

GÖKÇEHÖYÜK SOLAR POWER PLANT PROJECT

BIODIVERSITY MANAGEMENT PLAN

JULY 2024

ANKARA



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REVISION CODES: A: DRAFT, B: FINAL DRAFT, C: FINAL

PROJECT NO: 24 / 012

JULY 2024

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1. INTRODUCTION

This document Construction Biodiversity Management Plan has been designed by Gökçehöyük Solar Power Plant (SPP) Project Management in order to direct the CONTRACTOR to execute their activities in relation to biodiversity. This plan study has been conducted in line with the local law, legislation, IFC PS6 and OP 4.04.

The planned Solar Power Plant is located in Ankara Province, Gölbaşı District, Çerkezhöyük (Gökçehöyük) neighborhood, Block 125036, Parcel 21 and the land belongs to Gölbaşı Municipality. The solar panels to be used in the project are of high quality and have a lifetime of 30 years. This study was conducted to determine the biodiversity characteristics of the project area and its surroundings. In this context, field observations were made within the boundaries of the project area and its impact areas on June 29-30, 2024.

This report has been prepared to determine the floristic and faunistic structure of the SPP site and its surroundings, the ecosystem characteristics of these areas, and to minimize possible negative impacts by determining the impact of project activities on flora and fauna elements.

1.1. Purpose

The Purpose of this BMP is to define:

- Project standards for managing biodiversity matters during the construction phase.
- the scope and applicable interphases for the management of addressing biodiversity management and monitoring activities during the construction phase.
- responsibilities, commitments, operating procedures and instructions for the implementation of this BMP.
- the mitigation measures applicable to the Project concerning biodiversity elements.
- manage the monitoring activities performance concerning fauna and flora.

This BMP applies to normal operating conditions during the construction and operation activities and does not specifically address any emergency. The overall objective of this BMP is to identify the mitigation and monitoring measures to:

- adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize and restore impacts to the environment.
- develop and implement policies, plans and procedures to integrate environmental and social aspects within the overall project management framework throughout its lifecycle.
- establish a monitoring program to assess the effects of residual impacts on the environment.

- report the results of the periodic audits and provide for corrective actions, if necessary, to reach the planned objectives.

This report is a living document and hence, should be updated to reflect increased understanding of Project program and design throughout construction and operation (until agreed otherwise by Project Lenders) and should also be informed by new information as it becomes available (e.g., as obtained from ongoing/pre-construction surveys or as received from pertinent stakeholders).

2. REGULATIONS, STANDARDS AND GUIDANCE

In this section, regulations, standards and guidance related to the management of biodiversity is summarized.

2.1. National Legislations

The development of policies related to biodiversity conservation in Turkey, the determination and management of protected areas with different status, the development and implementation of plans and programs, to carry out actions within this scope, and to ensure coordination between different agencies, are under the responsibility of Republic of Turkey Ministry of Agriculture and Forestry (MoAF) and its affiliated institutions (CBD (Convention on Biological Diversity) National Focus Center, n.d.).

The main institution responsible for the conservation and sustainable use of biological diversity is the General Directorate of Nature Conservation and National Parks, which is under the Ministry and is also the focal point of the CBD. The General Directorate of Nature Conservation and National Parks is the main unit responsible for the management of conserved areas, the conservation of wildlife and the regulation and supervision of land hunting in accordance with the National Parks Law.

The Ministry of Agriculture and Forestry is another institution responsible for the conservation and sustainable use of biological diversity. The duties and responsibilities of the Ministry regarding biological diversity are carried out by the central and provincial organizations through the main service units, the General Directorate of Agricultural Research and Policies, the General Directorate of Protection and Control, and the General Directorate of Agricultural Production and Development.

2.1.1. National Laws and Regulations

The Environment Law (Nº: 2872 dated 9 August 1983) aims to protect the environment of Turkey, which has the common value of all living creatures in harmony with sustainable environment and sustainable development and defines and sets out the basic principles regarding the protection and development of the environment, and the prevention of pollution.

Within the framework of the Law on Amendment to the Environmental Law Nº5491 dated 26 April 2006, the importance of the conservation of biological diversity has been stated in Article 6, and regulations regarding criminal sanctions have been introduced in the case for which it is determined that the environment has been damaged by evidence of inspection and demonstrated negligence, including the destruction of biological diversity. With the regulations issued based on the Environmental Law, rules for the prevention of pollution and environmental impact assessment/mitigation have been determined. The laws and regulations related to the conservation of habitats and species in Turkey are presented in Table 2-1.

Table 2-1. Laws and Regulations for the Conservation of Habitats and Species

| Law / Regulation | Official Gazette | |
|---|------------------|-------|
| | Date | Nº. |
| Law on National Parks | 09.08.1983 | 2873 |
| Law on the Protection of Cultural and Natural Heritage | 23.07.1983 | 2863 |
| Decree-Law on the Establishment of the Special Environmental Protection Agency | 19.10.1989 | 383 |
| Law on Land Hunting | 01.07.2003 | 4915 |
| Law on Water Products | 04.04.1971 | 1380 |
| Law on Forests | 31.08.1956 | 6831 |
| Law on Animal Protection | 24.06.2004 | 5199 |
| Regulation on the Protection of Wetlands | 17.05.2005 | 25818 |
| Regulation on the Implementation of the Convention on International Trade of Endangered Wild Animal and Plant Species | 27.12.2001 | 24623 |
| Regulation on the Removal, Production and Export of Natural Flower Bulbs | 19.07.2012 | 28358 |
| Regulation on Water Products | 10.03.1995 | 22223 |
| Regulation on Wildlife Protection and Wildlife Development Area | 08.11.2004 | 25637 |

Turkey also has laws and regulations on the conservation of other environmental elements, such as reducing pollution, ensuring sustainable development and the management of natural resources. The Legislation on issues such as the control and management of air pollution, environmental management and permits, health and safety, management of chemicals and other hazardous materials, noise control and management, control of soil quality, control management of water quality, and waste management are also effective in terms of management of the secondary impacts on biodiversity elements.

2.1.2. National Environmental Plan and Programs

In addition to the international conventions to which Turkey is a party, several national environmental strategies have also been set forth through the preparation of plans and programs. These plans and programs can be listed as follows:

- National Environmental Action Plan (1998)
- National Plan for the in-situ Conservation of Plant Genetic Diversity (1998)
- National Agenda 21 Program (2001)
- National Wetland Strategy (2003)
- Turkey's National Forestry Program (2004)
- National Science and Technology Policies 2003-2023 Strategy Document (2004)
- Turkey National Action Program on Combating Desertification (2005)

- National Environmental Strategy (2006)
- National Rural Development Strategy (2006)
- National Biological Diversity Strategy and Action Plan (2007)

The National Biological Diversity Strategy and Action Plan, which is among the above-mentioned plans and programs, and last updated in 2007, is a national strategy that must be complied with in accordance with the provisions of the Convention on Biodiversity to be a guide for the implementation of the Convention on Biological Diversity articles. The strategy aims to succinctly describe and assess biodiversity, to determine an agreed conservation strategy and to provide decision-makers recommend the actions required to achieve the objectives of biodiversity conservation in Turkey. The aim of the strategy is "To create a society that lives as a part of nature, values biological diversity, does not consume more than nature can replace and leaves a nature-rich in biological diversity to future generations." Strategy defines the current legal responsibilities related to biodiversity, emphasizes the importance of international cooperation to create policies and the research conditions necessary for the development of ecosystem management, and includes strategies and priority action plans towards the target (MAF, 2007).

2.1.3. National Conservation Status of Flora

Plant samples collected during fieldwork were primarily determined using "Flora of Turkey and the East Aegean Islands" (Davis, 1965-1988) as a guideline. Concerning the determination of Turkish names, "Turkish Plant Names" prepared by Prof. Dr. Turhan Baytop (1994) was utilized. Determination of threat categories for flora types in the biodiversity study area was provided by the categories and criteria given in Turkey Plants Red Book (Ekim et al., 2000) as the basis. This reference source was prepared according to the IUCN Red List 1994 criteria. The hazard categories in the book have been re-evaluated considering the endemic species in the field and the IUCN 2001 criteria.

2.1.4. National Conservation Status of Fauna

Unlike the Turkey Plants Red Book, which provides an official national threat list for flora species, there is no nationally accepted official list for fauna species. The resources provided below are listed to provide an overview and guideline. However, as explained in the subsequent sections of the plan, these resources are not sufficient to make detailed assessments of critical and high priority habitats and species.

Central Hunting Commission (2023). 2023-2024 Hunting Season Decisions

The hunting status of the fauna types in the Project Area has been determined according to the General Directorate of Nature Conservation and National Parks, Hunting and Wildlife Agency, Central Hunting Commission (CHC) 2023-2024 Decisions. In line with the aforementioned decisions, fauna types have been evaluated as indicated in Table 2-2.

