods (G1.7A.2, 2%), permanent ponds (C1.2, 1%), screes (H2.2, <1%) and temporary streams (C2.5, <1%). Modified habitats dominate most of the powerline LSA (59%). The main type is small scale agricultural land (C1.2, 56%), followed by villages (J1.2, 1%) roads (J4, <1%) and channels (J5.4, J5.4). Although dominated by modified habitat the powerline LSA has a quite diverse fauna community, especially of bird species, owing to the vicinity of the area with the Sultan Sazlığı Wetland. The presence of the Common tortoise (*Testudo graeca*) defined as a priority biodiversity features (PBF) is also possible along the agricultural and semi-natural habitats present along the powerline LSA.

A description of the main characteristics for each of the natural and semi-natural habitat types found within the LSAs is given below.

Aquatic Habitats

“Permanent mesotrophic lakes, ponds and pools” (C1.2) (Figure 8-14) habitat type is characterized by lakes and pools, both natural and manmade, provided that they contain semi natural aquatic communities, with waters fairly rich in nutrients (nitrogen and phosphorus) and dissolved bases (pH often 6-7). Many unpolluted lowland lakes and ponds are naturally mesotrophic. They support dense beds of macrophytes, which are absent in polluted waters.

Most of the “Permanent mesotrophic lakes, ponds and pools” (C1.2) are located in Sultan Sazlığı KBA of the south-western portion of the powerline LSA. A few man made pools for cattle large enough to be mapped were also observed within the mine site LSA at lower elevations. This habitats were characterized by abundant macrophytes including free-floating species such as duckweed (*Lemna* spp., *Spirodela* spp., *Wolffia* spp.) and *Hydrocharis morsus-ranae*, or rooted aquatic plants such as the submerged *Potamogeton* spp., *Ceratophyllum submersum*, *Elodea canadensis*, and the floating *Nuphar lutea*, *Trapa natans*, *Ranunculus* spp. These open water habitats are often fringed by reedbeds (*Phragmites australis*) interspersed with expanses of *Typha latifolia*, *Juncus* spp. and *Carex* spp.

Although all the areas identifies are artificially built and/or maintained and impacted by anthropogenic activities such as cattle trampling/grazing and reed cutting, they are characterized by natural vegetation and seems to have a good ecosystem functionality. Therefore they can be considered as semi-natural habitats. A few water bodies situated close to the villages along the powerline LSA showed signs of heavy organic pollution probably due to farming or sewage discharge.

“Temporary running waters” (C2.5) (Figure 8-16) were identified within the Develi mountain range. These temporary streams hold water for a very short time in correspondence of snow melt or heavy precipitation; therefore they do not support aquatic communities.

At higher elevations these temporary streams cut deep narrow valleys and they can be considered natural habitats. Sparse riparian vegetation, such as *Salix* sp. *Juncus inflexus*, *Scirpoides holoschoenus* and *Mentha longifolia*, can be found along their rocky banks.

At lower elevations these temporary streams cross lower flatlands characterized by agriculture and are sometimes surrounded by narrow zones of vegetation mostly composed of poplar plantation and tree orchards. In this case the habitat can be considered semi-natural or even modified if they become completely channelled

Wetlands

Inland saline or brackish species-poor helophyte beds (D6.2) (Figure 8-17) normally without free-standing water surrounds the Sultan Sazlığı Wetland in the south-western portion of the powerline LSA.

The salt, deriving from high evaporation rate of shallow open water, forms white saline deposit on the soil. The vegetation communities that can grow in this environment are very poor and the vegetation is sparse. Characteristic species are *Phragmites australis* and *Cyperus* spp. These areas are inundated during at least part of the rainy season.

In the powerline LSA this habitat type is situated close to the villages and anthropogenic disturbances, such as cattle trampling/grazing and abandoned agricultural fields, are evident. Within the powerline LSA this habitat can be considered semi-natural.

Grassland Habitats

The “Perennial calcareous grassland and basic steppes” (E1.2E) (Figure 8-18) occupied most of the mine site LSA and the eastern portion of the powerline LSA. This habitat is considered secondary vegetation for this ecoregion. Forests represent the primary natural vegetation type, although most of the original woodland is now lost due to firewood cutting and cattle overgrazing.

The main grassland plant community observed within the LSA is the “*Festuca valesiaca*- *Astragalus microcephalus* Community”. The dominant species of the community are *Festuca valesiaca*, *Phlomis*

capitata, *Bromus tomentellus*, *Cirsium lappaceum*, *Astragalus microcephalus*, *Thymus sipyleus*, *Daphne oleoides*, *Marrubium parviflorum*, *Stipa lessingiana*, *Stipa holosericea*, *Asphodeline damascena*, subsp. *damascena*, and *Acantholimon acerosum*. The three endemic threatened flora species (*Astragalus vestitus* ssp. nov., *Cirsium aytatchii* and *Campanula stricta* var. *aladagensis*) are also found within this habitat type.

At present the grasslands within the LSAs are used as grazing lands. At lower elevations and near settlements the grazing pressure is quite intense and the vegetation communities are poor. However, above 1600-2000 m the vegetation is in general well-developed and diverse with a rich floristic composition and a good presence of endemic species. These steppes can be considered semi-natural habitat subject to different levels of grazing pressures.

This habitat is included at a higher level (E1.2 - Perennial calcareous grassland and basic steppes) in the revised list of endangered natural habitat types according to Resolution 4 of the *Bern Convention*.

Woodland Habitats

“Irano-Anatolian steppe [*Quercus*] woods” (G1.7A.2) (Figure 8-19) are present in the Develi mountain range LSA from about 1500 m to 1800 m. These areas are residual patches of a habitat that originally covered the majority of the LSAs and was lost due to firewood cutting and cattle overgrazing.

Dominant species of this deciduous woodland in the LSAs are *Quercus pubescens*, *Quercus cerris* and *Quercus petraea* subsp. *pinnatifida*. The sub-forest flora is composed of species like *Orchis tridentata*, *Comperia comperian*, and *Cephalanthera damasonium*. Two endemic threatened flora species (*Astragalus vestitus* ssp. nov. and *Verbascum luridiflorum*) are also found within this habitat type.

In most of the areas the trees are small and not very dense. This could be a result of excessive grazing pressure, soil erosion and firewood cutting activities. These woodlands can be considered semi-natural undergoing different levels of the anthropogenic pressures.

This habitat is included at higher level (G1.7- Thermophilous deciduous woodland) in the revised list of endangered natural habitat types according to Resolution 4 of the *Bern Convention*. Moreover it is also listed within the EU *Habitat Directive* as 9110 “Euro-Siberian steppic woods with *Quercus* sp”.

Rocky Habitats

“Cold limestone screes” (H2.2) (Figure 8-15) are present within the entire Develi mountain range, in particular at higher elevations. Only the main rocky outcrops were mapped, many more patches of this habitat are present, mainly sparse within high steppe vegetation.

Rocky vegetation identified within the LSAs is often dominant by species such as *Campanula cymbalaria*, *Phryna ortegoides* and *Campanula argaea*. The threatened species *Campanula stricta* var. *aladagensis* is also grows in the rocky habitats of the LSAs.

The anthropogenic pressure on these habitats is very low or absent considering the elevation and the access difficult, therefore it can be classified as a natural habitat.

Figure 8-14: Permanent mesotrophic lakes, ponds and pools (C1.2)



Figure 8-15: Cold limestone screes (H2.2)



Figure 8-16: Temporary running waters (C2.5)



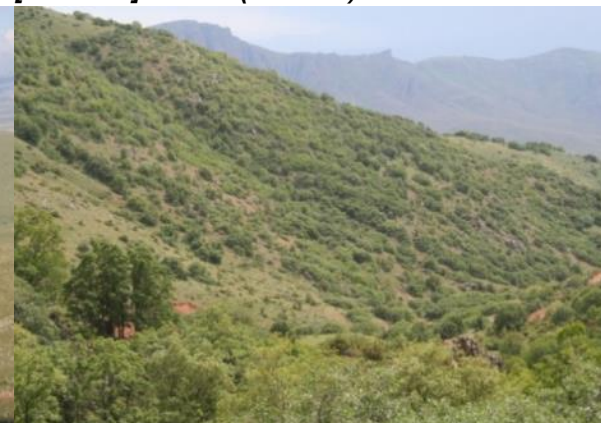
Figure 8-17: Inland saline or brackish species-poor helophyte beds (D6.2)



Figure 8-18: Perennial calcareous grassland and basic steppes (E1.2E)



Figure 8-19: Irano-Anatolian steppe [Quercus] woods (G1.7A.2)



The main characteristics of the main natural and seminatural habitats types are summarized in Table 8-11 below, the corresponding Annex I habitat type (EU *Habitats Directive*) is also shown.

Table 8-11: Semi-natural and Natural Habitat Types Within the LSAs

EUNIS Code	EUNIS Description	Vegetation Description	Habitat Natura 2000	Semi-natural and Natural Habitat
C1.2	Permanent mesotrophic lakes, ponds and pools	<ul style="list-style-type: none"> lakes and pools with waters fairly rich in nutrients (nitrogen and phosphorus) and dissolved bases; built and/or maintained and impacted by anthropogenic activities such as cattle trampling/grazing and reed cutting. 	-	Semi-natural Habitat
C2.5	Temporary running waters	<ul style="list-style-type: none"> Watercourses that cease to flow for part of the year, leaving a dry bed or pools. 	-	Semi-natural Habitat
D6.2	Inland saline or brackish species-poor helophyte beds	<ul style="list-style-type: none"> surrounding Sultan Sazlığı Wetland, normally without free-standing water; vegetation communities very poor with sparse vegetation; evident anthropogenic disturbances, such as cattle trampling/grazing and abandoned agricultural fields . 		Semi-natural Habitat
E1.2E	Perennial calcareous grassland and basic steppes	<ul style="list-style-type: none"> secondary vegetation characterized by <i>Festuca valesiaca</i>- <i>Astragalus microcephalus</i> community; at higher elevations floristic composition of the habitat is quite rich and its endemism rate is high; higher anthropogenic disturbance at lower elevations and close to villages. 	-	Semi-natural
G1.7A.2	Irano-Anatolian steppe [Quercus] woods	<ul style="list-style-type: none"> residual patches of original primary habitat; Dominant species <i>Quercus pubescens</i>, <i>Quercus cerris</i> and <i>Quercus petraea</i> subsp <i>pinnatifida</i>; potentially disturbed by anthropogenic activities. 	9110 Euro-Siberian steppic woods with <i>Quercus</i> sp.	Semi-natural
H2.2	Cold limestone screes	<ul style="list-style-type: none"> rocky outcrops at higher elevations mainly sparse within high steppe vegetation; anthropogenic impacts very low or absent. 	-	Semi-natural Habitat

8.7 Baseline - Protected and classified areas

The Powerline LSA intersects the Sultan Sazlığı National Park and the Erciyes Mountain Key Biodiversity Area (Figure 8-20). The Powerline LSA includes several infrastructures including two high voltage powerlines and a road; the physical footprint of the powerline is within the Buffer Zone of the Sultan Sazlığı National Park and outside the Ramsar area, hence outside the most sensitive areas.

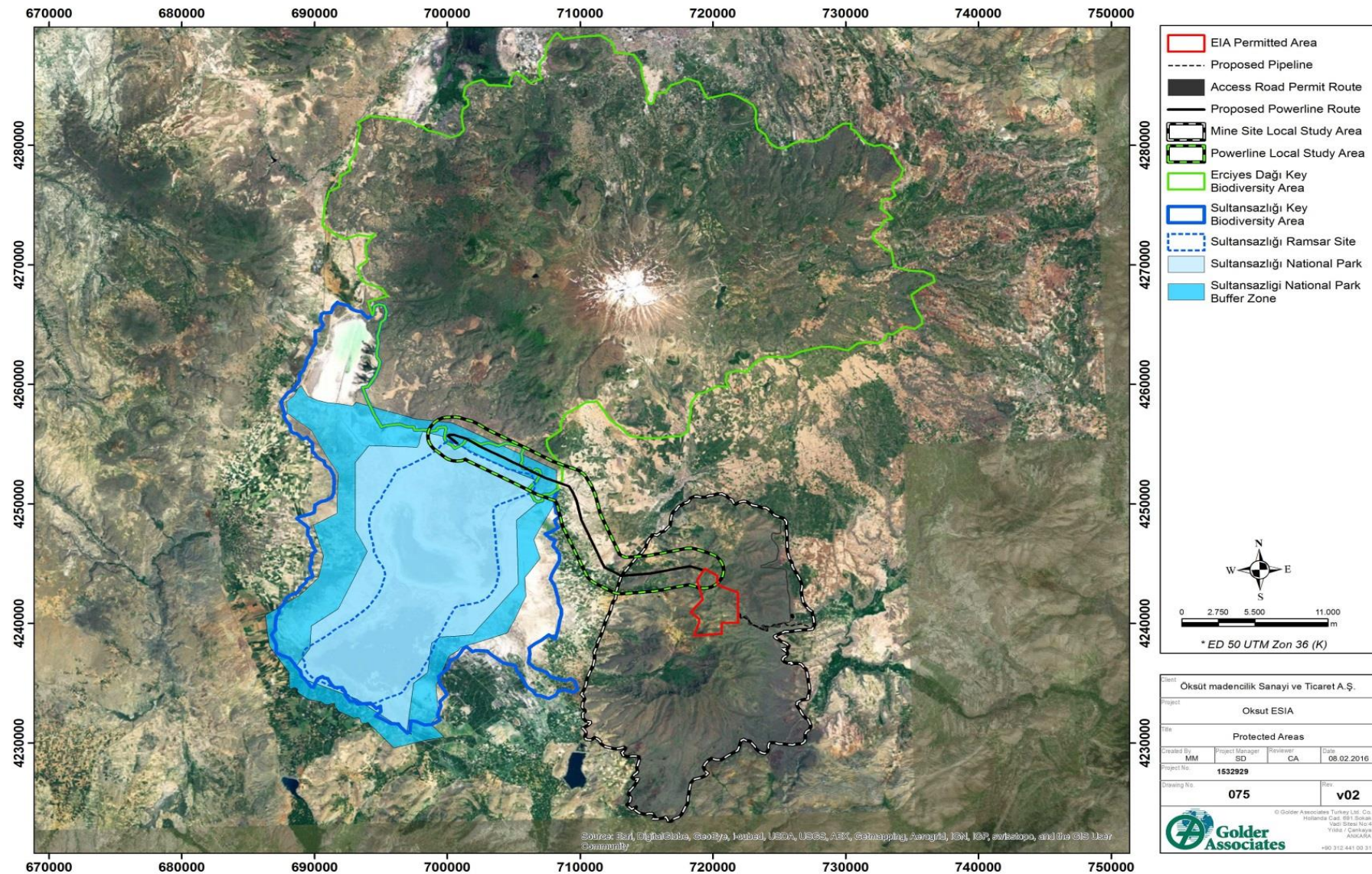
The Erciyes Dagı (Mountain) is internationally recognized as an Important Plant Area (IPA). These areas are defined as priority biodiversity features by PR6 (EBRD, 2014).

The Sultan Sazlığı Wetland is also internationally recognized also as Important Bird Area (IBA) and Important Plant Area (IPA). In addition, part of the Sultan Sazlığı Wetland is legally protected as National Park and recognized as Ramsar site.

Table 8-12: Protected and classified areas within the LSAs

Protected/ classified area	Designation	Total Area	Area under the LSA	
		ha	ha	%
Erciyes Dagı (Mountain)	KBA and IPA	103678.2	1637.16	2
Sultan Sazlığı Wetland	KBI, IBA and IPA	44705.87	1599.73	4
Sultan Sazlığı Wetland	National Park	24357.7	871.26	4
Sultan Sazlığı Wetland	Ramsar Site	17557.55	766.00	4

Figure 8-20: Map of the protected areas and KBA crossed by the powerline LSA



8.7.1 Erciyes Dagı (Mountain)

Although not legally protected, the Erciyes Dagı (Mountain) is internationally recognized as a Key Biodiversity Area (KBA) and Important Plant Area (IPA).

The area covers an extinct volcano rising from the plain high of about 1,000 m up to nearly 4,000 m a.s.l. for a total extension of 103,678.25 ha. Historically the volcano slopes were covered by a dense forest, but today it is characterized by mountain steppe communities as a result of heavy cutting and grazing. Despite this human management the flora is rich. It counts over 840 taxa and it includes 130 Turkish endemic species of which 10 are restricted regional endemic (known only for this KBA and a few other locations) and 9 are locally endemic (known only within the KBA). 42 nationally rare taxa are also found in the area.

The main threats to this area are overgrazing and firewood cutting. These activities are particularly intense at lower elevation and closer to villages and temporary settlements. The recent development of ski facilities have also caused localized damage and habitat loss.

The powerline LSA crosses the southern and lower slopes of this KBA and the two areas overlap for a total of 1637.16 ha. These areas include natural, semi natural and modified habitats almost in equal parts. Steppe cover 54% (E1.2E) of the area, followed by helophyte grassland (D6.2, 2%) and permanent ponds (C1.2, <1%). Modified habitats are dominated by small-scale cultivations (I1.13, 43%), villages (J1.2, 9%), channels (J5.4, <1%) and roads (J4, <1%).

These areas are located in close proximity of the Soysallı and Çayırözü villages and have a maximum elevation of 1,230 m. Therefore the grassland steppes (E1.2E) characterizing this part of the powerline LSA are particularly degraded due to overgrazing, animal trampling and soil erosion. In these areas the natural vegetation is expected to be quite poor compared to the rest of the KBA and the presence of threatened, rare, endemic or protected taxa is considered very unlikely.

Table 8-13: Habitats of the Erciyes Dagı KBA present within the powerline LSA

EUNIS Code	EUNIS Description	Powerline LSA	
		ha	%
<u>Natural and semi natural habitats</u>			
C1.2	Permanent mesotrophic lakes. ponds and pools	0.91	<1
D6.2	Inland saline or brackish species-poor helophyte beds	32.02	2
E1.2E	Perennial calcareous grassland and basic steppes	892.11	54
Total natural and semi natural habitats		925.04	57
<u>Modified habitats</u>			
I1.13	Small-scale intensive unmixed crops (<1 ha)	562.92	34
J1.2	Residential buildings of villages and urban periphery	144.76	9
J4	Transport networks and other constructed hard-surfaced areas	3.97	<1
J5.4	Highly artificial. non-saline running waters	0.47	<1
Total modified habitats		712.12	43
TOTAL		1637.16	100

8.7.2 Sultan Sazlığı Wetland

The entire wetland is recognized as a Key Biodiversity Area (KBA), Important Bird Area (IBA) and Important Plant Area (IPA) and it occupies a total area of 44705.87 ha. Part of the Sultan Sazlığı KBA

is legally protected as National Park (24.357.70 ha) and most of the National park is also recognized as a Ramsar site (17,557.55 ha) as Sultan Marshes.

Sultan Sazlığı Wetland is in the Develi close basin at about 1,070 m asl and it is surrounded by mountains. The wetland comprises a series of salt, brackish and freshwater lakes and extensive marshes (BirdLife, 2015b). The salt-lakes are surrounded by *Salicornia* steppe. The southern marshes comprise vast reedbeds (*Phragmites australis*) interspersed with expanses of *Typha spp.*, *Juncus spp.* and *Carex spp.* The site is considered of botanical importance with many distinctive Central Anatolian salt steppe flora taxa present. These include 10 globally threatened taxa.

The five main habitats are identified within Sultan Sazlığı are (Yeniyurt & Hemmami, 2011):

- Northern and Southern Marshes: Güney Marshes and Kepir Marshes in the north cover an area of 6,953 ha. Though remarkably shrunk due to inadequate inflow, Güney Marshes still cover a 4.19 hectare area. Most of Kepir Marshes was given to local people as agriculture lands as part of the Land Reform in 1950s, as a result most of the original habitat is significantly degenerated.
- Freshwater Lakes (Eğri Lake, Bağınaltı Lake, Sarp Lake, Kanlı Lake and Soysallı Pınar Lake): lakes cover an area of 16.9 ha. Eğri, Bağınaltı and Sarp Lakes cover an 8.5 hectare area and are fed by surface and ground water leaking from the marshes. Kanlı Lake (2.5 ha) and Soysallı Pınar Lake (5.9 ha) are formed from Çayırözü Spring and Soysallı Spring respectively.
- Saltwater Lakes (Yay Lake and Çöl Lake): located in the middle of Sultan Marshes, Lake Yay is the largest salt lake. Its surface area is 4,076 ha and is the best preserved salt lake within the protected area. Ground water carrying salty minerals of the soil, flowing from north and south feed the lake. Lake Yay completely dried out recently because of the spring inflow shortage. Other salt lakes have also shrunk and actually cover an area of only 36.5 ha.
- Meadows: cover an area of 2,103 ha. They are located around freshwater areas: Çayağzı and Tuzla in the south, Örtülüakar and Camuzgölü Pump Station in the west and Soysallı and Çayırözü Springs in the north.
- Salt Steppes: located in the eastern, northern and western portions of Sultan Sazlığı, where there is no freshwater inflow and the land is covered with salty soil. They cover an area of 8,777 ha.

The Sultan Sazlığı Wetland is an important area for birds being located in the junction of two main bird migration routes through Europe, Asia and Africa. The site is known to provide 301 bird species with feeding, breeding and staging habitats (information provided by Kayseri Branch Office of the Ministry of Forestry and Water Affairs, 7th Regional Directorate).

The key/trigger species for the definition as IBA are greylag goose (*Anser anser*), ruddy shelduck (*Tadorna ferruginea*) and common teal (*Anas crecca*). Large numbers of flamingos (*Phoenicopterus roseus*), common cranes (*Grus grus*) and pied avocets (*Recurvirostra avosetta*) also use the wetland in autumn.

Sultan Marshes Ramsar Site meets 5 out of 9 criteria for identifying wetlands of international importance. These are:

Criterion	Description	Sultan Marsh
Criteria 2	The site supports threatened and vulnerable species listed in International Union for Conservation of Nature (IUCN) red list categories.	<ul style="list-style-type: none"> ■ <i>Vanellus gregarius</i> (Sociable Lapwing) (CR) ■ <i>Numenius tenuirostris</i> (Slender-billed Curlew) (CR) ■ <i>Oxyura leucocephala</i> (White-headed Duck) (EN) ■ <i>Falco cherrug</i> (Saker Falcon) (EN) ■ Pochard (<i>Aythya ferina</i>) (VU) ■ Red-Breasted Goose (<i>Branta ruficollis</i>) (VU)

		<ul style="list-style-type: none"> Marbled Teal (<i>Marmaronetta angustirostris</i>) (VU) Velvet Scoter (<i>Melanitta fusca</i>) (VU) Imperial Eagle (<i>Aquila heliaca</i>) (VU) Greater Spotted Eagle (<i>Clanga clanga</i>) Great Bustard (<i>Otis tarda</i>) (VU) Aquatic Warbler (<i>Acrocephalus paludicola</i>) (VU) Dalmatian Pelican (<i>Pelecanus crispus</i>) (VU)
Criteria 3	The site regularly supports clusters of water birds in significant numbers that confirm the value and diversity of the site.	Site supporting significant clusters of water birds (over 300 species and significant migration stopover) It also is an important habitat particularly for water bird clusters due to being located on two main bird migration routes.
Criteria 4	Significant numbers of birds stage in the site during migration period.	<p>Significant concentrations in summer-winter migrations for:</p> <ul style="list-style-type: none"> Grey heron (<i>Ardea cinerea</i>) Little cormorant (<i>Microcarbo pygmaeus</i>) White-headed duck (<i>Oxyura leucocephala</i>), Ruddy shelducks (<i>Tadorna ferruginea</i>) Western marsh harrier (<i>Circus aeruginosus</i>) Common kingfisher (<i>Alcedo atthis</i>) <p>Significant concentrations over migration:</p> <ul style="list-style-type: none"> Flamingo (<i>Phoenicopterus roseus</i>) Eurasian Spoonbill (<i>Platalea leucorodia</i>) White stork (<i>Ciconia ciconia</i>)
Criteria 5	20,000 individual of bird species regularly inhabit in the site.	Over 20,000 individuals regularly on site. The site hosts over 500,000 individuals in September-October.
Criteria 6	A wetland, where collecting data on populations is possible should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of water bird.	In particular, during the migration period, flamingo (<i>Phoenicopterus roseus</i>) population reaches far more than 1% threshold. For example in 1998 more than 200,000 flamingos were recorded in the area.

The Sultan Sazlığı National Park has a management plan titled “Sultan Sazlığı Milli Parkı ve Ramsar Alanı Yönetim Planı 2008-2012 (Sultan Sazlığı National Park and Ramsar Area Management Plan 2008-2012) and dated 2008. The plan defines the management unit as showed in Figure 8-21.

Poor water management and pollution from agricultural land and industrial complexes poses a major threat to the long-term survival of the Sultan Sazlığı Wetland. The area is used for human activities that include cattle-grazing, reed-cutting and fishing. Illegal hunting of water birds is also present within the protected area although strictly persecuted.

The powerline LSA crosses the north western border of the Sultan Sazlığı Wetland KBA for a total area of 1599.67 ha (4 % of the KBA), partially overlapping also with the National Park for 871.26 (4% of the National Park area) and the Ramsar Site for 766.00 (4% of the Ramsar site area)

These areas include natural semi natural and modified habitats almost in equal parts. Helophyte grassland cover 46% (D6.2) of the area, followed by permanent ponds (C1.2, 6%) and steppe (E1.2E,

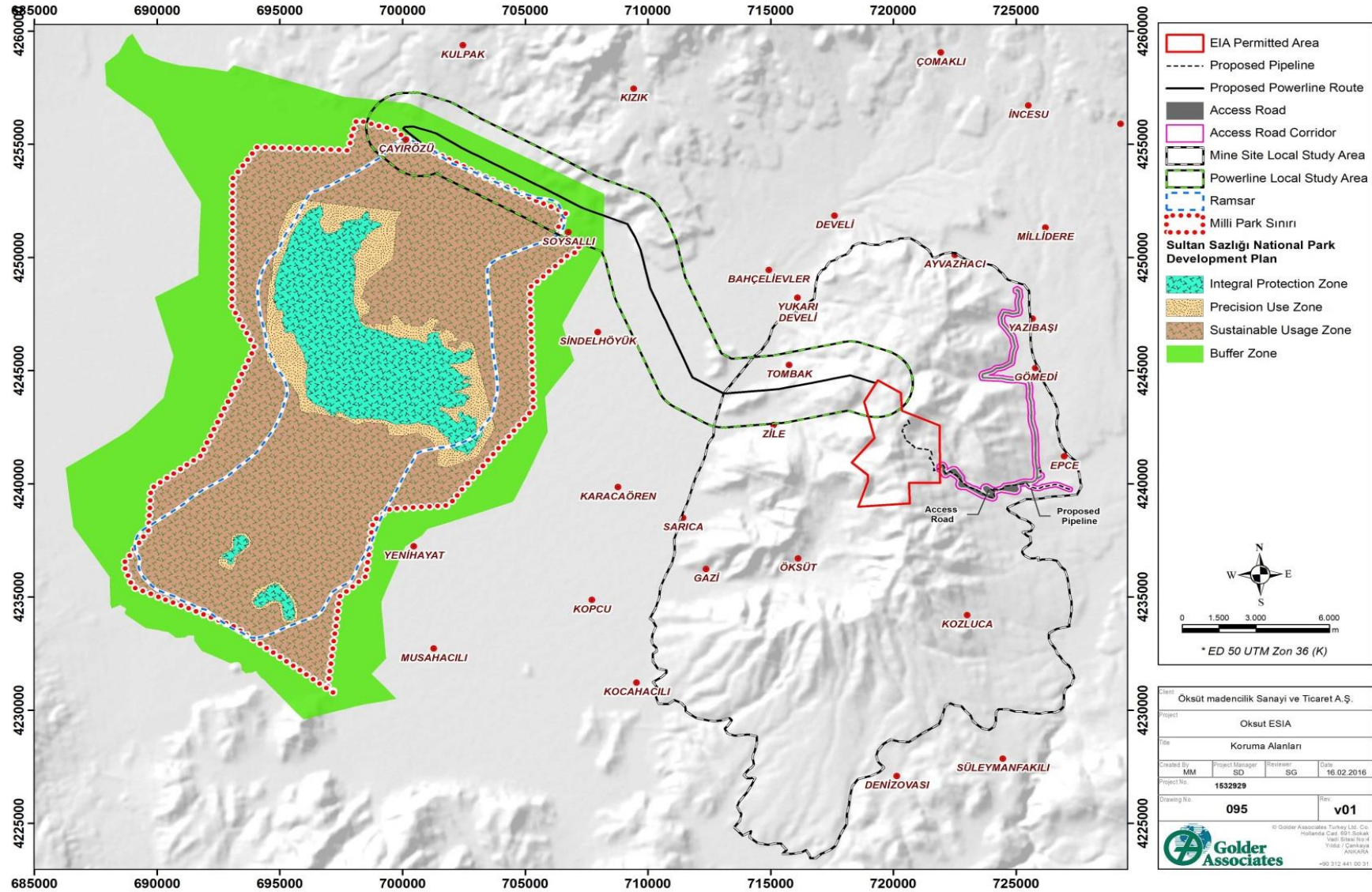
2%). Modified habitats are dominated by small-scale cultivations (I1.13, 40%), villages (J1.2, 2%), channels (J5.4, 2 %) and roads (J4, 1%).

Table 8-14: Habitats of the Sultan Sazlığı Wetland KBA present within the powerline LSA

EUNIS Code	EUNIS Description	Powerline LSA	
		ha	%
<u>Natural and semi natural habitats</u>			
C1.2	Permanent mesotrophic lakes. ponds and pools	103.89	6
D6.2	Inland saline or brackish species-poor helophyte beds	734.11	46
E1.2E	Perennial calcareous grassland and basic steppes	39.57	2
Total natural and semi natural habitats		877.58	55
<u>Modified habitats</u>			
I1.13	Small-scale intensive unmixed crops (<1 ha)	647.44	40
J1.2	Residential buildings of villages and urban periphery	36.27	2
J4	Transport networks and other constructed hard-surfaced areas	11.10	1
J5.4	Highly artificial. non-saline running waters	27.28	2
Total modified habitats		722.09	45
TOTAL		1599.67	100

The powerline LSA is located at the periphery of the KBA that also includes villages and other infrastructures present within the “buffer zone” and the “sustainable usage zone” of the National Park, including roads and various powerlines. This area, easily accessed thanks to the presence of dry path, is disturbed by human activities such as cattle grazing (in particular water buffalo), fishing and illegal hunting. Sensitive species like rare or threatened taxa and congregatory and nesting birds are less likely to be found in these areas disturbed habitats.

Figure 8-21: Map of the Sultan Sazlığı National Park management areas



8.8 Priority Biodiversity Features

Priority Biodiversity Features have been identified in the project mine site and powerline LSAs and are described in the following paragraphs. PBF include vulnerable species of flora and fauna, threatened habitats, Key Biodiversity Areas and Important Bird Areas.

8.8.1 Vulnerable flora species



Two of the total 397 taxa identified within the LSAs are defined as priority biodiversity features according to PR6 (12) (EBRD, 2014). These species are *Verbascum luridiflorum* and *Campanula stricta* var. *aladagensis* and were identified within the mine site LSA.

The threat status, endemism level and total known distribution of the species within the mine site LSA are showed in Table 8-15. *Verbascum luridiflorum* and *Campanula stricta* var. *aladagensis*, are threatened and endemic species with great conservation value, however they do not have any particular cultural, medicinal or agronomical value for the local populations.

The distribution, ecology, conservation status and main threats of the two species are described below. Data were collected from bibliographic research, field studies and expert opinion of the local botanist Prof. Hayri Duman (Gazi University) who conducted the field surveys on terrestrial flora and was consulted when relevant background data on species distributions and trends were limited.

Table 8-15: Terrestrial vulnerable flora species within the Mine Site LSA

Scientific name	Turkish Name	IUCN Red List Categories	Endemic	Known total area of occurrence within the LSA
<i>Verbascum luridiflorum</i>	Sığır kuyruğu	VU	restricted regional endemic	38.87 ha
<i>Campanula stricta</i> var. <i>aladagensis</i>	Çan çiçeği	VU	regional endemic	59.98 ha

<p>Figure 8-22: <i>Verbascum luridiflorum</i> spp. nov. (VU)</p>	<p>Figure 8-23 :<i>Campanula stricta</i> var. <i>aladagensis</i> (VU)</p>
	

***Verbascum luridiflorum* (VU)**

Verbascum luridiflorum is distributed in oak woodlands between Bakı rdağ-Saimbeyli and around Karsantı and Adana at elevations between 900-1950 m a.s.l (Davis, 1978). However the complete distribution of this restricted regional endemic species is still not well understood.

This perennial species grows in Oak woodland openings on slopes with medium/low inclination (5-25°) on slopes facing east and south (Prof. H. Duman pers. comm.). The vegetative period of *Verbascum luridiflorum* goes from the beginning of May to late July. The flowering season generally starts in mid-May to mid-June, while its fruiting season is in July.

Within the mine site LSA one population of about 38.87 ha was found in the south-western corner of the permitted area. This population is situated between 1500-1550 m a.s.l in a valley covered by sparse Irano-Anatolian steppe *Quercus* woods (G1.7.2). The population density observed within the study area was quite low and it was estimated to be of approximately 3-10 ind./100m² The species coverage within the distribution area is estimated to be <1%.

The main threats for the conservation of this species at present are considered to be overgrazing, mining activities and roads expansion.

According to the Red Data Book of Turkish Plants based on the 1994 IUCN Red List Categories and Criteria, *Verbascum luridiflorum* is LR (cd). However, the threat category was updated to VU (vulnerable) by Prof. H. Duman according to the new IUCN criteria (IUCN 2001 Red List Categories and Criteria), based on his expert judgement and most recent studies. The rational for this categorisation is discussed below:

- criterion: B1, B2b (ii, iii): the wider distribution of this species is less than 20,000 km², while at each location it is distributed within an area of less than 2,000 km² ;
- criterion: E: it is estimated that its population will be decreased by 10% within the next 100 years, due to mining activities, road expansion and excessive grazing.

The known distribution of *Verbascum luridiflorum* is shown in Figure 8-24, while the distribution within the mine site area is shown in Figure 8-25. The results of the habitat suitability model are shown in Figure 8-26, and the statistics for the habitat suitability modelling are as follows:

Suitability	ha	%
Unsuitable	19730,62	63
Low suitability	9936,23	32
Medium suitability	407,80	1
High suitability	802,58	3
Very high suitability	313,70	1
<u>Total</u>	31190,93	100

According to the suitability model 4% of the mine site LSA is considered to have a high or a very high suitability for the presence of this species (3% high and 1% very high). An additional 1% of the mine site LSA is considered to have medium suitability, while 32% of the area is considered having low suitability. The remaining 63% of the mine site LSA is considered to be unsuitable for the species.

The position of the known populations of the species seems to fit quite well with the suitability model. The presence of the species habitat, Irano-Anatolian steppe Quercus woods (G1.7.2), was considered the main descriptor of the habitat suitability.

Figure 8-24: Known distribution of the species *Verbascum luridiflorum* (Source: <http://www.tubives.com/>) outside the LSA

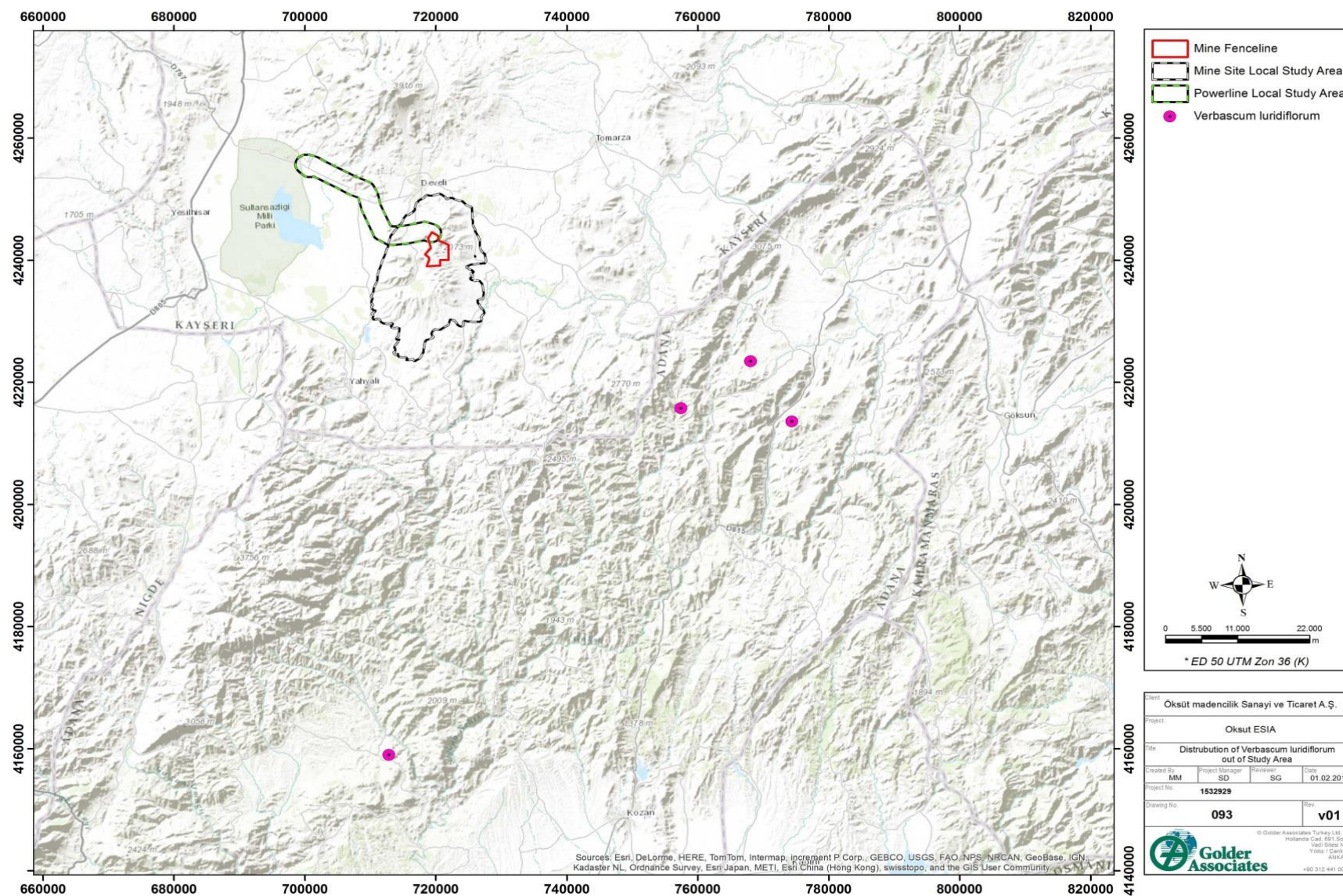
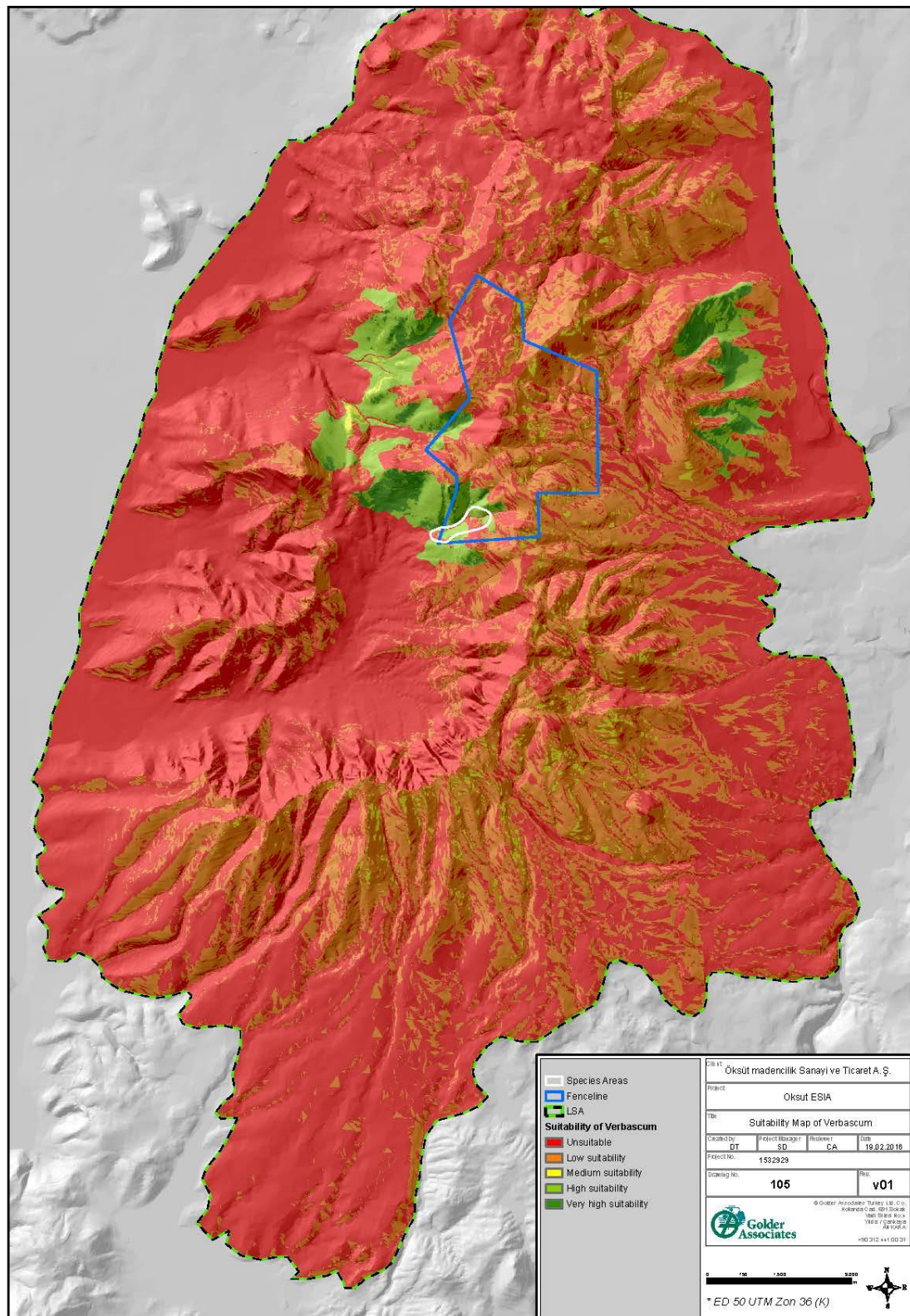


Figure 8-26: Habitat suitability map of *Verbascum luridiflorum* within the mine site LSA



***Campanula stricta* var. *aladagensis* (VU)**

Campanula stricta is an endemic perennial species with a widespread distribution in Turkey. The var. *aladagensis* is generally found in central Anatolia within provincial the boundaries of Kayser, Nevşehir and Kahramanmaraş.