Table 2-2. Annexes of CHC Decisions

| Annex | Central Hunting Commission Decisions |
|-------|--|
| I | Prey animals protected by the Central Hunting Commission |
| II | Prey animals allowed to be hunted at certain times by the Central Hunting Commission |

2.2. International Legislations and Standards

Both national and international legislation, standards and guidelines were taken into account when formulating and implementing biodiversity studies that have been completed in the Project Area, and in the evaluation of terrestrial and aquatic flora and fauna research results. Turkey is a party to several conventions listed below, which are related to different aspects of biodiversity, and these conventions form part of the national legislation. Although not all of the listed conventions are directly related to the project, they are given in the scope of the report to reveal the binding framework of any project executed in Turkey:

- Relevant protocols, including the Convention on the Protection of the Marine Environment and Coastal Zone of the Mediterranean (Barcelona Convention) (1981) and the Protocol on Specially Protected Areas and Biodiversity in the Mediterranean (1988) (N/A to Suez)
- European Landscape Convention (2001)
- Convention on the Conservation of Europe's Wildlife and Habitat (BERN) (1984)
- UN Convention on Biological Diversity (1997) and Cartagena Biosafety Protocol (2004)
- UN Framework Convention on Climate Change (UNFCCC) (2004)
- Convention on the Protection of the World Cultural and Natural Heritage (1983)
- International Convention for the Prevention of Pollution from Ships (MARPOL) (1990)
- International Agreement on Plant Genetic Resources for Food and Agriculture (2006)
- Related protocols including the Convention on the Protection of the Black Sea Against Pollution (Bucharest) (1994) and the Protocol for the Protection of Biological Diversity and Landscapes in the Black Sea (2002)
- Convention on the International Trade in Endangered Wild Animal and Plant Species (CITES) (1996)
- Vienna Convention for the Protection of the Ozone Layer (1988) and the Montreal Protocol on Substances that Deplete the Ozone Layer (1990)

- Convention on Wetlands of International Importance Especially as Habitat for Waterfowl (RAMSAR) (1994)
- Basel Convention on the Control of Transboundary Transport and Disposal of Hazardous Wastes (1994)
- UN Convention to Combat Desertification (1998)
- Long-Range Transboundary Air Pollution Convention and the Cooperation Program for Monitoring and Evaluation of Long-Range Transport of Air Pollutants in Europe (1983)

2.2.1. European Union (EU) Legislation

The European Union (EU) environmental legislation, in general terms, has been laid down to protect air and water quality, resources and biodiversity, and to control waste management and activities that are likely to have negative environmental effects in the member states and globally. Since the mid-1970s, environmental policies have been guided by action programs that set the priority objectives expected to be achieved within a certain period. The last of these programs was accepted by the European Parliament and the European Union Commission in November 2013 and is valid until 2020 (European Commission, 2014b).

The protection of biodiversity is one of the key objectives of the EU, like all other environmental legislation. The Biodiversity Strategy prepared for 2020 has been adopted to protect and improve the status of biodiversity in Europe in the next 10 years. The strategy sets out six goals that address biodiversity loss from different perspectives.

- Target 1 Fully implement the Birds and Habitats Directives
- Target 2 Maintain and restore ecosystems and their services
- Target 3 Increase the contribution of agriculture and forestry to biodiversity
- Target 4 Ensure the sustainable use of fisheries resources
- Target 5 Combat Invasive Alien Species
- Target 6 Step-up action to tackle the global biodiversity crisis

Although not one of the Member States, to ensure compliance with the EU acquis, currently a program consisting of more than 200 laws is in force in Turkey, including horizontal legislation, water and air quality, waste management, nature protection, control of industrial sourced pollution and risk management, chemicals and genetically modified organisms, noise and forestry. Many regulations have come into force and Turkey is now striving to make headway on biodiversity and nature conservation issues.

Action 7 under the EU Biodiversity Strategy 2020 Objective 2, has adopted the principle of “zero net loss in biodiversity and ecosystem services”. In this direction, two sub-actions are defined. According to Action 7a, "The Commission, in cooperation with the member states, shall develop a methodology until 2014 to evaluate the effects of EU-funded biodiversity

projects, plans and programs" and 7b, "The Commission will carry out further work with a view to proposing by 2015 an initiative to ensure there is no net loss of ecosystems and their services (e.g. through compensation or offsetting schemes)" (European Commission, 2014b).

Birds Directive (2009/147/EC)

The Birds Directive is the Directive of the European Parliament and the Commission on the conservation of wild birds (N° 2009/147/EC), which entered into force on 30 November 2009 (as amended by Directive 79/409/EEC). The Directive provides for the protection of all 194 identified wild bird species and subspecies, which are under threat and require special protection measures. There are different components for the implementation of the Directive (European Commission, 2014a, Table 2-3):

- Member states are required to allocate "Special Protection Areas (SPA)" for 194 threatened and all migratory birds listed in Annex-I of the Birds Directive. SPAs are scientifically determined critical areas (eg wetlands) for the survival of the targeted species. SPAs are part of the Natura 2000 ecology network established according to the Habitats Directive 92/43/EEC.
- The second component is the prohibition of activities that directly threaten the birds, such as intentional killing or catching, destruction of their nests, taking their eggs, and trading live or dead birds (with a few exceptions).
- The third component is the limitation of the number of birds listed in Annex-III and allowed to be hunted (82 species and subspecies) and the periods they can be hunted. This component also defines permitted hunting methods (eg non-selective hunting is prohibited).

Table 2-3. Annexes of Birds Directive

| Annex | Explanation |
|-------|--|
| I | Species subject to special protection measures regarding their habitats to ensure their survival in their own ranges and continuation. |
| II | The species may be hunted according to national legislation. The Member States shall ensure that hunting is carried out in a manner that does not interfere with bird conservation efforts in birds' ranges. |
| III | Sale of species, transport for sale, keeping for sale, and sale of live or dead birds or any recognizable parts or derivatives of the species are not prohibited, provided that the birds were legally killed, captured or otherwise seized. |

Habitat Directive (92/43/EEC)

The Habitats Directive 92/43/EEC entered into force in 1992. The main purpose of the Directive is to preserve biodiversity by taking into account economic, social, cultural and regional requirements. While the Directive contributes to the overall objective of sustainable development, it aims to conserve about 450 animal and 500 plant species, which are rare, threatened and endemic. About 200 rare and special habitat types are also included in the conservation targets in terms of their characteristics (European Commission, 2014a).

The Habitat Directive, together with the Birds Directive, forms the basis of Europe's nature conservation policy. The Directive has two bases; Natura 2000 network of protected sites and a solid system for species conservation. Within the scope of the Directive, more than 1,000 plant and animal species and more than 200 habitat types (such as special forest types, meadows, wetlands, etc.) are protected.

Annex-I and Annex-II of the Directive cover the habitat types and species that require the allocation of special areas for their protection. Some of these are defined as "priority" habitats or species (in danger of extinction). Explanations on the annexes of the Habitat Directive are shown in Table 2-4.

Table 2-4. Annexes of Habitat Directive

| Annex | Explanation |
|-------|---|
| I | Natural habitat types of community interest that should be declared special areas for protection |
| II | Plant and animal species of community interest that should be declared special areas for protection |
| III | Selection criteria for areas that are important for the community and suitable to be declared special areas to be protected |
| IV | Plant and animal species of community interest that require strict conservation measures |
| V | Plant and animal species of community interest that require management measures to take and use from nature |

2.2.2. Bern Convention

The Bern Convention was put into effect in 1982 to conserve European wildlife and natural habitats. Fauna types conserved by the Bern Convention are listed in two categories. The categories and definitions of the Bern List are presented in Table 2-5.

Table 2-5. Annexes of Bern Convention

| Annex | Explanation |
|-------|---|
| I | Plant species that absolutely must be protected |
| II | Fauna types that absolutely must be protected |
| III | Fauna types that must be protected |
| IV | Prohibited technique and methods of killing, capturing and other abuses |

The Bern Convention aims at conserving and promoting biodiversity, developing national policies for the conservation of wild flora and fauna and their natural habitats, protection of the wild flora and fauna from planned development and pollution, developing training for protection practices, and promoting and coordinating all research made regarding this subject. It has been signed by 26 member states of the European Council (as well as Turkey) to conserve the wildlife in Europe.

All of the nations that are parties to the convention have also signed the Convention on Biological Diversity, and are obliged to guarantee all possible steps, to be consistent with their national development, and to protect fragile habitats and threatened species. The species

which are not listed in the annexes of the convention are those that do not require any special conservation. These species are not listed individually, and the species are conserved due to the habitat protection approach of the Convention.

2.2.3. CITES

CITES is the Convention on the International Trade of Endangered Wild Animal and Plant Species. The CITES lists, which is an international convention signed by the governments of 164 countries (including Turkey), aim to ensure that international trade in wild animals and plants does not threaten their lives or depletion in the wild. CITES principles are based on sustainable trade, which is important for the future conservation of ecological resources (diverse wildlife products from large quantities of livestock and plants, food additives, exotic leather products, etc.). CITES was signed in 1973 and entered into force on 1 July 1975. Turkey became a party to this convention in 1996. Categories and species in CITES are given under three different annexes according to the required protection degrees. These annexes and explanations are presented in Table 2-6.

Table 2-6. Annexes of CITES

| Annex | Explanation |
|-------|---|
| I | Includes endangered species. Trade-in samples of these species are not permitted except in exceptional circumstances. |
| II | Includes the species that are not at risk of extinction but trade in these must be kept under control to prevent the use incompatible with their lives. |
| III | Includes species protected in at least one country where other CITES parties are consulted for assistance in commercial control. |

2.2.4. IUCN Red List of Threatened Species

The International Union for Conservation of Nature (IUCN) Red List is published to draw attention to species whose populations are at risk or under threat. After IUCN investigates the population of a species and the reasons for its decline, it may consider it at a level of vulnerability (threat category) and hence include that species in the Red List. Since the Red List is based on specific research, some countries give greater importance to species categorized in the IUCN list than species listed in the Bern List. IUCN Red List 2012 (ver. 4.0) categories and criteria are given in Table 2-7. The IUCN Red List Categories and Criteria have been established in recent years by extensive reassessment for production, with more transparent, more open and easy-to-use systems. As a result, the categories and criteria that were amended, accepted and revised by the IUCN Council in February 2000 were published in 2001.

Table 2-7. IUCN Red List Category and Criteria

| IUCN Red List Category and Criteria 2012 (ver. 4.0) | |
|---|-----------------------|
| EX | Extinct |
| EW | Extinct in Wild |
| CR | Critically Endangered |

| IUCN Red List Category and Criteria2012 (ver. 4.0) | |
|--|-----------------|
| EN | Endangered |
| VU | Vulnerable |
| NT | Near Threatened |
| LC | Least Concern |
| DD | Data Deficient |
| NE | Not Evaluated |

When determining the threat status of the flora types in the study area, Turkey Plant Red Book (Ekim et al., 2000) was used, which has been prepared in accordance with the IUCN Red List Categories and Criteria.

2.2.5. IFC Performance Standard 6

The International Finance Corporation (IFC) acts as the sub-branch of the World Bank and provides financial support to the private sector for the development of projects. IFC applies Performance Standards (PS) to manage the environmental and social risks of the projects it finances. Performance Standard 6 covers issues such as the conservation of biological diversity that is the basis of sustainable development, the maintenance of ecosystem services and the sustainable management of living resources. The objectives of PS6 are determined as follows (IFC, 2012):

- To conserve and preserve biological diversity.
- Sustaining the benefits derived from ecosystem services.
- To generalize the sustainable management of living natural resources by adopting practices covering biological diversity conservation needs and development priorities.

Actions put forward to fulfill PS6 requirements are to be managed within the scope of any project's Environmental and Social Management System (ESMS). Relevant requirements can be listed as follows: assessment of direct and indirect impacts of the project on biodiversity and ecosystem services, prevention of such impacts, taking necessary measures to minimize impacts when it is not possible to prevent impacts, adopting an adaptive management system, conservation and preservation of biodiversity, and management of ecosystem services and living natural resources and assessment of the supply chain in terms of the impacts.

IFC PS6 also proposes the implementation of a hierarchy of impact mitigation measures, including biodiversity compensation elements to be implemented following appropriate measures, mitigation and restoration measures to protect and preserve biodiversity.

2.2.6. World Bank OP 4.04 (Natural Habitats)

OP 4.04 aims to promote the protection, maintenance, and rehabilitation of natural habitats and their functions. The policy seeks to ensure that the World Bank-financed projects consider the conservation of biodiversity, including efforts to avoid or mitigate any potential impacts on natural habitats.

Key Principles:

1. Avoidance of Significant Conversion or Degradation:
 - Projects should avoid significant conversion or degradation of critical natural habitats.
 - Critical natural habitats include legally protected areas, areas officially proposed by governments for protection, and areas recognized as protected by traditional local communities.
2. Sustainable Use of Natural Resources:
 - Projects should support the sustainable use of natural resources to ensure that the natural habitats are not adversely affected.
3. Mitigation Measures:
 - Where adverse impacts are unavoidable, projects should include appropriate mitigation measures. These measures may include:
 - Restoration of degraded habitats.
 - Creation and maintenance of buffer zones.
 - Sustainable management and use of adjacent lands.
4. Assessment of Alternatives:
 - Project planning should consider alternative project designs and locations to avoid or minimize adverse impacts on natural habitats.
5. Consultation and Participation:
 - Projects should involve stakeholders, including local communities, in the planning, implementation, and monitoring of activities that affect natural habitats.
6. Legal and Policy Framework:
 - Projects should comply with applicable national laws and international agreements on natural habitat conservation.

3. ROLES AND RESPONSIBILITIES

A key aspect of the successful implementation of the BMP is a proper understanding of the roles and responsibilities described in this plan. It is the responsibility of the Project Owner to ensure that all relevant Project staff and contractors comply with the requirements of the BMP, together with ecological studies and all other relevant obligations contained in the ESMP.

The Project Owner will be responsible for ensuring that the BMP is updated to ensure its efficacy as the Project develops. The Project Owner will appoint an appropriately qualified Environmental officer at the Project to facilitate compliance with the BMP. Where necessary, additional technical experts will also need to be contracted to fulfill specific components of the BMP (e.g. botany, ornithology, etc.).

The following is an indicative breakdown of roles and responsibilities. This will be updated when the Project design program is finalized and, critically, when the Contractor has been engaged.

Project Management Team:

- Responsible for the overall coordination and execution of the Biodiversity Management Plan.

Biodiversity Specialist:

- Monitors biodiversity throughout the project and develops/ takes measures to ensure no loss.
- Conducts biodiversity assessments and monitors species and habitats worth monitoring identified in this report.
- Develops and implements biodiversity conservation strategies.
- Provides written and photographic reports on biodiversity status and progress.
- Provides biodiversity training to environmental officers and subcontractors.

Site Manager:

- Oversees day-to-day operations in the field.
- Ensures compliance with biodiversity management procedures.

Environmental Officer:

- Monitors environmental compliance and ensures compliance with regulations.
- Coordinates with regulatory bodies and stakeholders.

Contractors and Subcontractors:

- Carries out construction and maintenance activities.
- Ensures that their activities are in line with the Biodiversity Management Plan.

Community Liaison Officer:

- Maintains communication with local communities.
- Addresses community concerns about biodiversity and environmental impacts.

4. BASELINE CONDITIONS AND POTENTIAL SENSITIVITIES

4.1. Physical Features of the Project

4.1.1. Geographical Location of the Site

Ankara province is located in the Central Anatolia Region. Located in the northern part of the Central Anatolian Plateau, the territory of Ankara province has more of a plateau appearance and provides a transition between the mountainous-forested Northern Anatolia and the arid Konya Plain. With a surface area of 24,520 km², Ankara is approximately 830-850 meters above sea level. The highest point of the province is Mount Işık with an altitude of 2,015 meters and the largest plain is the Polatlı Plain with an area of 3,789 km².

Gölbaşı, where the project will be established, is a district of Ankara province. Located on the Central Anatolian Plateau and 20 km away from Ankara, Gölbaşı district is surrounded by Bala to the east, Yenimahalle to the west, Haymana to the south, and Çankaya to the north. Its surface area is 1.650 km² and its height above sea level is 970 meters. Important highway transportation networks passing through Gölbaşı are Ankara-Istanbul, Ankara-Konya- Adana, Ankara-Eskişehir, Ankara-Samsun state highways and Ankara Ring Highway. A 15 km section of the Ankara Ring Highway passes through Gölbaşı Special Environmental Protection Area (SEPA). In addition, Ankara-Nigde Motorway passes through the border of the project area. Gökçehöyük neighborhood and the SPP sub-project area are located within the Gölbaşı SEPA, and the SPP sub-project area is approximately 1400 meters from Gökçehöyük center and 2000 meters from the Mogan Lake Flood Trap Area.



Figure 4-1 Satellite Image of Project Area

4.1.2. Geology and Geomorphological Structure of the Site

According to the Provincial Disaster Risk Reduction Plan (IRAP) for 2021 and findings of Mineral Research and Exploration (MTA), Ankara is surrounded on four sides by the North Anatolian Fault Zone to the north, the Akpınar Fault to the southeast, the Tuz Lake Fault Zone to the south, the Kırıkkale-Erbaa Fault to the east and the Eskişehir Fault Zone to the southwest. Ankara city center is 60-80 km away from these faults. Ankara has never been at the center of destructive earthquakes.

According to the Earthquake Hazard Map of Turkey, Ankara Province is located around 0.0-0.2 in terms of seismicity. When the project area is examined based on the "Turkey Earthquake Hazard Map", which entered into force with the decision of the Council of Ministers dated 22.01.2018 and numbered 2018/11275, it is seen that the maximum ground acceleration value is around 0.149 PG (ESMP Report), which indicates that the area is a 4th degree earthquake zone. Therefore, it is seen that there is no serious earthquake risk in the sub-project area.

4.1.3. Climate and Hydrological Features

Located in the Central Anatolia region, Ankara province and its surroundings experience a continental climate with cold and rainy winters. While the steppe-semi-arid climate is observed in the south, the mild and rainy characteristics of the Black Sea Region are observed in the north. Winters are very cold and summers are very hot. The average annual precipitation is approximately 393.2 mm and the average annual temperature is 11.9°C. The highest average temperatures are usually experienced in July-August, while the lowest average temperatures are seen in December-January. The highest average annual temperature is 17.90°C and the lowest average annual temperature is 6.3°C. Gölbaşı and its surroundings have a continental climate with cold and rainy winters and hot and dry summers. The average annual rainfall is around 400 mm. The average annual temperature is 11.7 °C.

According to the Solar Energy Potential Atlas, Turkey's average annual total sunshine duration is 2,737 hours, daily total is 7.5 hours, and the total annual incoming solar energy is 1,527 kWh/m²/year. It is seen that the average solar radiation of Gölbaşı throughout the year is in the range of 1500-1600 kWh/m²/year. Global radiation values are above 6.00 kWh/m²/day in May, June, July and above 4.00 kWh/m²/day in 6 months from April to the end of September. The longest month of sunshine in Gölbaşı is July (11.06 hours) and the shortest month (3.35 hours) is December. In general, the sunshine duration is over 7 hours in most seasons in seven months of the year (April-September). Since the sunshine duration of the district is close to the average of Turkey, it is clear that the project area in Gölbaşı is an important investment area for solar energy.