It grows in steppes and rocky areas between 1250-2200 m a.s.l., on slopes between 25° and 45° of inclination, generally on slopes facing west or east (Prof. H. Duman pers. comm.). The vegetative period of *Campanula stricta* var. *aladagensis* is quite short and it goes from the beginning of June to the end of August. The flowering period of this species is from the second week of July to mid-August, while the fruiting period is late August to the beginning of September.

Within the LSA 3 sub-populations of the species were observed. These populations are located within and around the southern portion of the permitted area for a total estimated area of 59,98 ha. The populations are situated between 1740-1920 m a.s.l. in Irano-Anatolian steppes (E1.2E), cold limestone screes (H2.2) or openings of the the Irano-Anatolian steppe *Quercus* woods (G1.7.2). It is usually found within rocky outcrops. The population density observed within the study area was quite low and it was estimated to be of approximately 5-10 ind./100m². The species coverage within the sub-populations is estimated to be 1-2%.

The main threats for the conservation of this species at present are habitat loss due to mining activities and overgrazing.

According to the Red Data Book of Turkish Plants based on the 1994 IUCN Red List Categories and Criteria, *Campanula stricta* subsp. *aladagensis* is LR (cd). However, the threat category was updated to VU (vulnerable) by Prof. H. Duman according to the new IUCN criteria (IUCN 2001 Red List Categories and Criteria), based on his expert judgement and most recent studies. The rationale for this categorisation is discussed below:

- criterion: B1, B2b (ii, iii): the wider distribution of this species is less than 20,000 km², while at each location it is distributed within an area of less than 2,000 km² ;
- criterion: E: it is estimated that its population will be decreased by 10% within the next 100 years, due to mining activities, tourism and excessive grazing.

The known distribution of *Campanula stricta* is shown in Figure 8-27 and Figure 8-28, while the distribution within the mine site area is shown in Figure 8-29. The results of the habitat suitability model are shown in Figure 8-30, and the statistics for the habitat suitability modelling are as follows:

Suitability	ha	%
Unsuitable	8756.88	28
Low suitability	12568.14	40
Medium suitability	7753.38	25
High suitability	2068.79	7
Very high suitability	43.74	<1
<u>Total</u>	31190.93	100

According to the suitability model 7% of the mine site LSA is considered is considered to have a high or a very high suitability for the presence of this species (7% high and <1% very high). 25% of the LSA is considered to have medium suitability, while 40% of the area is consider having low suitability. The remaining 28% of the LSA is considered to be unsuitable for the species.

This model seems to be less predictive than the others with respect to the position of the known populations, also the definition between suitable and unsuitable areas is not so clearly defined. This could be explained by the ecology of the species that grows often within to rocky outcrops that are found space in the study area and are often too small to be mapped.

Figure 8-27: Known distribution of the species *Campanula stricta* (Source: <http://www.tubives.com/>) outside the LSA. Project site location is indicated with the red square

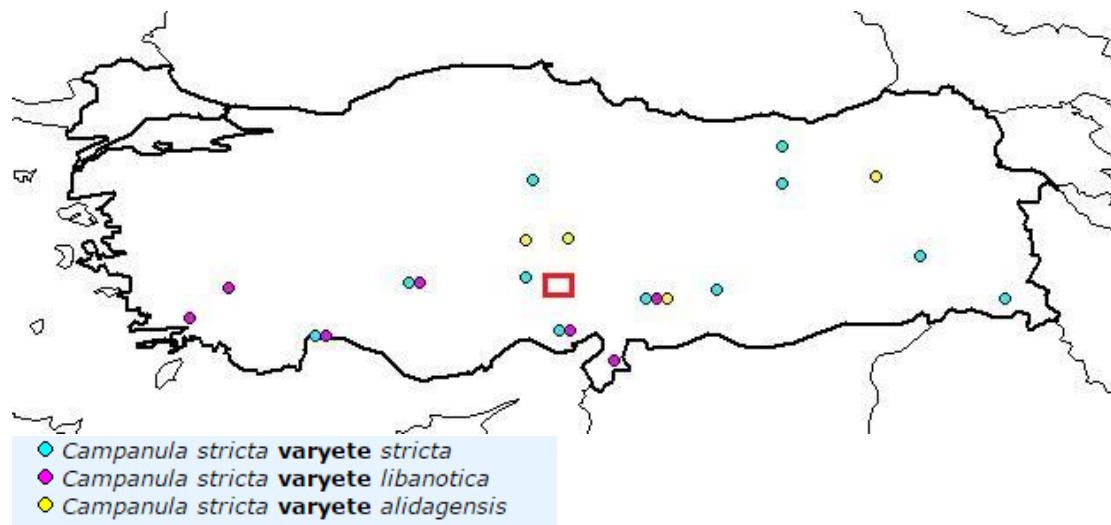


Figure 8-28: Known population of *Campanula stricta* var. *aladagensis* in the vicinity of the LSA

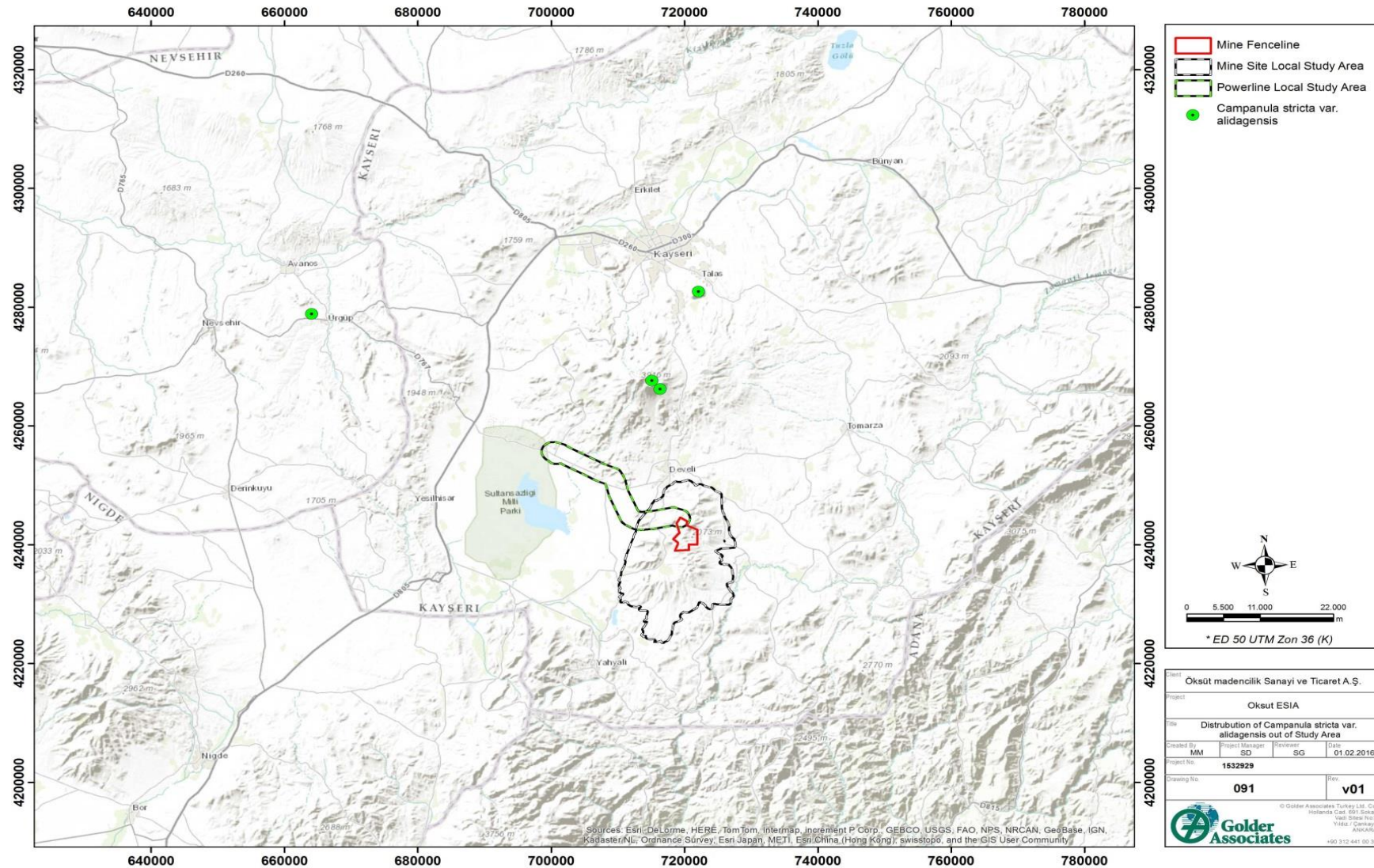
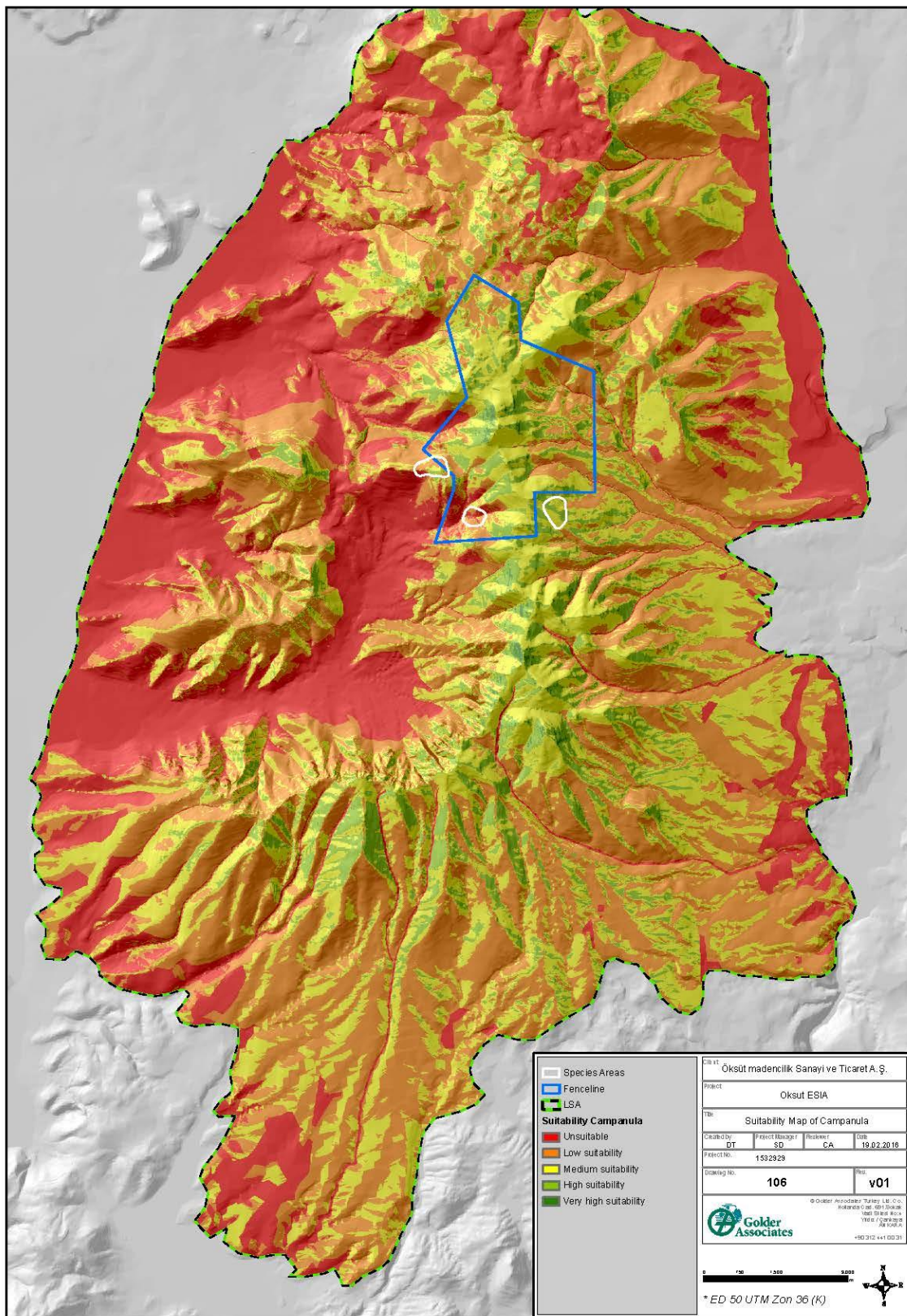


Figure 8-30: Habitat suitability map of *Campanula stricta* within the mine site LSA



8.8.2 Vulnerable fauna species

A total of ten species fauna are defined as priority biodiversity features according to PR6 (12) (EBRD, 2014). These species are one reptile and nine bird species listed as vulnerable according to the IUCN global threat categories.

The priority biodiversity features, their threat category and distribution within the Mine Site and Powerline LSAs are summarized below.

Table 8-16: Terrestrial fauna determining priority biodiversity features within the LSAs

Scientific Name	Common Name	IUCN Red List Categories	Endemic	Powerline/ Mine Site LSA	Area potentially occupied within the LSA (ha)
<i>Testudo graeca</i>	Common tortoise	VU	no	Mine Site LSA; Powerline LSA	34843.94
<i>Aythya ferina</i>	Pochard	VU	no	Powerline LSA	0.91
<i>Branta ruficollis</i>	Red-Breasted Goose	VU	no	Powerline LSA	1487.96
<i>Marmaronetta angustirostris</i>	Marbled Teal	VU	no	Powerline LSA	925.04
<i>Melanitta fusca</i>	Velvet Scoter	VU	no	Powerline LSA	0.91
<i>Aquila heliaca</i>	Imperial Eagle	VU	no	Powerline LSA	1487.96
<i>Clanga clanga</i>	Greater Spotted Eagle	VU	no	Powerline LSA	1487.96
<i>Otis tarda</i>	Great Bustard	VU	no	Powerline LSA	1455.03
<i>Acrocephalus paludicola</i>	Aquatic Warbler	VU	no	Powerline LSA	0.91
<i>Pelecanus crispus</i>	Dalmatian Pelican	VU	no	Powerline LSA	0.91

Available information on the species taxonomy, distribution, population, habitat, ecology, major threats and conservation status were collected from bibliographic research, field studies and local experts.

Figure 8-31: Common tortoise (*Testudo graeca*)



Figure 8-32: Pochard (*Aythya ferina*)



Figure 8-33: Red-Breasted Goose (*Branta ruficollis*)



Figure 8-34: Marbled Teal (*Marmaronetta angustirostris*)



Figure 8-35: Velvet Scoter (*Melanitta fusca*)



Figure 8-36: Imperial Eagle (*Aquila heliaca*)



Figure 8-37: Greater Spotted Eagle (*Clanga clanga*)



Figure 8-38: Great Bustard (*Otis tarda*)



Figure 8-39: Aquatic Warbler (*Acrocephalus paludicola*)



Figure 8-40: Dalmatian Pelican (*Pelecanus crispus*)



Common tortoise (*Testudo graeca*) (VU)

The Common tortoise is globally listed as Vulnerable (VU) according to IUCN standards (Van Dijk et al., 2004). The species is included in CITES Appendix II and EU Regulation EEC/338/97 prohibits import into the EU unless captive-bred.

Its range goes from the Mediterranean basin, east to Iran, with populations in North Africa, southern Europe and West Asia. It occurs from near sea level to 1,900 m altitude. The species distribution is shown in Figure 8-41.

The common tortoise inhabits a variety of dry, open scrubby habitats, meadows and pastures, sand dunes, forest, heathlands, and open habitats, and it is generally found on a sandy or calcareous substrate (Tortoise & Freshwater Turtle Specialist Group, 1996). *Testudo graeca* is a generalist vegetarian, feeding on a wide variety of leaves, buds, flowers, seeds and fruits of grasses, herbs and shrubs, as well as small invertebrates such as snails, arthropods and carrions.

According to bibliographic data available, at a landscape scale, the species selects re-colonisation shrub land and cropland over more complex mixed shrub land (Anado et al., 2006). The preference for areas with an open vegetation structure is likely to be linked to the thermoregulation requirements. In addition, according to a study performed in semi-arid Mediterranean region, tortoises had a preference for northwest- and west-facing slopes, whereas over those facing east (Anado et al., 2006). The selected range may be a reflection of a trade-off between thermo regulation and feeding requirements.

The general trend of the global population is declining, however little information is available on local populations. The main threat to this species includes:

- habitat destruction;
- over-harvesting for the pet trade and as living souvenirs by tourists;
- release of captive tortoises from different populations (dangers of genetic pollution and introduction of pathogens);
- road killing;
- killing by human commensal predators (mainly dogs but also crows and others);
- killing tortoises and destroying nests⁵.

The species was observed in the mine site LSA both during 2009 and 2015 baseline field work. No data are available regarding the species distribution or habitat selection within the mine site LSA was

⁵ Tortoise & Freshwater Turtle Specialist Group, 1996

documented, however the species is thought to be common in the mine site LSA, and its presence cannot be excluded in the powerline LSA.

Based on the data available and using precautionary approach, the species is potentially present within the powerline and the mine site LSAs in steppes (E1.2E), woodlands (G1.7A.2) and agricultural areas (I1.13) for a total area of 34843.94 ha (93% of the LSAs) .

Figure 8-41: Distribution of the Common tortoise (*Testudo graeca*)



(source: tortoiseforum.org)

Pochard (*Aythya ferina*) (VU)

This species has an extremely large range in both the breeding season and in winter, and an extremely large population. New information suggests the population has declined rapidly across the majority of the range, and it has therefore been up-listed to Vulnerable.

The species breeds from Western Europe through central Asia to south-central Siberia and northern China (Carboneras and Kirwan 2014). It is present throughout the year but may make within-winter movements. European migratory populations winter mostly in north-western and western Europe, the eastern Mediterranean, Black Sea and the Caspian Sea, as well as in Turkey, the Middle East and as far south as sub-Saharan Africa (Hagemeijer and Blair 1997, Carboneras and Kirwan 2014). The species distribution is shown in Figure 8-42

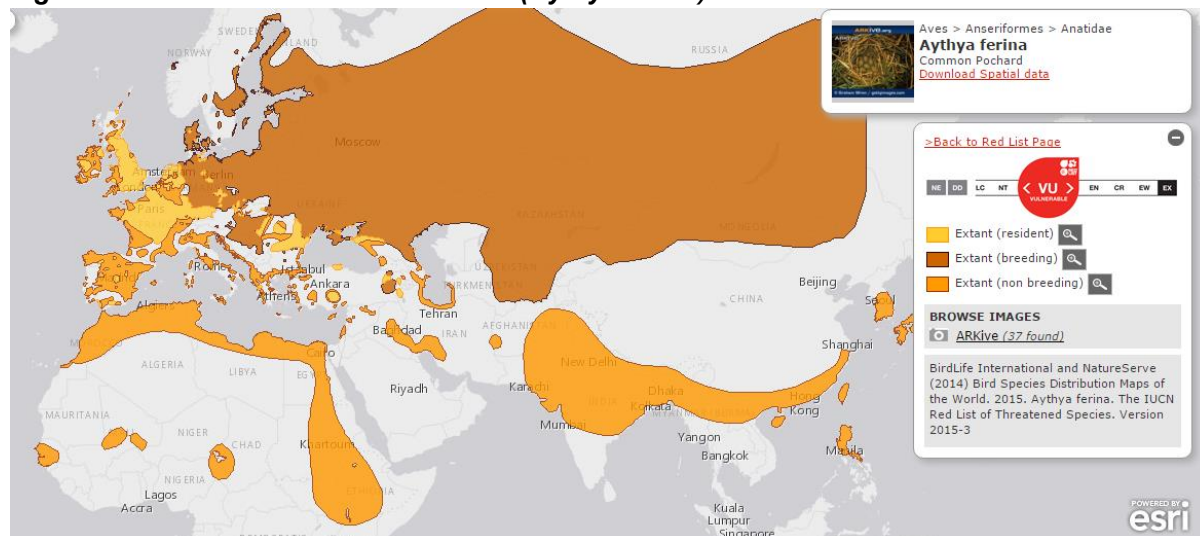
In Turkey both resident breeding populations and migrant non-breeding populations are present. The species is indicated as breeding in the Sultan Sazlığı Ramsar site, although no data on its abundance are available.

This species requires well-vegetated eutrophic to neutral swamps, marshes, lakes and slow-flowing rivers with areas of open water and abundant emergent fringing vegetation. It also breeds on saline, brackish and soda lakes and occasionally even in sheltered coastal bays (Kear 2005). The breeding grounds are reoccupied from early March (in the south) to early May (in Siberia) with breeding starting from April-May. During the winter the species frequents similar habitats to those it breeds in, including large lakes, slow-flowing rivers, reservoirs, brackish waters, marshes and flooded gravel pits.

The main threats to this species are disturbance from hunting, water-based recreation and from machinery noise from urban development. It is also threatened by habitat destruction on its wintering grounds due to eutrophication (partially as a result of nutrient run-off from agricultural land).

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2) for a total area of 0.91 ha (0.01% of the total Sultan Sazlığı IBA).

Figure 8-42: Distribution of the Pochard (*Aythya ferina*)



Red-Breasted Goose (*Branta ruficollis*) (VU)

This species has a moderately small population which appears to be declining over a short time period. The reasons for this decline are largely unknown. Maximum population counts from wintering or staging areas were 75,879 between 1991-1995, 88,000 in 1996), 60,444 between 1998-2001 (with a maximum of 88,425 in winter 2000) and 56,860 in 2010.

This species breeds on the Taimyr (70% of the population), Gydan and Yamal peninsulas, Russia. In winter, 80-90% of birds now congregate in January/ February at 5-10 roost sites on the Black Sea coast, particularly at Shabla Lakes and Durankulak Lake, Bulgaria, Razelm-Sinoe lagoons, Romania, and in the coastal area between the rivers Danube and Dniester in Ukraine. Small numbers also winter in Azerbaijan. The precise distribution in winter varies according to the severity of the weather. In cold weather, small numbers are occasionally on the Aegean shore of Greece and in Turkey. The species distribution is shown in Figure 8-43.

During the non-breeding season it inhabits open steppe and open rolling lowland hills, feeding among steppe, coastal lines, pasture, stubble and crop fields). Throughout the day it flies to coastal and freshwater lakes to drink (Kear 2005). Occasionally it also roosts at these lakes, using the middle of the water or remote shallow areas and muddy and sandy beaches with low aquatic vegetation (Kear 2005).

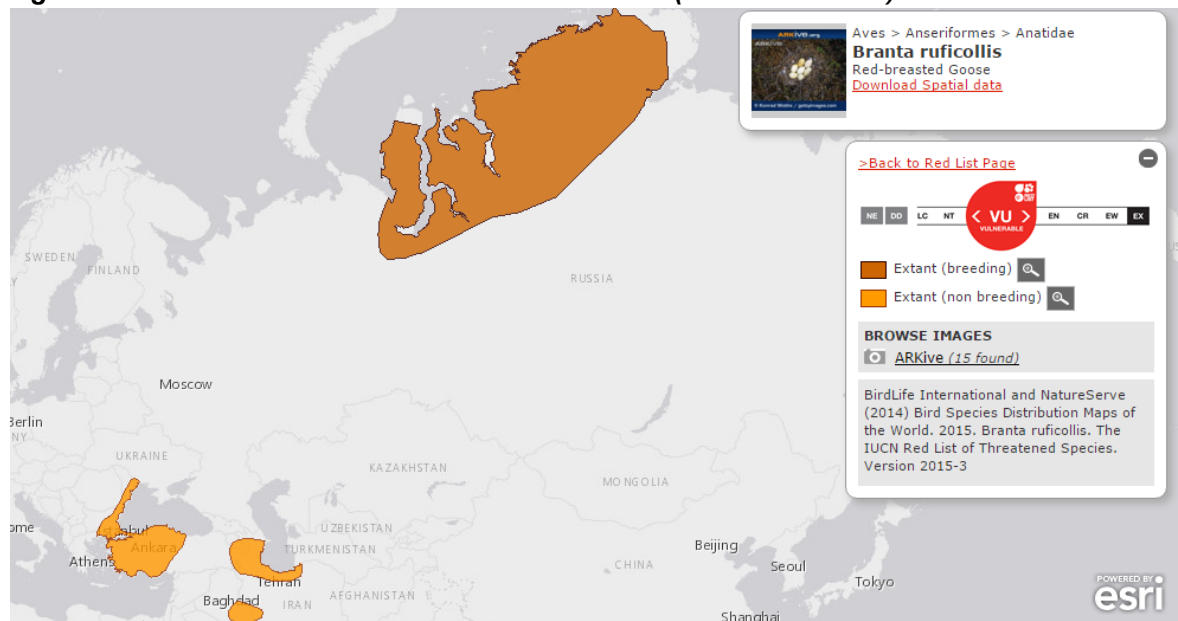
This species is migratory, arriving on its wintering grounds in October-November. Here it is highly gregarious and occurs in flocks, regularly in association with the White-fronted Goose (*Anser albifrons*) Lesser White-fronted Goose (*A. erythropus*) and Greylag Goose (*A. anser*). The return journey is made between March and May, often together with *A. albifrons* (Kear 2005). It flies in dense flocks rather than in the defined V-formation typical of other goose species (Kear 2005).

At present the main threats for the conservation of this species are: deliberate hunting of birds, habitat loss due to residential and tourist development, reduction of winter wheat cultivation which, together with conversion to other crops, has decreased the availability of food.

The species is present in the Sultan Sazlıği Wetland as a wintering non-breeding species although no data are available on its abundance.

Based on habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlıği Wetland in mesotrophic ponds (C1.2), salt marshes (D6.2), steppes (E1.2E) and agricultural areas (I1.13) for a total area of 1487.96 ha (3% of the total Sultan Sazlıği IBA).

Figure 8-43: Distribution of the Red-Breasted Goose (*Branta ruficollis*)



Marbled Teal (*Marmaronetta angustirostris*) (VU)

This species appears to have suffered a rapid population decline, evidenced in its core wintering range, as a result of widespread and extensive habitat destruction. However, data are scarce and some birds may have relocated to alternative wintering sites. The global population is estimated at c.50,000-55,000 individuals.

It has a fragmented distribution in the western Mediterranean, the eastern Mediterranean and western and southern Asia. This species is dispersive and partially migratory (del Hoyo *et al.* 1992). It shows variable, nomadic movements and is capable of dispersal in search of suitable habitat at any time of year as changing conditions require (Kear 2005, del Hoyo *et al.* 1992). There is a general tendency for a more southerly distribution during the non-breeding season and a more northerly distribution during the breeding season. It is highly gregarious post-breeding and during the non-breeding season when it occurs in large monospecific flocks (Kear 2005). The species distribution is shown in Figure 8-44.

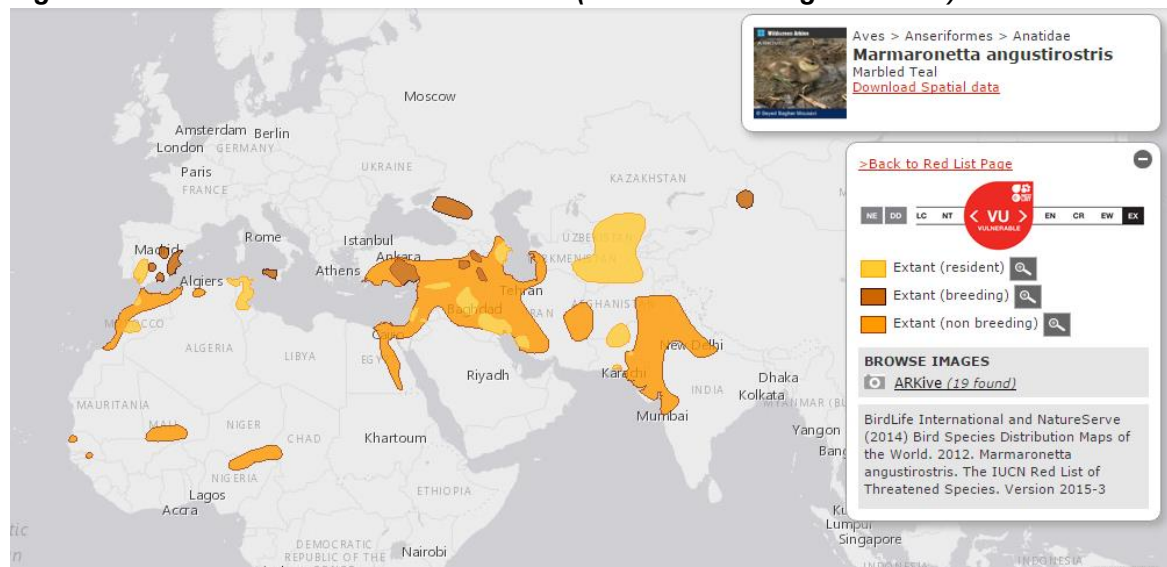
Migrant breeding and non-breeding populations exist in Turkey. The Sultan Sazlığı wetland is one of the important breeding sites in Turkey for the species. In the Wetland 5 breeding pairs and 121 passage individuals were observed in 1998.

It breeds in fairly dry, steppe-like areas on shallow freshwater, brackish or alkaline ponds with well vegetated shorelines, and rich emergent and submerged vegetation (Kear 2005). It uses similar habitat during the non-breeding season.

The main threats to this species are habitat loss due to wetland drainage for agriculture, fluctuating water levels and local water shortages, illegal hunting and egg collection, reed-cutting, reed-burning, grazing, pollution from agricultural, industrial and domestic sources.

Based on habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2), salt marshes (D6.2) and steppes (E1.2E) for a total area of 925.04 ha (2% of the total Sultan Sazlığı IBA).

Figure 8-44: Distribution of the Marbled Teal (*Marmaronetta angustirostris*)



Velvet Scoter (*Melanitta fusca*) (VU)

This species is classified as Vulnerable. It is estimated to have undergone a population decline of 30-49% over the last three generations. The rate of decline has apparently slowed however the causes are not fully understood. Its total population is now estimated at 450,000 individuals.

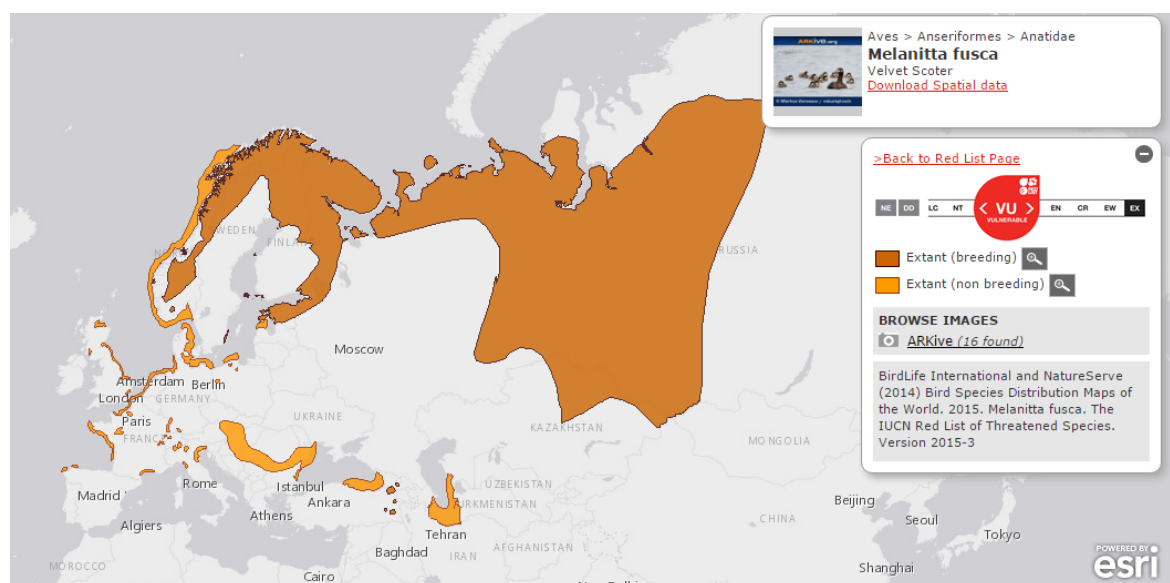
This species breeds in Scandinavia, from Norway and Sweden, into Finland and Estonia, and western Siberian Russia to the River Yenisey, and winters mostly in the Baltic Sea and along the coasts of Western Europe (Kear 2005). An estimated 1,500 birds winter in the Black Sea and Caucasus, and are thought to be from breeding populations in Turkey, Armenia, Georgia and Turkmenistan (Kear 2005). The species distribution is shown in Figure 8-45.

In the Sultan Sazlıği wetland the species was observed as a passage species during migration but no data on its abundance are available. The species breeds on wooded coastlines, small freshwater lakes, pools and rivers in northern coniferous forests, wooded Arctic tundra and alpine zones, especially where there are boulder-covered or small rocky islands available for nesting with extensive herbaceous vegetation, shrubs and low tree. The species may occur on freshwater lakes and estuaries during migration.

The main threats to this species are: oil spills and other marine pollutants, commercial exploitation of marine benthic organisms and shellfish (Kear 2005), habitat degradation in its breeding range (Kear 2005), and by lake drainage for irrigation and hydroelectric power production. The species is a target of hunters in some areas.

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlıği Wetland in mesotrophic ponds (C1.2) for a total area of 0.91 ha (0.01% of the total Sultan Sazlıği IBA).

Figure 8-45: Distribution of the Velvet Scoter (*Melanitta fusca*)



Imperial Eagle (*Aquila heliaca*) (VU)

This species has a small global population, and is likely to be undergoing continuing declines. It is therefore listed as Vulnerable. Recent population estimates the global population is precautionary retained in the band 2,500-10,000 mature individuals.

Aquila heliaca breeds in Austria, Azerbaijan, Bulgaria, China, Czech Republic, Macedonia, Georgia, Greece, Hungary, Kazakhstan, Russia, Serbia, Slovakia, Turkey and Ukraine (Heredia 1996). On passage and in winter, birds are found in the Middle East, East Africa south to Tanzania, the Arabian Peninsula, the Indian Subcontinent and south and East Asia. The species distribution is shown in Figure 8-46.

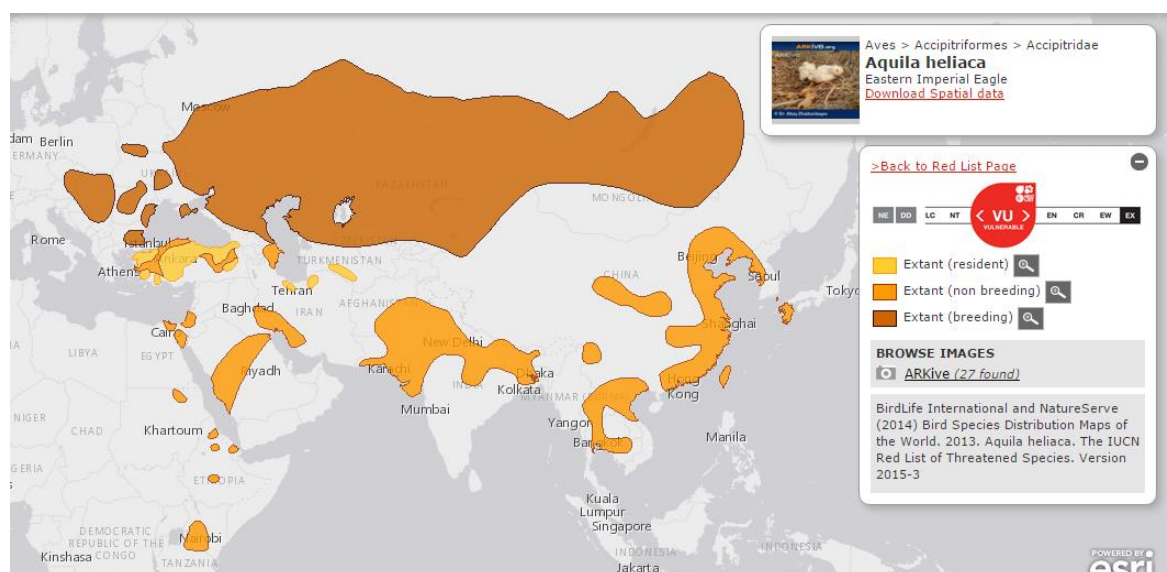
Both resident and migratory non-breeding populations are present in Turkey. In the Sultan Sazlığı wetland the species was observed but no data on its abundance or presence of breeding individuals are available. These birds make their southward migration between September and November, returning between February and May (Ferguson-Lees and Christie 2001). Wetlands are apparently preferred on the wintering grounds. Adults in central Europe, the Balkan Peninsula, Turkey and the Caucasus are usually residents, whilst most immature move south.

This is a lowland species that has been pushed to higher altitudes by persecution and habitat loss in Europe. In central and eastern Europe, it breeds in forests up to 1,000 m and also in steppe and agricultural areas with large trees, and nowadays also on powerline pylons. Eastern populations breed in natural steppe and agricultural habitat.

The main threats for this species are habitat loss and degradation, adult mortality through persecution and collision with powerlines, nest robbing and prey depletion.

Based on habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2), salt marshes (D6.2), steppes (E1.2E) and agricultural areas (I1.13) for a total area of 1487.96 ha (3% of the total Sultan Sazlığı IBA).

Figure 8-46: Distribution of the Imperial Eagle (*Aquila heliaca*)



Greater Spotted Eagle (*Clanga clanga*) (VU)

This species has a small population which appears to be declining owing to extensive habitat loss and persistent persecution. It is therefore listed as Vulnerable. The population probably numbers fewer than 10,000 mature individuals.

Clanga clanga occupies a fragmented range, breeding in Estonia, Poland, Belarus, Moldova, Russia, Ukraine, Kazakhstan, mainland China and Mongolia, and apparently regularly in tiny numbers in Pakistan and north-west India, with some individuals possibly still breeding in Finland, Latvia and Lithuania. Passage or wintering birds occur in small numbers over a vast area, including central and eastern Europe, North Africa, East Africa, the Middle East, the Arabian peninsula, the Indian Subcontinent, south Asia and South-East Asia. The species distribution is shown in Figure 8-47.

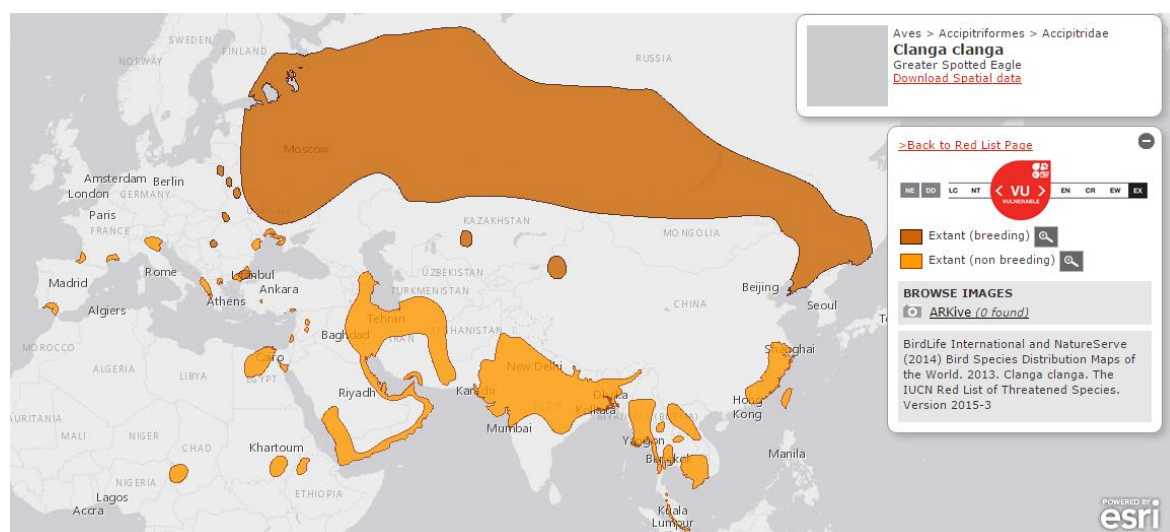
It is a migratory species, with birds leaving their breeding grounds in October and November to winter in southern Europe, southern Asia and north-east Africa. They tend to return in February and March.

Migratory non-breeding populations are present in Turkey. In the Sultan Sazlığı wetland the species was observed but no data on its abundance are available. It occurs in lowland forests near wetlands, nesting in different types of (generally tall) trees, depending on local conditions. It feeds on unretrieved quarry, small mammals, water birds, frogs and snakes, hunting over swamps, wet meadows and over extensively managed agricultural land.

The main threats for this species are: hybridisation between this species and Lesser Spotted Eagle (*Clanga pomarina*) habitat destruction, disturbance, poaching and electrocution.

Based on habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2), salt marshes (D6.2), steppes (E1.2E) and agricultural areas (I1.13) for a total area of 1487.96 ha (3% of the total Sultan Sazlığı IBA).

Figure 8-47; Distribution of the Greater Spotted Eagle (*Clanga clanga*)



Great Bustard (*Otis tarda*) (VU)

This species has suffered rapid population reductions across most of its range and it is likely to continue declining at a rapid rate over the next three generations. The estimate the global population is 44,000-57,000 individuals.

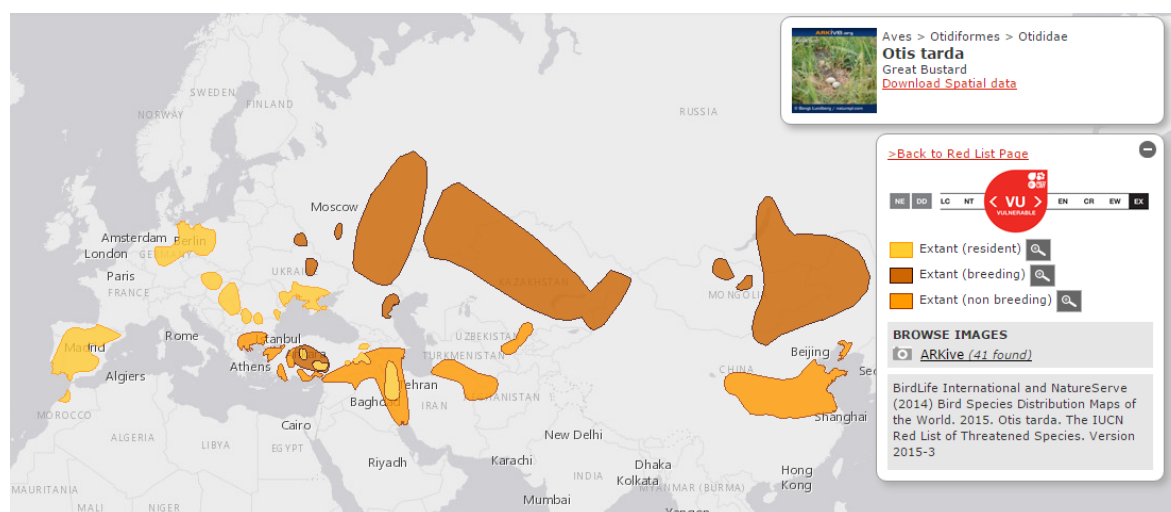
Resident, migratory breeding and non-breeding populations are present in Turkey. In the Sultan Sazlığı wetland the species was observed but no data on its abundance or the presence of breeding individuals are available. The species distribution is shown in Figure 8-48.

It occurs in open, flat or somewhat rolling landscapes, usually with a mixture of crops. Areas with little or no disturbance and abundant supply of insects are required for successful breeding. Nest sites are selected in fallow or cereal fields, far from human infrastructure and with good horizontal visibility.

The main threats to this species are loss, degradation and fragmentation of its habitat, as well as hunting. Habitat loss and fragmentation continues as a result of ploughing of grasslands, intensive grazing, afforestation and increasing development of irrigation schemes, roads, power-lines, fencing and ditches. Collision with power lines and wind turbines are also significant threats.

Based on habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic steppes (E1.2E) and agricultural areas (I1.13) for a total area of 1455.03 ha (3% of the total Sultan Sazlığı IBA), although, considering the disturbance level in this area its presence is not likely.

Figure 8-48: Distribution of the Great Bustard (*Otis tarda*)



Aquatic Warbler (*Acrocephalus paludicola*) (VU)

It probably declined rapidly until the late 1990s, as a result of the destruction of its habitat, at a rate equivalent to 40% in 10 years. It therefore qualifies as Vulnerable. The population is estimated at 22,000-32,000 mature individuals or 33,000-48,000 individuals in total.

Acrocephalus paludicola breeds across a highly fragmented range at fewer than 50 regular breeding sites in Poland, Belarus, Ukraine, Germany, Lithuania. On migration, it has been recorded in 15 European countries, mainly in the west and southwest of the continent. It winters in the Sahelian belt of sub-Saharan West Africa, mainly along the lower Senegal River. The species distribution is shown in Figure 8-49.

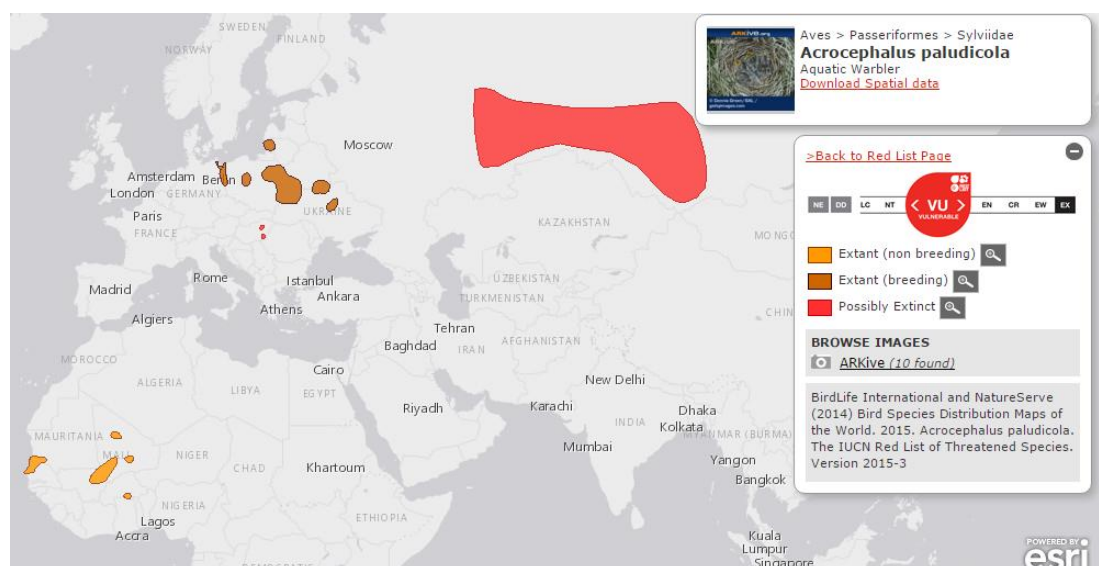
In the Sultan Sazlıği wetland the species was observed probably using the site as a stopover during migration but no data on its abundance are available.

Acrocephalus paludicola winters in large open lowland marsh habitats with low grassy vegetation (mostly sedge fen mires) with shallow water. On migration it favours coastal habitats with low stands of sedge and reed near open water

The most important threats are loss of breeding habitat owing to drainage for agriculture and peat extraction, damming of floodplains, unfavourable water management and the canalisation of rivers. In the wintering grounds, agricultural cultivation and irrigation, drought, wetland drainage, intensive grazing, succession to scrub, desertification and salinization of irrigated soils are all potential threats.

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlıği Wetland in mesotrophic ponds (C1.2) for a total area of 0.91 ha (0.01% of the total Sultan Sazlıği IBA).

Figure 8-49: Distribution of the Aquatic Warbler (*Acrocephalus paludicola*)



Dalmatian Pelican (*Pelecanus crispus*) (VU)

Conservation measures have resulted in a population increase in Europe. However, rapid population declines in the remainder of its range are suspected to be continuing and therefore the species is listed as Vulnerable. The population is estimated to number 10,000-13,900 individuals, roughly equating to 6,700-9,300 mature individuals.

Pelecanus crispus breeds in eastern Europe and east-central Asia. European breeders winter in the eastern Mediterranean countries, Russian and central Asian breeders in Iran, Iraq and the Indian subcontinent, and Mongolian breeds along the east coast of China. The species distribution is shown in Figure 8-50.

Resident and migratory non-breeding populations are present in Turkey. In the Sultan Sazlığı wetland the species was observed but no data on its abundance or the presence of breeding individuals are available.

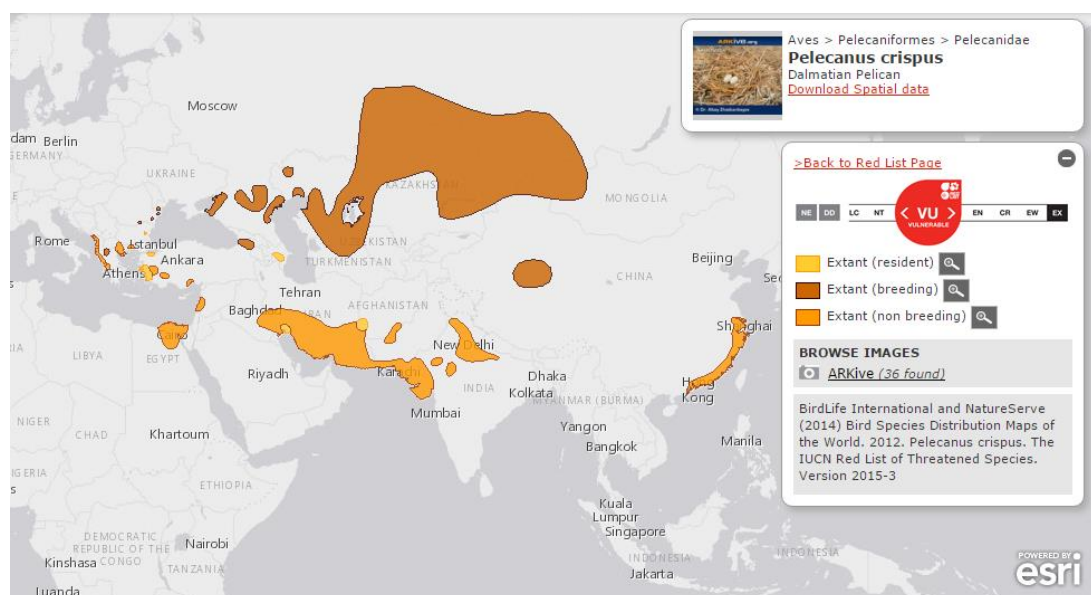
This species is dispersive in Europe, and migratory in Asia. It starts to breed in late March or April, sometimes solitarily but usually in dense colonies. Adults form monogamous pair bonds. It departs from the colonies between the end of July and September, although a few remain until November. It is gregarious during the winter, often occurring in large flocks and foraging communally and cooperatively in small groups. The birds return to their breeding sites in late-January to April, depending on the region. Immature birds and non-breeders may remain in the wintering grounds year round.

It occurs mainly at inland, freshwater wetlands but also at coastal lagoons, river deltas and estuaries. It breeds on small islands in freshwater lakes or in dense aquatic vegetation. A few breed in Mediterranean coastal lagoons. On migration, large lakes form important stop-over sites.

Declines were primarily caused by wetland drainage, shooting and persecution by fishers. Other continuing threats include disturbance from tourists and fishers, wetland alteration and destruction, water pollution, collision with overhead power-lines and over-exploitation of fish stocks.

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2) for a total area of 0.91 ha (0.01% of the total Sultan Sazlığı IBA).

Figure 8-50: Distribution of the Dalmatian Pelican (*Pelecanus crispus*)



8.8.3 Threatened habitats

Threatened habitats include the “*Irano-Anatolian steppe [Quercus] woods*” (G1.7A.2) (Table 8-17). This habitat is also listed within the EU *Habitat Directive* as 9110 “Euro-Siberian steppic woods with *Quercus* sp”. Moreover it is included at higher level (G1.7- Thermophilous deciduous woodland) in the revised list of endangered natural habitat types according to Resolution 4 of the *Bern Convention*.

This habitat has to be considered important at the landscape level since its distribution is currently very limited due to the intense transformation of the habitat over the past centuries. As a result of human pressure the forest habitats are quite limited in the mountain ranges around the Develi mountain, and they provide a suitable habitat to forest dwelling species, particularly of birds and mammals.

Table 8-17: Habitat determining priority biodiversity features within the LSAs

Habitat	Designation	Powerline/ Mine Site LSA	Area occupied within the LSAs (ha)
G1.7A.2 - Irano-Anatolian steppe [Quercus] woods	Annex 1 - EU Habitat Directive, Resolution 4 -Bern Convention.	Mine Site LSA; Powerline LSA	1137.75

8.8.4 Classified areas

The presence of the Erciyes Dagi (Mountain) KBA and IPA and the Sultan Sazlığı wetland KBA, IBA and IPA described above and showed in Figure 8-20 are considered priority biodiversity features according to PR6 (12) (EBRD, 2014) since they are “significant biodiversity features identified by a broad set of stakeholders or governments” (Table 8-18).

Table 8-18: Classified areas determining priority biodiversity features within the LSAs

Habitat	Designation	Poweline/ Mine Site LSA	Area occupied within the LSAs (ha)
Erciyes Dagı (Mountain)	KBA and IPA	Powerline LSA	1637.16
Sultan Sazlığı Wetland	KBA, IBA and IPA	Powerline LSA	1599.67

The Sultan Sazlığı KBA is also classified as Ramsar area and National Park, and as such it also contributes the definition of Critical Habitat (see 8.9.3).

8.8.5 Considerations regarding Priority Biodiversity Features

The mine site LSA includes areas of known distribution and potential distribution of two vulnerable flora species (*Verbascum luridiflorum* and *Campanula stricta* var. *aladagensis*) and areas of distribution of one fauna vulnerable species (*Testudo graeca*). Considering the limited global distribution of the flora species and the likely large overlap between these species and mine facilities it can be stated that the mine site LSA is significant for the conservation of the population of the species and as such a no-net-loss objective should be considered appropriate. The significance of the areas for the conservation of *Testudo graeca* is low, however specific mitigation measures will be included in the environmental management plan of the mine site.

The mine site LSA includes also a threatened habitat according to the EU Habitat Directive. Although there are uncertainty in the direct applicability of the EU Habitat classification to Turkey and the modest portion of habitat that would be affected by the project is quite disturbed by other anthropogenic factors, using a precautionary approach the area is considered a threatened habitat that requires no-net-loss.

The powerline LSA includes portions of habitats potentially suitable for nine vulnerable species of birds, and it is at the margin of the Sultan Sazlığı area which is classified as KBA, IBA, IPA, Ramsar site and National Park. However the significance of these portions of habitats for the populations of these species and for the conservation objectives of the Sultan Sazlığı area is low for the following reasons:

- The decreased quality of the habitats due to the proximity to existing infrastructures including irrigation canals, roads, and powerlines;
- The existing disturbance due to the proximity to villages and human settlements;
- The current level of fragmentation of the habitats;
- The limited surface compared to the wider area of analysis (Sultan Sazlığı KBA);
- The position at the margin of the Sultan Sazlığı KBA (and outside of core areas of conservation importance related to the National Park and Ramsar site).

For all these reasons it is considered that the LSA for the powerline does not include areas that are significant for the conservation of the Priority Biodiversity Features.

8.9 Critical habitat

Factors contributing to the determination of critical habitat in the mine site and Powerline LSAs include the presence of habitats of significant importance to critically endangered and endangered species, and endemic or geographically restricted species, and habitats supporting globally significant migratory or congregatory species.

8.9.1 Endangered and critically endangered flora species

Two of the total 397 taxa identified within the LSAs, *Astragalus vestitus* spp. nov., and *Cirsium aytatchii*, are listed respectively as critically endangered and endangered. These species are also respectively local endemic and restricted regional endemic.

The presence of these species defines the presence of critical habitat according to PR6 (14) (EBRD, 2014) and in particular of:

- habitats of significant importance to endangered or critically endangered species;
- habitats of significant importance to endemic or geographically restricted species.

These species were identified within the mine site LSA. The threat status and endemism and total known distribution of the species within the mine site LSA is showed in Table 8-19.

Astragalus vestitus spp. nov., and *Cirsium aytatchii*, are threatened and endemic species with great conservation value, however they do not have any particular cultural, medicinal or agronomical value for the local populations.

The distribution, ecology, conservation status and main threats of the two species are described below. Data were collected from bibliographic research, field studies and expert opinion of the local specialists Prof. Hayri Duman (Gazi University) who conducted the field surveys on terrestrial flora and was consulted when relevant background data on species distributions and trends were limited.

Table 8-19: Terrestrial flora determining the presence of critical habitats within the LSAs

Scientific name	Turkish Name	IUCN Red List Categories	Endemic	Area of the critical habitat identified within the LSA (ha)
<i>Astragalus vestitus</i> spp. nov.	Öksüt geveni	CR	local endemic	112.97 ha
<i>Cirsium aytatchii</i>	-	EN	restricted regional endemic	59.98 ha

Figure 8-51: Local endemic species *Astragalus vestitus* spp. nov. (CR)



Figure 8-52: Local endemic species *Cirsium aytatchii* (EN)



***Astragalus vestitus* spp. nov. (CR)**

Astragalus vestitus is only known from a single type locality in Karadağ region of Karaman Province (Tugay et al., 2014). Some differences between the samples collected at the mine site LSA and *Astragalus vestitus* have been detected and studies on the taxonomy of the species performed by Prof. Hayri Duman (Gazi University) identified the specimen found within the mine site LSA as a new subspecies.

Astragalus vestitus is a perennial species found in mountain steppes and oak woodland vegetation. The population of the spp. *vestitus* found in Ereğli Karacadağ are situated between 1350-1700 m a.s.l. While the populations of the new subspecies growing at the project site are higher and are located at 1730-1950 m a.s.l. *Astragalus vestitus* spp. nov. is found on slopes with low/medium inclination, between 5° and 25° (Prof. H. Duman pers. comm.).

Astragalus vestitus vegetative period goes from the beginning of May to late September. The flowering period of this specie goes from the mid-May to late June, while the fruiting period is in July.

Within the mine site LSA it was observed at 5 different locations within or around the project permitted area for a total area of 112.97 ha. . The populations of *Astragalus vestitus* spp. nov. found are considered to be in good conservation conditions and have a high population density estimated to be approximately 25-50 ind./100m². The species coverage within the sub-populations is estimated to be 2-5%

The main threats for the conservation of this species at present are habitat loss due to mining activities and overgrazing.

Astragalus vestitus is considered a critically endangered species according to the IUCN criteria (IUCN 2001 Red List Categories and Criteria). The newly discovered subspecies *Astragalus vestitus* spp. nov. is only known to inhabit a few localities close to one another, only around Öksüt Mountain. The IUCN Red List category for this species should be considered as “CR: Critically Endangered” following the IUCN criteria listed below:

- Criterion B2ab (ii,iii): only known population of *Astragalus vestitus* subsp. nov. less than 10 km²;
- it is estimated that 50% of its known population will be lost due to mining and excessive grazing activities.

The known distribution of *Astragalus vestitus* spp. nov is shown in Figure 8-53, while the distribution within the mine site area is shown in Figure 8-54. The results of the habitat suitability model are shown in Figure 8-55, and the statistics for the habitat suitability modelling are as follows:

Suitability	ha	%
Unsuitable	10732.72	34
Low suitability	4682.66	15
Medium suitability	6815.86	22
High suitability	6525.74	21
Very high suitability	2433.95	8
<u>Total</u>	31190.93	100

According to the suitability model 29% of the mine site LSA is considered is considered to have a high or a very high suitability for the presence of this species (21% high and 8% very high). 22% of the LSA is considered to have medium suitability, while 15% of the area is consider having low suitability. The remaining 34% of the LSA is considered to be unsuitable for the species.

The position of the known populations of the species seems to fit quite well with the suitability model since the areas mostly fell within the high or very high suitability categories.

Figure 8-53: Known distribution of *Astragalus vestitus* (Source: <http://www.tubives.com/>). Project site location is indicated with the red square



Figure 8-54: Known population of *Astragalus vestitus* spp. nov. within the mine site LSA

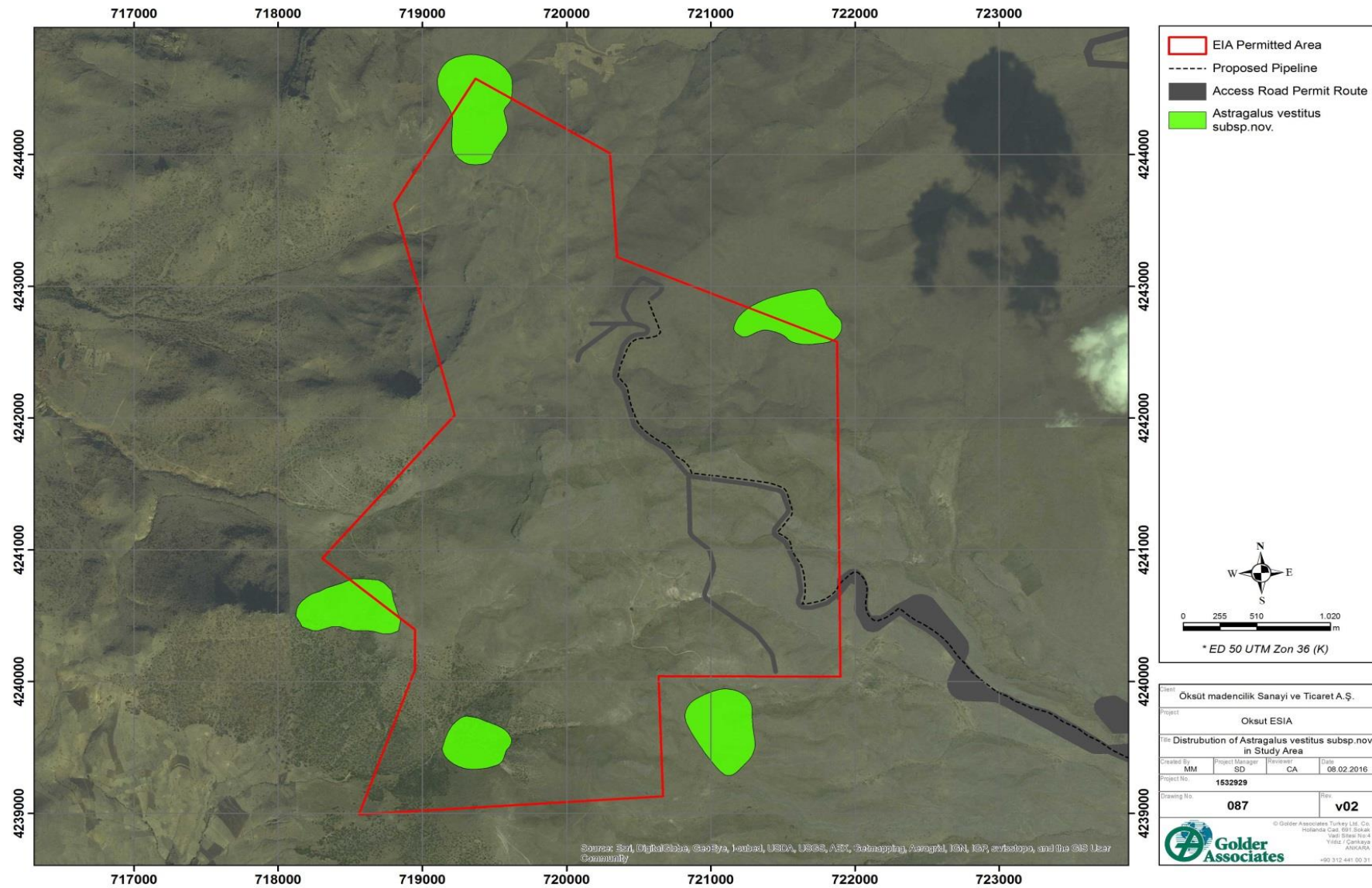
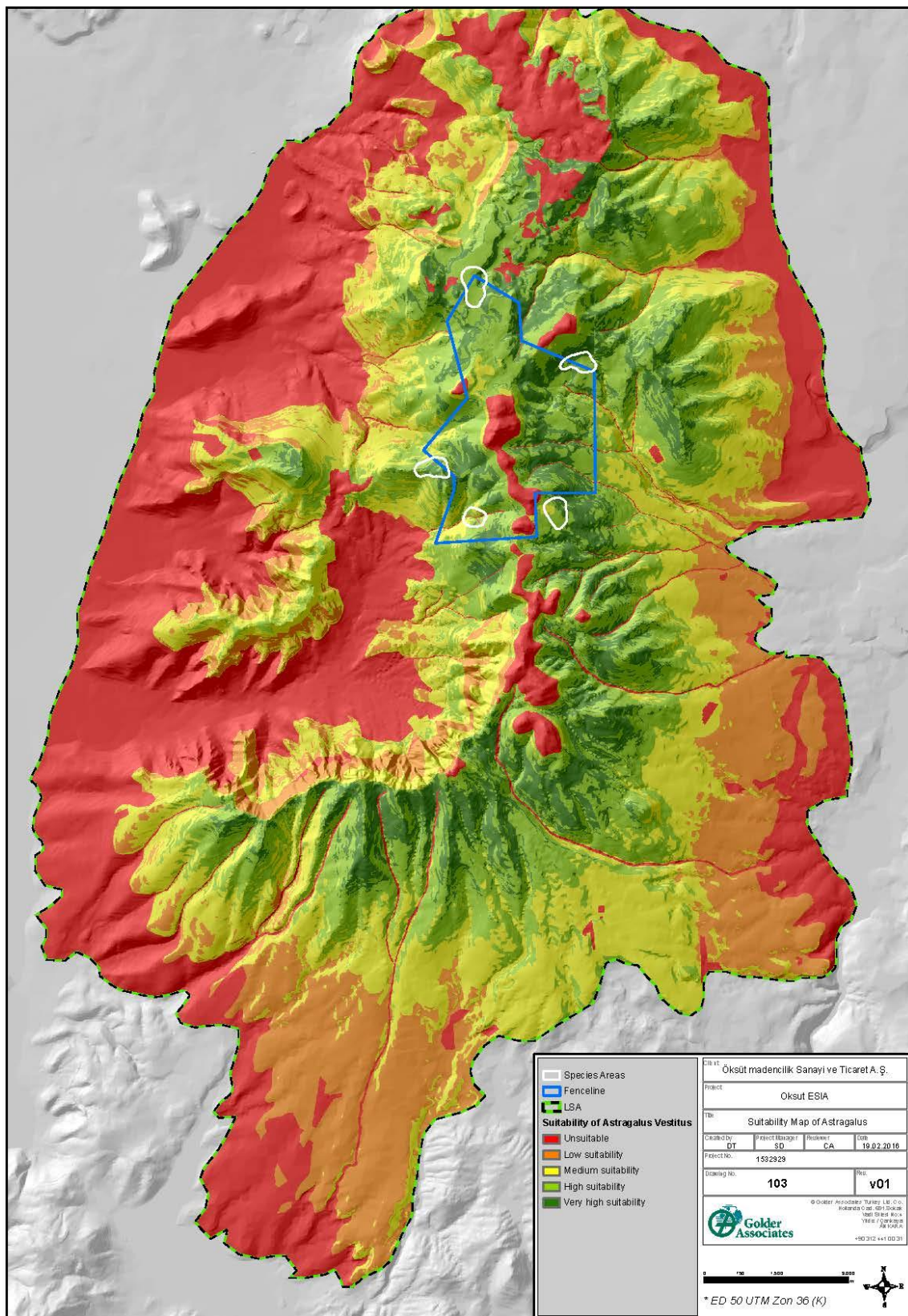


Figure 8-55: Suitability map of *Astragalus vestitus* spp. nov. within the mine site LSA



***Cirsium aytatchii* (EN)**

Cirsium aytatchii was first discovered as a new species in 2000 and its known distribution range goes between the provinces of Kayseri, Adana and Kahramanmaraş. The typical locality of this species is Develi-Saimbeyli.

The species is typically found in steppes and oak woodland openings around 1350-1800 m a.s.l. It grows on low/medium slopes from 5° to 45° of inclination, with a east south or west exposition (Prof. H. Duman pers. comm.). *Cirsium aytatchii* vegetative period starts from July to October. The flowering period of this species goes from the second week of July to late August, while the fruiting period is in September.

Within the mine site LSA it was observed at 3 different locations within or around the project permitted area between 1490-1800 m a.s.l. for a total area of 59.98 ha. The populations of *Cirsium aytatchii* found are considered to be in good conservation condition and have a high population density estimated to be approximately 15- 50 ind./100m².

The main threats for the conservation of this species at present are overgrazing and habitat loss due to road construction and agriculture.

The threat category of this species was evaluated as EN (endangered) by Prof. H. Duman according to the new IUCN criteria (IUCN 2001 Red List Categories and Criteria), based on his expert judgement and most recent studies. The rationale for this categorisation is discussed below:

- Criterion: C2a: number of known location of this species is less than 5, and each population is composed of less than 250 healthy number of individuals;
- Criterion E: it is estimated that population of *Cirsium aytatchii* will be decreased by 20% within the next 20 years, due to mining activities, road expansion and excessive grazing.
- The known distribution of *Cirsium aytatchii* is shown in Figure 8-56, while the distribution within the mine site LSA is shown in Figure 8-57. The results of the habitat suitability model are shown in Figure 8-58, and the statistics for the habitat suitability modelling are as follows:

Suitability	ha	%
Unsuitable	10732,72	23
Low suitability	4682,66	26
Medium suitability	6815,86	26
High suitability	6525,74	20
Very high suitability	2433,95	4
<u>Total</u>	31190,93	100

According to the suitability model 24% of the mine site LSA is considered is considered to have a high or a very high suitability for the presence of this species (20% high and 4% very high). 26% of the mine site LSA is considered to have medium suitability, while an additional 26% of the area is consider having low suitability. The remaining 23% of the mine site LSA is considered to be unsuitable for the species.

The position of the known populations of the species seems to fit with the suitability model, although most of the western populations fell within the medium suitability areas.

Figure 8-56: Known geographical distribution of the species *Cirsium aytatchii* outside the LSAs

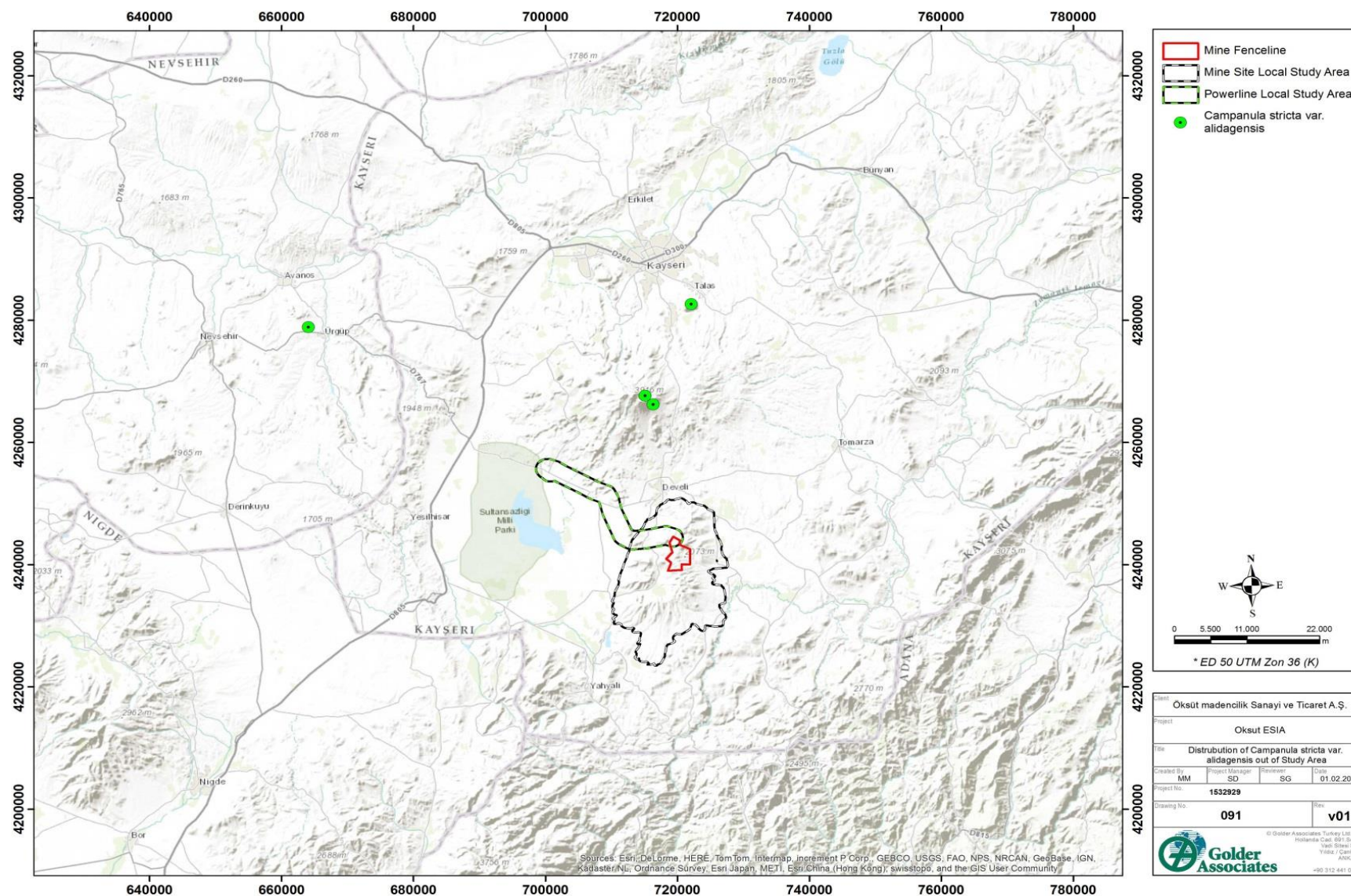


Figure 8-57: Known population of *Cirsium aytatchii* within the mine site LSA

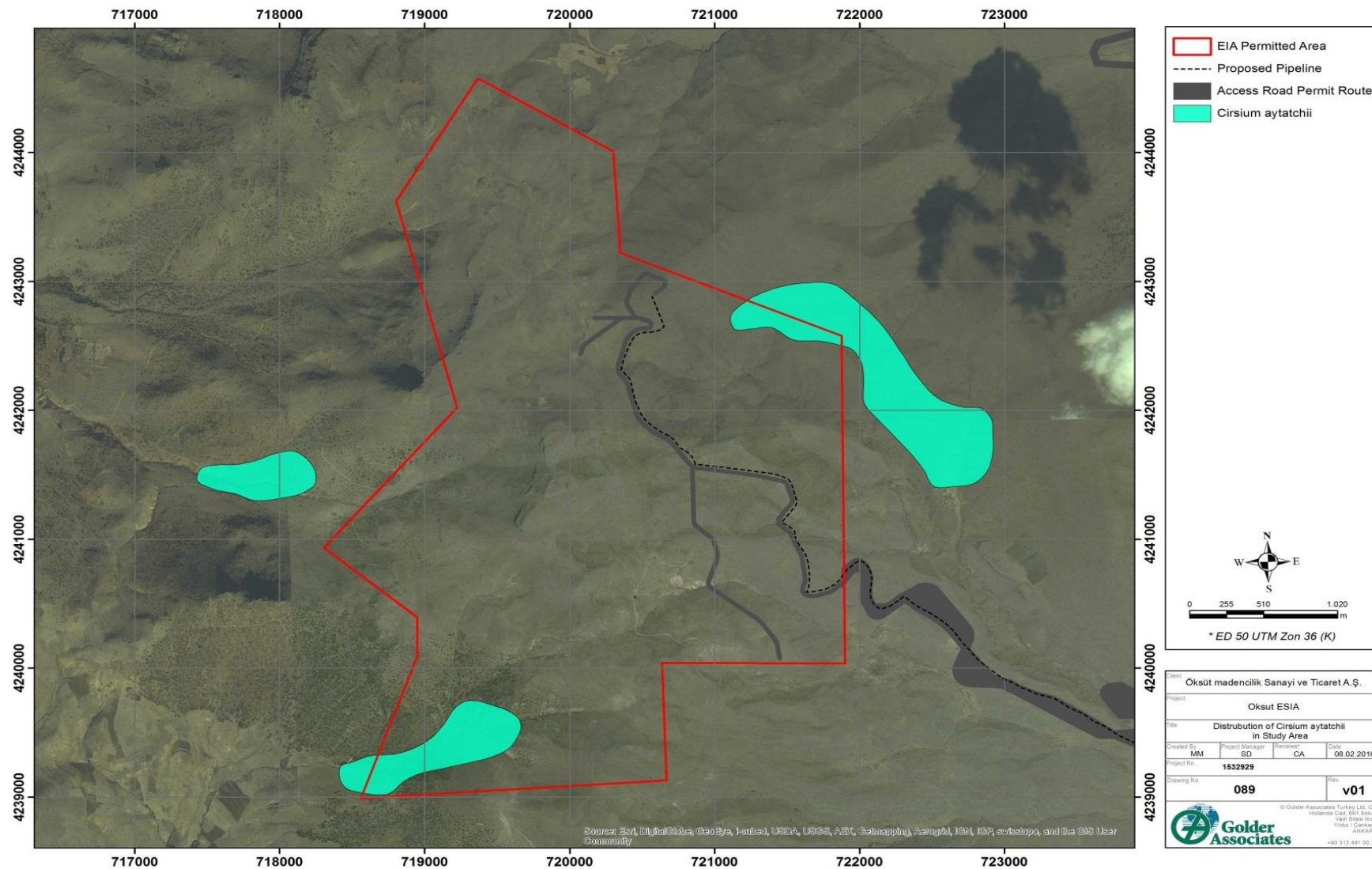
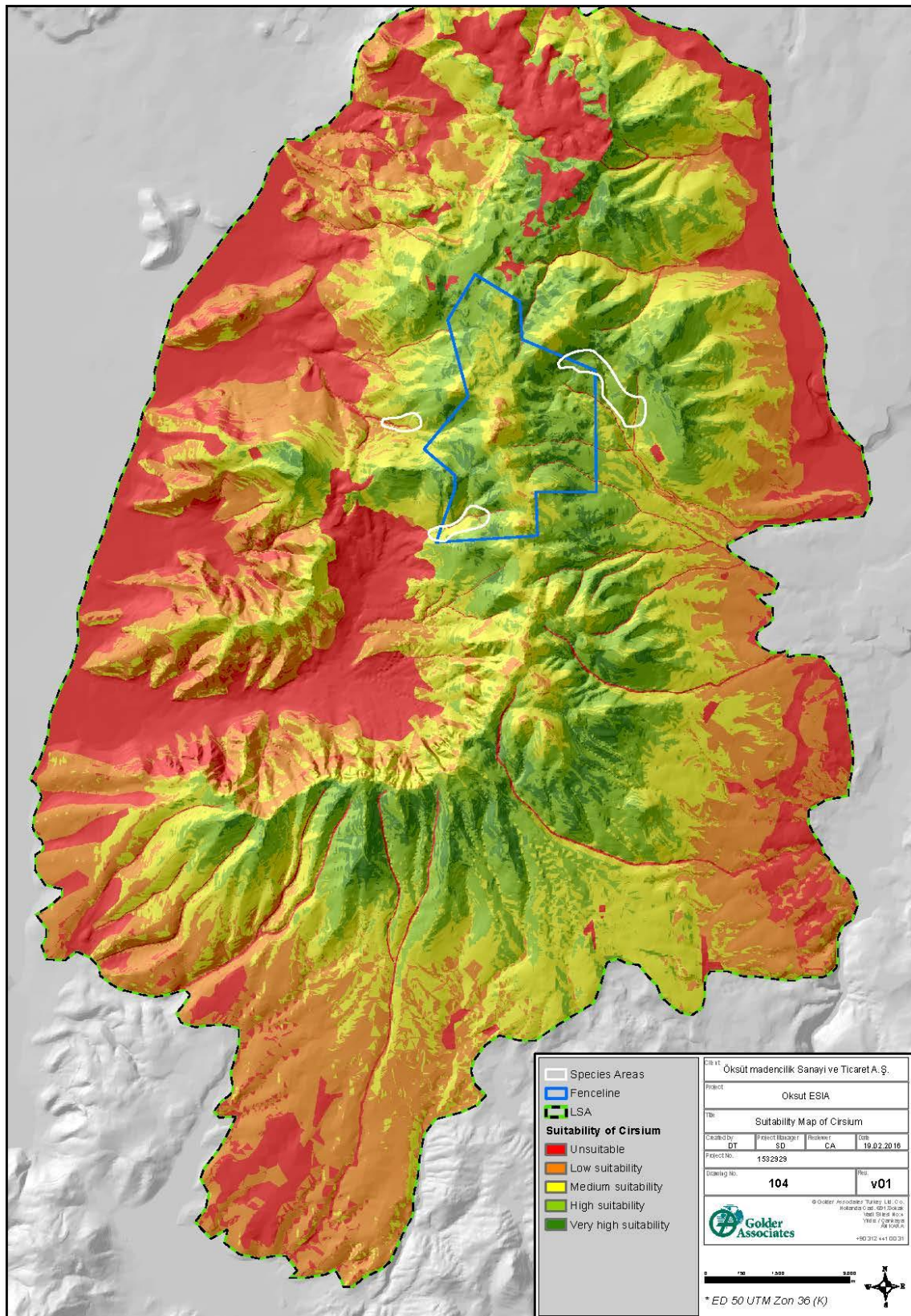


Figure 8-58: Suitability map of *Cirsium aytatchii* within the mine site LSA



8.9.2 Endangered and critically endangered fauna species

The presence of these species could define the presence of critical habitat according to PR6 (14) (EBRD, 2014): “habitats of significant importance to endangered or critically endangered species”.

Five of the fauna species identified as present or potentially present within the Mine Site and Powerline LSAs are considered endangered or critically endangered at global level according to IUCN standards. The species, their threat category and distribution within the LSAs are summarized below (Table 8-20).