4.1.4. Landscape Features of the Site

Gölbaşı district is one of the 25 districts of Ankara province. Gölbaşı district, located in the southern parts of Ankara province, is neighboring Yenimahalle, Çankaya, Bala, Haymana and Polatlı districts. Gölbaşı is the lakes region of Ankara province. Gölbaşı was declared as

"G  lba  ı SEPA " on October 22, 1990 by the Council of Ministers Decision No. 90/1117 based on Article 9 of the Environmental Law No. 2872. The sub-project area is located in G  k  eh      (  rkezh     ) neighborhood, one of the 54 neighborhoods of G  lba  ı. G  k  eh      is located in the south of the district and is within the borders of G  lba  ı SEPA. The area of the SEPA is 273.94 km². The elevation level of G  k  eh      neighborhood is between 750-1000 meters, therefore the sub-project area is located on a low elevation and flat area.

4.1.5. SPP and Operation Activities to be Established at the Site

With the World Bank's financial support for municipal renewable energy projects, a solar power plant project has been launched by the Ankara Metropolitan Municipality in G  lba  ı district of Ankara province, Turkey. This project aims to increase the share of renewable energy sources in the country's energy mix, reduce greenhouse gas emissions and dependence on fossil fuels, and meet the electrical energy needs of G  lba  ı.

The power plant, which is subject to Annex II of the EIA Regulation, has an installed capacity of 5040 kWp and is expected to generate 8,114,185 kWh of electricity per year. The project site is located on Block 125036, Parcel 21 in G  lba  ı/  rkezh      (G  k  eh     ) and the land belongs to G  lba  ı Municipality. The solar panels used in the project are of high quality and have a lifespan of 30 years. The project was designed and constructed by a team of experienced engineers and technicians. The developer has prepared and delivered the project in accordance with international quality and safety standards.

4.1.6. G  lba  ı SPP Features and Placement on the Land

The project has a transmission line for grid connection. Transmission line will be connected to the system from the high voltage (34.5kV) level of the facility. It will be connected to the existing energy transmission line pole located approximately 100 meters away from the facility site with medium voltage cables. The energy transmission line will be constructed in accordance with the opinion of Ba  kent Elektrik Da  ıtım A.  . and TEDA   specifications. However, the transmission line is excluded from the scope of this sub-project. The transmission line will be constructed with the municipality's own funds.

This study has been prepared within the scope of Article 30 and Article 1 of the "Regulation on Unlicensed Electricity Generation in the Electricity Market" to clarify the electricity consumption of the institutions related to the electricity generation of the power plants to be made over the electricity unit price determined according to the subscription type of the institutions in the Electricity Tariff published by EMRA.

The planned Solar Power Plant has a DC Capacity of 5040,0 kWp and AC Capacity of 4200,0 kWe. It is equipped with 600 Wp MonoPerc Half-Cut modules with 30   inclination and 25   azimuth angle.

The plant will be decommissioned at the end of its economic life of 30 years and the decommissioning cost of EU 32.000,00/MWp will be written to the cash flow as decommissioning cost. Thus, the total plant decommissioning cost will be 161.280,00 EU.

4.2. Biodiversity

4.2.1. Flora

In order to determine the flora and vegetation structure of the Gölbaşı Solar Power Plant project site, to determine whether the critically distributed species *Cyanus tchihatcheffii* (iridescent, love flower) is distributed in the project area and to minimize the impact of the activity on habitats and critically distributed species, a field visit was carried out on 29th-30th June 2024. Since the area is small and has only modified habitat structure, sampling points were not determined and the whole area was surveyed in detail using the transect method. All species seen in the project area during the field work were recorded in the field notebook, and species that were not recognized at the species level were collected and turned into herbarium material.

The species given in the floristic list were prepared based on the findings and observations made during the field trip (Table 4-1).

The floristic list is given in the order of open-seeded (Gymnospermae) and closed-seeded (Angiospermae). Families in each group are arranged in alphabetical order for easy finding. While writing the species; Turkish names, if any, plant geography region, whether it is endemic or not, endemic and non-endemic species with rare distribution, whether it is included in the Bern and CITES lists, the EUNIS habitat type in which it is distributed and its abundance in the area are given in the table in detail.

The plants collected from the project area were identified by using the "Flora of Turkey and East Aegean Islands". The Turkish names of the identified plants were prepared by using the website Bizimbitkiler.org.tr and the work titled "Turkish Plant Names" written by Prof. Dr. Turhan Baytop.

Project-induced impacts and the risk-impact-measure matrix to minimize impacts are given in Table 5-1.

4.2.1.1. Habitat Characteristics of the Project Area

Modified 1 EUNIS habitat type was identified at Level 3 within the project area.

E1.6: Subnitrophilic Annual Herbs

The dominant species of this habitat are *Scolymus hispanicus*, *Cirsium vulgare*, *Cirsium arvense*, *Sinapis arvensis*, *Anthemis altissima*, *Xanthium strumarium*, *Centaurea solstitialis*, *Convolvulus arvensis*, *Rapistrum rugosum*, *Raphanus raphanistrum*, *Helminthotheca echinoides*, *Cichorium intybus*, *Descurania sophia*, *Xeranthemum annuum*, *Onopordum turcicum*, *Hordeum murinum*, *Scabiosa rotata* (Figure 4-2 and Figure 4-3).



Figure 4-2. Habitat dominated by subnitrophilic annual herbaceous species (E1.6)



Figure 4-3. *Onopordum turcicum*

4.2.1.2. Vegetation and Floristic Structure

The study area is located near the southwest of Mogan Lake, Gölbaşı district, Ankara province, Central Anatolia Region (36 S 478422-4391384). The project area is completely marginal agricultural area (Figure 4-4). The project area generally has a nitrophilic ruderal habitat structure dominated by one-year herbaceous species that grow in fallow fields that have not been cultivated for many years. However, there are residential areas around the project area.

The project site and its surroundings consist of anthropogenic soils that are not rightfully used by the region. There are also areas with degraded agricultural lands around the site (Figure 4-4).



Figure 4-4 Project area and alternative sites

The aims of conducting flora and vegetation studies in the project area;

- To determine the flora and vegetation structure of the project area in June, when vegetation is good in the region,
- To determine whether the locally endemic species *Cyanus tchihatcheffii* (Fisch. & C.A. Mey.) Wagenitz & Greuter, which is distributed in Gölbaşı and its vicinity where the project area is located, is distributed in the project area, and if so, to develop protection measures for this species,
- If there are critical habitats or habitats according to the habitat directive in the project area, provide habitat protection and enhancement proposals so that these habitats are minimally or not affected at all by the project,
- To identify the negative impacts of the Project on flora and develop mitigation measures to minimize these impacts.

4.2.1.3. Findings

Since the project area is in the Central Anatolia Region, it is under the influence of cold Mediterranean climates in winter. Since the habitats in the project area have a modified habitat structure, the species growing in the area generally consist of cosmopolitan ruderal species.

As a result of the studies conducted in the project area, 89 species and subspecies level taxa belonging to 24 families were identified from the area (Table 4-1). None of these species are endemic and/or rare.

Many observations and studies have been carried out on the *Cyanus tchihatcheffii* (iridescent, love flower) species known to be distributed around the project area (Figure 4-5). The most comprehensive of these is the "***Centaurea tchihatcheffii*** Ankara-Gölbaşı Sevgi Çiçeği Project" edited by Prof. Dr. Ayşe Boşgelmez and prepared in 2005. In this study, although it was determined that the species was distributed in areas close to the planned project area, as a result of our observations and detailed studies in the project area, it was determined that the species was not distributed in the project area due to habitat unsuitability. Because this species prefers more open, well-ventilated soils.



Figure 4-5. *Cyanus tchihatcheffii* (Gölbaşı sevgi çiçeği, yanardöner)

Table 4-1. List of Flora Distributed in the Project Area and Surroundings

| Family | No | Species | Turkish Name | Phytogeographical Region | Endemism | | T.S | Bern | CITES | | | | Habitat | Abundance | | | | |
|----------------------|----|---|-----------------|--------------------------|----------|---|-----|------|-------|------|------|------|---------|-----------|---|---|---|---|
| | | | | | R | W | | | Anx1 | App1 | App2 | App3 | | 1 | 2 | 3 | 4 | 5 |
| ANGIOSPERMAE | | | | | | | | | | | | | | | | | | |
| DICOTYLEDONES | | | | | | | | | | | | | | | | | | |
| AMARANTHACEAE | 1 | <i>Amaranthus blitoides</i> S. Wats. | kömüşmancarı | Widely distributed | | | | | | | | | x | | x | | | |
| APIACEAE | 2 | <i>Torilis leptophylla</i> (L.) Reichb. | – | Mediterranean | | | | | | | | | x | | x | | | |
| | 3 | <i>Foeniculum vulgare</i> Miller | Rezene | Widely distributed | | | | | | | | | x | | x | | | |
| | 4 | <i>Echinophora tournefortii</i> Jaub. & Spach | Dikenli çördük | Iran-Turan | | | | | | | | | x | | x | | | |
| | 5 | <i>Eryngium campestre</i> L. var. <i>virens</i> Link | Yer kestanesi | Widely distributed | | | | | | | | | x | | x | | | |
| | 6 | <i>Daucus carota</i> L. | Yabani havuç | Widely distributed | | | | | | | | | x | | x | | | |
| BORAGINACEAE | 7 | <i>Echium italicum</i> L. | Kurtkuyruğu | Mediterranean | | | | | | | | | x | | x | | | |
| | 8 | <i>Buglossoides arvensis</i> (L.) Johnston | Tarla taşkeseni | Widely distributed | | | | | | | | | x | | x | | | |
| | 9 | <i>Heliotropium dolosum</i> De Not. | Bambulotu | Widely distributed | | | | | | | | | x | | x | | | |
| BRASSICACEAE | 10 | <i>Descurainia sophia</i> (L.) Webb ex Prantl | Sadırotu | Widely distributed | | | | | | | | | x | | x | | | |
| | 11 | <i>Hirschfeldia incana</i> (L.) Lag.-Foss. | Nadas turpu | Widely distributed | | | | | | | | | x | | x | | | |
| | 12 | <i>Sinapis arvensis</i> L. | Hardal | Widely distributed | | | | | | | | | x | | x | | | |
| | 13 | <i>Neslia apiculata</i> Fisch. | Göçmen hardalı | Widely distributed | | | | | | | | | x | | x | | | |
| | 14 | <i>Matthiola longipetala</i> (Vent.) DC. Subsp. <i>bicornis</i> (Sibth. Smith) P. W. Ball | Boynuzlu şebboy | Widely distributed | | | | | | | | | x | | x | | | |
| | 15 | <i>Diplotaenia tenuifolia</i> (L.) DC. | Türpenk | Widely distributed | | | | | | | | | x | | x | | | |
| | 16 | <i>Camelina rumelica</i> Vel. | Ketentere | Widely distributed | | | | | | | | | x | | x | | | |
| | 17 | <i>Capsella bursa-pastoris</i> (L.) Medik. | Cobancantasi | Widely distributed | | | | | | | | | x | | x | | | |
| | 18 | <i>Raphanus raphanistrum</i> L. | Yabani turp | Widely distributed | | | | | | | | | x | | x | | | |