Table 8-20: Endangered and Critically Endangered fauna species within the LSAs

Scientific Name	Common Name	IUCN Red List Categories	Endemic	Poweline/ Mine Site LSA	Area of occurrence identified within the LSA (ha)
<i>Vanellus gregarius</i>	Sociable Lapwing	CR	No	Powerline LSA	1487.05
<i>Numenius tenuirostris</i>	Slender-billed Curlew	CR	No	Powerline LSA	1487.96
<i>Oxyura leucocephala</i>	White-headed Duck	EN	No	Powerline LSA	0.91
<i>Falco cherrug</i>	Saker Falcon	EN	No	Powerline LSA	1487.96
<i>Neophron percnopterus</i>	Egyptian vulture	EN	No	Mine Site LSA; Powerline LSA	37352

Available information on the species taxonomy, distribution, population, habitat, ecology, major threats and conservation status collected from bibliographic research, field studies and local experts are described below.

Based on the information available, the presence of habitats of significant importance for the conservation of this species, and therefore their identification as critical habitat, is evaluated.

Figure 8-59: *Vanellus gregarius* (Sociable Lapwing) (CR)



Figure 8-60: *Numenius tenuirostris* (Slender-billed Curlew) (CR)



Figure 8-61: *Oxyura leucocephala* (White-headed Duck) (EN)



Figure 8-62: *Falco cherrug* (Saker Falcon) (EN)



Figure 8-63 : Egyptian vulture (*Neophron percnopterus*) (EN)



***Vanellus gregarius* (Sociable Lapwing) (CR)**

Vanellus gregarius (Figure 8-59) is listed as Critically Endangered because its population has undergone a very rapid reduction (40% during 1930-1960), for reasons that are poorly understood. This decline is projected to continue and increase in the future. More recent fieldwork has shown the population to be larger than once feared. According to recent researches the total population size is estimated to be of 5,600 breeding pairs, i.e. 11,200 mature individuals, roughly equivalent to 16,000-17,000 individuals in total.

The species breeds in northern and central Kazakhstan and south-central Russia (Kamp *et al.* 2010), dispersing through Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan, Afghanistan, Armenia, Georgia, Azerbaijan, Iran, Iraq, Saudi Arabia, Syria, Turkey and Egypt, to key wintering sites in Israel, Eritrea, Sudan (see below) and north-west India. Birds winter occasionally in Pakistan, Sri Lanka, Oman and UAE. The species distribution is shown in Figure 8-64.

In Turkey the species is present during migrations. Turkey has important stop-over sites at Muş Plain and Ceylanpınar Important Bird Area (1,300 birds were recorded at Ceylanpınar in October 2012 [Sheldon 2014]) (Sheldon *et al.* 2012). The Sultan Sazlığı Wetland the species was occasionally observed in the past and it is in the list of species present in the wetland according to the Kayseri Branch Office of the Ministry of Forestry and Water Affairs, 7th Regional Directorate.

The habitat used during migration is mainly sandy plains with short grass, dry meadows, fallow land and cultivated fields, where it feeds chiefly on insects including Orthoptera, Coleoptera, and moth larvae (del Hoyo et al. 1996).

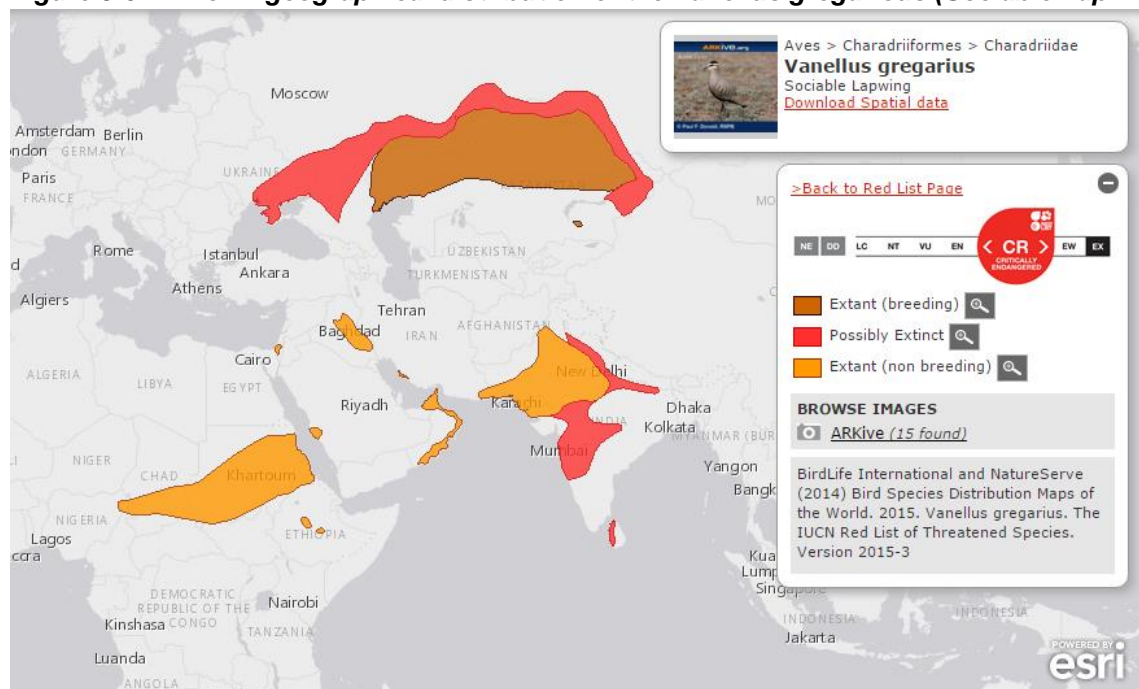
Key factors explaining the rapid decline of the species remain poorly understood, despite much recent research. On the breeding grounds, it was probably formerly threatened by the conversion of steppe to arable cultivation, plus, perhaps less likely, the reduction in grazing by large herds of native ungulates and, latterly, by the loss of the enormous herds of domestic grazing animals from state-sponsored collective farms (Eichhorn and Khrokov 2002, Watson et al. 2006).

Illegal hunting during migration and on the wintering grounds may now be the primary threat (Biricik et al. 2008). Agricultural expansion and intensification, overgrazing and loss of steppe habitats all pose threats to stopover sites used by the species (Ashoori et al. 2013, Sheldon 2013, Asswad 2014).

Although the species is only occasionally present during migrations, stop-over sites are a fundamental part in the life cycle of migrating species. Therefore, using a precautionary approach, the Sultan Sazlığı Wetland is considered a critical habitat of significant importance for this critically endangered species.

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in salt marshes (D6.2), steppes (E1.2E) and agricultural areas (I1.13) for a total area of 1487.05 ha (3% of the total Sultan Sazlığı IBA).

Figure 8-64: Known geographical distribution of the *Vanellus gregarius* (Sociable Lapwing)



(Source: <http://maps.iucnredlist.org/>)

***Numenius tenuirostris* (Slender-billed Curlew) (CR)**

There are very few recent confirmed records of *Numenius tenuirostris* (Figure 8-60) and sightings have become more and more infrequent, presumably as a result of its decline. No regular breeding, passage or wintering population is known, and the number of remaining individuals must be very small. In 1994, the population was estimated at only 50-270 individuals, but the paucity of recent confirmed records suggests it is now lower than 50 birds (BirdLife International 2015). For these reasons the species qualifies as Critically Endangered.

This species has only been confirmed breeding near Tara, north of Omsk in Siberia, Russia, between 1909-1925. It migrates west-south-west from its presumed breeding grounds in Siberia through central and eastern Europe, predominantly Russia, Kazakhstan, Ukraine, Bulgaria, Hungary, Romania and the former Yugoslavia to southern Europe, Greece, Italy, and Turkey, and North Africa, Algeria, Morocco and Tunisia. It has also been reported from Slovenia, Uzbekistan, Turkmenistan, Saudi Arabia, and Yemen. Reports of birds staging in Ukraine persist but require confirmation. The species distribution is shown in Figure 8-65.

This species is migratory (del Hoyo et al. 1996). It is thought to breed in small colonies. Early records often referred to the species as occurring in large flocks on migration and in winter. However, it is some decades since any sizeable flocks have been observed.

In Turkey the species is present was observed in stop over sites during migrations. The peak of the autumn migration appears to occur around September, with the spring migration peaking around March (Gretton 1991). The Sultan Sazlığı Wetland the species was occasionally observed in the past and it is in the list of species present in the wetland according to the Kayseri Branch Office of the Ministry of Forestry and Water Affairs, 7th Regional Directorate.

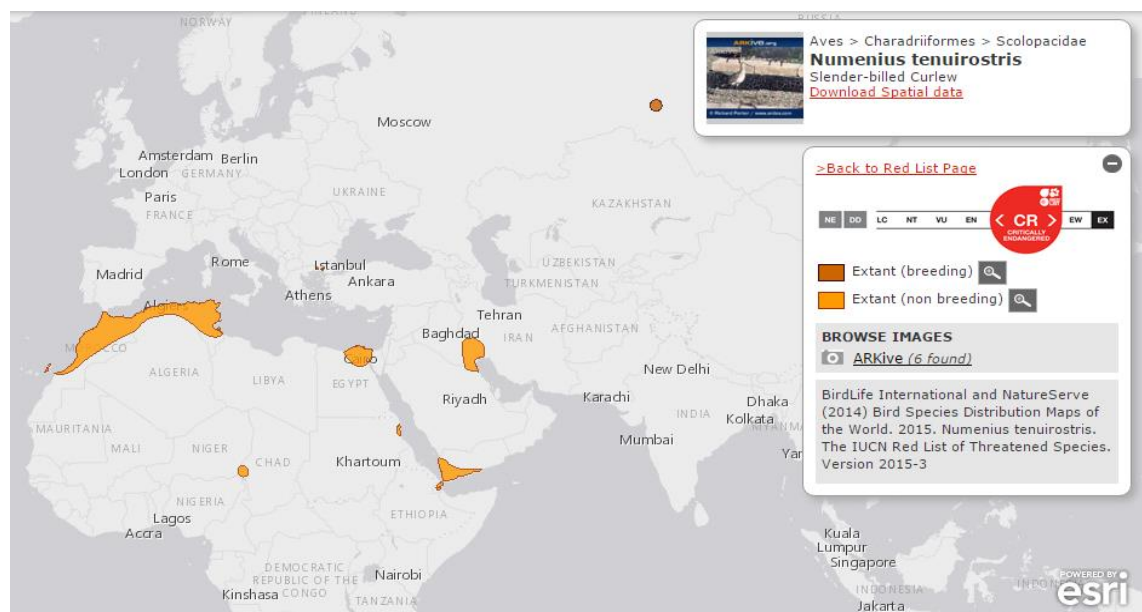
On migration and in winter, a wide variety of habitats are used, including saltmarsh, steppe grassland, fishponds, saltpans, brackish lagoons, tidal mudflats, semi-desert, brackish wetlands and sandy farmland next to lagoons. It fed on earthworms and tipulid larvae, but also on insects, molluscs and crustaceans.

Threats present threats to this species are uncertain. Within its potential breeding range, the taiga has been little modified, the forest-steppe partially cultivated and much of the steppe modified by agriculture. Habitat loss in the wintering grounds is of unknown importance. Historically hunting was high, and may have been the key factor in its decline. Following the initial decline, breakdown of social behaviour patterns may have prevented recovery.

Although the species it only occasionally present during migrations since stop-over sites are a fundamental part in the life cycle of migrating species, using a precautionary approach, the Sultan Sazlığı Wetland is considered a habitat of significant importance for this critically endangered species.

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2), salt marshes (D6.2), steppes (E1.2E) and agricultural areas (I1.13) for a total area of 1487.96 ha (3% of the total Sultan Sazlığı IBA).

Figure 8-65: Known geographical distribution of the *Numenius tenuirostris* (Slender-billed Curlew)



(Source: <http://maps.iucnredlist.org/>)

***Oxyura leucocephala* (White-headed Duck) (EN)**

Mid-winter counts indicate that the population of *Oxyura leucocephala* (Figure 8-61) has undergone a very rapid decline, which qualifies it as Endangered. The Spanish subpopulation has now stabilised, and it is projected that the global rate of decline will be lower in the next ten years (Green and Hughes 1996). The global population was probably over 100,000 in the early 20th century, falling to an estimated 20,000 birds in 1996 (Green and Hunter 1996), since then numbers have probably declined to around 8,000-13,000 individuals (Li and Mundkur 2003).

Oxyura leucocephala is resident in Spain, Algeria and Tunisia. A larger population breeds primarily in Russia and Kazakhstan, and also Turkey, Iran, Afghanistan, Tajikistan, Turkmenistan, Uzbekistan, Armenia, and Mongolia (Green and Hughes 1996). Its status in China is unclear, but it appears to be rare. Species distribution is shown in Figure 8-66.

Birds breed from April to July (Sánchez *et al.* 2000, Kear 2005). After breeding it undergoes a flightless moulting period lasting for 2-3 weeks before it begins the migration to its wintering grounds in late August to arrive September-October. The return journey commences in February and all birds have returned to the breeding range by early May (Johnsgard and Carbonell 1996, Kear 2005).

The species is highly gregarious outside of the breeding season. In Mediterranean populations, although the species forms congregations at certain sites during the non-breeding season, there is no overall direction to its seasonal movements (Kear 2005) and the location of such non-breeding sites varies inter-annually).

It breeds on small, enclosed, semi-permanent or temporary (Kear 2005) freshwater, brackish or eutrophic lakes with a fringe of dense emergent vegetation (Sánchez *et al.* 2000, Sebastián-González *et al.* submitted). It is usually found where these conditions occur within larger wetland systems and areas with extensive areas of shallow water 0.3-0.5 m deep (Kear 2005). During the winter the species inhabits larger, deeper alkaline or saline waters which often have less emergent vegetation (Johnsgard and Carbonell 1996).

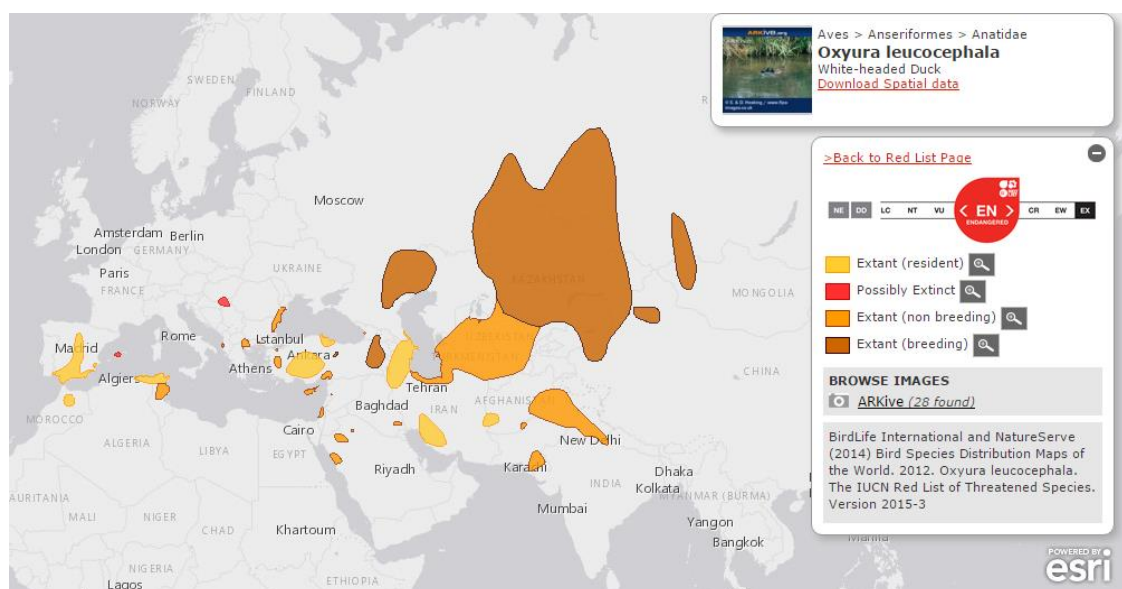
In Turkey resident and migratory populations are present (both breeding and non-breeding). The total Turkish wintering population in 2005 was only 1,006 birds, down from over 9,000 in 1988 (S.

Isfendiyyaroglu *in litt.* 2005). In the Sultan Sazlığı Wetland the presence of 20 breeding pairs was identified during a study conducted in 1994 (BirdLife, 2015)

Considering the presence of breeding individuals in the Sultan Sazlığı Wetland, this area is identified as a habitat of significant importance for this endangered species and therefore as a critical habitat.

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2) for a total area of 0.91 ha (less than 0.01% of the total Sultan Sazlığı IBA).

Figure 8-66: Known geographical distribution of the *Oxyura leucocephala* (White-headed Duck)



(Source: <http://maps.iucnredlist.org/>)

***Falco cherrug* (Saker Falcon) (EN)**

Falco cherrug (Figure 8-62) has been up listed to Endangered because a revised population trend analysis indicates that it may be undergoing a very rapid decline (BirdLife, 2015). This classification is highly uncertain and may be revised when new information becomes available. The historical and present global population size remains subject to considerable uncertainty; however, a revised analysis of available data has resulted in a global population estimate of 17,400-28,800 breeding pairs (median 22,100). The species is precautionary estimated to be declining by at least 50% over three generations. The rate of decline appears to be particularly severe in the species's central Asian breeding grounds.

Falco cherrug occurs in a wide range across the Palearctic region from eastern Europe to western China, breeding in Austria, Hungary, Czech Republic, Slovakia, Serbia & Montenegro, Bulgaria, Romania, Moldova, Ukraine, Turkey, Iraq, Armenia, Russian Federation, Uzbekistan, Tajikistan, Kyrgyzstan, Kazakhstan, Mongolia and China, and at least formerly in Turkmenistan and probably Afghanistan, possibly India (Ladakh), with wintering or passage populations regularly in Italy, Malta, Cyprus, Israel, Jordan, Egypt, Libya, Sudan, South Sudan, Tunisia, Ethiopia, Kenya, Saudi Arabia, Yemen, Oman, U.A.E., Bahrain, Kuwait; Iran, Pakistan, India, Nepal, Afghanistan and Azerbaijan (Baumgart 1991, 1994, Snow and Perrins 1998, Haines 2002, ERWDA 2003). Species distribution is shown in Figure 8-67.

In Turkey resident and migratory non breeding populations are present. In the Sultan Sazlığı wetland the species was observed but no data on its abundance or presence of nesting individuals are available.

Migrant birds winter in East Africa, southern Europe and southern Asia, and generally leave their breeding grounds in September and October, returning between February and May (del Hoyo *et al.* 1994a).

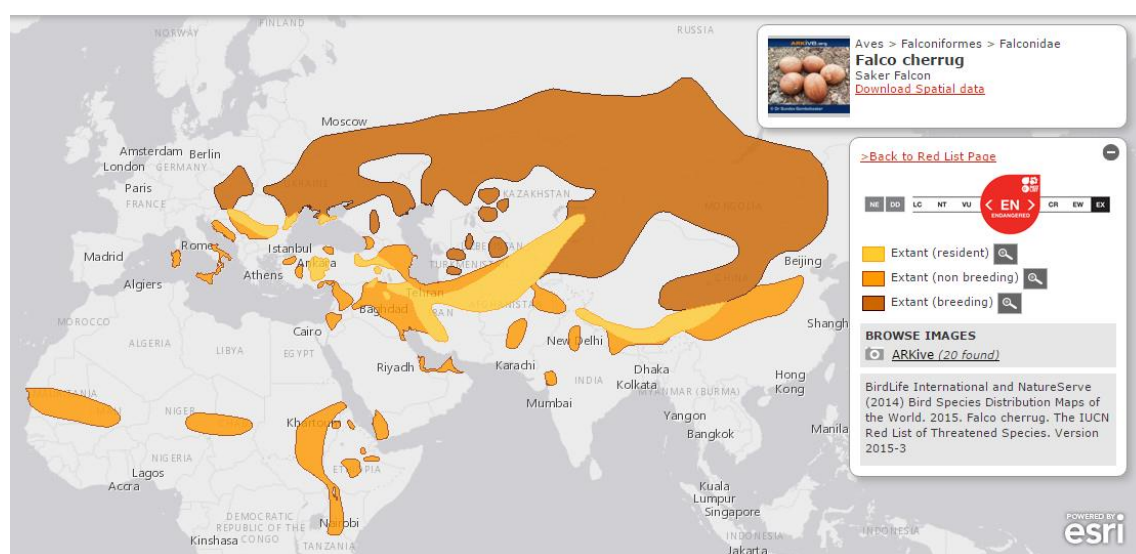
Falco cherrug hunts close to the ground in open terrain, combining rapid acceleration with high manoeuvrability, thus specialising on mid-sized diurnal terrestrial rodents (especially ground squirrels *Citellus*) of open grassy landscapes such as steppes; in some areas, particularly near water, it switches to birds as key prey. It uses copses or cliffs for nest sites, occupying the old nests of other birds (Baumgart 1991, Snow and Perrins 1998).

This species has suffered mainly from the loss and degradation of steppes and dry grasslands through agricultural intensification, plantation establishment and declines in sheep pastoralism, causing a decline in key prey species. Offtake for falconry is a serious problem, which has caused local extinctions (Baumgart 1991, 1994).

Considering the presence of favourable habitat for breeding and wintering and the potential presence of nesting individuals in the Sultan Sazlığı Wetland, this area is identified as a habitat of significant importance for this endangered species and therefore as a critical habitat.

Based on the data available on the habitat suitability and distribution, using precautionary approach, the species is potentially present within the powerline LSA in correspondence of the Sultan Sazlığı Wetland in mesotrophic ponds (C1.2), salt marshes (D6.2), steppes (E1.2E) and agricultural areas (I1.13) for a total area of 1487.96 ha (3% of the total Sultan Sazlığı IBA).

Figure 8-67: Known geographical distribution of the *Falco cherrug* (Saker Falcon)



(Source: <http://maps.iucnredlist.org/>)

Egyptian vulture (*Neophron percnopterus*) (EN)

This species occupies a large range with isolated resident populations in the Cape Verde and Canary Islands. A preliminary estimate of the global population size is 20,000-61,000 individuals, roughly equivalent to 13,000-41,000 mature individuals. The global population is declining. In particular the European population has declined by over 50% in the last three generations (BirdLife International 2014). Species distribution is shown in Figure 8-68.

The causes of the species' decline are many across its range, the main causes are the following (BirdLife International, 2015):

- disturbance from human settlements or activities;
- lead poisoning (from gunshot) and poisoning from antibiotic and medicinal residues present in the carcasses of intensively-farmed livestock;

- direct poisoning or poisoning through the consumption of poison baits targeted at terrestrial predators and through the consumption of inappropriately disposed poisoned animals;
- collisions with powerlines and wind turbines;
- reduced food availability: loss of wild ungulate populations, reduction of traditional nomadic pastoral activity and disposal of animal carcasses, greatly reduced food availability;
- habitat change.

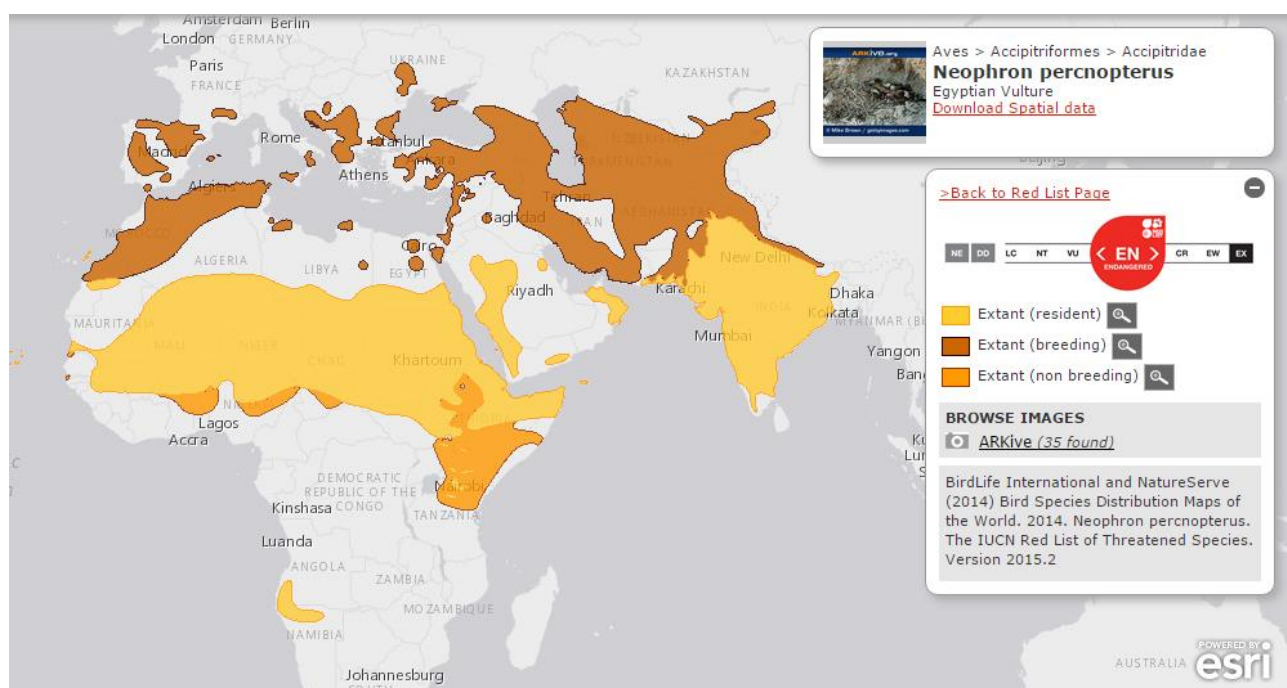
In Turkey the species is defined as Vulnerable and breeding species (A.3).

An Egyptian vulture was observed in 2009 flying over the mine site LSA but the sighting was not confirmed during 2015 field survey. No nest and no behaviours connected to the presence of a possible nest or roost nearby were observed in the surroundings of the LSA. Moreover, no data were found in literature of nesting sites within the Develi Mountain.

The LSA is within the range of the species and the area is probably used as a feeding ground for this species that could feed on occasional cattle carrions and other smaller pray. This species has a very extensive home range and forage areas are typically lowland and montane regions over open, often in arid country.

Considering the species occasional presence within the LSA and the absence of nesting sites within the LSA, the area is not considered to be habitats of significant importance for this species and therefore it does not qualify as critical habitat.

Figure 8-68: Known geographical distribution of the Egyptian vulture (*Neophron percnopterus*)



(Source: <http://maps.iucnredlist.org/>)

8.9.3 Habitats supporting globally significant migratory species

The Sultan Sazlıği National Park and Ramsar areas are defined as critical habitat according to PR6 (14) (EBRD, 2014) because of the following:

- highly threatened or unique ecosystems;
- habitats of significant importance to endangered or critically endangered species;

- habitats supporting globally significant migratory or congregatory species.

These areas are described in the section 8.8.4 and summarized below (Table 8-21).

Table 8-21: protected areas determining the presence of critical habitats within the LSAs

Habitat	Designation	Poweline/ Mine Site LSA	Area of the critical habitat identified within the LSA (ha)
Sultan Sazlığı Wetland	National Park	Powerline LSA	871.26
Sultan Sazlığı Wetland	Ramsar Site	Powerline LSA	766.00

8.9.4 Considerations regarding Critical Habitat

The mine site LSA includes areas of known distribution and potential distribution of one critically endangered flora species (*Astragalus vestitus ssp novae*) and one endangered flora species (*Cirsium aytatchii*) and areas where the presence of one Endangered fauna species has been detected (*Neophron percnopterus*). Considering the limited global distribution of the flora species and the likely large overlap between these species and mine facilities it can be stated that the mine site LSA is significant for the conservation of the population of the species and as such a Critical Habitat designation and a net-gain objective should be considered appropriate. The significance of the areas for the conservation of *Neophron percnopterus* is low, considering that the areas do not seem to be suitable as a nesting site and the presence.

The Powerline LSA includes portions of habitats potentially suitable for two critically endangered and three endangered species of birds, and it is at the margin of the Sultan Sazlığı area which is classified as KBA, IBA, IPA, Ramsar site and National Park. However the significance of these portions of habitats for the populations of these species and for the conservation objectives of the Sultan Sazlığı area is low for the following reasons:

- The decreased quality of the habitats due to the proximity to existing infrastructures including irrigation canals, roads, and powerlines;
- The existing disturbance due to the proximity to villages and human settlements;
- The current level of fragmentation of the habitats;
- The limited surface compared to the wider area of analysis (Sultan Sazlığı KBA);
- The position at the margin of the Sultan Sazlığı KBA (and outside of core areas of conservation importance related to the National Park and Ramsar site)

For all these reasons it is considered that the LSA for the powerline does not include areas of Critical Habitat.

8.10 Receptor sensitivity

8.10.1 Terrestrial Flora

Based on the considerations presented above, the following sensitivities are assigned:

- semi natural flora: medium sensitivity
- priority biodiversity features (flora): high sensitivity
- critical habitats (flora): very high sensitivity

8.10.2 Terrestrial Fauna

Based on the considerations presented above, the following sensitivities are assigned:

- terrestrial fauna: medium sensitivity
- priority biodiversity features (fauna): high sensitivity
- species of conservation concern: high sensitivity

8.10.3 Habitats

Based on the considerations presented above, the following sensitivities are assigned:

- natural and semi-natural habitats: medium sensitivity
- priority biodiversity features: high sensitivity

8.10.4 Protected and Classified Areas

Based on the considerations presented above, Protected and Classified areas are assigned: high sensitivity.

8.11 Impact Assessment Methodology

This impact assessment determines the impacts on the various sub-components identified in the baseline studies, taking into account their different sensitivities and the conservation objectives set forth by the EBRD PR6.

Impacts have been assessed separately for the following sub-components:

- Modified and semi-natural habitats;
- Priority Biodiversity Features;
- Critical Habitats.

Section 8.12 assesses impacts on the mine site LSA and 8.13 assesses impacts on the powerline LSA separately. The project mitigation, monitoring, future management actions and related offsets measures will be included in the Biodiversity Management Plan (BMP, OMAS-ESMS-BIO-PLN-001), Biodiversity Action Plan (BAP) and in the Biodiversity Offset Strategy (OMAS-ESMS-OFF-PLN-001). A description of the rehabilitation and restoration activities is presented in the Conceptual Closure Framework (OMAS-ESMS-CP-PLN-001).

Types of Impacts

The impacts have been assessed in terms of loss and degradation of habitat, both in terms of semi-natural and modified habitat and habitat suitable for the species of conservation concern, considering both the direct loss caused by the removal of vegetation and topsoil and the degradation due to other indirect effects.

Indirect effects have been considered to extend over a buffer around the areas of direct effects.

For the calculation of habitat loss the concept of “habitat quality” has been applied, and the areas directly affected have been considered at 100% of their surface, while areas indirectly affected have been considered at 20% of their surface. For each sub-component the total area affected is therefore calculated as follows:

- Total area affected = The total areas directly affected + (0.2 x Total area indirectly affected).

Multiple Impacts

In addition to the impact assessment methodology outlined in *Section 3.7*, in instances where there are multiple impacts causing an effect over the same sub-component, the significance of the effects is combined in order to have an overall definition of the significance for the sub-component. The combination of effects is determined as follows:

- over three negligible effects: overall minor effect;
- over three minor effects: overall moderate effect;
- over three moderate effects: overall major effect.

Temporal Scope

The impacts are assessed for the three phases of construction, operation and closure/post-closure. Areas of impacted habitats are calculated conservatively as the maximum disturbed areas during the specific phase as follows:

- end of the construction phase: all directly and indirectly affected areas by temporary and permanent facilities;
- end of the operation phase: all directly and indirectly affected areas by permanent facilities;
- end of the closure phase: all directly affected areas by facilities not reclaimed to their original habitat.

The temporal scale of the assessment is:

- Construction phase: 1.5 years;
- Operation phase: 8 years;
- Closure and post closure phase: 30 years.

Habitat losses for offset purposes have been calculated conservatively at the end of the construction phase or in the worst case scenario.

8.12 Impact Assessment – Mine Site LSA

8.12.1 Construction phase

The potential impacts to biodiversity related to the effects of the Project during construction are listed below:

- 1) vegetation clearing and removal/disturbance of topsoil;
- 2) fragmentation due to the presence of new infrastructure;
- 3) changes in morphology and hydrology;
- 4) emission of gaseous pollutant and dust in the atmosphere;
- 5) emission of noise and vibration;
- 6) increased direct mortality for wildlife due to vehicular traffic;
- 7) introduction and spreading of alien species.

All the impacts listed are considered and discussed in the following assessment.

1) Vegetation clearing and disturbance of topsoil

During the construction phase of the Project, the vegetation present within the direct footprint of the open pits and mine facilities will be cleared and the topsoil will be removed for site preparation.

Local fauna could also be directly impacted by the vegetation clearing and topsoil disturbance activities performed during site preparation. In particular, species characterized by low mobility are not able to move ahead of construction and might be accidentally killed during the construction operations. The removal of vegetation will also involve the destruction of suitable habitats for many fauna species that use the vegetation as food, shelter or nesting site.

Direct impacts on local flora and habitats should be limited to the areas cleared during site preparation, corresponding to the mine facilities, roads, pipeline footprints and lay down areas temporarily occupied during construction. However, if construction areas are not properly delimited, impact outside these areas is possible.

2) Fragmentation due to the presence of new infrastructure

The presence of mine facilities and new linear infrastructure will cause habitat fragmentation for terrestrial species within the study area. The level of fragmentation depends on the mobility and on the sensitivity of the species to anthropic disturbance.

3) Changes in Morphology and Hydrology

During construction changes in local morphology and surface hydrology could occur in relation to the construction of project facilities.

When the local morphology is changed and local surface drainage features are altered, soil erosion may occur. This is particularly the case on steep slopes and in the absence of adequate vegetation cover. The removal of vegetation and topsoil could also decrease the water retention capacity of the soils in the area.

If not correctly mitigated and monitored, these localized erosion phenomena may indirectly impact flora and habitats outside the project footprint. Local fauna may also be indirectly impacted by the degradation of habitat.

Using a precautionary approach, a 100 m buffer is considered around pits mine facilities, roads, pipeline footprints and areas temporarily occupied during construction.

4) Pollutants and Dust Emission in the Atmosphere

Construction activities such as rock blasting, surface levelling and grading and the temporary stockpiling of resulting material, and transportation of soil and construction materials will cause emission of dust and gaseous pollutant (mainly NO_x and CO₂) in the air.

In particular dust emissions could impact vegetation directly by covering leaf surface and indirectly through impacts on soil composition and structure (Farmer A.M., 1993). Dust can block stomata on the leaf surface, affect photosynthesis, respiration, transpiration, and may cause leaf injury symptoms. As a result, the productivity of plants can decline. With the consequent reduction in vegetation growth, abundance and species loss, fauna species that depend on them for food and shelter can be indirectly affected.

Airborne soil dust is typically coarse and therefore remains airborne only for short periods. United States Environmental Protection Agency (US EPA) research shows that 90% of total airborne dust returns to the earth's surface within 100 m of the emission source and over 98% within 250 m⁶. However, under strong wind conditions, these effects could extend further.

Continuous and significant dust deposition could indirectly affect the surrounding vegetation and habitats in the absence of any mitigation measures. Fauna species could also be indirectly affected by the habitat degradation due to gaseous pollutants and dust emission in the atmosphere with a consequent limited reduction in the habitat suitability for terrestrial wildlife.

⁶ United States Environmental Protection Agency (USEPA) AP-42

A clear guideline value to protect vegetation from dust is not available. The guideline value for the loss of human amenity is a threshold of 350 mg/m²/day. The values obtained from the dust model during construction are clearly below this limit.

Using a precautionary approach, compared to the result of the settled dust model, a 100 m buffer is considered around pits mine facilities, roads, pipeline footprints and areas temporary occupied during construction.

5) Emission of Noise and Vibration

The emission of noise and vibration is expected to be of high intensity during construction. All construction activities such as the operation of diesel engines, transportation of construction materials, soil and rock movement, etc. are expected to generate noise and vibration. In addition, any rock blasting activities required during site preparation are expected to produce especially loud noise, although limited in time.

Emission of noise and vibration could cause indirect habitat loss or degradation due to temporary avoidance of surrounding areas by sensitive fauna species. Disturbance from anthropogenic noise has been correlated with reduced densities of breeding birds (Reijnen *et al.*, 1995; Canaday and Rivadeneyra, 2001).

Noise disturbances from human activity are generally strongest over short distances (up to ~ 300 m, Reijnen *et al.*, 1995; Canaday and Rivadeneyra, 2001).

Noise has the greatest effect on wildlife that relies heavily on auditory signals for survival and in particular on birds. The effects of vibration on wildlife is poorly studied, however avoidance behaviour around the source of vibration is likely in particular for reptiles and amphibians.

Most fauna species, including birds, tend to habituate to constant steady noise and vibration levels, such as road traffic, even of a relatively high level, in the order of 70-80 dBA. Once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activities, they suffer very little adverse response. However sudden and discontinuous loud noises like rock blasting may cause an adverse response in many fauna species present in the surroundings of the construction site.

Using a precautionary approach, a 300 m buffer is considered around pits mine facilities, roads, pipeline footprints and areas temporary occupied during construction.

6) Increased direct mortality for wildlife due to vehicular traffic;

During construction, an increase in vehicular activity is expected. The construction of bitumen roads may lead to increases in average vehicle speeds. As a consequence accidental collisions with wildlife might occur even if the event is expected to be unlikely.

Road kill can have a significant impact on wildlife populations. Animals subject to road kill are attracted to roads for a variety of reasons. Reptiles and other ectotherms go there to bask in the sun, some birds use roadside gravel to aid their digestion of seeds, mammals go to eat de-icing salts, browsing herbivores are attracted to the vegetation of roadside edge, rodents proliferate in the artificial grasslands of road verges, and many large mammals find roads to be efficient travel ways. Songbirds come to dust bathe on dirt roads, where they are vulnerable to vehicles as well as predators. Vultures, crows, foxes and other scavengers seek out roadkill and often become roadkill themselves.

Therefore, increased vehicular traffic may result in a direct mortality for fauna species and indirect habitat degradation.

7) Introduction of Invasive Alien Species

The accidental introduction of invasive alien species, particularly flora species, could potentially have an adverse indirect effect on flora, fauna and habitats, even if the probability of this impact is expected to be low when considering the extreme climatic conditions of the LSA (high elevation, low temperatures in winter, xeric condition and low organic content in soil).

Removal of natural vegetation cover and soil disturbance could facilitate the spreading of invasive alien (non-native) species accidentally introduced. These species tend to have an advantage in disturbed ecosystems, and if they penetrate into a habitat they can potentially change its functionality and species composition, including priority biodiversity species. Local fauna that depend on those ecosystems could also be indirectly affected.

Although unlikely to occur and usually localized to areas of disturbed soil and vegetation, this impact could have a potential long term duration on flora, fauna and ecosystems.

Using a precautionary approach, a 100 m buffer is considered around areas of vegetation clearing and terrestrial topsoil disturbance.

Modified and semi natural habitats

Modified, natural and semi natural habitat present within the mine site LSA are showed in Table 8-22 and Figure 8-69.

In the mine site LSA semi natural habitats cover around 80% of the area, while modified habitat cover the remaining 20%.

According to the baseline results, the following sensitivities are assigned:

- modified habitats: low sensitivity
- semi-natural habitats: medium sensitivity

The habitat types predicted to be directly and potentially indirectly impacted by the project during construction are listed in Table 8-22.

Direct impacts from vegetation clearing and disturbance of terrestrial topsoil will impact less than 1% of the total mine site LSA. All the direct impacts will be on semi natural habitats and will be mainly concentrated on steppe (E1.2E, 1% of the total habitat present in the LSA).

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutants and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could impact a total of 3% of the mine site LSA. Indirect impacts in the 100 m buffer will be mainly on semi natural habitats and concentrated on steppe (E1.2E, 4% of the total habitat present in the LSA) and oak forest (G1.7A.2, 3% of the total habitat present in the LSA).

Indirect impacts in the 300 m buffer deriving from noise and vibration could impact a total of 6% of the mine site LSA. Indirect impacts within the 300 m buffer will be mostly on semi natural habitats and concentrate on steppe (E1.2E, 7% of the total habitat present in the LSA) and oak forest (G1.7A.2, 7% of the total habitat present in the LSA).

The mine site fence line will enclose 3% of the total LSA. This area includes 6% of the total oak forest (G1.7A.2), 3% of the steppe (E1.2E), 2% of the temporary streams (C2.5) and <1% of the rocky (H2.2) habitats present within the LSA.

Table 8-22: Construction Phase - Habitats and Project facilities within the Mine Site LSA

Code	Habitat	Direct impacts		Indirect impact (100 m buffer)		Indirect impact (300 m buffer)		Fence line		Total mine Site LSA	
		ha	%	ha	%	ha	%	ha	%	ha	%
<u>Semi natural habitats</u>											
C1.2	Permanent mesotrophic lakes, ponds and pools	-	-	-	-	0.10	100	-	-	0.10	<0,01
C2.5	Temporary running waters	1.98	<1	6.27	1	24.45	6	6.93	2	426.40	1
E1.2E	Perennial calcareous grassland and basic steppes	237.94	1	664.26	3	1515.99	7	723.67	3	22811.12	73
G1.7A.2	Irano-Anatolian steppe [Quercus] woods	8.62	<1	41.29	4	81.45	7	63.30	6	1137.75	4
H2.2	Cold limestone screes	0.16	<0.1	1.43	<1	3.80	<1	0.69	<1	680.45	2
Total natural and semi natural habitats		248.71	<1	713.25	3	1625.78	6	794.58	3	25055.82	80
<u>Modified habitats</u>											
I1.13	Small-scale intensive unmixed crops (<1 ha)	-	-	45.52	<1	277.77	5	-	-	5842.17	19
J1.2	Residential buildings of villages and urban periphery	-	-	-	-	0.32	<1	-	-	291.92	<1
J4	Transport networks and other constructed hard-surfaced areas	-	-	0.40	81	0.49	99	-	-	0.49	<0,01
Total modified habitats		0.00	0	45.91	<1	278.58	5	-	-	6134.58	20
TOTAL		248.71	<1	759.17	2	1904.36	6	794.58	3	31190.40	100

Impact assessment

The potential effects expected during the construction phase without the implementation of any mitigation measures are shown in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of these impacts within the mine site LSA is expected to be moderate.

Sub-component		Modified and semi natural Habitats	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/disturbance of topsoil	Medium	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium.	The potential effects are expected to be minor.
2) fragmentation due to the presence of new infrastructure	Medium	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible.
3) changes in morphology and hydrology	Medium	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible.
4) emission of gaseous pollutant and dust in the atmosphere	Medium	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible.	The potential effects are expected to be negligible.
5) emission of noise and vibration;	Medium	- indirect impact - highly medium-term duration - localised extent - likely to occur The expected impact magnitude is low.	The potential effects are expected to be negligible.
6) increased vehicular traffic (road kill);	Medium	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low.	The potential effects are expected to be minor.
7) introduction and spreading of alien species.	Medium	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low.	The potential effects are expected to be minor.

Impact Mitigation

The mitigation measures listed below follow the mitigation hierarchy and are proposed for the construction phase for the entire area that will be disturbed by the mine:

■ Avoidance:

Avoidance measures have been considered particularly during the design of the facilities and include:

- Minimising the footprint of individual facilities;
- Minimising the length of internal roads;
- Fencing the mining areas within the EIA Permitted Area in order to reduce the risk of footprint creep.

■ Minimization:

- 1) vegetation clearing and removal/disturbance of topsoil;
 - all vehicles will drive on designated routes unless otherwise authorised;
 - before the start of bird nesting season, a systems to scare the birds away from the construction areas using “bird repellent tape” will be implemented. OMAS personnel will go on site ahead of the nesting season (around mid-end April) and put some posts with the tape attached within the construction areas so that it would make the site unsuitable for nesting birds;
 - an ecologist appointed by the Construction Contractor will perform pre-construction surveys in the areas prior to vegetation clearing. The survey will focus fauna species with limited mobility that cannot move ahead of construction (e.g. Common tortoise). If any these species are observed they will be collected by the ecologist and translocated to undisturbed but similar sites within the LSA;
 - if during pre-construction survey nests are observed, OMAS will undertake their best efforts to preserve the vegetation in place;
 - hunting and collection of wild animals, and in particular of *Testudo graeca* (Common tortoise) by OMAS staff and contractors will be strictly prohibited within the Project area.
- 2) fragmentation due to the presence of new infrastructure;
 - culverts with specific design conducive to use by reptiles, and in particular tortoises, will be installed under the access road in a sufficient number to minimize the effects of habitat fragmentation (see Biodiversity Management Plan, OMAS-ESMS-BIO-PLN-001).
- 3) changes in morphology and hydrology;
 - environmental engineering techniques will be applied in order to create stable slope and minimise the risk of erosion;
 - culverts will be designed and constructed on the access road in line with temporary river beds or other drainage features in order to minimize the interference with local hydrology.
- 4) emission of gaseous pollutant and dust in the atmosphere;
 - dust management control measures will be implemented as described in *Chapter 7: Air Quality*.
- 5) emission of noise and vibration;
 - Noise and Vibration management control measures will be implemented as described in *Chapter 11: Noise and Vibration*;
 - rock blasting activities will be performed during the day time and at regular times to enhance local fauna habituation to noise and avoid disturbance during critical hours for many species (dusk and dawn).
- 6) increased direct mortality due to vehicular traffic;
 - install speed limits and animal crossing signs on the access road and enforce speed limit along the site access road;
 - if necessary, install speed bumps and noise stripes on straight sections of the access road;
 - provide training to all staff and contractors on road safety and speed awareness.

- 7) introduction and spreading of alien species;
 - if spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.
- Rehabilitation/Restoration:
 - topsoil will be separately stored at the site and used for progressive restoration and rehabilitation after the closure of the mine. The location of the topsoil stockpile is shown in *Figure 5-3*. Topsoil will be stored in accordance with the provisions of the Regulation on the Control of Excavation Soil and Construction and Demolition Waste (2004) and the conditions in the Forest Rehabilitation Plan;
 - progressive restoration of areas cleared during construction but not subjected to the placement of permanent facilities (e.g. laydown areas, pipeline route) will occur, with the goal of producing a stable vegetative cover to minimize erosion, dust and spreading of invasive alien species. The restoration of these areas is also expected to produce positive direct effects on local flora, fauna and habitats. A description of the rehabilitation and restoration activities is presented in the Conceptual Closure Framework (OMAS-ESMS-CP-PLN-001).

Residual Effects

After mitigation, the following residual effects remain on modified and semi natural habitats:

- 1) vegetation clearing and removal/disturbance of topsoil: **minor residual effect** (medium receptor sensitivity and low impact magnitude);
- 2) fragmentation due to the presence of new infrastructure: **negligible residual effect** (medium receptor sensitivity and negligible impact magnitude);
- 3) changes in morphology and hydrology: **negligible residual effect** (medium receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **negligible residual effect** (medium receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **negligible residual effect** (medium receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **negligible residual effect** (medium receptor sensitivity and negligible impact magnitude);
- 7) introduction and spreading of alien species. **negligible residual effect** (medium receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on modified and semi natural habitats during the construction phase within the Mine Site LSA are expected to be **minor**.

Offset Measures

No offset measures are required for this component.

Monitoring measures

In order to monitor the effectiveness of the mitigation measures applied, the following monitoring measures are suggested during the construction phase:

- Avoidance:
 - the development of the construction sites should be monitored weekly in order to avoid footprint creep within and outside the fence line.

■ Minimization:

- 1) vegetation clearing and removal/disturbance of topsoil;
 - hunting and collection of wild animals will be monitored within the Project area;
 - the construction sites will be checked periodically to confirm the permanence of the tape to scare birds and the effectiveness of the technique;
 - pre-construction wildlife and nest survey will be performed, timed in accordance with the nesting season the methodology of the survey is further assessed in the BAP (Biodiversity Action Plan).
- 2) fragmentation due to the presence of new infrastructure;
 - culverts will be regularly monitored (once every three months) to avoid any blockages or erosion that would made them unsuitable for target wildlife.
- 3) changes in morphology and hydrology;
 - the presence of erosion should be monitored monthly with particular regards for steep slopes, river crossing and areas cleared of vegetation.
- 4) emission of gaseous pollutant and dust in the atmosphere;
 - dust monitoring measures will be implemented as described in *Chapter 7: Air Quality*.
- 5) emission of noise and vibration;
 - Noise and Vibration monitoring I measures will be implemented as described in *Chapter 11: Noise and Vibration*.
- 6) increased direct mortality of wildlife due to vehicular traffic;
 - accidents involving wildlife or the observation of live animal or carcasses along the access road will be monitored. Additional mitigation measure to avoid road kill will be taken if needed.
- 7) introduction and spreading of alien species;
 - the presence and spread of invasive flora species will be monitor monthly during the vegetative season, with particular attention to disturbed areas.

■ Rehabilitation/Restoration:

- topsoil salvaging operations and topsoil storage condition will be inspected in order to guarantee accordance with the provisions of the Regulation on the Control of Excavation Soil and Construction and Demolition Waste (2004) and the conditions in the Forest Rehabilitation Plan;
- areas progressively restored will be inspected monthly for the first year during the vegetative season in order to allow for prompt corrective actions if needed. The monitoring will aim to assess the development of the planted/seeded species, the vegetation cover and the presence of stress or erosion signs.

Priority Biodiversity Features

The Priority Biodiversity Features (PBF) identified within the mine site LSA are:

- vulnerable flora species:
 - *Verbascum luridiflorum*;
 - *Campanula stricta* var. *aladagensis*.
- vulnerable fauna species

- *Testudo graeca* (Common tortoise).
- threatened habitats:
 - Irano-Anatolian steppe *Quercus* woods (G1.7A.2).

The extent of direct and indirect impact on the priority biodiversity features within the mine site LSA are summarized and discussed below.

Vulnerable flora species

Verbascum luridiflorum:

Direct impact from vegetation clearing and disturbance of terrestrial topsoil will affect 9% of the known area of occurrence of the species in the mine site LSA. In particular, the impact on this PBF is limited to the development of the Güneytepe mine pit (Table 8-23 and Figure 8-70).

Indirect impacts within the 100 m buffer from emissions of gaseous pollutants and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could potentially impact a total of 14% of the total area.

The mine site fence line will enclose 37% of the total area known to be occupied by the species in the LSA.

Campanula stricta var. aladagensis:

Direct impacts from vegetation clearing and disturbance of terrestrial topsoil will affect 5% of the known area of occurrence of the species in the mine site LSA. In particular, the impact on this PBF is limited to the development of the Güneytepe mine pit (Table 8-23 and Figure 8-71).

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutant and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could potentially impact a total of 8% of the total area.

The mine site fence line will enclose 20% of the total area known to be occupied by the species in the LSA.

Vulnerable fauna species

Testudo graeca (Common tortoise):

In the mine site LSA the species is present and probably widespread with the exception of the higher elevations where most of the mine site facilities are located. However, since no site specific data are available on the distribution of the species, using a precautionary approach, the following habitat are considered suitable (Table 8-22 and Figure 8-69):

- C2.5 Temporary running waters
- E1.2E Perennial calcareous grassland and basic steppes
- G1.7A.2 Irano-Anatolian steppe [*Quercus*] woods
- I1.13 Small-scale intensive unmixed crops (<1 ha)

These habitats are 98% of the total LSA.

Direct impacts from vegetation clearing and disturbance of terrestrial topsoil will affect 1% of the known area of occurrence of the species in the mine site LSA.

Indirect impacts in the 100 m buffer from the emission of gaseous pollutants and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could potentially impact a total of 3% of the total species distribution in the mine site LSA. While indirect impacts in the 300 m buffer deriving from noise and vibration could potentially impact a total of 6% of the total tortoise distribution in the mine site LSA.

The mine site fence line will enclose 7% of the total species habitat present in the LSA.

Threatened habitats

Irano-Anatolian steppe Quercus woods (G1.7A.2)

Direct impacts from vegetation clearing and disturbance of terrestrial topsoil will affect less than 1% of the total oak forest present in the mine site LSA. In particular, the impact on this PBF is limited to the development of the Güneytepe mine pit and associated roads (Table 8-22 and Figure 8-69).

Indirect impacts within the 100 m buffer from emissions of gaseous pollutants and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could potentially impact a total of 4% of the total oak forest present in the mine site LSA. While indirect impacts within the 300 m buffer from noise and vibration could potentially impact a total of 8% of the total oak forest present in the mine site LSA.

The mine site fence line will enclose 6% of the total threatened habitat present in the LSA.

Table 8-23: Construction Phase – Priority biodiversity features directly and indirectly impacted within the Mine Site LSA

Priority Biodiversity Feature	Direct impacts		Indirect impact (100 m buffer)		Indirect impact (300 m buffer)		Fence line		Total area within the LSA
	ha	%	ha	%	ha	%	ha	%	ha
Vulnerable flora species									
<i>Verbascum luridiflorum</i>	3.67	9	5.60	14	-	-	14.22	37	38.87
<i>Campanula stricta</i> var. <i>alidagensis</i>	3.06	5	5.03	8	-	-	11.73	20	59.98
Vulnerable fauna species									
<i>Testudo graeca</i> (common tortoise)	248.55	1	757.34	3	1899.65	6	793.90	3	30217.44
Threatened habitats									
Irano-Anatolian steppe [<i>Quercus</i>] woods (G1.7A.2)	8.62	<1	49.91	4	90.07	8	63.30	6	1137.75

Figure 8-70: Construction Phase – *Verbascum luridiflorum* known growing sites and Project facilities within the Mine Site LSA

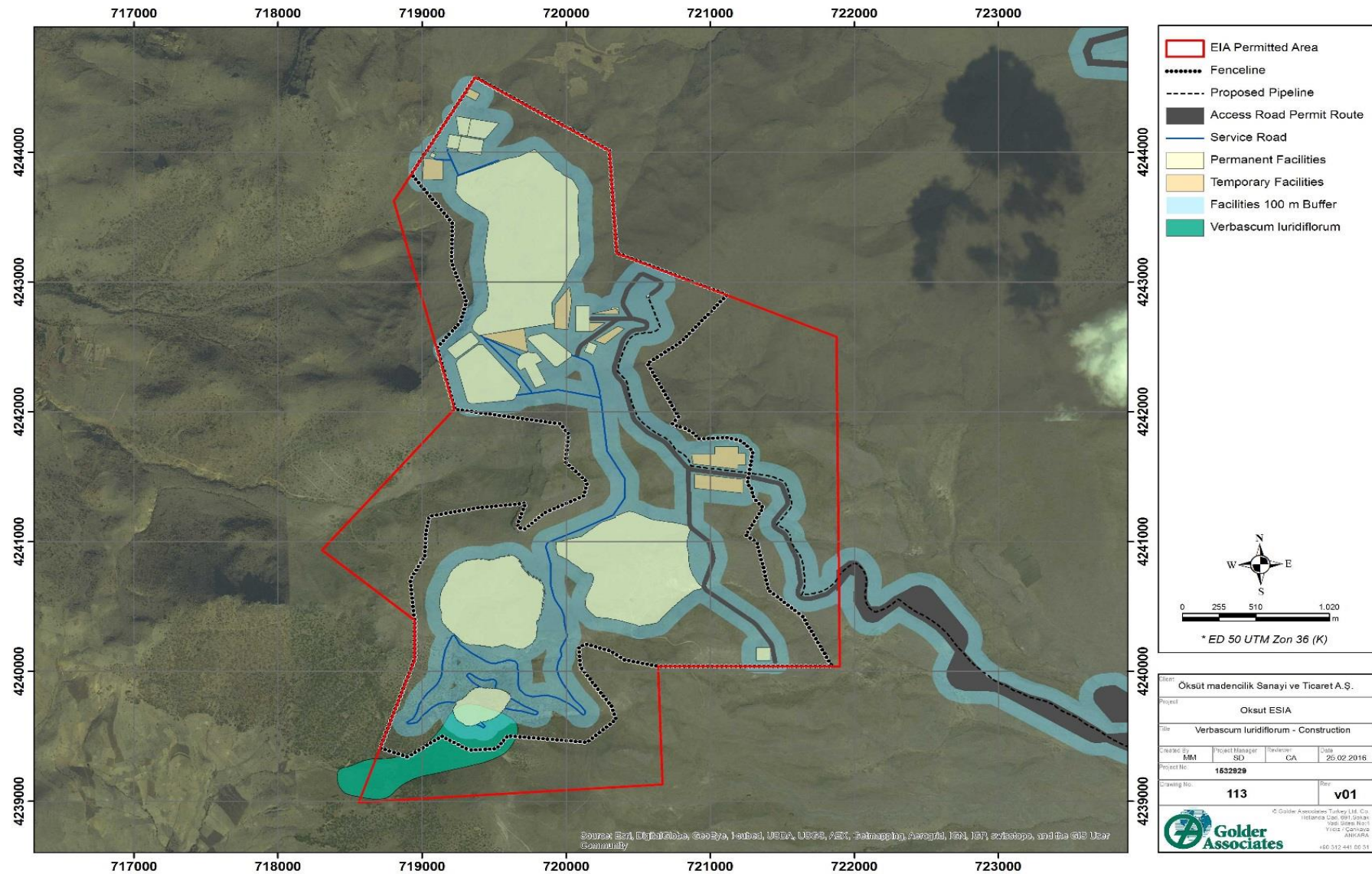
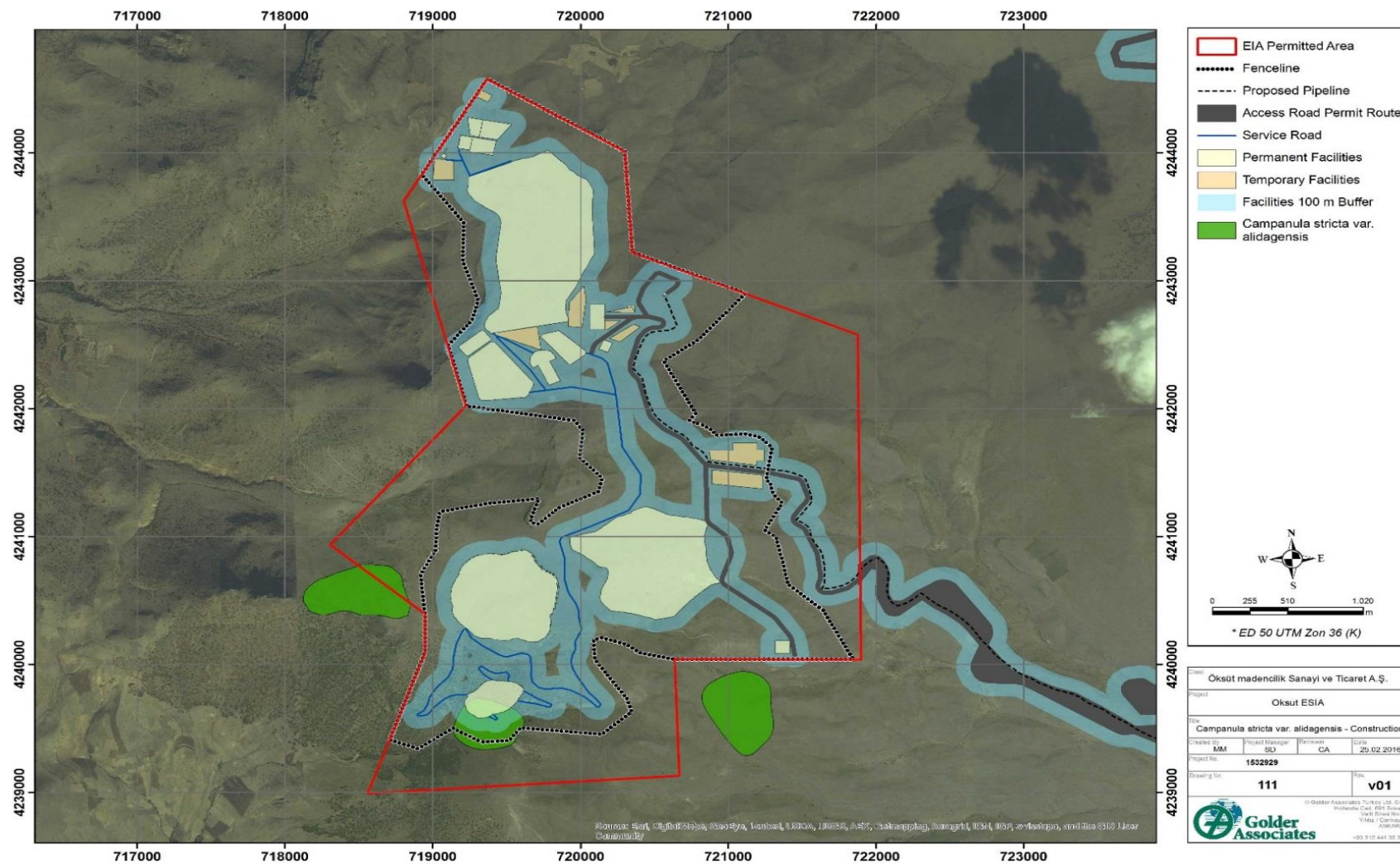


Figure 8-71: Construction Phase – *Campanula stricta* var. *aladagensis* known growing sites and Project facilities within the Mine Site LSA



Impact assessment

The potential effects expected during the construction phase without the implementation of any mitigation measure are showed in the tables below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of the impacts on *Campanula stricta* var. *aladagensis* and *Verbascum luridiflorum* is expected to be **major** considering the present knowledge on the species distribution within the mine site LSA.

The combined effect of the impacts on *Testudo graeca* (Common tortoise) is expected to be **moderate** within the mine site LSA.

The combined effect of the impacts on Irano-Anatolian steppe Quercus woods (G1.7A.2) is expected to be **moderate** within the mine site LSA.

Sub-component	Vulnerable flora species: <i>Verbascum luridiflorum</i> and <i>Campanula stricta</i> var. <i>aladagensis</i>		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/ disturbance of topsoil	High	- direct impact - long term duration - localised extent - certain to occur The expected impact magnitude is high	The potential effects are expected to be major
2) fragmentation due to the presence of new infrastructure	High	Not applicable	No effect
3) changes in morphology and hydrology	High	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
4) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
5) emission of noise and vibration	High	Not applicable	No effect
6) increased vehicular traffic (road kill)	High	Not applicable	No effect
7) introduction and spreading of alien species.	High	- indirect impact - long term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

Sub-component	Vulnerable fauna species: <i>Testudo graeca</i> (VU)		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/ disturbance of topsoil	High	- indirect impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is low	The potential effects are expected to be minor
2) fragmentation due to the presence of new infrastructure	High	- indirect impact - medium-term duration - highly localised extent	The potential effects are expected to be negligible.

Sub-component	Vulnerable fauna species: <u>Testudo graeca (VU)</u>		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
		- likely to occur The expected impact magnitude is negligible	
3) changes in morphology and hydrology	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
4) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible.	The potential effects are expected to be negligible.
5) emission of noise and vibration	High	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
6) increased vehicular traffic (road kill)	High	- direct impact - medium-term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
7) introduction and spreading of alien species	High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

Sub-component	Threatened habitats: <u>Irano-Anatolian steppe Quercus woods (G1.7A.2)</u>		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/disturbance of topsoil	High	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
2) fragmentation due to the presence of new infrastructure	High	Not applicable	No effect
3) changes in morphology and hydrology	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
4) emission of gaseous pollutant and dust in the atmosphere	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
5) emission of noise and vibration	High	- indirect impact - medium-term duration - localised extent	The potential effects are

Sub-component	Threatened habitats: <u>Irano-Anatolian steppe Quercus woods (G1.7A.2)</u>		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
		- certain to occur The expected impact magnitude is low	expected to be minor
6) increased vehicular traffic (road kill)	High	Not applicable	No impact
7) introduction and spreading of alien species	High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

Impact Mitigation

The following mitigation measures are proposed for the construction phase, in addition to the measures suggested for priority biodiversity features:

■ Avoidance:

- vulnerable flora species:
 - careful siting of temporary facilities needed during construction will be done in order to avoid direct impact on vulnerable flora species;
 - on-site conservation of vulnerable flora species will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted.
- vulnerable fauna species:
 - hunting and collection of wild animals, and in particular of *Testudo graeca* (Common tortoise) by OMAS staff and contractors will be strictly prohibited within the Project area.
- threatened habitats:
 - careful siting of temporary facilities needed during construction will be done in order to avoid direct impact on threatened habitats;
 - on-site conservation of threatened habitats will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted.

■ Minimization:

- 1) vegetation clearing and removal/disturbance of topsoil;
 - vulnerable flora species:
 - vulnerable flora individuals directly impacted by the project will be identified and salvaged. The salvaged individuals will be temporary grown in a greenhouse an ecologist appointed by the Construction Contractor will perform pre-construction surveys in the areas prior to vegetation clearing. The survey will focus fauna species with limited mobility that cannot move ahead of construction (e.g. Common tortoise). If any these species are observed they will be collected by the ecologist and translocated to undisturbed but similar sites within the LSA;
 - the pre-construction survey will also search for tortoise nests. If tortoise nests are observed, the eggs will be collected and kept in a controlled environment (incubator) until hatched and then released back into the LSA;

- hunting and collection of wild animals, and in particular of *Testudo graeca* (Common tortoise) by OMAS staff and contractors will be strictly prohibited within the Project area;
- 2) fragmentation due to the presence of new infrastructure;
 - vulnerable fauna species:
 - culverts with specific design conducive to use by reptiles, and in particular tortoise, will be installed under the access road in a sufficient number to minimize the effects of habitat fragmentation (see Biodiversity Management Plan, OMAS-ESMS-BIO-PLN-001).
- 3) changes in morphology and hydrology;
 - no additional mitigation measures.
- 4) emission of gaseous pollutant and dust in the atmosphere;
 - no additional mitigation measures.
- 5) emission of noise and vibration;
 - no additional mitigation measures.
- 6) increased direct mortality of wildlife due to vehicular traffic;
 - vulnerable fauna species:
 - culverts with specific design conducive to use by reptiles, and in particular tortoise, will be installed under the access road in order to guarantee safe road crossings in the most suitable locations in a sufficient number to minimize the effects of habitat fragmentation (see Biodiversity Management Plan, OMAS-ESMS-BIO-PLN-001).
- 7) introduction and spreading of alien species;
 - no additional mitigation measures

■ Rehabilitation/Restoration:

A description of the rehabilitation and restoration activities is presented in the Conceptual Closure Framework (OMAS-ESMS-CP-PLN-001).

- threatened habitats:
 - progressive restoration and rehabilitation of areas disturbed during construction and also during exploration phase will focus on the 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).

Residual Effects

Construction impacts will lead to following residual effects on vulnerable flora species:

- 1) vegetation clearing and removal/disturbance of topsoil: **moderate residual effect** (high receptor sensitivity and medium impact magnitude);
- 2) fragmentation due to the presence of new infrastructure: **none**;
- 3) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **none**;

- 6) increased direct mortality of wildlife due to vehicular traffic: **none**;
- 7) introduction and spreading of alien species: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on vulnerable flora species during the construction phase is expected to be **moderate** considering the present knowledge on the species distribution within the mine site LSA.

Construction impacts will lead to following residual effects on vulnerable fauna species:

- 1) vegetation clearing and removal/disturbance of topsoil: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 2) fragmentation due to the presence of new infrastructure: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 7) introduction and spreading of alien species: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on vulnerable fauna species during the construction phase is expected to be **negligible** within the mine site LSA.

Construction impacts will lead to following residual effects on threatened habitat:

- 1) vegetation clearing and removal/disturbance of topsoil: **minor** residual effect (high receptor sensitivity and low impact magnitude);
- 2) fragmentation due to the presence of new infrastructure: **none**;
- 3) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **none**;
- 7) introduction and spreading of alien species: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on threatened habitat during the construction phase is expected to be **minor** within the mine site LSA.

Offset measures

Considering the residual effects, offset measures are necessary for vulnerable flora species and threatened habitats in order to achieve no net loss of biodiversity. The OMAS Biodiversity Offsets

Strategy (OMAS-ESMS-OFF-PLN-001) provides more detail and it is designed to provide no net loss or preferably net gain for priority biodiversity features identified within the LSA.

Monitoring measures

The following monitoring measures are proposed for the construction phase, in addition to the measures suggested for priority biodiversity features, in order to monitor the effectiveness of the additional mitigation measures applied

- Avoidance:
 - vulnerable flora species;
 - inadvertent disturbance to on-site conservation areas for vulnerable flora species adjacent to construction sites should be monitored daily.
 - vulnerable fauna species;
 - threatened habitats;
 - inadvertent disturbance to on-site conservation areas for threatened habitats adjacent to construction sites should be monitored daily.
- Minimization:
 - 1) vegetation clearing and removal/disturbance of topsoil;
 - vulnerable flora species:
 - the salvaged vulnerable flora individuals will be kept in a controlled environment for the ex-situ cultivation and multiplication and monitored twice a week;
 - the number of seeds collected, their viability and growing conditions will be monitored after collection in order to assess the need of additional collection campaigns.
 - vulnerable fauna species:
 - suitable sites for the eventual translocation of *Testudo graeca* (Common tortoise) will be identified within the Mine Site LSA prior to the beginning of vegetation clearing;
 - a turtle nest survey will be performed, timed in accordance with the nesting season. Eggs will be collected and kept in a controlled environment (incubator) until hatched and then released back into the LSA. The methodology of the survey is further assessed in the BAP (Biodiversity Action Plan).
 - 2) fragmentation due to the presence of new infrastructure;
 - the presence of erosion phenomena should be monitored monthly with particular regards for steep slopes, river crossing and areas cleared of vegetation.
 - 3) changes in morphology and hydrology;
 - vulnerable flora species and threatened habitats:
 - signs of erosions in areas characterized by vulnerable flora species on-site and within 100 m from the facilities will be monitored monthly during construction. If erosion signs are noticed, additional site-specific mitigation measures will be applied (e.g. erosion control mat, additional engineering measures, additional culvert or channels for storm water).
 - 4) emission of gaseous pollutants and dust in the atmosphere;
 - vulnerable flora species and threatened habitats:
 - dust accumulation in areas characterize by vulnerable flora species on-site and within 100 m from the facilities will be monitored monthly during construction. If excessive

dust accumulation or stress sign are noticed, additional location specific mitigation measures will be applied (e.g. additional dust management measures, temporary dust screens, water spray to clean plants).

- 5) emission of noise and vibration;
 - no additional monitoring measures.
 - 6) increased direct mortality of wildlife due to vehicular traffic;
 - vulnerable fauna species:
 - accidents involving wildlife or the observation of live animal or carcasses along the access road will be monitored. Additional mitigation measure to avoid road kill will be taken if needed.
 - 7) introduction and spreading of alien species.
 - no additional monitoring measures
- Rehabilitation/Restoration:
 - threatened habitats:
 - areas progressively restored will be inspected monthly for the first year during the vegetative season in order to allow for prompt corrective actions if needed. The monitoring will aim to assess the development of the planted/seeded species, the vegetation cover and the presence of stress or erosion sings.

Critical Habitats

Factors contributing to the determination of critical habitat (CH) identified within the Mine Site LSA are:

- endangered and critically endangered flora species:
 - *Astragalus vestitus ssp. nov. (CR)*;
 - *Cirsium aytatchii (EN)*.
- endangered and critically endangered fauna species
 - *Neophron percnopterus (Egyptian vulture EN)*.

The presence of the Egyptian vulture (*Neophron percnopterus*), is considered occasional within the LSA and considering the probable absence of nesting sites within the LSA, the area is not considered to be of significant importance for this species and therefore it does not qualify as critical habitat. However, using a precautionary approach, an additional nest surveys in the rocky cliff areas will be performed prior to the development of the mine site.

The extension of directly and indirectly impacted areas on critical habitats within the Mine Site LSA is summarized in Table 8-24 and discussed below.

Astragalus vestitus ssp. nov. (CR)

Direct impact deriving from vegetation clearing and disturbance of terrestrial topsoil will affect 8% of the known area of occurrence of the species in the mine site LSA. The impact on this CH is connected to the development of the heap leach facilities (ponds and recovery plant) and the Güneytepe mine pit (Figure 8-70).

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutant and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could potentially impact a total of 16% of the total area.

The mine site fence line will enclose 27% of the total are known to be occupied by the species in the LSA.

Cirsium aytatchii (EN)

Direct impact deriving from vegetation clearing and disturbance of terrestrial topsoil will affect 6% of the known area of occurrence of the species in the mine site LSA. The impact on this CH is connected to the development of the Güneytepe mine pit (Figure 8-71).

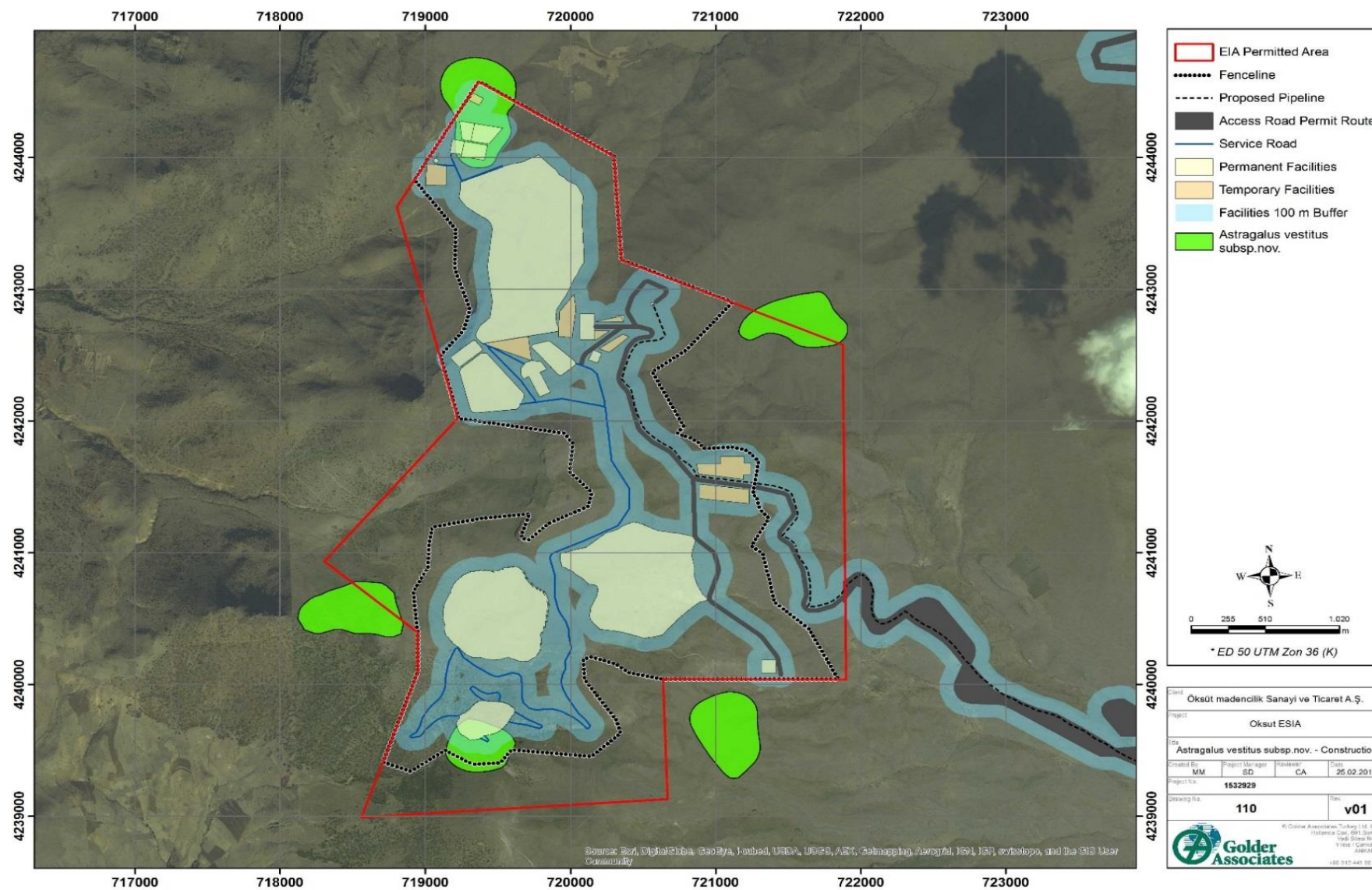
Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutant and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could potentially impact a total of 9% of the total area.

The mine site fence line will enclose 24% of the total area known to be occupied by the species in the LSA.

Table 8-24: Construction Phase - Endangered and critically endangered flora species directly and indirectly impacted within the Mine Site LSA (EUNIS classification)

Priority Biodiversity Feature	Direct impacts		Indirect impact (100 m buffer)		Fence line		Total Known area within the LSA
	ha	%	ha	%	ha	%	ha
Endangered and critically endangered flora species							
<i>Astragalus vestitus subsp.nov.</i>	9.35	8	18.22	16	30.67	27	112.97
<i>Cirsium aytatchii</i>	3.67	6	5.60	9	14.22	24	59.98

Figure 8-72: Construction Phase - *Astragalus vestitus* ssp. nov. known growing sites and Project facilities within the Mine Site LSA



Impact assessment

The potential effects expected during the construction phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of the impacts on *Astragalus vestitus ssp. nov.* and *Cirsium aytatchii* is expected to be major considering the present knowledge on the species distribution within the mine site LSA.

Sub-component			
Vulnerable flora species: <i>Astragalus vestitus ssp. nov.</i> and <i>Cirsium aytatchii</i>			
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/ disturbance of topsoil	Very high	- direct impact - long term duration - localised extent - certain to occur The expected impact magnitude is high	The potential effects are expected to be major
2) fragmentation due to the presence of new infrastructure	Very high	Not applicable	No effect
3) changes in morphology and hydrology	Very high	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be moderate
4) emission of gaseous pollutants and dust in the atmosphere	Very high	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be moderate
5) emission of noise and vibration	Very high	Not applicable	No effect
6) increased vehicular traffic (road kill)	Very high	Not applicable	No effect
7) introduction and spreading of alien species	Very high	- indirect impact - long term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be moderate

Impact Mitigation

The following mitigation measures are proposed for the construction phase, in addition to the measures suggested for critical habitats:

- Avoidance:
 - careful siting of temporary facilities needed during construction will be done in order to avoid direct impacts on endangered and critically endangered flora species;
 - on-site conservation of endangered and critically endangered flora species will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted;
- Minimization:
 - 1) vegetation clearing and removal/disturbance of topsoil;
 - individuals of flora species determining critical habitats directly impacted by the project will be identified and salvaged. The salvaged individuals will be temporary grown in a greenhouse and used for multiplication in order to create a pool of individuals to be used for future restoration and offset measures. During construction a greenhouse will be set up offsite at the 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;

- topsoil to be stripped from the growing sites of the two species determining critical habitats should be segregated from other topsoil salvage and kept for revegetation of these species;
 - considering that the best time to identify the species is during their flowering periods (for *Astragalus vestitus* ssp. nov. from mid-May to mid-June, for *Cirsium aytatchii* the second week of July to the third week of August), vegetation clearing and removal/disturbance of topsoil removal in the heap leach associated facilities (ponds and recovery plant) will be postponed likely until mid-June and in the Güneytepe mine pit until mid-August 2016, as to allow for the salvaging of the endangered and critically endangered flora species (and associated topsoil) directly impacted.
- 2) fragmentation due to the presence of new infrastructure;
 - no impact.
 - 3) changes in morphology and hydrology;
 - no additional mitigation measures.
 - 4) emission of gaseous pollutant and dust in the atmosphere;
 - no additional mitigation measures.
 - 5) emission of noise and vibration;
 - no impact.
 - 6) increased direct mortality of wildlife due to vehicular traffic;
 - no impact.
 - 7) introduction and spreading of alien species;
 - no additional mitigation measures.

■ Rehabilitation/Restoration:

- no additional mitigation measures.

Residual Effects

Construction impacts will lead to the following residual effects on modified and critical habitats:

- 1) vegetation clearing and removal/disturbance of topsoil: **moderate** residual effect (very high receptor sensitivity and low impact magnitude);
- 2) fragmentation due to the presence of new infrastructure: **none**;
- 3) changes in morphology and hydrology: **low** residual effect (very high receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **low** residual effect (very high receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **none**;
- 6) increased direct mortality of wildlife due to vehicular traffic: **none**;
- 7) introduction and spreading of alien species: **low** residual effect (very high receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the total residual effect on endangered and critically endangered flora species during the construction phase is expected to be **moderate** considering the present knowledge on the species distribution within the mine site LSA.

Offset measures

Considering the residual effects, offset measures are necessary for endangered and critically endangered flora species in order to obtain net gain. The offset strategy is described in detail within the Offset Strategy document and it is design to provide net gain of critical habitats identified within the LSA.

Monitoring measures

The following monitoring measures are proposed for the construction phase, in addition to the measures suggested for critical habitats, in order to monitor the effectiveness of the additional mitigation measures applied

- Avoidance:
 - inadvertent disturbance to on-site conservation areas for endangered and critically endangered flora species adjacent to construction sites should be monitored daily by the responsible of construction on site;
 - an additional Egyptian vulture (*Neophron percnopterus*) nest surveys will be performed in the rocky cliff areas will be performed prior to pit development in order to exclude the presence of critical habitats for this species.
- Minimization:
 - 1) vegetation clearing and removal/disturbance of topsoil;
 - the salvaged endangered and critically endangered flora individuals will be kept in a controlled environment for the *ex-situ* cultivation and multiplication and monitored twice a week;
 - the number of seeds collected, their viability and growing conditions will be monitored after collection in order to assess their germinability and the need of additional collection campaigns.
 - 2) fragmentation due to the presence of new infrastructure:
 - no impact.
 - 3) changes in morphology and hydrology;
 - signs of erosions in areas characterize critical habitats on-site and within 100 m from the facilities will be monitored monthly during construction. If erosion signs are noticed, additional location specific mitigation measures will be applied (e.g. erosion control mat, additional engineering measures, additional culvert or channels for storm water).
 - 4) emission of gaseous pollutant and dust in the atmosphere;
 - dust accumulation in areas characterize by critical habitats on-site and within 100 m from the facilities will be monitored monthly during construction. If excessive dust accumulation or stress sign are noticed, additional location specific mitigation measures will be applied (e.g. additional must management measure, temporary dust screens, water spray to clean plants).
 - 5) emission of noise and vibration;
 - not applicable;
 - increased direct mortality of wildlife due to vehicular traffic;
 - not applicable.
 - 6) introduction and spreading of alien species;

- no additional mitigation measures.

Rehabilitation/Restoration:

- no additional monitoring measures.

8.12.2 Operation Phase

The potential impacts to biodiversity related to the effects of the Project during operation are listed below:

- 1) habitat loss/fragmentation due to the presence of new infrastructure;
- 2) emission of gaseous pollutants and dust in the atmosphere;
- 3) emission of noise and vibration;
- 4) contamination of soil and surface water;
- 5) changes in morphology and hydrology;
- 6) increased wildlife mortality due to vehicular traffic.

All the impacts listed are considered and discussed in the following assessment.

1) Habitat loss/fragmentation due to the presence of new infrastructure

The presence of the facilities during operation will cause a loss of available natural habitat during the entire operation phase that will directly and indirectly affect habitats, flora and fauna species.

The direct impact will be limited to the areas occupied by Project infrastructure including pits, mine facilities and roads. While areas temporarily occupied during construction by stockpiles, yards etc. as well as the pipeline route will be progressively reclaimed.

The presence of new linear infrastructure will also cause habitat fragmentation within the study area depending on the mobility and sensitivity of the species to anthropic disturbance.