| Family | No | Species | Turkish Name | Phytogeographical Region | Endemism | | T.S | Bern Anx1 | CITES | | | Habitat 1 | Abundance | | | | |
|-------------------------|----|--|---------------|--------------------------|----------|---|-----|-----------|-------|------|------|-----------|-----------|---|---|---|---|
| | | | | | R | W | | | App1 | App2 | App3 | | 1 | 2 | 3 | 4 | 5 |
| | 19 | <i>Sisymbrium officinale</i> (L.) Scop. | Çalgıcı otu | Widely distributed | | | | | | | | x | x | | | | |
| | 20 | <i>Thlaspi perfoliatum</i> L. | Giyle | Widely distributed | | | | | | | | x | x | | | | |
| | 21 | <i>Rapistrum rugosum</i> (L.) All. | kediturpu | Widely distributed | | | | | | | | x | x | | | | |
| CARYOPHYLLACEAE | 22 | <i>Gypsophila pilosa</i> Hudson | Tarla çöveni | Iran-Turan | | | | | | | | x | x | | | | |
| | 23 | <i>Silene dichotoma</i> Ehrh. Subsp. <i>dichotoma</i> | Çatal nakıl | Widely distributed | | | | | | | | x | x | | | | |
| CHENOPODIACEAE | 24 | <i>Chenopodium album</i> L. subsp. <i>album</i> | Ak sirken | Widely distributed | | | | | | | | x | x | | | | |
| | 25 | <i>Chenopodium murale</i> L. | Kaz ayağı | Widely distributed | | | | | | | | x | x | | | | |
| | 26 | <i>Salsola tragus</i> L. Subsp. <i>ragus</i> | Kum döngesi | Widely distributed | | | | | | | | x | x | | | | |
| COMPOSITAE (ASTERACEAE) | 27 | <i>Achillea willhelmsii</i> C. Koch | Kardaşkınısı | Iran-Turan | | | | | | | | x | x | | | | |
| | 28 | <i>Anthemis altissima</i> L. | Köpekpatıyası | Widely distributed | | | | | | | | x | x | | | | |
| | 29 | <i>Senecio vernalis</i> Waldst. et Kit | Kanarya otu | Widely distributed | | | | | | | | x | x | | | | |
| | 30 | <i>Helminthotheca echioides</i> (L.) Holub | Billurdüğme | Widely distributed | | | | | | | | x | | x | | | |
| | 31 | <i>Cichorium intybus</i> L. | Karahindiba | Widely distributed | | | | | | | | x | x | | | | |
| | 32 | <i>Carduus pycnocephalus</i> L. Subsp. <i>albidus</i> (M. Bieb.) Kazmi | Eşeksoymacı | Widely distributed | | | | | | | | x | x | | | | |
| | 33 | <i>Carduus nutans</i> L. Subsp. <i>nutans</i> | Eşekdikeni | Widely distributed | | | | | | | | x | x | | | | |
| | 34 | <i>Onopordum turcicum</i> Danin | Boz kangal | Iran-Turan | | | | | | | | x | | x | | | |
| | 35 | <i>Silybum marianum</i> (L.) Gaertner | Boga diken | Widely distributed | | | | | | | | x | x | | | | |
| | 36 | <i>Chondrilla juncea</i> L. var. <i>juncea</i> | Karakavuk | Widely distributed | | | | | | | | x | x | | | | |
| | 37 | <i>Centaurea depressus</i> (M. Bieb.) Sojak | Gökbaş | Widely distributed | | | | | | | | x | x | | | | |
| | 38 | <i>Centaurea solstitialis</i> L. subsp. <i>solstitialis</i> | Çakır diken | Widely distributed | | | | | | | | x | | | x | | |

| Family | No | Species | Turkish Name | Phytogeographical Region | Endemism | | T.S | Bern Anx1 | CITES | | | Habitat 1 | Abundance | | | | |
|----------------|----|--|----------------|--------------------------|----------|---|-----|-----------|-------|------|------|-----------|-----------|---|---|---|---|
| | | | | | R | W | | | App1 | App2 | App3 | | 1 | 2 | 3 | 4 | 5 |
| | 39 | <i>Sonchus asper</i> (L.) Hill. Subsp. <i>glaucescens</i> (Jordan) Ball. | Gevirtlek | Widely distributed | | | | | | | | x | | x | | | |
| | 40 | <i>Tragopogon longirostris</i> Bisch. ex Schultz Bip. var. <i>longirostris</i> | Yemlik | Widely distributed | | | | | | | | x | | x | | | |
| | 41 | <i>Crepis sancta</i> (L.) Babcock | Yabankısı | Widely distributed | | | | | | | | x | | x | | | |
| | 42 | <i>Crepis foetida</i> L. Subsp. <i>rhoeadifolia</i> (M. Bieb.) Celak | Sakarkanat | Widely distributed | | | | | | | | x | | x | | | |
| | 43 | <i>Carthamus dentatus</i> (Forssk.) Vahl | Kınadiken | Widely distributed | | | | | | | | x | | x | | | |
| | 44 | <i>Scolymus hispanicus</i> L. | şevketibostan | Mediterranean | | | | | | | | x | | x | | | |
| | 45 | <i>Cirsium arvense</i> (L.) Scop. | Köygöçüren | Widely distributed | | | | | | | | x | | | x | | |
| | 46 | <i>Cirsium vulgare</i> (Savi) Ten. | yaygıncangal | Widely distributed | | | | | | | | x | | x | | | |
| | 47 | <i>Picnemon acarna</i> (L.) Cass. | Kılçık diken | Mediterranean | | | | | | | | x | | | x | | |
| | 48 | <i>Crupina crupinastrum</i> (Moris) Vis. | Gelindöndüren | Widely distributed | | | | | | | | x | | x | | | |
| | 49 | <i>Xeranthemum annuum</i> L. | Kağıtçiçeği | Widely distributed | | | | | | | | x | | x | | | |
| | 50 | <i>Xanthium spinosum</i> L. | Pıtrak | Widely distributed | | | | | | | | x | | x | | | |
| | 51 | <i>Xanthium strumarium</i> L. subsp. <i>cavanillesii</i> (Schouw) D. Löve & P. Dansereau | Koca pıtrak | Widely distributed | | | | | | | | x | | | x | | |
| CONVOLVULACEAE | 52 | <i>Convolvulus arvensis</i> L. | Kuzu sarmaşığı | Widely distributed | | | | | | | | x | | x | | | |
| DIPSACACEAE | 53 | <i>Scabiosa rotata</i> M. Bieb. | Top uyuzotu | Iran-turan | | | | | | | | x | | x | | | |
| | 54 | <i>Dipsacus laciniatus</i> L. | Fescitarağı | Widely distributed | | | | | | | | x | | x | | | |
| EUPHORBIACEAE | 55 | <i>Euphorbia aleppica</i> L. | Haşul | Widely distributed | | | | | | | | x | | x | | | |
| FABACEAE | 56 | <i>Medicago sativa</i> L. | Yonca | Widely distributed | | | | | | | | x | | x | | | |
| | 57 | <i>Melilotus officinalis</i> (L.) Desr. | Kokuluyonca | Widely distributed | | | | | | | | x | | x | | | |
| | 58 | <i>Medicago x varia</i> Martyn | Yonca | Widely distributed | | | | | | | | x | | x | | | |
| | 59 | <i>Trifolium arvense</i> L. subsp. <i>arvense</i> | Üçgül | Widely distributed | | | | | | | | x | | x | | | |