2) Emission of gaseous pollutants and dust in the atmosphere

During operations, point sources of air emissions (mainly NO_x and CO₂) are expected to be exhaust emissions from trucks, machinery and other vehicles working on site. In addition two emergency diesel power generators are planned on site. Dust during this phase will mainly derive from operation of the facility, including those deriving from ore and waste rock extraction, movement, stockpiling and crushing.

Dust deposition on vegetation or in water can reduce the quality of natural and modified habitats or degrade it to a point where it is no longer suitable. A clear guideline value to protect vegetation from dust is not available. The guideline value for the loss of human amenity is a threshold of 350 mg/m²/day. The values obtained from the dust model during operation are clearly below this limit.

Hazardous materials used on site are another potential source of air pollution. However, the engineering measures built in the Project make the release of hazardous dust and gas into the environment highly unlikely.

Using a precautionary approach, and considering the results of the dust dispersion model, a 100 m buffer where effects of dust deposition may affect vegetation is considered around the mine facilities.

3) Emission of noise and vibration

The emission of noise and vibration is expected to be of high intensity during construction. Noise and vibration emissions deriving from operational activities will include those from machinery and heavy equipment, road traffic, excavation and ore movement and crushing. In addition, mining in the open pits will be through a combination of blasting and excavation. Blasting is expected to take place five times a week.

Emission of noise and vibration could cause indirect habitat loss or degradation due to temporary avoidance of surrounding areas by sensitive fauna species.

The response of birds, animals and livestock to noise also depends on the character and duration of the sound and observations suggest that steady broad band noise will create less negative response than transient, intermittent, tonal sounds.

For example, disruptions to normal breeding and behaviour patterns may result from birds taking flight as a result of the blasting stimulus (i.e. blast noise and/or vibration). Dooling and Popper (2007) note that physical damage to birds' ears occur for single blasts of 140 dBA and 125 dBA for multiple blasts.

Once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activity, they suffer very little adverse response. It is therefore considered that noise levels up to 60 dBA do not result in negative or adverse response to impacted animals or livestock. Noise levels up to 80 dBA generate startle responses in birds and animals, and noise levels in excess of 90 dBA may cause more permanent impacts.

Noise disturbances from human activity are generally strongest over short distances (up to ~ 300 m, Reijnen *et al.*, 1995; Canaday and Rivadeneyra, 2001).

During the operations phase the following effects are expected on local fauna:

- likely change in species composition in the LSA, with less noise-tolerant species moving further away to avoid areas of high noise;
- selection for more noise tolerant individuals within the population of species closed to the project;
- habituation of some species and individuals to the noise impacts.

Sudden and discontinuous loud noises such as rock blasting may temporarily scare away individuals from the area immediately surrounding the operation site. However, given that blasting will occur once per day and on a regular basis, and that sound levels will have dissipated significantly at the fence line, it is considered reasonable to assume that animals and birds will either change their behaviours to avoid certain areas at certain times, or will adapt to the new noise levels.

Using a precautionary approach a 300 m buffer is considered around mine facilities.

4) Changes in Morphology and Hydrology

Local morphology and surface hydrology altered for the construction of the road and the pipeline could result in erosion phenomena also during operation. The likelihood of this impact is particularly high in the presence of temporary stream crossings and steep elevation changes and in the absence of adequate vegetation cover.

Using a precautionary approach, a 100 m buffer is considered around pits and mine facilities for soil erosion.

In addition, the excavation of the two mine pits could cause the dewatering of shallow and alluvial aquifer. Dewatering may cause a loss or diminish in the natural springs and a change in surrounding habitats toward more xeric conditions.

No shallow alluvium or perched aquifer was found within the pit area during hydrogeological studies. In fact, according to the hydrogeological survey, the oxidation zone where the open-pits will be located is an extremely fractured and highly permeable. Moreover, the level of the ground water table is 44 m deeper than the deepest pit bottom; considering these data, no drawdown effect around pits is expected.

5) Contamination of soil and surface water

Different potential hazardous materials will be transported, stored and used on the site for ore processing. The main hazardous products that will be used during operation are:

- quicklime (CaO);
- hydrochloric acid (HCl);
- sodium hydroxide (NaOH);
- diesel fuel;
- sodium cyanide (NaCN).

The main potential impact of products like quicklime (CaO), sodium hydroxide (NaOH) and hydrochloric acid, if released in the environment, is to change soil and water pH; accidental releases of large quantities might cause the death of fauna and flora. These substances will be delivered to the mine site by truck and stored on site in accordance with national and international regulations.

Diesel products are moderately volatile, flammable, and combustible liquids and can cause significant harm to aquatic life. Birds, particularly, waterfowls, may be affected externally and internally by oil contamination. Plant life may also sustain long-term growth inhibition. Available data suggest that the bioaccumulation potential of diesel products may be low; however, data related to their biomagnification potential or food chain impacts are limited. The individual constituents of the diesel products can be biodegraded to varying degrees and at different rates.

Diesel fuel will be required for the process plant and mining operations. Monthly diesel consumption is expected to be around 500,000 l. Diesel will be delivered to the plant in trucks and stored in a 250 m³ tank. Machinery operating only in the mining areas will be refuelled by service and refuelling trucks. Diesel on site will be stored according to national and international regulations and spills will be managed in accordance with the Hazardous Materials Management Plan.

Products containing cyanide and its compounds are very toxic to many living organisms at very low concentrations, although cyanide degrades readily in the environment or forms complexes and salts of varying stabilities. Cyanide has a natural low persistence in the environment and it is produced by a number of plants, bacteria, fungi, and algae.

Chronic exposure to sublethal concentrations of cyanide does not appear to result in acute toxicity since cyanide does not accumulate or biomagnify in the food chain. Repeated sublethal doses of cyanide seldom result in cumulative adverse effects and many species can tolerate cyanide in substantial yet sublethal intermittent doses for long periods of time.

The sensitivity of aquatic organisms to cyanide is particularly high. The toxicity of cyanide to aquatic life is probably caused by hydrogen cyanide that has ionized, dissociated or photochemically decomposed from compounds containing cyanide. It is therefore the hydrogen cyanide concentration of water that is of greatest significance in determining toxicity to aquatic life rather than the total cyanide concentration.

Sodium Cyanide (NaCN) will be delivered to the mine site by truck in accordance with Turkish requirements and International Cyanide Management Code requirements. Cyanide will be stored in a closed building with restricted access. All site activities involving the use of cyanide will be performed in accordance with International Cyanide Management Code guidelines in order to avoid accidental discharge of cyanide into the environment. OMAS will develop a Cyanide Management Plan which includes worker safety, emergency response, employee and contractor training and transportation.

Considering the management and engineering measures built in the Project the accidental dispersion of contamination of soil and surface water is considered extremely unlikely. However, using a precautionary approach, a 100 m buffer is considered around facilities using hazardous substances and transportation routes.

6) Increased direct mortality of wildlife due to vehicular traffic

During the operations phase, an increase in vehicular activity is expected due to additional trucks, buses and vehicles moving from and to the EIA Permitted Area. The construction of new paved roads is likely to increase average vehicle speeds in the area.

The possible consequences are the same as expected for the construction phase. Increased vehicular traffic could result in a direct impact on fauna and in indirect habitat degradation. If not properly managed and mitigated road kill can have a significant impact on sensitive wildlife populations over time.

Modified and semi natural habitats

Modified, natural and semi natural habitat present within the mine site LSA are showed in Figure 8-69. In the mine site LSA semi natural habitats cover around 80% of the area, while modified habitat cover the remaining 20%.

According to the baseline results, the following sensitivities are assigned:

- modified habitats: low sensitivity
- semi-natural habitats: medium sensitivity

The habitat types predicted to be directly and potentially indirectly impacted by the project during operation are listed in Table 8-25.

Direct impact deriving from habitat loss/fragmentation due to the presence of new infrastructure will impact less than 1% of the total mine site LSA. All the direct impacts will insist on semi natural habitats and will be mainly concentrated on steppe (E1.2E, less than 1% of the total habitat present in the LSA).

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutants and dust in the atmosphere, contamination of soil and surface water and changes in morphology and hydrology could impact a total of 2% of the mine site LSA. Indirect impacts in the 100 m buffer insist mainly semi natural habitats and concentrate on steppe (E1.2E, 3% of the total habitat present in the LSA) and on oak forest (G1.7A.2, 4% of the total habitat present in the LSA).

Indirect impacts in the 300 m buffer deriving from noise and vibration could impact a total of 6% of the mine site LSA. Indirect impacts in the 300 m buffer insist mostly semi natural habitats and concentrate on steppe (E1.2E, 7% of the total habitat present in the LSA) and in smaller part oak forest (G1.7A.2, 7% of the total habitat present in the LSA).

The mine site fence line will enclose 3% of the total LSA. This area include 6% of the total oak forest (G1.7A.2), 3 % of the steppe (E1.2E), 2 % of the temporary streams (C2.5) and <1% of the rocky (H2.2) habitats present within the LSA.

Table 8-25: Operation Phase - Habitat Types Directly and Indirectly Impacted Within the Mine Site LSA (EUNIS classification)

Code	Habitat	Direct impacts		Indirect impact (100 m buffer)		Indirect impact (300 m buffer)		Fence line		Total mine Site LSA	
		ha	%	ha	%	ha	%	ha	%	ha	%
<u>Semi natural habitats</u>											
C1.2	Permanent mesotrophic lakes, ponds and pools	-	-	-	-	0.10	100	-	-	0.10	<0,01
C2.5	Temporary running waters	1.98	<1	6.27	1	24.44	6	6.93	2	426.40	1
E1.2E	Perennial calcareous grassland and basic steppes	210.23	<1	662.72	3	1513.36	7	723.67	3	22811.12	73
G1.7A.2	Irano-Anatolian steppe [Quercus] woods	8.62	<1	41.29	4	81.44	7	63.30	6	1137.75	4
H2.2	Cold limestone screes	-	-	0.90	<1	3.96	<1	0.69	<1	680.45	2
Total natural and semi natural habitats		220.83	<1	711.19	3	1623.31	6	794.58	3	25055.82	80
<u>Modified habitats</u>											
I1.13	Small-scale intensive unmixed crops (<1 ha)	-	-	44.77	1	277.42	5	-	-	5842.17	19
J1.2	Residential buildings of villages and urban periphery	-	-	-	-	0.32	<1	-	-	291.92	<1
J4	Transport networks and other constructed hard-surfaced areas	-	-	0.40	81	0.49	99	-	-	0.49	<0,01
Total modified habitats		-	-	45.16	<1	278.23	5	-	-	6134.58	20
TOTAL		220.83	<1	756.35	2	1901.54	6	794.58	3	31190.40	100

Impact assessment

The potential effects expected during the operation phase without the implementation of any mitigation measure are showed in the table below for each impact, considering the receptor sensitivity and the impacts magnitude. The combined effect of these impacts within the mine site LSA is expected to be moderate.

Sub-component		Modified and semi natural Habitats	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) Habitat loss/fragmentation due to the presence of new infrastructure	Medium	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
2) emission of gaseous pollutants and dust in the atmosphere	Medium	- indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
3) emission of noise and vibration	Medium	- indirect impact - long term duration - localised extent - likely to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
4) contamination of soil and surface water	Medium	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
5) changes in morphology and hydrology	Medium	- indirect impact - mid-term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be negligible
6) increased direct wildlife mortality due to vehicular traffic;	Medium	- indirect impact - long term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

Impact Mitigation

The mitigation measures listed below are proposed for the operation phase following the mitigation hierarchy:

■ Avoidance:

Avoidance measures have been considered particularly during the design of the facilities and consisted in:

- Minimising the footprint of individual facilities;
- Minimising the length of internal roads;
- Fencing the mining areas within the EIA permit area in order to reduce the risk of footprint creep.

■ Minimization:

- 1) Habitat loss/fragmentation due to the presence of new infrastructure;
 - culverts with specific design conducive to use by for reptiles and in particular tortoise, will be installed under the access road in a sufficient number to minimize the effects of habitat fragmentation in order to guarantee safe road crossings in the most suitable locations for small-medium size animals with low mobility (see Biodiversity Management Plan);
 - hunting and collection of wild animals, and in particular of *Testudo graeca* (Common tortoise) by OMAS staff and contractors will be strictly prohibited within the Project area.
- 2) emission of gaseous pollutants and dust in the atmosphere;
 - dust management control measures will be implemented as described in *Chapter 7: Air Quality*.
- 3) emission of noise and vibration;
 - Noise and Vibration management control measures will be implemented as described in *Chapter 11: Noise and Vibration*;
 - rock blasting activities should be performed during the day time and at regular times to enhance local fauna habituation to noise and avoid disturbance during critical hours for many species (dusk and dawn).
- 4) contamination of soil and surface water;
 - employee and contractors will report any accidental spills of hazardous substances;
 - a spill register, reporting the spill type, quantity, location, area impacted and clean-up methods, will be created and constantly updated.
- 5) changes in morphology and hydrology;
 - no additional mitigation measure needed during construction.
- 6) increased direct wildlife mortality due to vehicular traffic;
 - install speed limit and animal crossing signs on the access road and enforce speed limit along the site access road, if necessary, install speed bumps and noise stripes on straight sections of the access road;
 - provide training to all staff and contractors on road safety and speed awareness;
 - culverts with specific design conducive to use by for reptiles and in particular tortoise, will be installed under the access road in order to guarantee safe road crossings in the most suitable locations for small-medium size animals with low mobility (see Biodiversity Management Plan).

■ Rehabilitation/Restoration:

- progressive restoration of areas cleared during construction but not subjected to the placement of permanent facilities (e.g. laydown areas, pipeline route) will occur, with the goal of producing a stable vegetative cover to minimize erosion, dust and spreading of invasive alien species. The restoration of these areas is also expected to produce positive direct effects on local flora, fauna and habitats. A description of the rehabilitation and restoration activities is presented in the Conceptual Closure Framework (OMAS-ESMS-CP-PLN-001).

Residual Effects

Operation impacts will lead to the following residual effects on vulnerable flora species:

- 1) habitat loss/fragmentation due to the presence of new infrastructure: **minor** residual effect (medium receptor sensitivity and low impact magnitude);
- 2) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **minor** residual effect (medium receptor sensitivity and low impact magnitude);
- 4) contamination of soil and surface water: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 5) changes in morphology and hydrology: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on modified and semi natural habitats during the operation phase within the Mine Site LSA are expected to be **minor**.

Offset Measures

No offset measures are required for this component.

Monitoring measures

- Avoidance:
 - during operation the development of the sites should be monitored monthly in order to avoid footprint creep outside of the fence line.
- Minimization:
 - 1) Habitat loss/fragmentation due to the presence of new infrastructure;
 - Hunting and collection of wild animals will be monitored within the Project area;
 - culverts should regular monitor (once every three months) to avoid blockage or erosion phenomena that would made them unsuitable for target wildlife.
 - 2) emission of gaseous pollutants and dust in the atmosphere;
 - no additional monitoring measure required during construction.
 - 3) emission of noise and vibration;
 - no additional monitoring measure required during construction.
 - 4) contamination of soil and surface water;
 - no additional monitoring measure required during construction.
 - 5) changes in morphology and hydrology;
 - no additional mitigation measure required during construction.
 - 6) increased direct wildlife mortality due to vehicular traffic;
 - Accidents involving wildlife or the observation of live animal or carcasses along the access road will be monitored. Additional mitigation measure to avoid road kill will be taken if needed.
- Rehabilitation/Restoration:
 - restored areas will be inspected monthly for the first year during the vegetative season in order to allow for prompt corrective actions if needed. The monitoring will

aim to assess the development of the planted/seeded species, the vegetation cover and the presence of stress or erosion signs. After the first year, if no particular problems are observed, monitoring will be performed every three month until the replanted area are considered reclaimed to their natural state.

Priority Biodiversity Features

The Priority Biodiversity Features (PBF) identified within the mine site LSA are:

- vulnerable flora species:
 - *Verbascum luridiflorum*;
 - *Campanula stricta* var. *aladagensis*.
- vulnerable fauna species
 - *Testudo graeca* (Common tortoise).
- threatened habitats:
 - Irano-Anatolian steppe *Quercus* woods (G1.7A.2).

Vulnerable flora species

Verbascum luridiflorum:

Direct impact deriving from habitat loss due to the presence of new infrastructure will affect 9% of the known area of occurrence of the species in the mine site LSA. In particular, the impact on this PBF is limited to the development of the Güneytepe mine pit (Table 8-26 and Figure 8-74).

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutants and dust in the atmosphere, contamination of soil and surface water and changes in morphology and hydrology could potentially impact a total of 14% of the total area.

The mine site fence line will enclose 37% of the total are known to be occupied by the species in the LSA.

Campanula stricta var. *aladagensis*;

Direct impact deriving from vegetation clearing and disturbance of terrestrial topsoil will affect 5% of the known area of occurrence of the species in the mine site LSA. In particular, the impact of this PBF is limited to the development of the Güneytepe mine pit (Table 8-26 and Figure 8-75).

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutants and dust in the atmosphere, contamination of soil and surface water and changes in morphology and hydrology could potentially impact a total of 8% of the total area.

The mine site fence line will enclose 20% of the total are known to be occupied by the species in the LSA.

Vulnerable fauna species

Testudo graeca (Common tortoise):

In the mine site LSA the species is present and probably widespread with the exception of the higher elevations where most of the mine site facilities are located. However, since no site specific data are available on its distribution of the species, using a precautionary approach, the following habitat are considered suitable (Table 8-26):

- C2.5 Temporary running waters
- E1.2E Perennial calcareous grassland and basic steppes
- G1.7A.2 Irano-Anatolian steppe [*Quercus*] woods
- I1.13 Small-scale intensive unmixed crops (<1 ha)

These habitats are 98% of the total LSA

Direct impact deriving from habitat loss/fragmentation due to the presence of new infrastructure will affect less than 1% of the area of occurrence of the species in the mine site LSA.

Indirect impacts in the 100 m buffer of 2% of the total area of occurrence of this species. While indirect impacts in the 300 m buffer deriving from noise and vibration could potentially impact a total of 6% of the total area of occurrence of this species in the mine site LSA.

The mine site fence line will enclose 3% of the total area known to be occupied by the species in the LSA.

Threatened habitats

Irano-Anatolian steppe Quercus woods (G1.7A.2):

Direct impact deriving from habitat loss/fragmentation due to the presence of new infrastructure will affect less than 1% of the total oak forest present in the mine site LSA. In particular, the impact on this PBF is limited to the development of the Güneytepe mine pit and associated roads (Table 8-25).

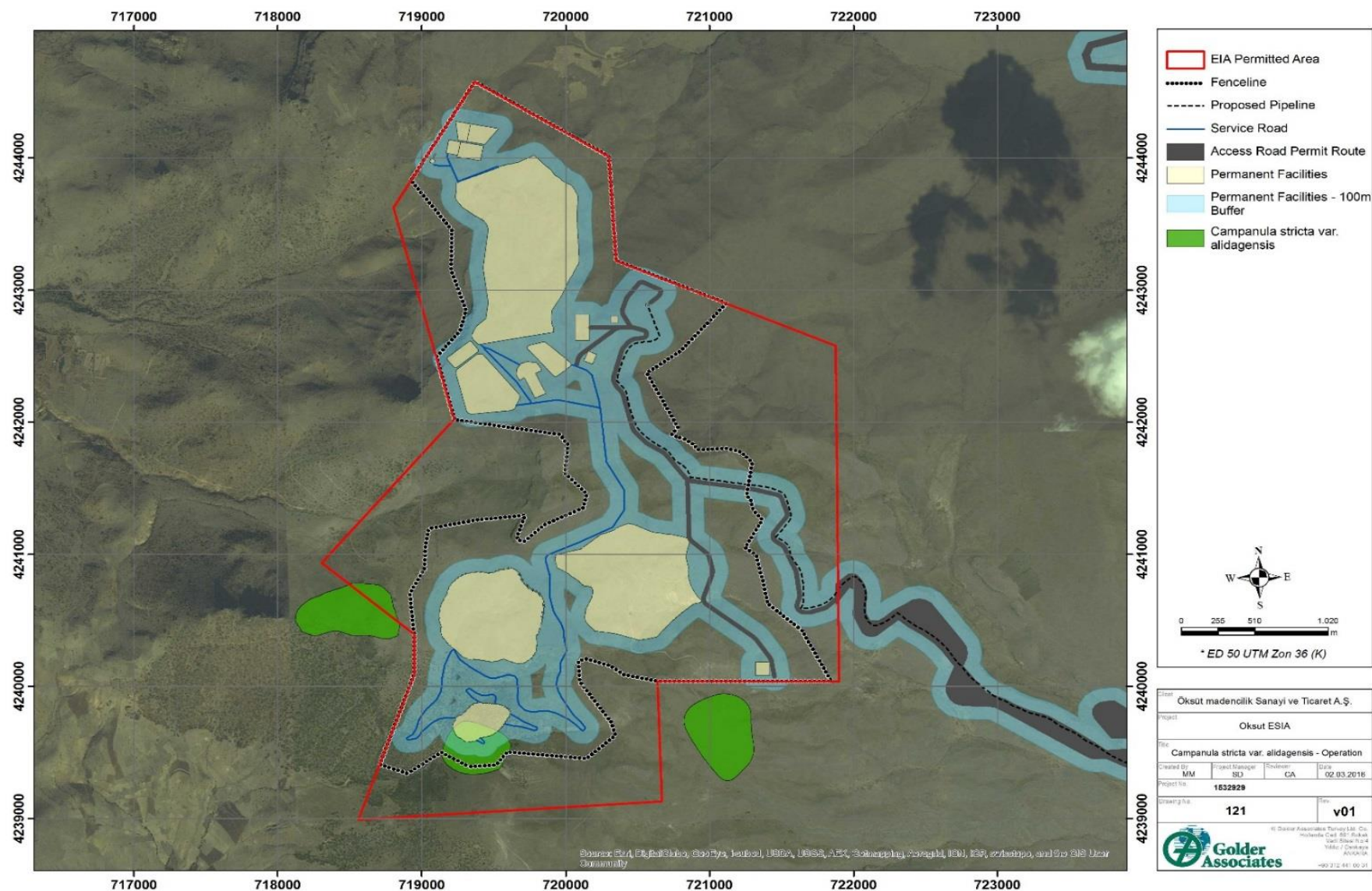
Indirect impacts in the 100 m buffer could potentially impact a total of 2% of the total oak forest present in the mine site LSA. While indirect impacts in the 300 m buffer deriving from noise and vibration could potentially impact a total of 6% of the total oak forest present in the mine site LSA.

The mine site fence line will enclose 3% of the total threatened habitat present in the LSA.

Table 8-26: Operation Phase - Vulnerable flora species directly and indirectly impacted within the Mine Site LSA (EUNIS classification)

Priority Biodiversity Feature	Direct impacts		Indirect impact (100 m buffer)		Indirect impact (300 m buffer)		Fence line		Total area within the LSA
	ha	%	ha	%	ha	%	ha	%	ha
Vulnerable flora species									
Verbascum luridiflorum	3,67	9	5,60	14	-	-	14.22	37	38,87
Campanula stricta var. alidagensis	3,06	5	5,03	8	-	-	11.73	20	59,98
Vulnerable fauna species									
Testudo graeca (common tortoise)	220,83	<1	755,05	2	1896,67	6	793.90	3	30217,44
Threatened habitats									
Irano-Anatolian steppe [Quercus] woods (G1.7A.2)	8,62	<1	41,29	4	81,44	7	63.30	6	1137,75

Figure 8-75: Operation Phase - *Campanula stricta* var. *aladagensis* known growing sites and Project facilities within the Mine Site LSA



Impact assessment

The potential effects expected during the operation phase without the implementation of any mitigation measure are showed in the tables below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of the impacts on *Verbascum luridiflorum* and *Campanula stricta* var. *aladagensis* during operation is expected to be moderate considering the present knowledge on the species distribution within the mine site LSA.

Sub-component		Vulnerable flora species: <i>Verbascum luridiflorum</i> and <i>Campanula stricta</i> var. <i>aladagensis</i>	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) Habitat loss/fragmentation due to the presence of new infrastructure	High	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
2) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - long term duration - localised extent - likely to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
3) emission of noise and vibration	High	Not applicable	No impact
4) contamination of soil and surface water	High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
5) changes in morphology and hydrology	High	- indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
6) increased direct wildlife mortality due to vehicular traffic;	High	- Not applicable	No impact

The combined effect of the impacts on *Testudo graeca* (Common tortoise) is expected to be moderate within the mine site LSA.

Sub-component		Vulnerable fauna species: <i>Testudo graeca</i>	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) Habitat loss/fragmentation due to the presence of new infrastructure	High	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
2) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor

Sub-component	Vulnerable fauna species: <i>Testudo graeca</i>		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
3) emission of noise and vibration	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
4) contamination of soil and surface water	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
5) changes in morphology and hydrology	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be low
6) increased direct wildlife mortality due to vehicular traffic;	High	<ul style="list-style-type: none"> - direct impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is medium	The potential effects are expected to be moderate

The combined effect of the impacts on Irano-Anatolian steppe Quercus woods (G1.7A.2) is expected to be moderate within the mine site LSA.

Sub-component	Threatened habitats: <u>Irano-Anatolian steppe Quercus woods (G1.7A.2).</u>		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) Habitat loss/fragmentation due to the presence of new infrastructure	High	<ul style="list-style-type: none"> - direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
2) emission of gaseous pollutants and dust in the atmosphere	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
3) emission of noise and vibration	High	<ul style="list-style-type: none"> - indirect impact - long term duration - localised extent - likely to occur The expected impact magnitude is medium	The potential effects are expected to be moderate
4) contamination of soil and surface water	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
5) changes in morphology and hydrology	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor

Sub-component	Threatened habitats: <u>Irano-Anatolian steppe Quercus woods (G1.7A.2).</u>		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
6) increased direct wildlife mortality due to vehicular traffic;	High	- Not applicable	No impact

Impact Mitigation

The following mitigation measures are proposed for the construction phase, in addition to the measures suggested for PBF:

■ Avoidance:

- vulnerable flora species:
 - on-site conservation of vulnerable flora species will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted.
- vulnerable fauna species:
 - hunting and collection of wild animals, and in particular of *Testudo graeca* (Common tortoise) by OMAS staff and contractors will be strictly prohibited within the Project area.
- threatened habitats:
 - on-site conservation of threatened habitats will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted.

■ Minimization:

- 1) habitat loss/fragmentation due to the presence of new infrastructure;
 - vulnerable fauna species:
 - culverts with specific design conducive to use by reptiles, and in particular tortoise, will be installed under the access road in a sufficient number to minimize the effects of habitat fragmentation (see Biodiversity Management Plan, OMAS-ESMS-BIO-PLN-0001).
- 2) emission of gaseous pollutants and dust in the atmosphere;
 - no additional mitigation measures.
- 3) emission of noise and vibration;
 - no additional mitigation measures.
- 4) contamination of soil and surface water;
 - no additional mitigation measures.
- 5) changes in morphology and hydrology;
 - no additional mitigation measures.
- 6) increased direct mortality of wildlife due to vehicular traffic;
 - vulnerable fauna species:

- culverts with specific design conducive to use by reptiles, and in particular tortoise, will be installed under the access road in order to guarantee sufficient safe road crossings in the most suitable locations in a sufficient number to minimize the effects of habitat fragmentation (see Biodiversity Management Plan, OMAS-ESMS-BIO-PLN-0001).
- Rehabilitation/Restoration:
 - threatened habitats:
 - progressive restoration and rehabilitation of areas disturbed during construction and during exploration phases will continue during operation and it will focus on the 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). A description of the rehabilitation and restoration activities is presented in the Conceptual Closure Framework (OMAS-ESMS-CP-PLN-001).

Residual Effects

Operation impacts will lead to following residual effects on vulnerable flora species:

- 1) habitat loss/fragmentation due to the presence of new infrastructure: **minor** residual effect (high receptor sensitivity and low impact magnitude);
- 2) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **none**;
- 4) contamination of soil and surface water: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **none**.

Considering the implementation of the proposed mitigation measures, the total residual effect on vulnerable flora species during the operation phase is expected to be **minor** considering the present knowledge on the species distribution within the mine site LSA.

Operation impacts will lead to following residual effects on vulnerable fauna species:

- 1) habitat loss/fragmentation due to the presence of new infrastructure: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 2) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible e impact magnitude);
- 3) emission of noise and vibration: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) contamination of soil and surface water: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the total residual effect on vulnerable fauna species during the operation phase is expected to be **negligible** within the mine site LSA.

Operation impacts will lead to following residual effects on threatened habitat:

- 1) habitat loss/fragmentation due to the presence of new infrastructure: **minor** residual effect (high receptor sensitivity and low impact magnitude);
- 2) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **minor** residual effect (high receptor sensitivity and low impact magnitude);
- 4) contamination of soil and surface water: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **none**.

Considering the implementation of the proposed mitigation measures, the total residual effect on threatened habitat during the operation phase is expected to be **minor** within the mine site LSA.

Offset measures

Considering the residual effects, offset measures are necessary for vulnerable flora species and threatened habitats in order to achieve no net loss. The offset strategy is detailed more in depth within the Biodiversity Offset Strategy and it is designed to provide no net loss or preferably net gain for priority biodiversity features identified within the LSA.

Monitoring measures

■ Avoidance:

- vulnerable flora species:
 - inadvertent disturbance to on-site conservation areas for vulnerable flora species adjacent to construction sites should be monitored monthly.
- vulnerable fauna species:
 - hunting and collection of wild animals will be monitored within the Project area.
- threatened habitats:
 - inadvertent disturbance to on-site conservation areas for threatened habitats adjacent to construction sites should be monitored monthly.

■ Minimization:

- 1) habitat loss/fragmentation due to the presence of new infrastructure;
 - no additional measures.
- 2) emission of gaseous pollutants and dust in the atmosphere;
 - vulnerable flora species and threatened habitats:
 - dust accumulation in areas characterized by vulnerable flora species on-site and within 100 m from the facilities will be monitored every three month in the vegetative season during operation. If excessive dust accumulation or stress signs are noticed, additional site-specific mitigation measures will be applied (e.g. additional dust management measure, temporary dust screens, water spray to clean plants).
- 3) emission of noise and vibration;
 - no additional monitoring measures.

- 4) contamination of soil and surface water;
 - no additional monitoring measures.
- 5) changes in morphology and hydrology;
 - vulnerable flora species and threatened habitats:
 - signs of erosions or water stress in areas characterize by vulnerable flora species on-site and within 100 m from the facilities will be monitored every three month in the vegetative season during operation. If erosion or stress signs are noticed, additional site-specific mitigation measures will be applied (e.g. erosion control mat, additional engineering measures, additional culverts or channels for storm water).
- 6) increased direct mortality of wildlife due to vehicular traffic;
 - vulnerable fauna species:
 - no additional measure.
- Rehabilitation/Restoration:
 - threatened habitats:
 - areas progressively restored will be inspected every three month for the first three year of construction during the vegetative season in order to allow for prompt corrective actions if needed. The monitoring will aim to assess the development of the planted/seeded species, the vegetation cover and the presence of stress or erosion signs.

Critical Habitats

Factors contributing to the determination of critical habitat (CH) identified within the mine site LSA are:

- endangered and critically endangered flora species:
 - *Astragalus vestitus ssp. nov. (CR)*;
 - *Cirsium aytatchii (EN)*.

The presence of the Egyptian vulture (*Neophron percnopterus*), is considered occasional within the LSA and considering the probable absence of nesting sites within the LSA, the area is not considered to be of significant importance for this species and therefore it does not qualify as critical habitat. However, using a precautionary approach, an additional nest survey in the rocky cliff areas will be performed prior to the development of the mine site.

The extension of directly and indirectly impacted on critical habitats within the mine site LSA is summarized in Table 8-27.

Astragalus vestitus ssp. nov. (CR)

Direct impact deriving from habitat loss due to the presence of new infrastructure will affect 8% of the known area of occurrence of the species in the mine site LSA. The impact of this this CH is connected to the development of the heap leach facilities (ponds and recovery plant) and the Güneytepe mine pit (Figure 8-76).

Indirect impacts in the 100 m buffer could potentially impact a total of 12% of the total area. The mine site fence line will enclose 27% of the total area known to be occupied by the species in the LSA.

Cirsium aytatchii (EN)

Direct impact deriving from habitat loss due to the presence of new infrastructure will affect 6% of the known area of occurrence of the species in the mine site LSA. The impact of this this CH is connected to the development of the Güneytepe mine pit (Figure 8-77).

Indirect impacts in the 100 m buffer could potentially impact a total of 9% of the total area. The mine site fence line will enclose 24% of the total area known to be occupied by the species in the LSA.

Table 8-27: Operation Phase - Endangered and critically endangered flora species directly and indirectly impacted within the Mine Site LSA (EUNIS classification)

Priority Biodiversity Feature	Direct impacts		Indirect impact (100 m buffer)		Fence line		Total area within the LSA
	ha	%	ha	%	ha	%	ha
Endangered and critically endangered flora species							
<i>Astragalus vestitus subsp. nov.</i>	8,87	8	13,23	12	30.67	27	112,97
<i>Cirsium aytatchii</i>	3,67	6	5,60	9	14.22	24	59,98

Figure 8-76: Operation Phase - *Astragalus vestitus* ssp. nov. known growing sites and Project facilities within the Mine Site LSA

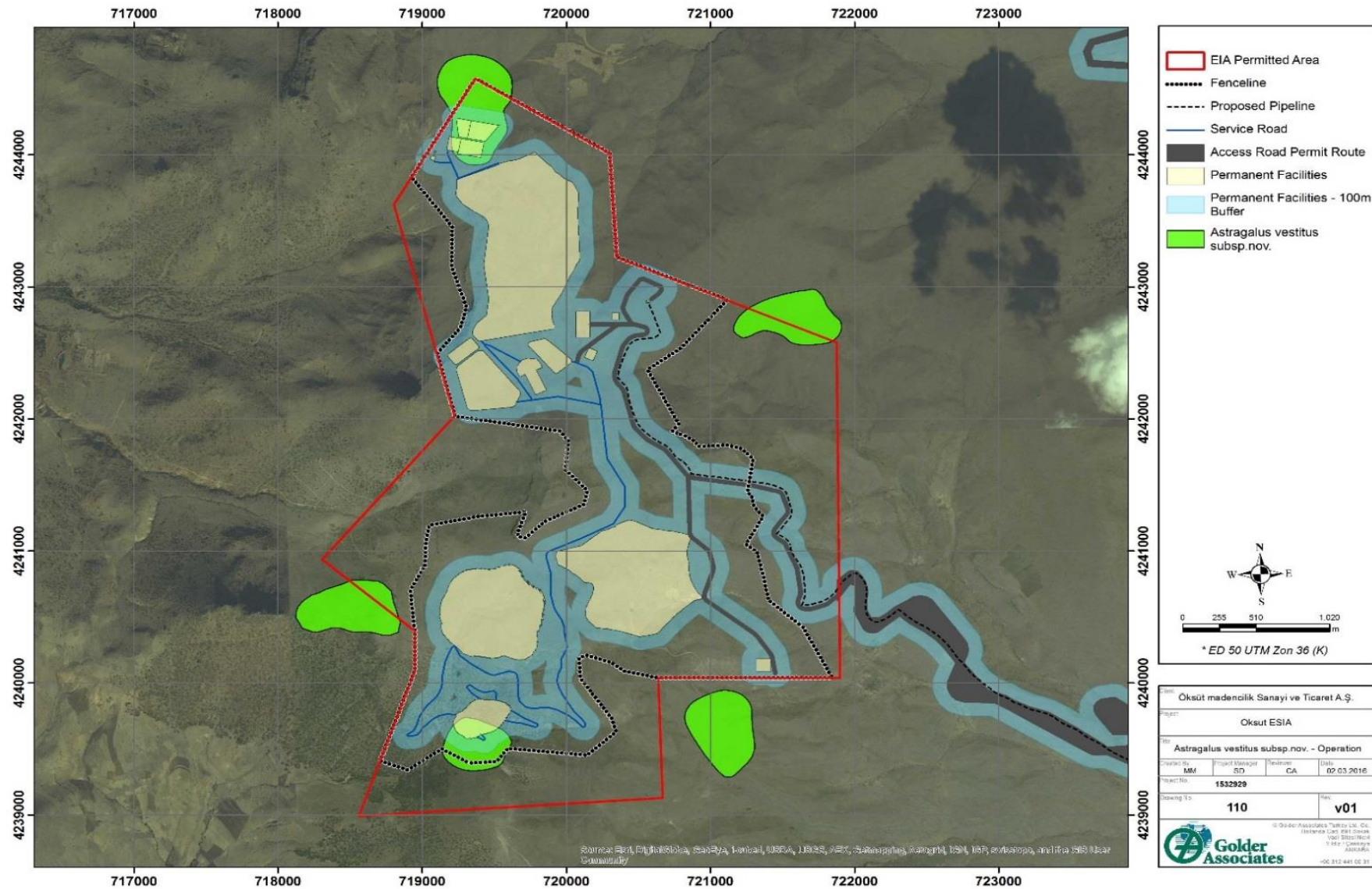
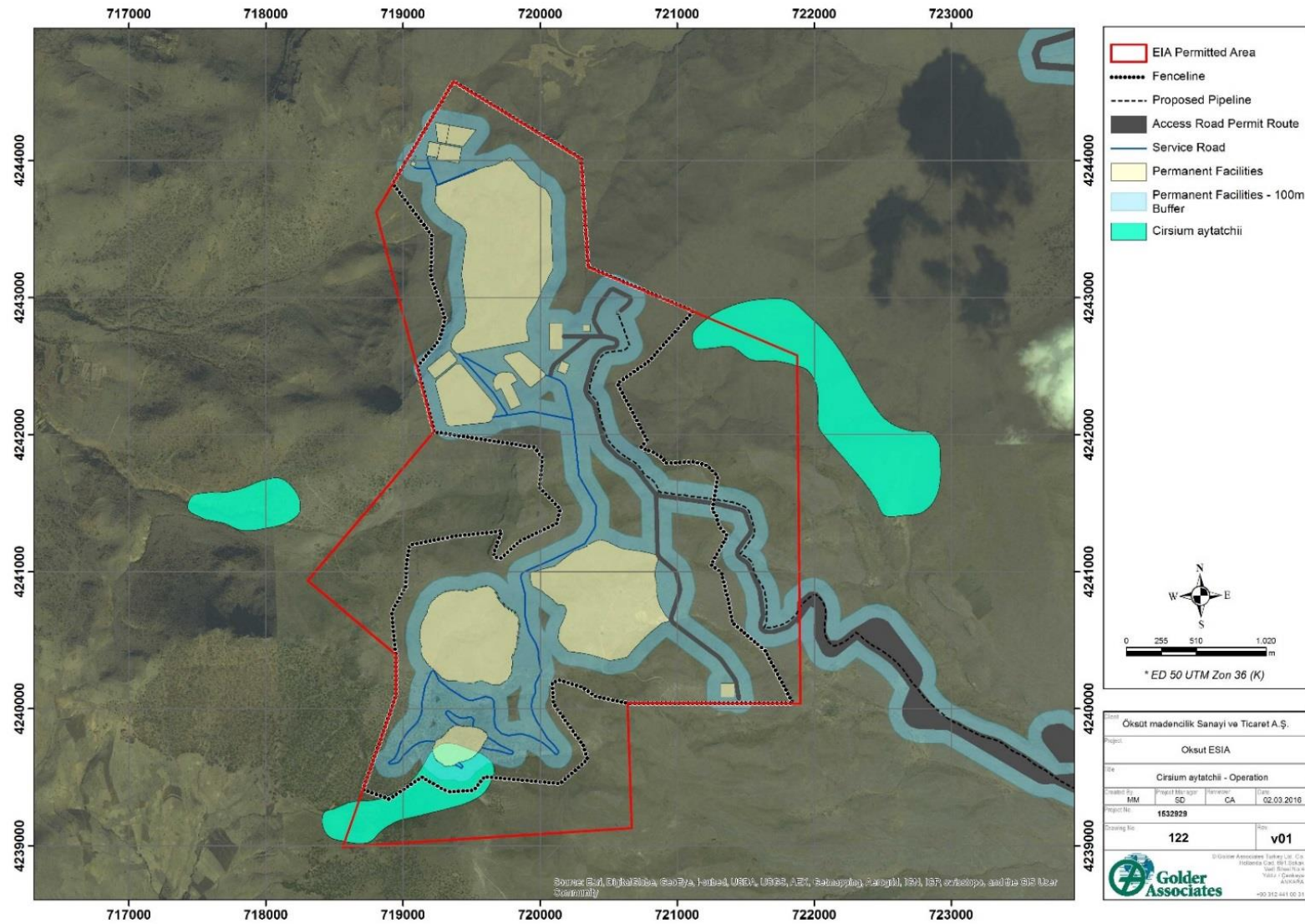


Figure 8-77: Operation Phase - *Cirsium aytatchii* known growing sites and Project facilities within the Mine Site LSA



Impact assessment

The potential effects expected during the operation phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of the impacts on *Astragalus vestitus ssp. nov.* and *Cirsium aytatchii* expected to be major considering the present knowledge on the species distribution within the mine site LSA.

Sub-component		Endangered and critically endangered flora species: <i>Astragalus vestitus ssp. nov. (CR)</i> and <i>Cirsium aytatchii (EN)</i>	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) Habitat loss/fragmentation due to the presence of new infrastructure	Very High	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be major
2) emission of gaseous pollutants and dust in the atmosphere	Very High	- indirect impact - long term duration - localised extent - likely to occur The expected impact magnitude is medium	The potential effects are expected to be major
3) emission of noise and vibration	Very High	Not applicable	No impact
4) contamination of soil and surface water	Very High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be moderate
5) changes in morphology and hydrology	Very High	- indirect impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be moderate
6) increased direct wildlife mortality due to vehicular traffic;	Very High	- Not applicable	No impact

Impact Mitigation

The following mitigation measures are proposed for the construction phase, in addition to the measures suggested for CH:

- Avoidance:
 - on-site conservation of critical habitats will be provided by setting aside specific fenced areas where soil and vegetation will be preserved and access will not be permitted.
- Minimization:
 - 1) habitat loss/fragmentation due to the presence of new infrastructure;
 - no additional mitigation measures.
 - 2) emission of gaseous pollutants and dust in the atmosphere;
 - no additional mitigation measures.
 - 3) emission of noise and vibration;

- no impact.
- 4) contamination of soil and surface water;
 - no additional mitigation measures.
- 5) changes in morphology and hydrology;
 - no additional mitigation measures.
- 6) increased direct mortality of wildlife due to vehicular traffic;
 - no impact.
- Rehabilitation/Restoration:
 - no additional mitigation measures.

Residual Effects

Operation impacts will lead to following residual effects on critical habitats:

- 1) habitat loss/fragmentation due to the presence of new infrastructure: **moderate** residual effect (high receptor sensitivity and low impact magnitude);
- 2) emission of gaseous pollutants and dust in the atmosphere: **moderate** residual effect (high receptor sensitivity and low impact magnitude);
- 3) emission of noise and vibration: **none**;
- 4) contamination of soil and surface water: **low** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) changes in morphology and hydrology: **low** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **none**.

Considering the implementation of the proposed mitigation measures, the total residual effect on endangered and critically endangered flora species during the operation phase is expected to be **moderate** considering the present knowledge on the species distribution within the mine site LSA.

Offset measures

Considering the residual effects, offset measures are necessary for endangered and critically endangered flora species in order to obtain net gain. The offset strategy is described in detail within the Biodiversity Offsets Strategy (OMAS-ESMS-OFF-PLN-001) document and it is design to provide net gain of critical habitats identified within the LSA.

Monitoring measures

The following monitoring measures are proposed for the operation phase, in addition to the measures suggested for CH, in order to monitor the effectiveness of the additional mitigation measures applied.

- Avoidance:
 - inadvertent disturbance to on-site conservation areas for threatened habitats adjacent to construction sites should be monitored monthly.
- Minimization:
 - 1) habitat loss/fragmentation due to the presence of new infrastructure;
 - no additional mitigation measures.
 - 2) emission of gaseous pollutants and dust in the atmosphere;
 - dust accumulation in areas characterize by critical habitats on-site and within 100 m from the facilities will be monitored every three month in the vegetative season during

operation. If excessive dust accumulation or stress signs are noticed, additional site-specific mitigation measures will be applied (e.g. additional dust management measure, temporary dust screens, water spray to clean plants).

- 3) emission of noise and vibration;
 - no impact.
 - 4) contamination of soil and surface water;
 - no additional mitigation measures.
 - 5) changes in morphology and hydrology;
 - signs of erosions in areas characterize critical habitats on-site and within 100 m from the facilities will be monitored every three month in the vegetative season during operation. If erosion signs are noticed, additional site-specific mitigation measures will be applied (e.g. erosion control mat, additional engineering measures, additional culvert or channels for storm water).
 - 6) increased direct mortality of wildlife due to vehicular traffic;
 - no impact.
- Rehabilitation/Restoration:
 - no additional mitigation measures.

8.12.3 Closure and Post Closure Phase

The closure phase, consisting in the rehabilitation and re-naturalization operations will likely cover a period of 3 years. However, post-closure activities will continue until the stabilization of environmental impacts, which may last longer will be scrutinized through an environmental monitoring program (generally up to 30 years).

OMAS will undertake its closure planning activities in line with Turkish regulatory requirements, the closure requirements set out in the Turkish EIA, the International Cyanide Management Code and EU Mine Waste Directive.

Based on the current mine life, the following schedule will be used for mine closure planning:

- Conceptual Closure Framework – March 2016;
- Conceptual Closure Plan – within 2 years of commencement of mining operations;
- Final closure plan – 2 years prior to planned completion of mining operations.

Activities performed during closure and post closure could potentially impact biodiversity present on the LSA in both positive and negative directions. However, this phase is expected to have an overall positive impact on biodiversity.

Considering that closure plans are not available at the moment a detailed description of potential impact and mitigation measures for biodiversity is not feasible. However some general considerations are given below based on the measures presented in the Conceptual Closure Framework (OMAS-ESMS-CP-PLN-001).

The following potential impacts have been identified related to the effects of the Project on biodiversity during the closure phase:

- 1) emission of gaseous pollutant and dust in the atmosphere;
- 2) contamination of soil and surface water;
- 3) emission of noise and vibration;

- 4) introduction and spreading of alien species;
- 5) re-establishment of natural morphology and hydrology;
- 6) re-establishment of natural vegetation.

All the impacts listed are considered and discussed in the following assessment.

1) Emission of gaseous pollutant and dust in the atmosphere;

During closure, activities such as de commissioning of the facilities, temporary stockpiling of resulting material and the transportation of will cause emission of dust and gaseous pollutant (mainly NO_x and CO₂) in the air.

Moreover, if a good vegetation cover is not achieved during reclamation, exposed soil could become another potential source of dust emission during the closure phase.

2) Contamination of soil and surface water;

The main potential source of contamination during closure and post closure are the heap leach facility (HLF) and the waste rock dump areas (WRD).

However, considering the engineering measures put in place during the closure phase, as outlined in the closure phase, this impact is expected to be unlikely.

The WRD and the HLF will be covered with a cover layer to minimise infiltration of precipitation and minimise leachate generation. According to the HELP model developed no percolation or discharge from the floor of the heap leaching will occur during the closure and the post-closure. Moreover geochemical analyses of the WRD area were performed in order to exclude the risk of acid rock drainage (ARD) infiltration.

All tanks, fuel storage facilities, unused additives and lab chemicals will be disposed of in accordance with the regulations in effect. The pipelines on the surface will be removed. Embedded pipelines will be emptied, washed, and their ends will be closed, and they will be covered with soil.

3) Emission of noise and vibration;

The emission of noise and vibration is expected to quite high during the first part of the closure phase. All decommissioning activities such as the operation of diesel engines, transportation of materials, soil and rock movement, etc. are expected to generate noise and vibration.

After the decommissioning and during the post-closure phase, impacts deriving from noise and vibration will be negligible and limited to the monitoring activities.

4) Introduction and spreading of alien species.

The accidental introduction of invasive alien species, particularly flora species, could potentially have an adverse indirect effect on flora, fauna and habitats, even if the probability of this impact is expected to be low when considering the extreme climatic conditions of the LSA (high elevation, low temperatures in winter, xeric condition and low organic content in soil).

If they penetrate into a habitat they can potentially change its functionality and species composition, including priority biodiversity species. Local fauna that depend on those ecosystems could also be indirectly affected. This impact could have a potential long term duration on flora, fauna and ecosystems.

These species tend to have an advantage in disturbed ecosystems, and their propagation could occur on areas subject to restoration, especially in the first years, during closure.

5) Re-establishment of natural morphology and hydrology;

During the closure phase the re-contouring of the excavated areas in harmony with the natural morphology will be performed. In order to prevent siltation during rehabilitation works necessary

measures will be taken against soil erosion. This phase could comprise measures such as land levelling and terracing.

The interception channels within the mine site will be removed and rehabilitated and the natural hydrology of the site will be re-established.

The open pits will be surrounded by an embankment of inert material to stop the accidental entrance of surface flows. The embankments will be surrounded by wire mesh security fencing with warning signs. Moreover, the main access road will be maintained in order to allow for closure activities and decommissioning.

6) Re-establishment of natural vegetation.

Topsoil stripped within the EIA Permitted Area will be stored separately and used in mine rehabilitation (volume estimated a 100-400,000 m³).

As the first step of the reclamation work, re-contoured areas will be covered with the top soil and re-planted with suitable local species, in harmony with the natural environment. Plant species which can grow under the conditions in the region will be identified in the closure plan.

Studies on reclamation activities conducted during operation phase on temporary facilities, road sides, pipeline route and other areas stripped of vegetation will be used as to determine the optimum reclamation techniques and plant species.

If not available from local green houses, seeds of the plants existing in the region will be collected during the operation period and stored appropriately for the reclamation works. The topsoil stored in the storage areas will also provide suitable sites to grow various plant species to be used during the closure period. This activity will also allow control the spreading of invasive alien species, minimise soil erosion and regenerate soil seed bank.

Reclamation will occur on the areas previously occupy by the mine facilities, with the exception of the open pits and the access road that will be maintained in order to allow monitoring activities during the post closure phase.

The WRD and the HLF will be covered with a cover layer to minimise infiltration of precipitation. The cover layer may comprise an upper layer of soil to allow reclamation and planting, however, is it unlikely that the reclamation of these areas will bring them close to their natural state during the closure and post closure phase.

Modified and semi natural habitats

During the post closure phase, indirect negative impacts deriving from decommissioning and reclamation activities, such as emission of gaseous pollutant and dust in the atmosphere, contamination of soil and surface water, emission of noise and vibration and introduction and spreading of alien species, will stop or will be limited to the monitoring and maintenance activities, therefore they can be considered negligible.

The re-establishment of natural morphology and hydrology and the restoration of the disturbed areas will allow to reclaim most of the mine site with a positive effect on biodiversity. However, it is expected that some areas will not be returned to their natural state during the closure and post closure period. The areas not reclaimed are those corresponding the access road and the two pits (197.30 ha, less than 1% of the mine site LSA).

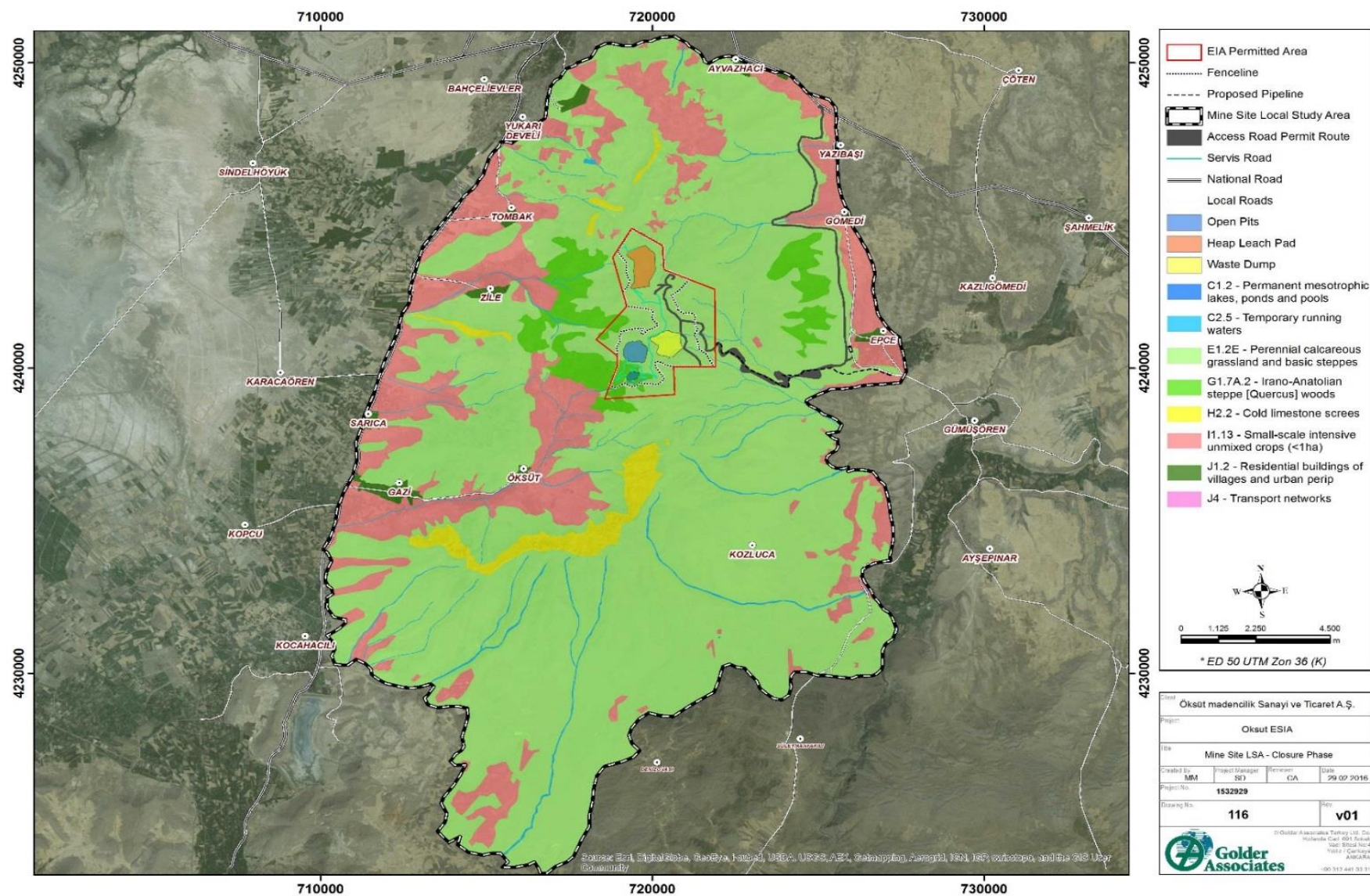
The waste rock dump (WRD) and the heap leach (HLF) will be covered with a cover layer that may comprise an upper layer of soil to allow partial reclamation and planting, however it is unlikely that these areas will have an ecological function similar to their original at the end of this phase. These areas are considered as partially reclaimed at closure (57.17 ha, less than 1% of the mine site LSA).

The areas occupied by these facilities and their original habitat are listed in Table 8-28 and showed in Figure 8-78.

Table 8-28: Closure Phase - Habitats and Project facilities within the Mine Site LSA

Code	Habitat	Areas not reclaimed		Areas partially reclaimed		Total Mine Site LSA	
		ha	%	ha	%	ha	%
<u>Semi natural habitats</u>							
C1.2	Permanent mesotrophic lakes, ponds and pools	-	-	-	-	0.10	<0,01
C2.5	Temporary running waters	0.96	<1	1.98	<1	426.40	1
E1.2E	Perennial calcareous grassland and basic steppes	184.82	<1	55.18	<1	22811.12	73
G1.7A.2	Irano-Anatolian steppe [Quercus] woods	8.62	<1	-	-	1137.75	4
H2.2	Cold limestone screes	0.54	<0.1	-	-	680.45	2
Total natural and semi natural habitats		194.94	1	57.17	<1	25055.82	80
<u>Modified habitats</u>							
I1.13	Small-scale intensive unmixed crops (<1 ha)	2.35	<0.1	-	-	5842.17	19
J1.2	Residential buildings of villages and urban periphery	-	-	-	-	291.92	1
J4	Transport networks and other constructed hard-surfaced areas	-	-	-	-	0.49	<0,01
Total modified habitats		2.35	<0.1	-	-	6134.58	20
TOTAL		197.30	<1	57.17	<1	31190.40	100

Figure 8-78: Closure Phase - Habitat Types Directly and Indirectly Impacted Within the Mine Site LSA (EUNIS classification)



Impact assessment

The potential effects expected during the closure and post closure phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

During the closure and post closure phase both indirect negative impacts and direct positive impacts could occur.

The combined effect of the negative indirect impacts during this phase is expected to be negative and minor.

Sub-component	Modified and semi natural Habitats		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) emission of gaseous pollutant and dust in the atmosphere	Medium	- indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
2) contamination of soil and surface water	Medium	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
3) emission of noise and vibration	Medium	- indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
4) introduction and spreading of alien species	Medium	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

The combined effect of the positive direct impacts during this phase is expected to be positive and minor.

Sub-component	Modified and semi natural Habitats		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
5) re-establishment of natural morphology and hydrology	Medium	- direct positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is medium	The potential positive effects are expected to be minor
6) re-establishment of natural vegetation	Medium	- direct positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is medium	The potential positive effects are expected to be minor

Impact Mitigation

The mitigation measures listed below are proposed for the closure phase for the entire area than will be disturbed by the mine following the mitigation hierarchy:

- Avoidance:

Avoidance measures have been considered particularly during the design of the facilities and consisted in:

- Fencing the decommissioning areas in order to reduce the risk of footprint creep.

■ Minimization:

- 1) emission of gaseous pollutant and dust in the atmosphere;
 - dust management control measures will be implemented as described in Chapter 7: Air Quality.
- 2) contamination of soil and surface water;
 - employee and contractors will report any accidental spills of hazardous substances,
 - a spill register, reporting the spill type, quantity, location, area impacted and clean-up methods, will be created and constantly updated.
- 3) emission of noise and vibration;
 - Noise and Vibration management control measures will be implemented as described in Chapter 11.
- 4) introduction and spreading of invasive alien species.
 - if spreading of invasive alien species is observed, an appropriate eradication program will be developed and implemented.
- 5) re-establishment of natural morphology and hydrology;
 - environmental engineering techniques will be applied in order to create stable slopes and minimise the risk of erosion.
- 6) re-establishment of natural vegetation:
 - suitable local species, in harmony with the natural habitat, will be used (plant species identified in the closure plan);
 - studies on reclamation activities conducted during operation phase on temporary facilities, road sides, pipeline route and others will be used as to determine the optimum reclamation techniques and plant species.

Residual Effects

Closure impacts will lead to following residual effects on modified and semi natural habitats:

- 1) emission of gaseous pollutant and dust in the atmosphere: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 2) contamination of soil and surface water: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 4) introduction and spreading of alien species: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 5) re-establishment of natural morphology and hydrology: **minor** positive residual effect (medium receptor sensitivity and low impact magnitude);
- 6) re-establishment of natural vegetation: **minor** positive residual effect (medium receptor sensitivity and low impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on modified and semi natural habitats during the construction phase within the mine site LSA are expected to be **minor and positive**.

Offset Measures

No offset measures are required for this component.

Monitoring measures

In order to monitor the effectiveness of the mitigation measures applied, the following monitoring measures are suggested during the closure phase:

- Avoidance:
 - the decommissioning construction sites should be monitored weekly in order to avoid inadvertent outside the decommissioned area.
- Minimization:
 - 1) emission of gaseous pollutant and dust in the atmosphere;
 - dust monitoring measures will be implemented as described in Chapter 7: Air Quality.
 - 2) contamination of soil and surface water;
 - a detailed monitoring plan for the closure and post closure phase will be developed within the closure plan.
 - 3) emission of noise and vibration;
 - Noise and Vibration monitoring measures will be implemented as described in Chapter 11.
 - 4) introduction and spreading of alien species;
 - the presence and spread of invasive flora species will be monitor every three month during the vegetative season, with particular attention to disturbed areas.
 - 5) re-establishment of natural morphology and hydrology;
 - the presence of erosion phenomena should be monitored every three month for the first three years with particular regards for steep slopes, river crossing and replanted areas.
 - 6) re-establishment of natural vegetation;
 - areas replanted will be inspected monthly for the first year during the vegetative season in order to allow for prompt corrective actions if needed. The monitoring will aim to assess the development of the planted/seeded species, the vegetation cover and the presence of stress or erosion signs. After the first year, if no particular problems are observed, monitoring will be performed every three month until the replanted area are considered reclaimed to their natural state.

Priority Biodiversity Features

The Priority Biodiversity Features (PBF) identified within the mine site LSA are:

- vulnerable flora species:
 - *Verbascum luridiflorum*;
 - *Campanula stricta* var. *aladagensi*.
- vulnerable fauna species
 - *Testudo graeca* (Common tortoise).
- threatened habitats:
 - Irano-Anatolian steppe *Quercus* woods (G1.7A.2).

The calculation of the priority biodiversity features directly and indirectly impacted during the project lifespan that will not be reclaimed at closure is summarized in Table 8-29. This calculation is made considering the maximum extent of the directly and indirectly disturbed habitat.

Vulnerable flora species

Since little is known at the moment about the ecological niche of these species, it is considered, using a precautionary approach, that the priority biodiversity features directly and indirectly impacted during the project will not be reclaimed based on the closure framework.

Verbascum luridiflorum:

Direct impact deriving from vegetation clearing and habitat loss will affect 9% of the known area of occurrence of the species in the mine site LSA.

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutant and dust in the atmosphere, changes in morphology and hydrology, contamination of soil and surface water; and introduction of invasive alien species could potentially impact a total of 14% of the total area.

Campanula stricta var. aladagensis:

Direct impact deriving from vegetation clearing and habitat loss will affect 5% of the known area of occurrence of the species in the mine site LSA.

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutant and dust in the atmosphere, changes in morphology and hydrology, contamination of soil and surface water; and introduction of invasive alien species could potentially impact a total of 20% of the total area.

Table 8-29: Closure Phase – Priority biodiversity Features (Vulnerable flora species)

Priority Biodiversity Feature (PBF)		Direct impacts		Indirect impact (100 m buffer)		Total Area
		ha	%	ha	%	ha
Vulnerable flora species	<i>Verbascum luridiflorum</i>	3,67	9	5,60	14	38,87
	<i>Campanula stricta var. aladagensis</i>	3,06	5	5,03	20	59,98

Vulnerable fauna species

Testudo graeca (Common tortoise)

In the mine site LSA the species is present and probably widespread with the exception of the higher elevations where most of the mine site facilities are located. However, since no site specific data are available on the distribution of the species, using a precautionary approach, the following habitat are considered suitable

- C2.5 Temporary running waters
- E1.2E Perennial calcareous grassland and basic steppes
- G1.7A.2 Irano-Anatolian steppe [Quercus] woods
- I1.13 Small-scale intensive unmixed crops (<1 ha)

At closure, the re-establishment of natural morphology and hydrology and the restoration of the disturbed areas will allow to reclaim most of the mine site with a positive effect on biodiversity. The two mine pits and the access road are not expected to be reclaimed within this phase. Moreover, the waste rock dump (WRD) and the heap leach (HLF) will only partially reclaimed.

The suitable habitats for *Testudo graeca* that will not be reclaimed or that will be only partially reclaimed after closure are in total less than 1% of the known area of occurrence of the species in the mine site LSA (Table 8-30).

Threatened habitats: Irano-Anatolian steppe *Quercus* woods (G1.7A.2).

At closure, the re-establishment of natural morphology and hydrology and the restoration of the disturbed areas will allow to reclaim most of the mine site with a positive effect on biodiversity. The two mine pits and the access road are not expected to be reclaimed within this phase. Moreover, the waste rock dump (WRD) and the heap leach (HLF) will only partially reclaimed.

The oak wood habitat that will not be reclaimed after closure correspond 8.62 ha, less than 1% of the known area of occurrence of the species in the mine site LSA (Table 8-30).

Table 8-30: Closure Phase – Priority biodiversity Features (Vulnerable fauna species and Threatened habitats)

Priority Biodiversity Feature (PBF)		Areas not reclaimed		Areas partially reclaimed		Total Mine Site LSA
		ha	%	ha	%	ha
Vulnerable fauna species	<i>Testudo graeca</i> (common tortoise)	196.75	<1	57	<1	31190.4
Threatened habitats	Irano-Anatolian steppe [Quercus] woods (G1.7A.2)	8.62	<1	-	-	1137.75

Impact assessment

The potential effects expected during the closure and post closure phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

During the closure and post closure phase both indirect negative impacts and direct positive impacts could occur.

Vulnerable flora species

The combined effect of the negative impacts on *Campanula stricta* var. *aladagensis* and *Verbascum luridiflorum* during this phase is expected to be negative and minor.

Sub-component	Vulnerable flora species:		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
2) contamination of soil and surface water	High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
3) emission of noise and vibration	High	Not applicable	No impact
4) introduction and spreading of alien species	High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

The combined effect of the positive impacts on *Campanula stricta* var. *aladagensis* and *Verbascum luridiflorum* during this phase is expected to be positive and minor.

Sub-component	Vulnerable flora species:		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
5) re-establishment of natural morphology and hydrology	High	<ul style="list-style-type: none"> - indirect positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential positive effects are expected to be minor
6) re-establishment of natural vegetation	High	<ul style="list-style-type: none"> - indirect positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential positive effects are expected to be minor

Vulnerable fauna species

The combined effect of the negative impacts on *Testudo graeca* (Common tortoise) is expected to be minor within the mine site LSA.

Sub-component	Vulnerable fauna species:		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) emission of gaseous pollutants and dust in the atmosphere	High	<ul style="list-style-type: none"> - indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
2) contamination of soil and surface water	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
3) emission of noise and vibration	High	<ul style="list-style-type: none"> - indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
4) introduction and spreading of alien species	High	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

The combined effect of the positive impacts on *Testudo graeca* (Common tortoise) is expected to be minor within the mine site LSA.

Sub-component	Vulnerable fauna species:		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
5) re-establishment of natural morphology and hydrology	High	<ul style="list-style-type: none"> - indirect positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential positive effects are expected to be minor
6) re-establishment of natural vegetation	High	<ul style="list-style-type: none"> - indirect positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential positive effects are expected to be minor.

Threatened habitats

The combined effect of the negative impacts on Irano-Anatolian steppe Quercus woods (G1.7A.2) is expected to be minor within the mine site LSA.

Sub-component	Threatened habitats		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
2) contamination of soil and surface water	High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
3) emission of noise and vibration	High	- indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
4) introduction and spreading of alien species	High	- indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

The combined effect of the positive impacts on Irano-Anatolian steppe Quercus woods (G1.7A.2) is expected to be minor within the mine site LSA.

Sub-component	Threatened habitats		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
5) re-establishment of natural morphology and hydrology	High	- indirect positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential positive effects are expected to be minor
6) re-establishment of natural vegetation	High	- indirect positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential positive effects are expected to be minor

Impact Mitigation

The mitigation measures listed below are proposed for the construction phase for the entire area than will be disturbed by the mine following the mitigation hierarchy:

■ Avoidance:

Avoidance measures have been considered particularly during the design of the facilities and consisted in:

- Fencing the decommissioning areas in order to reduce the risk of footprint creep.

■ Minimization:

- 1) emission of gaseous pollutant and dust in the atmosphere;
 - no additional mitigation measures.
- 2) contamination of soil and surface water;
 - no additional mitigation measures.
- 3) emission of noise and vibration;
 - no additional mitigation measures.
- 4) introduction and spreading of invasive alien species;
 - no additional mitigation measures.
- 5) re-establishment of natural morphology and hydrology;
 - no additional mitigation measures.
- 6) re-establishment of natural vegetation;
 - no additional mitigation measures.

Residual Effects

Closure and post closure phase will lead to following residual effects on PBF:

Vulnerable flora species

- 1) emission of gaseous pollutant and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 2) contamination of soil and surface water: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **none**;
- 4) introduction and spreading of alien species: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) re-establishment of natural morphology and hydrology: **minor positive** residual effect (high receptor sensitivity and low impact magnitude);
- 6) re-establishment of natural vegetation: **minor positive** residual effect (high receptor sensitivity and low impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect during the closure phase within the mine site LSA are expected to be **minor and positive**.

Vulnerable fauna species

- 1) emission of gaseous pollutant and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 2) contamination of soil and surface water: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) introduction and spreading of alien species: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);

- 5) re-establishment of natural morphology and hydrology: **minor positive** residual effect (high receptor sensitivity and low impact magnitude);
- 6) re-establishment of natural vegetation: **minor positive** residual effect (high receptor sensitivity and low impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect during the closure phase within the mine site LSA is expected to be **minor and positive**.

Threatened habitats

- 1) emission of gaseous pollutant and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 2) contamination of soil and surface water: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) introduction and spreading of alien species: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) re-establishment of natural morphology and hydrology: **minor positive** residual effect (high receptor sensitivity and low impact magnitude);
- 6) re-establishment of natural vegetation: **minor positive** residual effect (high receptor sensitivity and low impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect during the closure phase within the mine site LSA are expected to be **minor and positive**.

Offset measures

Following the Biodiversity Offsets Strategy (OMAS-ESMS-OFF-PLN-001), by the time of closure, no further offsets will be required. The project will be in a state of monitoring and adaptive management. If unforeseen impacts to PBF and/or previously initiated offsets occur, the project will investigate and take actions accordingly.

Monitoring measures

In order to monitor the effectiveness of the mitigation measures applied, the following monitoring measures are suggested during the closure phase:

- Avoidance:
 - vulnerable flora species and threatened habitats;
 - areas containing vulnerable flora species close to decommissioning sites should be monitored weekly in order to avoid inadvertent outside the decommissioned area.
- Minimization:
 - 1) emission of gaseous pollutant and dust in the atmosphere;
 - vulnerable flora species and threatened habitats:
 - dust accumulation in areas characterize by PBF on-site and within 100 m from the facilities will be monitored monthly during decommissioning. If excessive dust accumulation or stress sign are noticed, additional location specific mitigation measures will be applied (e.g. additional must management measure, temporary dust screens, water spray to clean plants). After decommissioning dust monitoring will be performed every three month for at least three years.
 - 2) contamination of soil and surface water;

- no additional measures.
- 3) emission of noise and vibration;
 - no additional measures.
- 4) introduction and spreading of alien species;
 - vulnerable flora species and threatened habitats:
 - the presence and spread of invasive flora species will be every three month for at least three years during the vegetative season in correspondence of PBF present within 100m from the rehabilitation sites.
- 5) re-establishment of natural morphology and hydrology;
 - vulnerable flora species and threatened habitats:
 - the presence of erosion phenomena should be monitored every three month for the first three years in in correspondence of PBF within 100 m from the rehabilitation sites.
- 6) re-establishment of natural vegetation;
 - no additional measures.

Critical Habitats

Factors contributing to the determination of critical habitat (CH) identified within the mine site LSA are:

- endangered and critically endangered flora species:
 - *Astragalus vestitus ssp. nov. (CR)*;
 - *Cirsium aytatchii (EN)*.

The presence of the Egyptian vulture (*Neophron percnopterus*), is considered occasional within the LSA and considering the probable absence of nesting sites within the LSA, the area is not considered to be of significant importance for this species and therefore it does not qualify as critical habitat. However, using a precautionary approach, an additional nest surveys in the rocky cliff areas will be performed prior to the development of the mine site.

Since little is known at the moment about the ecological niche of these species, it is considered, using a precautionary approach, that the priority biodiversity features directly and indirectly impacted during the project will not be reclaimed based on the closure framework.

The calculation of the critical habitat features directly and indirectly impacted during the project lifespan that will not be reclaimed at closure is summarized in Table 8-31. This calculation is made considering the maximum extent of the directly and indirectly disturbed habitat.

Astragalus vestitus ssp. nov. (CR)

Direct impact deriving from vegetation clearing and habitat loss will affect 8% of the known area of occurrence of the species in the mine site LSA.

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutant and dust in the atmosphere, changes in morphology and hydrology, contamination of soil and surface water; and introduction of invasive alien species could potentially impact a total of 16% of the total area.

Cirsium aytatchii (EN)

Direct impact deriving from vegetation clearing and habitat loss will affect 6% of the known area of occurrence of the species in the mine site LSA.

Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutant and dust in the atmosphere, changes in morphology and hydrology, contamination of soil and surface water; and introduction of invasive alien species could potentially impact a total of 9% of the total area.

Table 8-31: Closure Phase – Critical habitats

Critical habitat (CH)		Direct impacts		Indirect impact (100 m buffer)		Total Area
		ha	%	ha	%	ha
Endangered and critically endangered flora species	<i>Astragalus vestitus subsp.nov.</i>	9.35	8	18.22	16	112.97
	<i>Cirsium aytatchii</i>	3.67	6	5.03	9	59.98

Impact assessment

The potential effects expected during the closure and post closure phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impact magnitude.

During the closure and post closure phase both indirect negative impacts and direct positive impacts could occur.

The combined effect of the negative indirect impacts during this phase is expected to be negative and moderate.

Sub-component	Critical habitat		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
emission of gaseous pollutants and dust in the atmosphere	Very high	<ul style="list-style-type: none"> - indirect impact - mid term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be minor
contamination of soil and surface water	Very high	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be moderate
emission of noise and vibration	Very high	Not applicable	No impact
introduction and spreading of alien species	Very high	<ul style="list-style-type: none"> - indirect impact - long term duration - highly localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be moderate

The combined effect of the positive direct impacts during this phase is expected to be positive and moderate.

Sub-component	Critical habitat		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
re-establishment of natural morphology and hydrology	Very high	<ul style="list-style-type: none"> - indirect positive impact - long term duration - highly localised extent 	The potential positive effects are

		- likely to occur The expected impact magnitude is low	expected to be moderate
re-establishment of natural vegetation.	Very high	- indirect positive impact - long term duration - highly localised extent - likely to occur The expected impact magnitude is low	The potential positive effects are expected to be moderate

Impact Mitigation

The mitigation measures listed below are proposed for the closure phase for the entire area than will be disturbed by the mine following the mitigation hierarchy:

■ Avoidance:

Avoidance measures have been considered particularly during the design of the facilities and consisted in:

- Fencing the decommissioning areas in order to reduce the risk of footprint creep.

■ Minimization:

- 1) emission of gaseous pollutant and dust in the atmosphere;
 - no additional mitigation measures.
- 2) contamination of soil and surface water;
 - no additional mitigation measures.
- 3) emission of noise and vibration;
 - no additional mitigation measures.
- 4) introduction and spreading of invasive alien species;
 - no additional mitigation measures.
- 5) re-establishment of natural morphology and hydrology;
 - no additional mitigation measures.
- 6) re-establishment of natural vegetation;
 - no additional mitigation measures.

Residual Effects

Closure impacts will lead to following residual effects on CH:

- 1) emission of gaseous pollutant and dust in the atmosphere: **minor** residual effect (very high receptor sensitivity and negligible impact magnitude);
- 2) contamination of soil and surface water: **minor** residual effect (very high receptor sensitivity and negligible impact magnitude);
- 3) emission of noise and vibration: **none**;
- 4) introduction and spreading of alien species: **minor** residual effect (very high receptor sensitivity and negligible impact magnitude);
- 5) re-establishment of natural morphology and hydrology: **moderate positive** residual effect (very high receptor sensitivity and low impact magnitude);
- 6) re-establishment of natural vegetation: **moderate positive** residual effect (very high receptor sensitivity and low impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect during the construction phase within the mine site LSA is expected to be **moderate and positive**.

Offset measures

Following the Biodiversity Offsets Strategy (OMAS-ESMS-OFF-PLN-001), by the time of closure, no further offsets will be required. The project will be in a state of monitoring and adaptive management. If unforeseen impacts to CH and/or previously initiated offsets occur, the project will investigate and take actions accordingly.

Monitoring measures

In order to monitor the effectiveness of the mitigation measures applied, the following monitoring measures are suggested during the closure phase:

- Avoidance:
 - critical habitats close to decommissioning sites should be monitored weekly in order to avoid inadvertent outside the decommissioned area.
- Minimization:
 - 1) emission of gaseous pollutant and dust in the atmosphere;
 - dust accumulation in areas characterize by critical habitats on-site and within 100 m from the facilities will be monitored monthly during decommissioning. If excessive dust accumulation or stress sign are noticed, additional location specific mitigation measures will be applied (e.g. additional must management measure, temporary dust screens, water spray to clean plants). After decommissioning dust monitoring will be performed every three month for at least three years.
 - 2) contamination of soil and surface water;
 - no additional measures.
 - 3) emission of noise and vibration;
 - no additional measures.
 - 4) introduction and spreading of alien species;
 - the presence and spread of invasive flora species will be every three month for at least three years during the vegetative season in critical habitats present within 100m from the rehabilitation sites.
 - 5) re-establishment of natural morphology and hydrology;
 - the presence of erosion phenomena should be monitored every three month for the first three years in critical habitats present within 100 m from the rehabilitation sites.
 - 6) re-establishment of natural vegetation;
 - no additional measures.

Loss calculation for PBF and CH

In this paragraph the expected loss of habitat for Priority Biodiversity Features (PBF) and Critical Habitats (CH) due to the project is quantified using a precautionary approach. This calculation will be used to calibrate the offset measures that will ensure that no net loss and preferably a net gain of the Priority Biodiversity Features (PBF) and a net gain of the Critical Habitats (CH) is achieved.

The offset strategy is detailed more in depth within the Biodiversity Offsets Strategy (OMAS-ESMS-OFF-PLN-001) document and it is designed as to provide net gain of critical habitats identified within the LSA.

For the vulnerable, endangered and critically endangered flora species, since little is known at the moment about their ecological requirements, it is considered, using a precautionary approach, that these priority biodiversity features and critical habitats directly or indirectly impacted during the project will not be reclaimed at closure. Habitat losses for offset purposes for these species is calculated conservatively at the end of the construction phase or in the worst case scenario. For the loss calculation, of these PBFs and CHs, the following methodology was used:

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

Priority Biodiversity Features

The Priority Biodiversity Features (PBF) that are expected to be significantly impacted by the Project are:

- vulnerable flora species:
 - *Verbascum luridiflorum*;
 - *Campanula stricta* var. *aladagensis*.
- threatened habitats:
 - Irano-Anatolian steppe *Quercus* woods (G1.7A.2).

For the vulnerable flora species, since little is known at the moment about their ecological requirements, is considered, using a precautionary approach, that these priority biodiversity features and critical habitats directly or indirectly impacted during the project will not be reclaimed at closure. Habitat losses for offset purposes for these species is calculated conservatively at the end of the construction phase or in the worst case scenario. For the loss calculation, of these PBFs and CHs, the following methodology was used:

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

For the threatened habitat it is considered that at closure, the re-establishment of natural morphology and hydrology and the restoration of the disturbed areas will allow to reclaim most of the mine site to is original habitat. However, the oak woodland present under the footprint of the in the two mine pits is not expected to be reclaimed.

The loss calculation of the priority biodiversity features within the LSAs is summarized in Table 8-32.

Table 8-32: Loss calculation – Priority biodiversity Features

Priority Biodiversity Feature (PBF)		Direct impacts	Indirect impact (100 m buffer)			Total Area	TOTAL LOSS
			Total area	Loss			
		ha	ha	%	ha	ha	ha
Vulnerable flora species	<i>Verbascum luridiflorum</i>	3.67	5.60	20	1.12	38.87	4.79
	<i>Campanula stricta</i> var. <i>alidagensis</i>	3.06	5.03	20	1.01	59.98	4.06

Endangered and critically endangered flora species	Irano-Anatolian steppe [Quercus] woods (G1.7A.2)	8.62	-	-	-	1137.75	8.62
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Critical Habitats

The critical habitat (CH) that are expected to be significantly impacted by the Project are:

- endangered and critically endangered flora species:
 - *Astragalus vestitus* ssp. nov. (CR);
 - *Cirsium aytatchii* (EN).

For the endangered and critically endangered flora species, since little is known at the moment about their ecological requirements, it is considered, using a precautionary approach, that these priority biodiversity features and critical habitats directly or indirectly impacted during the project will not be reclaimed at closure. Habitat losses for offset purposes for these species is calculated conservatively at the end of the construction phase or in the worst case scenario. For the loss calculation, of these PBFs and CHs, the following methodology was used:

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

The loss calculation of the critical habitat within the LSAs is summarized in Table 8-33 below.

Table 8-33: Loss calculation – Critical habitats

Critical habitat (CH)		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 subsp.nov.</i>	9.35	18.22	20	3.64	13.00
	<i>Cirsium aytatchii</i>	3.67	5.03	20	1.01	4.67

8.13 Impact Assessment – Powerline LSA

The assessment of impacts related to the construction and operation of the powerline considers the following targets:

During construction:

- Modified and semi-natural habitats
- Protected and classified areas
- Species of conservation concern

During operation:

- Species of conservation concern
- Protected and classified areas

As discussed in the baseline report, no Critical Habitat and Priority Biodiversity Features habitat has been identified within the powerline LSA.

8.13.1 Construction Phase

The potential impacts to biodiversity related to the effects of the Project during construction are listed below:

- 1) vegetation clearing and removal/disturbance of topsoil;
- 2) fragmentation due to the presence of temporary access road;
- 3) changes in morphology and hydrology;
- 4) emission of gaseous pollutants and dust in the atmosphere;
- 5) emission of noise and vibration;
- 6) increased direct mortality for wildlife due to vehicular traffic;
- 7) introduction and spreading of alien species.

All the impacts listed are considered and discussed in the following paragraph.

1) Vegetation clearing and disturbance of terrestrial topsoil

During the construction phase of the Project, the vegetation present within the direct footprint of the pylons and access roads will be cleared and the topsoil will be removed for site preparation.

Local fauna could also be directly impacted by the vegetation clearing and topsoil disturbance activities performed during site preparation. In particular, species characterized by low mobility are not able to move ahead of construction and might be accidentally killed during the construction operations. The removal of vegetation will also involve the destruction of suitable habitats for fauna species that use the vegetation as food, shelter or nesting site.

Direct impacts on local flora and habitats should be limited to the areas cleared during site preparation, corresponding to the pylons and access roads footprint and lay down areas temporarily occupied during construction. However, if construction areas are not properly delimited, impact outside these areas is possible.

2) Fragmentation due to the presence of temporary access road

The presence of temporary access road will cause habitat fragmentation for terrestrial species within the study area. The level of fragmentation depends on the mobility and on the sensitivity of the species to anthropic disturbance.

3) Changes in Morphology and Hydrology

During construction changes in local morphology and surface hydrology could occur in relation to the construction of project facilities.

When the local morphology is changed and local surface drainage features are altered, soil erosion may occur. This is particularly the case on steep slopes and in the absence of adequate vegetation cover. The removal of vegetation and topsoil could also decrease the water retention capacity of the soils in the area.

If not correctly mitigated and monitored, these localized erosion phenomena may indirectly impact flora and habitats outside the project footprint. Local fauna may also be indirectly impacted by the degradation of habitat.

Using a precautionary approach, a 100 m buffer around pylons and access roads has been considered.

4) Pollutants and Dust Emission in the Atmosphere

Construction activities such as rock blasting, surface levelling and grading and the temporary stockpiling of resulting material, and transportation of soil and construction materials will cause emission of dust and gaseous pollutant (mainly NO_x and CO₂) in the air.