| Family | No | Species | Turkish Name | Phytogeographical Region | Endemism | | T.S | Bern Anx1 | CITES | | | Habitat 1 | Abundance | | | | |
|------------------------|----|--|----------------|--------------------------|----------|---|-----|-----------|-------|------|------|-----------|-----------|---|---|---|---|
| | | | | | R | W | | | App1 | App2 | App3 | | 1 | 2 | 3 | 4 | 5 |
| GERANIACEAE | 60 | <i>Erodium hoefftianum</i> C.A. Mey. | Eşek iğneliği | Widely distributed | | | | | | | | x | x | | | | |
| LAMIACEAE | 61 | <i>Marrubium vulgare</i> L. | Kara derme | Mediterranean | | | | | | | | x | x | | | | |
| | 62 | <i>Ajuga chamaepitys</i> (L.) Schreb. Subsp. <i>chia</i> (Schreb.) Arcang. | Acıgıcı | Widely distributed | | | | | | | | x | x | | | | |
| | 63 | <i>Sideritis montana</i> L. Subsp. <i>montana</i> | Karaçay | Mediterranean | | | | | | | | x | x | | | | |
| | 64 | <i>Teucrium polium</i> L. | Acıyavşan | Widely distributed | | | | | | | | x | x | | | | |
| MALVACEAE | 65 | <i>Malva neglecta</i> Wallr. | Ebegümeci | Widely distributed | | | | | | | | x | x | | | | |
| PLANTAGINACEAE | 66 | <i>Plantago lanceolata</i> L. | Sinir otu | Widely distributed | | | | | | | | x | x | | | | |
| POLYGONACEAE | 67 | <i>Polygonum arenastrum</i> Bor. | Madımak | Widely distributed | | | | | | | | x | x | | | | |
| PRIMULACEAE | 68 | <i>Anagallis arvensis</i> L. Var. <i>caerulea</i> (L.) Gouan | Farekulağı | Widely distributed | | | | | | | | x | x | | | | |
| RANUNCULACEAE | 69 | <i>Ranunculus arvensis</i> L. | Düğün çiçeği | Widely distributed | | | | | | | | x | x | | | | |
| RESEDACEAE | 70 | <i>Reseda lutea</i> L. var. <i>lutea</i> | Muhabbetçiçeği | Widely distributed | | | | | | | | x | x | | | | |
| ROSACEAE | 71 | <i>Sanguisorba minor</i> Scop. Subsp. <i>muricata</i> (Spach) Brig | Çayırduğmesi | Widely distributed | | | | | | | | x | x | | | | |
| | 72 | <i>Potentilla reptans</i> L. | Reşatınotu | Widely distributed | | | | | | | | x | x | | | | |
| RUBIACEAE | 73 | <i>Galium spurium</i> L. | Arsız iplikcik | Avrupa-Sibirya | | | | | | | | x | x | | | | |
| SCROPHULARIACEAE | 74 | <i>Kickxia lanigera</i> (Desf.) Hand.- Mazz. | Tüyü fukaraotu | Widely distributed | | | | | | | | x | x | | | | |
| ZYGOPHYLLACEAE | 75 | <i>Tribulus terrestris</i> L. | Demirdiken | Widely distributed | | | | | | | | x | x | | | | |
| MONOCOTYLEDONES | | | | | | | | | | | | | | | | | |
| GRAMINEAE (POACEAE) | 76 | <i>Hordeum murinum</i> L. subsp. <i>glaucum</i> (Steudel) Tzvelev | Duvar arpası | Widely distributed | | | | | | | | x | | | x | | |
| | 77 | <i>Hordeum bulbosum</i> L. | boncukarpa | Widely distributed | | | | | | | | x | x | | | | |
| | 78 | <i>Aegilops cylindrica</i> Host | Kirpiklot | Iran-Turan | | | | | | | | x | x | | | | |
| | 79 | <i>Aegilops columnaris</i> Zhukovsky | Kılbuğday | Iran-Turan | | | | | | | | x | x | | | | |
| | 80 | <i>Phragmites australis</i> (Cav.) Trin. ex Steudel | Kamış | Avrupa-Sibirya | | | | | | | | x | | | x | | |

| Family | No | Species | Turkish Name | Phytogeographical Region | Endemism | | T.S | Bern | CITES | | | | Habitat | Abundance | | | | |
|--------|----|---|---------------|--------------------------|----------|---|-----|------|-------|------|------|------|---------|-----------|---|---|---|---|
| | | | | | R | W | | | Anx1 | App1 | App2 | App3 | | 1 | 2 | 3 | 4 | 5 |
| | 81 | <i>Bromus arvensis</i> L. | Tarla bromu | Widely distributed | | | | | | | | | x | | x | | | |
| | 82 | <i>Bromus japonicus</i> Thunb. subsp. <i>japonicus</i> | İyeotu | Widely distributed | | | | | | | | | x | | x | | | |
| | 83 | <i>Bromus tectorum</i> L. | Kır bromu | Widely distributed | | | | | | | | | x | | x | | | |
| | 84 | <i>Stipa holosericea</i> Trin. | Dirgen kıl aç | Iran-Turan | | | | | | | | | x | | x | | | |
| | 85 | <i>Triticum baeoticum</i> Boiss. | Yabanisiyez | Widely distributed | | | | | | | | | x | | x | | | |
| | 86 | <i>Taeniatherum caput-medusae</i> (L.) Nevski | Kılçıkarpası | Widely distributed | | | | | | | | | x | | | x | | |
| | 87 | <i>Poa bulbosa</i> L. | Yumrulusalkım | Widely distributed | | | | | | | | | x | | x | | | |
| | 88 | <i>Lolium perenne</i> L. | Çim | Widely distributed | | | | | | | | | x | | x | | | |
| | 89 | <i>Cynodon dactylon</i> (L.) Pers. Var. <i>dactylon</i> | Ayrık | Widely distributed | | | | | | | | | x | | x | | | |

FLORA TABLE LEGEND

Endemism

R: Regional Endemic

W: Widely distributed Endemic

Red Data Book of Turkish Plants Threat Categories*(According To IUCN Categories Ekim et al., 2000)*

EX: Extinct

EW: Extinct in wild

CR: Critically Endangered

EN: Endangered

VU: Vulnerable

LR: Low Risk

NT: Near threatened

LC: Least Concerned i

DD: Data deficient

Habitat Classes

1: E1.6: Subnitrophilic annual herbs

Abundance Status

1: Very rare

2: Rare

3: Medium density

4: Abundant

5: Highly abundant

Bern (Bern Convention)

App-1: Strictly protected flora species

4.2.1.4. Status of Plants in the Area in terms of Endangerment Class and Endemism

As a result of the field work carried out in the project area, no endemic and/or rare plant species were identified from the area. Because the habitat in the project area is not natural. Since the habitat is not natural, the species hosted by the habitat consist of cosmopolitan species.

4.2.2. Fauna

The project license areas are generally characterized by Central Anatolian steppe habitat. A large part of the area is not used by the local people. There are also heterogeneously opened agricultural areas in the area. With these characteristics, the area contains habitats suitable for breeding, feeding and sheltering of ground-dependent terrestrial vertebrate fauna (Figure 4-6). The main objective of terrestrial fauna studies is to identify the areas likely to be affected during the construction and operation phase of the project (project activity and impact areas) and the terrestrial fauna elements (amphibians, reptiles, birds and mammals) in these areas at the species level, to determine the biological activities of these species in the areas (such as breeding, feeding, accommodation, etc.), to put forward studies to determine the possible impacts that may arise from project activities, and to evaluate how monitoring will be carried out during construction and operation. In this context, the principles and methods taken as basis in faunistic studies are outlined below:

- Fauna studies include mammals (Mammalia), birds (Aves), reptiles (Reptilia) and Amphibians (Amphibia).
- Fauna studies are carried out to cover areas likely to be affected during the construction- operation phase of the project and similar alternative areas outside these areas.
- In order to determine the fauna elements, data obtained from field observations are collected during field studies in the project area. In addition to these, literature information obtained from studies conducted in previous years in this region, previous studies conducted in the regions close to the area, habitat suitability and interviews with local people were also utilized.
- In the identification of animal species, the presence of habitats suitable for the species' preferences and the remains of nests, young, vomit, feces (especially for the identification of bird and large mammal species), food residues and nest holes (especially for the identification of mammals), skin, antler, leg and bone remains of animals were also used.
- Advanced optical instruments (Nikon Telescope, 10x40 Binoculars, Canon R7 and 100-500 mm lens) were used for identification of bird species. Atraps, nets and live traps were used for the identification of reptiles and bivalves, and animals were released back into the wild after identification. Line and point counting methods were also used for identification of birds.

- Especially for reptile and small mammal species, observations and inanimate material found in nature (especially dead reptile individuals and/or skin, ligament remains found in the field) were utilized. Literature information on fauna elements related to this area, previously collected museum materials, animal specimens filled by local people and amateurs were also used as sources for the lists prepared.
- 1/25.000 maps and satellite images are used in fauna field studies. In addition, GPS-enabled smartphones were used to determine elevations and geographical coordinates during mapping studies.
- Fieldwork started early in the morning and continued until sunset.
- During the faunistic field studies, no hunting-collecting-killing was carried out in the identification of the species in the area. All sampled individuals were released back into the wild.

The annexes of the IUCN Red List, Bern Convention and CITES lists were used to determine the international endangerment categories of fauna elements. Central Hunting Commission (CHC) Decisions (2023-2024) were used as references to determine the national threat categories.



Figure 4-6. Project area and vegetation view



Figure 4-7 Alternative areas around the project site and vegetation appearance

4.2.2.1. Amphibians and Reptiles

Two species of amphibians identified in and around the ecological impact boundaries of the project implementation area are found seasonally in damp environments, rock crevices and under stones where they can meet their biological needs. Particularly terrestrial ones hide during the day in a quiescent state and are active at night for feeding and mating purposes when it gets dark in the evening. The species present in the ecological impact area will be able to use the area depending on seasonal rainfall and humidity. Since the project site is a degraded agricultural area and there is no stagnant or flowing wetland in the vicinity, the presence of amphibian species in these areas is very low. The presence of alternative areas minimizes the impact of project activities on these species.

According to the evaluation made regarding the protection status of the Amphibian species identified in the project area, it was determined that two Amphibian species in the area are in the "LC" (least concern) category according to the updated list prepared by the IUCN European Red List.

According to the BERN Convention, two amphibian species are listed in Annex-III, i.e. "List of Protected Species". There are no endemic species for the area among the Amphibian species identified within the Project implementation and impact area.

Table 4-2. Amphibian Species and their Conservation Status in the Project Area and the Near Environment

| Scientific Name | Common Name | IUCN | Bern | CITES | CHC |
|------------------------------|-------------|------|---------|-------|-----|
| <i>Bufo variabilis</i> | Night Frog | LC | Ann-III | - | - |
| <i>Pelophylax ridibundus</i> | Marsh frog | LC | Ann-III | - | - |

The project implementation area and its immediate surroundings is a habitat area under intense anthropogenic pressure and reptiles can survive in stony steppes, field edges and agricultural areas where they can meet their ecological needs. As a result of the observations made in the area, it was determined that eight reptile species live in the project area and ecological impact areas. Of these, one is a tortoise, three are geckos, two are lizards and two are snakes.

The reptile species identified to live in the Project area and ecological impact areas and their National and International Protection Statuses are given in Table 4-3.

According to the assessment based on the European Red List (ERL) prepared by IUCN, one of the eight Reptile species recorded in the project area and ecological impact areas is VU and seven of them are not in the "LC" (=Least Concern), i.e. "Least Threatened" category.

According to the annex lists of the Bern Convention in the project area and its ecological impact areas, five of the reptile species in the area are listed in Annex-II and three species are listed in Annex-III.

There are no endemic species among the Reptile species identified in the Project area and ecological impact areas.

Table 4-3. Reptilia (Reptile) Species and their Conservation Status in the Project Area and the Near Environment

| Scientific Name | Common Name | IUCN | Bern | CITES | CHC |
|--------------------------------|--------------------|------|---------|----------|-----|
| <i>Testudo graeca</i> | Tortoise | VU | Ann-II | Annex II | - |
| <i>Lacerta diplochondrodes</i> | Large Green Lizard | LC | Ann-II | - | - |
| <i>Mediodactylus kotschy</i> | Slender-toed gecko | LC | Ann-II | - | - |
| <i>Hemidactylus turcicus</i> | Broad-toed gecko | LC | Ann-III | - | - |
| <i>Ophisops elegans</i> | Field Lizard | LC | Ann-II | - | - |
| <i>Elaphe quatuorlineata</i> | Yellow Snake | LC | Ann-III | - | - |
| <i>Dolichophis caspius</i> | Hazer Snake | LC | Ann-II | | |
| <i>Natrix natrix</i> | Half-breed Snake | LC | Ann-III | - | - |

4.2.2.2. Birds

During the field observations made in the project implementation area and its immediate vicinity are evaluated together with the results of previous studies, it is determined that birds can be found as area users. Since the project implementation area generally consists of agricultural areas, meadow areas and pasture-dominated habitats, the presence of bird species that can use these habitats can be seen. However, birds can be seen in all habitats with their flying abilities.

As a result of the assessment based on the European Red List prepared by the International Union for Conservation of Nature and Natural Habitats (IUCN), it was determined that 41 bird species identified in the region are in the "LC" (Least Concern) "Least Threatened" category and 1 bird species is in the NT (Near Threatened) "Near Threatened" category.

According to the assessment made according to the BERN List, 19 of the bird species identified in the area are listed in Annex-II, i.e. "Species under Absolute Protection", while 18 bird species are listed in Annex-III, i.e. "Species under Protection". The precautions to be taken and points to be considered regarding the forms in this category are emphasized in the text.

According to the results of the evaluation based on the protection lists prepared for the 2023-2024 season by the Central Hunting Commission of the General Directorate of Nature Conservation and National Parks, which carries out all regulations regarding hunting in our country, 10 bird species are included in Annex I: "Game Animals Protected by the MAK" list, and 4 bird species are included in Annex II: "Species Permitted to be Hunted in Certain Periods" list.

Table 4-4. Bird (Aves) Species and their Protection Statuses in the Project Area and the Near Environment

| Species | English Name | IUCN | BERN | EU Bird Directive | Status | Source |
|-------------------------------|---------------------|------|---------|-------------------|--------------------|--------|
| <i>Ciconia ciconia</i> | White Stork | LC | Ann-II | Ann-I | Migratory-Resident | L |
| <i>Circus macrourus</i> | Steppe Harrier | NT | Ann-II | Ann-I | Resident | L |
| <i>Circus cyaneus</i> | Hen Harrier | LC | Ann-II | Ann-I | Resident | L |
| <i>Accipiter nisus</i> | Sparrowhawk | LC | Ann-II | Ann-I | Resident | O |
| <i>Buteo buteo</i> | Buzzard | LC | Ann-II | | Resident | O |
| <i>Buteo rufinus</i> | Long-Legged Buzzard | LC | Ann-II | Ann-I | Resident | L |
| <i>Falco tinnunculus</i> | Kestrel | LC | Ann-II | | Resident | O |
| <i>Falco subbuteo</i> | Hobby | LC | Ann-II | | Resident | L |
| <i>Falco peregrinus</i> | Peregrine | LC | Ann-II | Ann-I | Resident | L |
| <i>Columba livia</i> | Rock Dove | LC | Ann-III | | Resident | O |
| <i>Streptopelia decaocto</i> | Collared Dove | LC | Ann-III | | Resident | O |
| <i>Athene noctua</i> | Little Owl | LC | Ann-II | | Resident | O |
| <i>Apus apus</i> | Swift | LC | Ann-III | | Migratory | L |
| <i>Merops apiaster</i> | Bee-Eater | LC | Ann-II | | Migratory | L |
| <i>Upupa epops</i> | Eurasian Hoopoe | LC | Ann-II | | Migratory | L |
| <i>Melanocorypha calandra</i> | Calandra Lark | LC | Ann-II | Ann-I | Resident | L |
| <i>Galerida cristata</i> | Crested Lark | LC | Ann-III | | Resident | O |
| <i>Alauda arvensis</i> | Skylark | LC | Ann-III | Ann-II-B | Resident | L |
| <i>Hirundo rustica</i> | Swallow | LC | Ann-II | | Migratory | L |
| <i>Delichon urbicum</i> | House Martin | LC | Ann-II | | Migratory | L |
| <i>Anthus campestris</i> | Tawny Pipit | LC | Ann-II | Ann-I | Migratory | L |
| <i>Motacilla flava</i> | Yellow Wagtail | LC | Ann-II | | Migratory | L |
| <i>Motacilla alba</i> | Pied Wagtail | LC | Ann-II | | Resident | O |
| <i>Saxicola torquata</i> | Stonechat | LC | Ann-II | | Resident | L |
| <i>Oenanthe isabellina</i> | Isabellina Wheatear | LC | Ann-II | | Resident | L |
| <i>Turdus merula</i> | Blackbird | LC | Ann-III | Ann-II-B | Resident | O |
| <i>Hippolais pallida</i> | Olivaceous Warbler | LC | Ann-III | | Migratory | L |
| <i>Sylvia communis</i> | Whitethroat | LC | Ann-II | | Migratory | L |

| Species | English Name | IUCN | BERN | EU Bird Directive | Status | Source |
|-------------------------------|-----------------------------|------|---------|-------------------|-----------|--------|
| <i>Muscicapa striata</i> | Spotted flycatcher | LC | Ann-II | | Migratory | L |
| <i>Ficedula parva</i> | Red-breasted flycatcher | LC | Ann-II | Ann-I | Migratory | L |
| <i>Lanius collurio</i> | Red-Backed Shrike | LC | Ann-II | | Migratory | L |
| <i>Lanius minor</i> | Lesser Grey Shrike | LC | Ann-II | Ann-I | Migratory | L |
| <i>Pica pica</i> | Magpie, Black-billed Magpie | LC | - | | Resident | O |
| <i>Corvus monedula</i> | Jackdaw, Eurasian Jackdaw | LC | - | | Resident | O |
| <i>Corvus cornix</i> | Hooded Crow | LC | - | | Resident | O |
| <i>Sturnus vulgaris</i> | Starling | LC | - | | Resident | O |
| <i>Passer domesticus</i> | House Sparrow | LC | - | | Resident | O |
| <i>Passer montanus</i> | Tree Sparrow | LC | Ann-III | | Resident | O |
| <i>Fringilla coelebs</i> | Chaffinch | LC | Ann-III | | Resident | O |
| <i>Carduelis carduelis</i> | Goldfinch | LC | Ann-II | | Resident | L |
| <i>Carduelis cannabina</i> | Linnet | LC | Ann-II | | Resident | O |
| <i>Emberiza hortulana</i> | Ortolan | LC | Ann-III | | Migratory | L |
| <i>Emberiza melanocephala</i> | Black-Headed Bunting | LC | Ann-II | | Migratory | L |
| <i>Miliaria calandra</i> | Corn Bunting | LC | Ann-III | | Resident | L |

*O: Observation, L: Literature, SLP: Survey with local people, HS: Habitat Suitability

4.2.2.3. Mammals

Field observations and interviews with local people to determine the mammals (Insectivores, Bats, Rabbits, Rodents, Predators and Ungulates) present in the project implementation areas and ecological impact boundaries were evaluated together with the existing literature. While creating the table of mammal species found in the area, the existing fauna was listed with the natural ecosystem characteristics of the area. This is because vertebrate animals can move in and out of anthropogenic areas from time to time and even adapt thanks to their ability to move.