In particular dust emissions could impact vegetation directly by covering leaf surface and indirectly through impacts on soil composition and structure (Farmer A.M., 1993). Dust can block stomata on the leaf surface, affect photosynthesis, respiration, transpiration, and may cause leaf injury symptoms. As a result, the productivity of plants can decline. With the consequent reduction in vegetation growth, abundance and species loss, fauna species that depend on them for food and shelter can be indirectly affected.

Airborne soil dust is typically coarse and therefore remains airborne only for short periods. United States Environmental Protection Agency (US EPA) research shows that 90% of total airborne dust returns to the earth's surface within 100 m of the emission source and over 98% within 250 m⁷. However, under strong wind conditions, these effects could extend further.

Continuous and significant dust deposition could indirectly affect the surrounding vegetation and habitats in the absence of any mitigation measures. Fauna species could also be indirectly affected by the habitat degradation due to gaseous pollutants and dust emission in the atmosphere with a consequent limited reduction in the habitat suitability for terrestrial wildlife.

Using a precautionary approach, a 100 m buffer is considered around pylons and access roads, roads, and areas temporarily occupied during construction.

5) Emission of Noise and Vibration

The emission of noise and vibration is expected to be of high intensity during construction. All construction activities such as the operation of diesel engines, transportation of construction materials, soil and rock movement, etc. are expected to generate noise and vibration. In addition, any rock blasting activities required during site preparation are expected to produce especially loud noise, although limited in time.

Emission of noise and vibration could cause indirect habitat loss or degradation due to temporary avoidance of surrounding areas by sensitive fauna species. Disturbance from anthropogenic noise has been correlated with reduced densities of breeding birds (Reijnen *et al.*, 1995; Canaday and Rivadeneyra, 2001).

Noise disturbances from human activity are generally strongest over short distances (up to ~ 300 m, Reijnen *et al.*, 1995; Canaday and Rivadeneyra, 2001).

Noise has the greatest effect on wildlife that relies heavily on auditory signals for survival and in particular on birds. The effects of vibration on wildlife is poorly studied, however avoidance behaviour around the source of vibration is likely in particular for reptiles and amphibian.

Most fauna species, including birds, tend to habituate to constant steady noise and vibration levels, such as road traffic, even of a relatively high level, in the order of 70-80 dBA. Once animals become habituated to noise, especially when it is steady and associated with clearly non-threatening activities, they suffer very little adverse response. However sudden and discontinuous loud noises like rock blasting may cause an adverse response in many fauna species present in the surroundings of the construction site.

Using a precautionary approach, a 300 m buffer is considered around pylons, access roads and areas temporarily occupied during construction.

6) Increased direct mortality for wildlife due to vehicular traffic

During construction, an increase in vehicular activity is expected. The construction of bitumen roads may lead to increases in average vehicle speeds. As a consequence accidental collisions with wildlife might occur even if the event is expected to be unlikely.

Road kill can have a significant impact on wildlife populations. Animals subject to road kill are attracted to roads for a variety of reasons. Reptiles and other ectotherms go there to bask in the sun, some birds use roadside gravel to aid their digestion of seeds, mammals go to eat de-icing salts,

⁷ United States Environmental Protection Agency (USEPA) AP-42

browsing herbivores are attracted to the vegetation of roadside edge, rodents proliferate in the artificial grasslands of road verges, and many large mammals find roads to be efficient travel ways. Songbirds come to dust bathe on dirt roads, where they are vulnerable to vehicles as well as predators. Vultures, crows, foxes and other scavengers seek out roadkill's and often become roadkill themselves.

Therefore, increased vehicular traffic may result in a direct mortality for fauna species and indirect habitat degradation.

7) Introduction of Invasive Alien Species

The accidental introduction of invasive alien species, particularly flora species, could potentially have an adverse indirect effect on flora, fauna and habitats, even if the probability of this impact is expected to be low.

Removal of natural vegetation cover and soil disturbance could facilitate the spreading of invasive alien (non-native) species accidentally introduced. These species tend to have an advantage in disturbed ecosystems, and if they penetrate into a habitat they can potentially change its functionality and species composition, including priority biodiversity species. Local fauna that depend on those ecosystems could also be indirectly affected.

Although unlikely to occur and usually localized to areas of disturbed soil and vegetation, this indirect impact could have a potential long term duration impact on flora, fauna and ecosystems.

Using a precautionary approach, a 100 m buffer is considered around areas of vegetation clearing and terrestrial topsoil disturbance.

Modified and Semi natural habitats

Modified and semi natural habitat present within the powerline LSA are showed in Figure 8-79. In the powerline LSA semi natural habitats cover around 41% of the area, while modified habitat cover the remaining 59%.

According to the baseline results, the following sensitivities are assigned:

- modified habitats: low sensitivity
- semi-natural habitats: medium sensitivity

The habitat types predicted to be directly and potentially indirectly impacted by the project during construction are listed in Table 8-34 and shown in Figure 8-79

Direct impact deriving from vegetation clearing and disturbance of terrestrial topsoil on the access road and pillar footprints will impact less than 1% of the total powerline LSA. Direct impacts will impact mainly on modified habitats, in particular on agricultural land (I1.13, 14.94 ha)

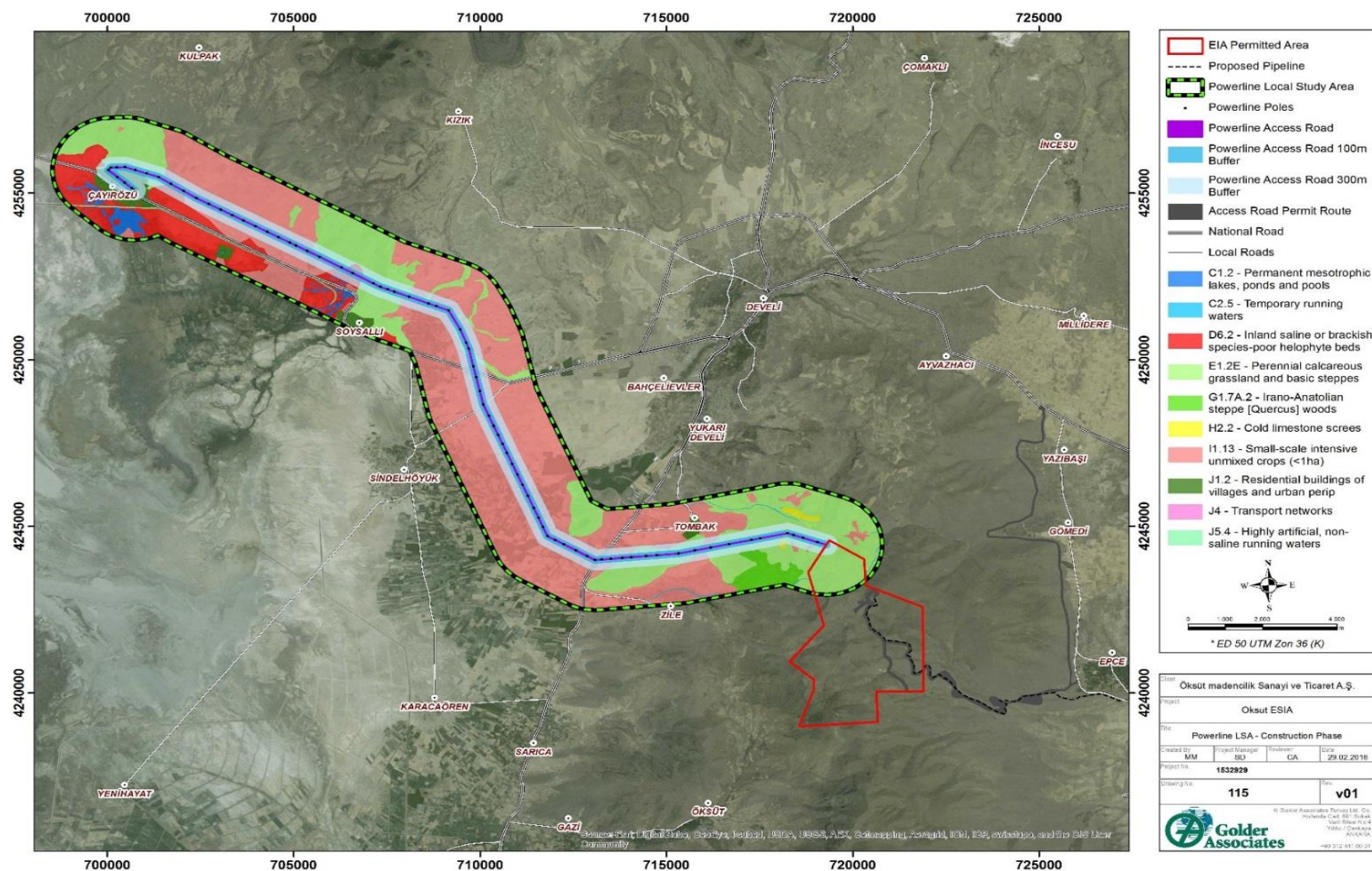
Indirect impacts in the 100 m buffer deriving from emission of gaseous pollutants and dust in the atmosphere, changes in morphology and hydrology and introduction of invasive alien species could impact a total of 7% of the powerline LSA. Indirect direct impacts in the 100 m buffer insist mainly on modified, in particular on agricultural land (I1.13, 309.50 ha)

Indirect impacts in the 300 m buffer deriving from noise and vibration could impact a total of 19% of the powerline LSA. Indirect direct impacts in the 300 m buffer insist mostly semi natural habitats and I concentrate on agricultural land (I1.13, 929.85 ha) and on steppe (E1.2E, 536.01).

Table 8-34: Construction Phase - Habitat Types Directly and Indirectly Impacted Within the Powerline LSA (EUNIS classification)

Code	Habitat	Direct impacts		Indirect impact (100 m buffer)		Indirect impact (300 m buffer)		Total Powerline LSA	
		ha	%	ha	%	ha	%	ha	%
<u>Semi natural habitats</u>									
C1.2	Permanent mesotrophic lakes, ponds and pools	0.03	<0.1	0.90	<1	2.96	3	104.81	1
C2.5	Temporary running waters	-	-	-	-	-	-	16.32	<1
D6.2	Inland saline or brackish species-poor helophyte beds	0.64	<0.1	14.22	2	52.87	7	766.13	9
E1.2E	Perennial calcareous grassland and basic steppes	10.13	<1	200.14	8	536.01	22	2400.72	29
G1.7A.2	Irano-Anatolian steppe [Quercus] woods	-	-	-	-	1.20	<1	135.22	2
H2.2	Cold limestone screes	0.16	36	3.37	11	10.59	35	30.10	<1
Total natural and semi natural habitats		10.95	<1	218.62	6	603.63	17	3453.30	41
<u>Modified habitats</u>									
I1.13	Small-scale intensive unmixed crops (<1 ha)	14.94	<1	309.50	7	929.85	20	4642.70	56
J1.2	Residential buildings of villages and urban periphery	1.01	<1	24.02	12	77.92	39	200.34	2
J4	Transport networks and other constructed hard-surfaced areas	0.07	<1	1.31	4	5.14	18	29.34	<1
J5.4	Highly artificial, non-saline running waters	-	-	-	-	-	-	27.74	<1
Total modified habitats		16.03	<1	334.83	7	1012.91	21	4900.12	59
TOTAL		26.98	<1	553.45	7	1616.54	19	8353.42	100

Figure 8-79: Construction Phase -Habitats within the Powerline LSA (LSA)



Impact assessment

The potential effects expected during the construction phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of these impacts within the powerline LSA is expected to be moderate.

Sub-component		Modified and semi-natural habitat	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/ disturbance of topsoil	Medium	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be minor
2) fragmentation due to the presence of temporary access road	Medium	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
3) changes in morphology and hydrology	Medium	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
4) emission of gaseous pollutants and dust in the atmosphere	Medium	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
5) emission of noise and vibration;	Medium	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
6) Increased direct mortality for wildlife due to vehicular traffic	Medium	- indirect impact - medium-term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
7) introduction and spreading of alien species.	Medium	- indirect impact - long-term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor

Impact Mitigation

The mitigation measures listed below are proposed for the construction phase for the entire area that will be disturbed by the powerline construction following the mitigation hierarchy:

■ Avoidance:

Avoidance measures have been considered particularly during the design of the facilities and consisted in:

- Routing of the new powerline in a corridor with other powerlines;
- Minimising the length of access roads.

■ Minimization:

- 1) vegetation clearing and removal/disturbance of topsoil;

- before the start of bird nesting season, a systems to scare the birds away from the construction areas using “bird repellent tape” will be implemented. OMAS personnel will go on site ahead of the nesting season (around mid-end April) and put some posts with the tape attached within the construction areas so that it would make the site unsuitable for nesting birds;
 - if during pre-construction survey nests are observed, OMAS will undertake their best efforts to preserve the vegetation in place;
 - an ecologist appointed by the Construction Contractor will perform pre-construction survey in the areas prior to vegetation clearing. The survey will focus fauna species with limited mobility that cannot move ahead of construction (e.g. Common tortoise). If any these species are observed they will be collected by the ecologist and translocated to undisturbed similar site within the LSA;
 - the pre-construction survey will also search for tortoise and bird nests. If tortoise nests are observed, the eggs will be collected and kept in a controlled environment (incubator) until hatched and then released back into the LSA.
- 2) fragmentation due to the presence of temporary access road;
- no additional measures.
- 3) changes in morphology and hydrology;
- environmental engineering techniques will be applied in order to create stable slope and minimise the risk of erosions.
- 4) emission of gaseous pollutants and dust in the atmosphere;
- dust management control measures will be implemented as described in Chapter 7: Air Quality.
- 5) emission of noise and vibration;
- Noise and Vibration management control measures will be implemented as described in *Chapter 11: Noise and Vibration*.
- 6) increased direct mortality due to vehicular traffic;
- install speed limit and animal crossing signs on the access road and enforce speed limit along the access roads;
 - if necessary, install speed bumps and noise stripes on straight sections of the access roads;
 - provide training to all staff and contractors on road safety and speed awareness.
- 7) introduction and spreading of alien species;
- if spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.
- Rehabilitation/Restoration:
- topsoil will be separately stored at the site and used for progressive restoration and rehabilitation after the end of the construction works. Topsoil will be stored in accordance with the provisions of the Regulation on the Control of Excavation Soil and Construction and Demolition Waste (2004) and the conditions in the Forest Rehabilitation Plan;
 - restoration of access roads and other areas cleared during construction but not subjected to the placement of permanent facilities (e.g. laydown areas) will occur, with the goal of producing a stable vegetative cover to minimize erosion, dust and

spreading of invasive alien species. The restoration of these areas is also expected to produce positive direct effects on local flora, fauna and habitats.

Residual Effects

Construction impacts will lead to following residual effects on modified and semi natural habitats:

- 1) vegetation clearing and removal/disturbance of topsoil: **negligible** residual effect (medium receptor sensitivity and low impact magnitude);
- 2) changes in morphology and hydrology: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 3) fragmentation due to the presence of temporary access road: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **negligible** residual effect (medium receptor sensitivity and negligible e impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 7) introduction and spreading of alien species: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on modified and semi natural habitats during the construction phase within the powerline LSA are expected to be **minor**.

Offset Measures

No offset measures are required for this component.

Monitoring Measures

In order to monitor the effectiveness of the mitigation measures applied, the following monitoring measures are suggested during the construction phase:

- Avoidance:
 - the development of the construction sites should be monitored weekly in order to avoid footprint creep within and outside the fence line.
- Minimization:
 - 1) vegetation clearing and removal/disturbance of topsoil:
 - the construction sites will be checked periodically to confirm the permanence of the tape to scare birds and the effectiveness of the technique;
 - pre-construction wildlife and nest survey will be performed, timed in accordance with the nesting season the methodology of the survey is further assessed in the BAP (Biodiversity Action Plan).
 - 2) changes in morphology and hydrology;
 - the presence of erosion phenomena should be monitored monthly with particular regards for steep slopes, river crossing and areas cleared of vegetation.
 - 3) emission of gaseous pollutant and dust in the atmosphere;
 - dust monitoring measures will be implemented as described in *Chapter 7: Air Quality*.
 - 4) emission of noise and vibration;

- Noise and Vibration monitoring measures will be implemented as described in *Chapter 11: Noise and Vibration*.
- 5) increased direct mortality of wildlife due to vehicular traffic;
 - accidents involving wildlife or the observation of live animal or carcasses along the access road will be monitored. Additional mitigation measure to avoid road kill will be taken if needed.
- 6) introduction and spreading of alien species;
 - the presence and spread of invasive flora species will be monitor monthly during the vegetative season, with particular attention to disturbed areas.
- Rehabilitation/Restoration:
 - within natural habitats, top soil salvaging operations and storage condition will be inspected in order to guarantee accordance with the provisions of the Regulation on the Control of Excavation Soil and Construction and Demolition Waste (2004) and the conditions in the Forest Rehabilitation Plan;
 - areas progressively restored will be inspected monthly for the first year during the vegetative season in order to allow for prompt corrective actions if needed. The monitoring will aim to assess the development of the planted/seeded species, the vegetation cover and the presence of stress or erosion signs.

Species of conservation concern (SCC)

The Species of conservation concern identified within the powerline LSA are:

- critically endangered species (CR):
 - *Vanellus gregarius* (Sociable Lapwing)
 - *Numenius tenuirostris* (Slender-billed Curlew)
- endangered species (EN):
 - *Oxyura leucocephala* (White-headed Duck)
 - *Falco cherrug* (Saker Falcon)
 - *Neophron percnopterus* (Egyptian vulture)
- Vulnerable species (VU):
 - *Testudo graeca* (Common tortoise)
 - *Aythya ferina* (Pochard)
 - *Branta ruficollis* (Red-Breasted Goose)
 - *Marmaronetta angustirostris* (Marbled Teal)
 - *Melanitta fusca* (Velvet Scote)
 - *Aquila heliaca* (Imperial Eagle)
 - *Clanga clanga* (Greater Spotted Eagle)
 - *Otis tarda* (Great Bustard)
 - *Acrocephalus paludicola* (Aquatic Warbler)
 - *Pelecanus crispus* (Dalmatian Pelican)
- Near Threatened species (NT).
 - *Aythya nyroca* (Ferruginous Duck)

- *Vanellus vanellus* (Northern Lapwing)
- *Glareola nordmanni* (Black-winged Praticole)
- *Haematopus ostralegus* (Oystercatcher)
- *Calidris ferruginea* (Curlew Sandplover)
- *Numenius arquata* (Curlew)
- *Coracias garrulus* (European roller)
- *Aegypius monachus* (Black Vulture)
- *Circus macrourus* (Pallid Harrier)
- *Falco vespertinus* (Red-footed Falcon)
- *Tetrax tetrax* (Little Bustard)
- *Anthus pratensis* (Meadow Pipit)
- *Limosa lapponica* (Bar-tailed Godwit)
- *Limosa limosa* (Black-tailed Godwit)
- Species with significant concentrations in summer-winter migrations:
 - *Ardea cinerea* (Grey heron),
 - *Microcarbo pygmaeus* (Little cormorant)
 - *Tadorna ferruginea* (Ruddy shelducks)
 - *Circus aeruginosus* (Western marsh harrier)
 - *Alcedo atthis* (Common kingfisher)
- Species with significant concentrations over migration:
 - *Phoenicopterus roseus* (Flamingo)
 - *Platalea leucorodia* (Eurasian Spoonbill)
 - *Ciconia ciconia* (White stork)

According to the baseline results, species of conservation concern are assigned high sensitivity.

Impact assessment

To determine the potential impacts over the species of conservation concern during construction, an analysis of the suitability of the habitats affected by the construction activities for each species has been conducted. As a result, the following species have been identified as the most likely to use the habitats mostly affected by the construction ("Small-scale intensive unmixed crops" (I1.13) and "Perennial calcareous grassland and basic steppes" (E1.2E)):

- critically endangered species (CR):
 - *Vanellus gregarius* (Sociable Lapwing)
 - *Numenius tenuirostris* (Slender-billed Curlew)
- endangered species (EN):
 - *Falco cherrug* (Saker Falcon)
 - *Neophron percnopterus* (Egyptian vulture)
- Vulnerable species (VU):
 - *Testudo graeca* (Common tortoise)

- *Branta ruficollis* (Red-Breasted Goose)
- *Aquila heliaca* (Imperial Eagle)
- *Otis tarda* (Great Bustard)
- Near Threatened species (NT).
 - *Vanellus vanellus* (Northern Lapwing)
 - *Glareola nordmanni* (Black-winged Praticole)
 - *Haematopus ostralegus* (Oystercatcher)
 - *Coracias garrulus* (European roller)
 - *Aegypius monachus* (Black Vulture)
 - *Circus macrourus* (Pallid Harrier)
 - *Falco vespertinus* (Red-footed Falcon)
 - *Tetrax tetrax* (Little Bustard)
 - *Anthus pratensis* (Meadow Pipit)
 - *Limosa limosa* (Black-tailed Godwit)
- Species with significant concentrations in summer-winter migrations:
 - *Circus aeruginosus* (Western marsh harrier)
- Species with significant concentrations over migration:
 - *Ciconia ciconia* (White stork)

The potential effects expected during the construction phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of these impacts within the powerline LSA is expected to be moderate.

Impacts during construction are expected to occur mainly through direct disturbance of birds using the construction areas and immediate vicinity. Considering that the construction areas are largely located in an already disturbed corridor, and that the most sensitive species are generally rare occupants of the LSA, it can be expected that the impacts over species of concern during construction will be negligible.

Sub-component		Modified and semi-natural habitat	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/ disturbance of topsoil	High	- indirect impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is low	The potential effects are expected to be minor
2) fragmentation due to the presence of temporary access road	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
3) changes in morphology and hydrology	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible.

Sub-component	Modified and semi-natural habitat		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
4) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
5) emission of noise and vibration	High	- indirect impact - medium-term duration - localised extent - likely to occur The expected impact magnitude is low	The potential effects are expected to be minor
6) increased vehicular traffic (road kill)	High	- direct impact - medium-term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
7) introduction and spreading of alien species	High	- indirect impact - long-term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be negligible

Impact Mitigation

No additional measures.

Residual Effects

Construction impacts will lead to following residual effects on species of conservation concern:

- 1) vegetation clearing and removal/disturbance of topsoil: **negligible** residual effect (high receptor sensitivity and low impact magnitude);
- 2) fragmentation due to the presence of temporary access road: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 7) introduction and spreading of alien species. **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on species of concern during the construction phase within the powerline LSA are expected to be **negligible**.

Offset Measures

No offset measures are required for this component.

Monitoring Measures

Monitoring of bird and nest presence, will be performed along the planned powerline route at least once prior to construction. The monitoring will be focused in particular on the SoC species identified and they

will be further detailed in the BAP (Biodiversity Action Plan). This monitoring, together with the monitoring performed within the Ramsar area, will help to better assess the conservation status of the area 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 or offset measures.

Protected and classified areas

The powerline LSA is at the margin of the Sultan Sazlığı area which is classified as KBA, IBA, IPA, Ramsar site and National Park and the Ercyies mountain which is classified as KBA. The significance of the portions of these classified and protected areas included in the LSA for the conservation objectives of the Sultan Sazlığı area is low for the following reasons:

- The decreased quality of the habitats due to the proximity to existing infrastructure including irrigation canals, roads, and powerlines;
- The existing disturbance due to the proximity to villages and human settlements;
- The current level of fragmentation of the habitats;
- The limited surface compared to the wider area of analysis (Sultan Sazlığı KBA – Ercyies Mountain KBA);
- The position at the margin of the Sultan Sazlığı KBA (and outside of core areas of conservation importance related to the National Park and Ramsar site).

For all these reasons it is considered that the LSA for the powerline does not include areas that are significant for the conservation of Priority Biodiversity Features or Critical Habitats. Nevertheless, OMAS will seek to identify opportunities to assist the National Park implement its current monitoring commitments to gain a better understanding of the seasonal species that can be found within the protected area (this will be developed in the Biodiversity Offsets Plan).

The potential effects expected during the construction phase without the implementation of any mitigation measure are showed in the table below for each potential impact, considering the receptor sensitivity and the impacts magnitude.

The combined effect of these impacts within the powerline LSA is expected to be negligible.

Sub-component		Modified and semi-natural habitat	
Impact	Receptor Sensitivity	Impact Magnitude	Significance
1) vegetation clearing and removal/ disturbance of topsoil	High	- direct impact - long term duration - highly localised extent - certain to occur The expected impact magnitude is medium	The potential effects are expected to be minor
2) fragmentation due to the presence of temporary access road	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
3) changes in morphology and hydrology	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
4) emission of gaseous pollutants and dust in the atmosphere	High	- indirect impact - medium-term duration - highly localised extent - likely to occur The expected impact magnitude is negligible	The potential effects are expected to be negligible
5) emission of noise and vibration	High	- indirect impact - medium-term duration	The potential effects are

Sub-component	Modified and semi-natural habitat		
Impact	Receptor Sensitivity	Impact Magnitude	Significance
		- localised extent - likely to occur The expected impact magnitude is low	expected to be minor
6) increased vehicular traffic (road kill)	High	- indirect impact - medium-term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
7) introduction and spreading of alien species	High	- direct impact - long-term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be negligible

Impact Mitigation

No additional measures.

Residual Effects

Construction impacts will lead to following residual effects on species of conservation concern:

- 1) vegetation clearing and removal/disturbance of topsoil: **negligible** residual effect (high receptor sensitivity and low impact magnitude);
- 2) fragmentation due to the presence of temporary access road: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 3) changes in morphology and hydrology: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 4) emission of gaseous pollutants and dust in the atmosphere: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 5) emission of noise and vibration: **negligible** residual effect (high receptor sensitivity and negligible impact magnitude);
- 6) increased direct mortality of wildlife due to vehicular traffic: **negligible** residual effect (medium receptor sensitivity and negligible impact magnitude);
- 7) introduction and spreading of alien species. **negligible** residual effect (high receptor sensitivity and negligible impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on protected and classified areas during the construction phase within the powerline LSA are expected to be **negligible**.

Offset Measures

No offset measures are required for this component.

Monitoring Measures

In addition to the monitoring measure to be performed along the powerline route, 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”. The monitoring will be focused in particular on the SoC species identified and they will be further detailed in the BAP (Biodiversity Action Plan).

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 or off set measures.

8.13.2 Operation Phase

The potential impacts to biodiversity related to the effects of the Project during construction are listed below:

- 1) degradation/fragmentation of habitats for birds;
- 2) increased birds mortality due to collision and electrocution.

The impacts listed are considered and discussed in the following assessment.

1) Degradation/fragmentation of habitats

The presence of a powerline can degrade the quality or suitability of habitats for several species as it introduces an element of physical disturbance and induces a potential change in behaviour in predators. For terrestrial species the presence of the pylons and of the regular maintenance of the line introduces a minor element of disturbance to movement, while the presence of the pylons offers also an opportunity for predators to increase their presence and predation activity. At the same time the presence of the cables and pylons is a physical barrier to movement and it alters the quality of the airspace as discussed in the points below.

2) Increased birds mortality due to collision and electrocution;

Although the planned powerline will run in between two existing parallel powerlines that are already present (Figure 8-80), the addition of a new powerline could cause an increase in the chances of collision and electrocution, since it adds additional vertical and horizontal obstacles.

Collision and electrocution on vertical obstacles and powerlines are a major mortality factors for numerous medium-sized and large birds, such as Storks, Eagles, Vultures, other Raptors, Owls, Ravens, Bustards, Rails and Waders. However, even smaller birds down to the size of a starling can be affected depending on detailed construction features

Migrating birds flying at heights of 20 m to 50 m are at considerable risk of collision, especially at night, when flying in flocks, and for large and heavy birds of limited manoeuvrability.

The risk of bird collision with suspended powerline cables and vertical structures varies considerably depending on the bird species and the detailed design of power facilities⁸.

Figure 8-80: Existing powerlines in the north western portion of the Powerline parallel to the planned powerline route



⁸ BirdLife, 2007. Position Statement on Birds and Power Lines



Species of conservation concern (SCC)

The Species of conservation concern identified within the powerline LSA are:

- critically endangered species (CR):
 - *Vanellus gregarius* (Sociable Lapwing)
 - *Numenius tenuirostris* (Slender-billed Curlew)
- endangered species (EN):
 - *Oxyura leucocephala* (White-headed Duck)
 - *Falco cherrug* (Saker Falcon)
 - *Neophron percnopterus* (Egyptian vulture)
- Vulnerable species (VU):
 - *Testudo graeca* (Common tortoise)
 - *Aythya ferina* (Pochard)
 - *Branta ruficollis* (Red-Breasted Goose)
 - *Marmaronetta angustirostris* (Marbled Teal)
 - *Melanitta fusca* (Velvet Scote)
 - *Aquila heliaca* (Imperial Eagle)
 - *Clanga clanga* (Greater Spotted Eagle)
 - *Otis tarda* (Great Bustard)
 - *Acrocephalus paludicola* (Aquatic Warbler)
 - *Pelecanus crispus* (Dalmatian Pelican)
- Near Threatened species (NT).
 - *Aythya nyroca* (Ferruginous Duck)
 - *Vanellus vanellus* (Northern Lapwing)
 - *Glareola nordmanni* (Black-winged Praticole)
 - *Haematopus ostralegus* (Oystercatcher)
 - *Calidris ferruginea* (Curlew Sandplover)
 - *Numenius arquata* (Curlew)
 - *Coracias garrulus* (European roller)
 - *Aegypius monachus* (Black Vulture)

- *Circus macrourus* (Pallid Harrier)
- *Falco vespertinus* (Red-footed Falcon)
- *Tetrax tetrax* (Little Bustard)
- *Anthus pratensis* (Meadow Pipit)
- *Limosa lapponica* (Bar-tailed Godwit)
- *Limosa limosa* (Black-tailed Godwit)
- Species with significant concentrations in summer-winter migrations:
 - *Ardea cinerea* (Grey heron)
 - *Microcarbo pygmaeus* (Little cormorant)
 - *Tadorna ferruginea* (Ruddy shelducks)
 - *Circus aeruginosus* (Western marsh harrier)
 - *Alcedo atthis* (Common kingfisher)
- Species with significant concentrations over migration:
 - *Phoenicopterus roseus* (Flamingo)
 - *Platalea leucorodia* (Eurasian Spoonbill)
 - *Ciconia ciconia* (White stork)

According to the baseline results, species of conservation concern are assigned high sensitivity.

Impact assessment

During operation impacts on habitats for birds will be related to the physical presence of the powerline, which will cause a degradation through fragmentation and increase the bird mortality risks due to electrocution and collisions. Birds' collision and electrocution with powerlines is a significant cause of mortality particularly for certain species given their migratory behaviour and flying mode. Considering the position of the powerline with respect to the main migratory flyway (NE - SW) and habitats favourable to the species of concern, it can be expected that the powerline will constitute an additional obstacle to birds' flight over that already represented by the existing powerlines. To determine the risk to birds' species of concern potentially present in the powerline LSA, each species has been assigned to a group according to the flight patterns and migratory behaviours, and each group has been assigned a sensitivity to the collision and electrocution risk (5 very high sensitivity – 1 very low sensitivity).

Species	Group	Risk of collision	Risk of electrocution
<i>Oxyura leucocephala</i> - White-headed Duck	Ducks, Geese, Swans, Loons and Grebes	3	2
<i>Tadorna ferruginea</i> – Ruddy Shelduck			
<i>Aythya nyroca</i> - Ferruginous Duck			
<i>Aythya ferina</i> – Common Pochard			
<i>Marmaronetta angustirostris</i> - Marbled Teal			
<i>Branta ruficollis</i> - Red-breasted Goose			
<i>Melanitta fusca</i> – Velvet Scoter			
<i>Falco cherrug</i> - Saker Falcon	Falcons	3	5

Species	Group	Risk of collision	Risk of electrocution
<i>Falco vespertinus</i> – Red-footed Falcon			
<i>Ardea cinerea</i> – Grey Heron	Flamingos, Herons, Cranes and Storks	5	4
<i>Ciconia ciconia</i> - White stork			
<i>Phoenicopterus roseus</i> - Greater Flamingo			
<i>Platalea leucorodia</i> - Eurasian Spoonbill			
<i>Tetrax tetrax</i> - Little Bustard			
<i>Otis tarda</i> - Great Bustard			
<i>Microcarbo pygmaeus</i> – Pygmy Cormorant			
<i>Neophron percnopterus</i> - Egyptian vulture	Hawks, Eagles and Kites	5	5
<i>Circus aeruginosus</i> – Western Marsh Harrier			
<i>Aegypius monachus</i> - European Black Vulture			
<i>Circus macrourus</i> – Pallid Harrier			
<i>Clanga clanga</i> – Greater Spotted Eagle			
<i>Aquila heliaca</i> - Eastern Imperial Eagle			
<i>Acrocephalus paludicola</i> – Aquatic Warbler	Passerines, Swifts and Woodpeckers	1	1
<i>Alcedo atthis</i> – Common Kingfisher			
<i>Anthus pratensis</i> – Meadow Pipit			
<i>Pelecanus crispus</i> - Dalmatian Pelican	Pelicans	4	3
<i>Numenius tenuirostris</i> - Slender-Billed Curlew	Waders	2	1
<i>Vanellus gregarius</i> - Sociable Lapwing			
<i>Calidris ferruginea</i> – Curlew Sandpiper			
<i>Coracias garrulus</i> – European Roller			
<i>Glareola nordmanni</i> – Black-winged			
<i>Haematopus ostralegus</i> – Eurasian Oystercatcher			
<i>Limosa lapponica</i> – Bar-tailed Godwit			
<i>Limosa limosa</i> – Black-tailed Godwit			
<i>Numenius arquata</i> – Eurasian Curlew			
<i>Vanellus vanellus</i> – Northern Lapwing			

From this table it can be seen that of the 36 species of concern, 14 species have a high or very high risk of collision and 15 species have a high or very high risk of electrocution related to the powerline. According to the interviews conducted with local stakeholders during a social survey in February 2016, no evidence of impacts from birds' collisions or electrocution with the two existing powerlines has been collected. The existing powerlines have been equipped with spikes on the poles, but not with bird flight diverters. Therefore the additional risk of collision can be considered limited based on the adoption of the mitigation measures described below.

Based on these considerations, the impact on species of concern due to the powerline are summarized in the table below.

The combined effect of these impacts within the powerline LSA is expected to be moderate.

Sub-component	Modified and semi-natural habitat		
	Receptor Sensitivity	Impact Magnitude	Significance
degradation/fragmentation of habitats for birds	High	<ul style="list-style-type: none"> - indirect impact - long term duration - localised extent - unlikely to occur The expected impact magnitude is low	The potential effects are expected to be minor
increased birds mortality due to collision and electrocution	High	<ul style="list-style-type: none"> - direct impact - long term duration - localised extent - unlikely to occur The expected impact magnitude is medium	The potential effects are expected to be moderate

Impact Mitigation

OMAS is committed to working with the powerline contractor and TEİAŞ to reach the best mitigation strategy possible and will use some/all of the techniques suggested below.

Mitigation for birds' collision

In order to minimize the risk of collision, the main aim is to make lines more visible to birds, since the assumption is that birds collide with overhead cables because they cannot see them. Standard design techniques are suggested below (AEWA, 2012).

- Route: building a powerline adjacent to an existing power lines mitigates the risks of collision, since birds will be more able to see the combined obstruction as well as have a greater likelihood of safely passing a second nearby line if this is of the same or lower height;
- Line design or configuration: the lower power line cables are to the ground, the better for preventing bird collision, less vertical separation of cables is preferred as it poses less of an 'obstacle' for birds to collide with. Multilevel vertical arrangements are more dangerous to birds because they provide an obstacle over a greater plane;
- Line marking: a wide range of potential 'line marking' devices is available, including: spheres, swinging plates, spiral vibration dampers, strips, swan flight diverters, Firefly Bird Flight Diverters, bird flappers, aerial marker spheres, ribbons, tapes, flags, fishing floats, aviation balls and crossed bands (Figure 8-81). Considering bird vision and flying behaviour, the following designs are suggested:
 - line markers should be as large as possible, and increase the visible thickness of the line by at least 20 cm, for a length of at least 10-20 cm;
 - spacing of devices should be not more than 5-10 m apart;
 - line markers should incorporate as much contrast with relevant backgrounds as possible, colour is probably less important than contrast;
 - movement of the device and markers that protrude vertically both above and below the cable are likely important;
 - since we suspect that many collisions may occur at night, devices that are nocturnally visible (phosphorescence, ultraviolet radiation and other means) would be advantageous;

- devices should be installed on the earth wire (also called ground or shield wire) wherever possible. On lines without an earth wire, devices should be installed on the conductors.

OMAS is committed to minimizing its impacts to the SCC bird species identified and to Sultan Sazlığı Ramsar site and National Park. Accordingly, OMAS will negotiate the implementation of the bird diverters and other mitigation measures to the maximum extent practicable with TEİAŞ and the powerline construction contractors. If these measures are not technically feasible, then OMAS will seek to identify, assess and implement additional conservation actions (adopting a BATNEEC approach) that may include offsets as required in PR6.

OMAS will negotiate the implementation of bird fly diverters to the entire powerline length, install alternating flight diverters and large spirals with colours at a frequency of at least one of each every 10-20 m. The new powerline will be built adjacent to an existing power lines.

Figure 8-81: An example of various line marking devices.



Mitigation for birds' electrocution

An "avian-safe" power pole is a configuration designed to minimise bird electrocution risk by providing sufficient separation between energised phase conductors and between phases and grounded hardware to accommodate at least the wrist-to-wrist or head-to-foot distance of a bird. If such separation cannot be provided, exposed parts should be covered (insulated) to reduce electrocution risk (AEWA, 2012). The main standard design techniques suggested by literature and guidelines and applicable to the present case are discussed below. The final decision on the specific measures implemented and on the powerline design will be based on consultation with the company in charge of the powerline construction.

- Line design or configuration: when the power line is located within the distribution area of large raptors or storks, as in the present case, a minimum distance of 1.5 m between powerlines is

required and a space greater than 0.75 m between a likely perch site and the energised parts in order to reduce the risk of electrocution (Haas & Nipkow, 2006; Haas & Schürenberg, 2008).

- insulation: if it is not possible to have sufficient clearances between critical hardware, it is necessary to cover energised parts and/or cover grounded parts with appropriate materials in order to provide protection against birds incidental contact. It is best to use suspended insulators and vertical disconnectors, if upright insulators or horizontal disconnectors are present these should be covered. The length of insulated chains should be higher than 0.70 m;
- perch management techniques: one option is the use of discouragers (spikes) to be placed on top of potential perching sites. However this solution often causes more problems since birds still try to perch but have less space and may get closer to the electrified parts. Another option is to combine the discouragers with artificial bird safe perches and nesting platforms which are placed at a safe distance from the energised parts (Bayle, 1999).

OMAS is committed to minimizing its impacts to the SCC bird species identified and to Sultan Sazlığı Ramsar site and National Park. Accordingly, OMAS will negotiate the implementation of the bird diverters and other mitigation measures to the maximum extent practicable with TEİAŞ and the powerline construction contractors. If these measures are not technically feasible, then OMAS will seek to identify, assess and implement additional conservation actions (adopting a BATNEEC approach) that may include offsets as required in PR6.

OMAS will negotiate the implementation of insulation, in case sufficient clearances between critical hardware is not guaranteed by the project design, and the placement of perch discourager, additional safe perches and nesting platforms.



Figure 8-82: existing powerline parallel to the new powerline route with perch discouragers (spikes)

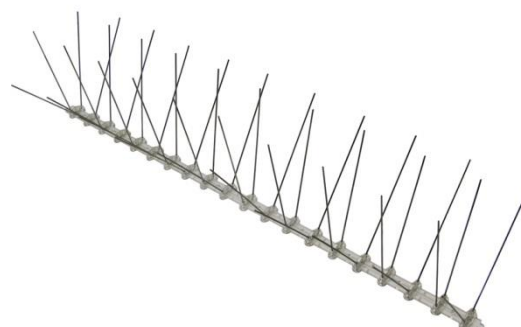


Figure 8-83: perch discouragers (spikes)



Figure 8-84: Distribution pole with symmetric chevron on top as bird exclusion device.



Figure 8-85: Nesting Osprey on artificial platform in medium voltage transmission line

Residual Effects

Operation impacts will lead to following residual effects on species of conservation concern:

- 1) degradation/fragmentation of habitats for birds: **minor** residual effect (high receptor sensitivity and low impact magnitude);
- 2) increased birds mortality due to collision and electrocution: **minor** residual effect (high receptor sensitivity and low impact magnitude).

Considering the implementation of the proposed mitigation measures, the overall residual effect on species of concern during the operation phase within the powerline LSA are expected to be **minor**.

Offset Measures

If the mitigation measures proposed above 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 OMAS's adaptive management strategy and allow the evaluation of necessity, typology and location of additional offset measures

Monitoring Measures

During the first three years of operation monitoring of bird presence and bird mortality will be performed along the portion of the powerline route that overlaps with the National Park buffer area.

Monitoring for bird presence will be performed every three months by an expert ornithologist.

Monitoring for bird mortality will be assessed weekly during peak migration periods and monthly outside migration periods by an environmental technician that will collect photographic documentation of the carcasses found and record the date of the finding and the GPS location.

This 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 the Company's adaptive management strategy and allow the evaluation the necessity and typology of additional mitigation measures.

Protected and classified areas

Impacts over classified and protected areas during the operations phase will be related to impacts over species of concern discussed in the paragraphs above.

An appropriate assessment screening of the protected area was performed and it is provided in *Annex W* to this ESIA.

Considering the implementation of the proposed mitigation measures, the overall residual effect on protected and classified areas during the operation phase within the powerline LSA is expected to be **negligible**.

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