As a result of field studies, literature reviews and interviews conducted within the project implementation area and ecological impact boundaries, it was determined that 26 mammal species live in the project area and ecological impact areas (Table 4-5).



Figure 4-8. *Microtus* (Field Mouse) burrows and dead individuals in alternative areas around the Project site



Figure 4-9. *Lepus europaeus* droppings seen around the project site



Figure 4-10. *Nannospalax xanthodon* (Molerat) burrows



Figure 4-11. A burrow of *Meriones tristrami* (Tristram Jird)

As a result of the assessment based on the European Red List prepared by the International Union for Conservation of Nature and Natural Habitats (IUCN), 23 of the 26 mammal species identified in the region are in the "LC" (Least Concern) "Least Threatened" category, one species is in the "NT" (Near Threatened) "Near Threatened" category and 2 two species are in the "VU" (Vulnerable) "Sensitive" category.

According to the BERN List, among the mammal species identified in the area, six mammal species are listed in Annex-II, i.e. "Species under absolute protection", while six mammal species are listed in Annex-III, i.e. "Species under protection".

According to the results of the evaluation based on the protection lists prepared for the 2023-2024 season by the Central Hunting Commission of the General Directorate of Nature Conservation and National Parks, which carries out all regulations regarding hunting in our country, two mammal species are included in Annex I: "Hunting Animals Protected by the MAK" list and three mammal species are included in Annex II: "Species Permitted to be Hunted in Certain Periods" list.

Table 4-5. Mammal Species Distributed in the Project Area and the Vicinity and Their Protection Statuses

| Family | Species | English Name | IUCN | BERN | Habitat Directive | Source |
|-------------|---------------------------|----------------------------------|------|---------|-------------------|--------|
| Erinaceidae | <i>Erinaceus concolor</i> | Southern White-breasted Hedgehog | LC | - | | O |
| Soricidae | <i>Crocidura leucodon</i> | Bicolored Shrew | LC | | | L |
| Leporidae | <i>Lepus europaeus</i> | European Hare | LC | Ann-III | | O |

| Family | Species | English Name | IUCN | BERN | Habitat Directive | Source |
|------------------|-----------------------------------|-----------------------------|------|---------------|-------------------|--------|
| Cricetidae | <i>Microtus guentheri</i> | Gunter's Vole | LC | - | | O |
| Cricetidae | <i>Mesocricetus brandti</i> | Turkish Hamster | NT | | | L |
| Cricetidae | <i>Nothoricetulus migratorius</i> | Grey Dwarf Hamster | LC | | | L |
| Spalacidae | <i>Nannospalax xanthodon</i> | Lesser Mole Rat | LC | - | | O |
| Gerbillidae | <i>Meriones tristrami</i> | Tristram's Jird | LC | | | O |
| Zipodidae | <i>Scartururs williamsi</i> | Williams's Jerboa | LC | | | L |
| Muridae | <i>Apodemus flavicollis</i> | Field Mouse | LC | - | | HS |
| Muridae | <i>Rattus rattus</i> | Black-House Rat | LC | - | | L |
| Muridae | <i>Rattus norvegicus</i> | Brown Rat | LC | - | | L |
| Muridae | <i>Mus macedonicus</i> | Macedonian Mouse | LC | | | L |
| Muridae | <i>Mus domesticus</i> | House Mouse | LC | | | L |
| Rhinolophidae | <i>Rhinolophus ferrumequinum</i> | Greater Horseshoe Bat | LC | | Ann-II | L |
| Rhinolophidae | <i>Rhinolophus hipposideros</i> | Lesser Horseshoe Bat | LC | | Ann-II | L |
| Vespertilionidae | <i>Myotis mystacinus</i> | Steppe Whiskered Bat | LC | | Ann-II | L |
| Vespertilionidae | <i>Myotis blythii</i> | Lesser Mouse-eared Myotis | LC | | Ann-II | L |
| Vespertilionidae | <i>Pipistrellus pipistrellus</i> | Common Pipistrelle | LC | Ann-III | | L |
| Miniopteridae | <i>Miniopterus schreibersii</i> | Schreiber's Bent-winged Bat | VU | Ann-II | Ann-II | L |
| Canidae | <i>Canis aureus</i> | Golden Jackal | LC | - | Ann-V | SLP |
| Canidae | <i>Vulpes vulpes</i> | Red Fox | LC | - | | O |
| Mustelidae | <i>Mustela nivalis</i> | Least Weasel | LC | Ann-III | | L |
| Mustelidae | <i>Martes foina</i> | Stone Marten | LC | Ann-III | | O |
| Mustelidae | <i>Vormela peregusna</i> | Marbled Polecat | VU | Ann-III | | L |
| Suidae | <i>Sus scrofa</i> | Wild Boar | LC | Ann-III | | O |

*O: Observation, L: Literature, SLP: Survey with local people, HS: Habitat Suitability

4.2.3. Summary of Biodiversity Features

As a result of the field studies carried out in the project area, two different habitat types were identified: one habitat type that vertebrate species (Amphibia=Frogs, Reptiles=Reptiles, Aves=Birds and Mammalia=Mammals) can use, namely degraded agricultural areas and two habitat types, namely settlements and dry agricultural areas. When we look at the faunal biodiversity identified in the area, it can be evaluated as species with high ecological tolerance adapted to terrestrial habitats in general.

The biodiversity of 80 species of terrestrial vertebrates identified in the project implementation area and its immediate surroundings is given in Table 4-6.

Table 4-6. Distribution of Vertebrate (Amphibia= Frogs, Reptiles= Reptiles, Birds and Mammalia= Mammals) Species in the Project Implementation Area and its Vicinity According to IUCN, Bern, CHC and CITES Criteria

| SPECIES | | IUCN | | | | | | Bern | | CITES | | | CHC | |
|----------|----|------|----|----|----|----|----|--------|---------|-------|--------|---------|-------|--------|
| | | LC | VU | NT | DD | EN | NE | Ann-II | Ann-III | Ann-I | Ann-II | Ann-III | Ann-I | Ann-II |
| Amphibia | 2 | 2 | - | - | - | - | - | - | 2 | - | - | - | - | - |
| Reptilia | 8 | 7 | 1 | - | - | - | - | 5 | 5 | - | 1 | - | - | - |
| Aves | 44 | 43 | - | 1 | - | - | - | 19 | 18 | - | 7 | - | 10 | 4 |
| Mammalia | 26 | 23 | 2 | 1 | - | - | - | 6 | 6 | - | - | 2 | 2 | 3 |
| Total | 80 | 75 | 3 | 2 | - | - | - | 30 | 31 | - | 8 | 2 | 12 | 7 |

According to the IUCN;

- 75 species LC: (Least Concern): Commonly found species,
- One species VU: (Vulnerable): Species in great danger of extinction in the wild.
- Two species NT: (Near Threatened): Species that are not currently endangered but are candidates to be categorized as VU, EN or CR in the near future.

According to BERN, the European Convention on the Conservation of Wildlife and Natural Habitats, 30 species are classified as Annex II: Strictly protected species and 31 species are in Annex-III: Protected species category.

According to CITES, the international convention on trade in threatened natural fauna and flora, the Annex 2 list of 8 species includes species that are not threatened with absolute extinction, but whose trade is subject to certain conditions in order to prevent uses incompatible with the continuation of their extinction.

2023-2024 CHC: According to the decisions of the Central Hunting Commission, 12 species are listed in Annex I: Game Animals Protected by the MAK" list and 7 species are listed in Annex II: "Species Permitted to be Hunted in Specified Periods" list for the 2023-2024 hunting season.

According to these data, 3 species identified in the area are in the VU category and are among the species that are in danger of extinction in natural life. Details of these species are given below.

Reptiles

Testudo graeca (Turtle-Tortoise)

The tortoise is listed as globally VU (Vulnerable) according to IUCN standards (Van Dijk et al., 2004). This species is covered by CITES Ann-II and according to EU Regulation AE/338/97, importation of this species into the EU is prohibited except for conservation purposes.

The species is distributed from the Mediterranean Basin to Iran in the east with populations in North Africa, Southern Europe and Western Asia. It is seen at altitudes close to sea level and at altitudes up to 1900 m above sea level.

The tortoise inhabits a variety of dry, open scrub habitats, meadows, pastures, dunes, forests, heathlands, open habitats and is usually found on sandy or calcareous substrate (Tortoise and Freshwater Turtle Specialized Group, 1996). *Testudo graeca* is an herbivore feeding on a wide variety of leaves, buds, flowers, seeds and fruits of grasses, plants and shrubs; it also feeds on small invertebrates such as snails, arthropods and carrion.

The main threats to this species are as follows:

- Habitat destruction,
- Over-hunting for the pet trade and for tourists to buy live animals as souvenirs,
- Transportation and release of tortoise collected from different populations into the same environment and parasite-related deaths,
- Being killed by vehicles,
- Killed by natural animals for feeding.

Mammals

Miniopterus schreibersii (Long-winged Bat)

Species in great danger of extinction in the wild. It is categorized as VU (Vulnerable) on the IUCN red list.

Long-winged Bat wings are very long and pointed at the tip. The muzzle and nose are short; the forehead is strongly curved. The fur is brown on the back and light brown on the abdomen. They live in caves in open areas far from settlements. They form large colonies during breeding. In Turkey, they are found in Kırklareli, Istanbul, Muğla, Burdur, Karabük, Antalya, Kahramanmaraş provinces and scattered records from other regions.

Vormela peregusna (Marbled Polecat)

The observations made in the area suggest that the habitats of the species continue to exist in the area and its immediate surroundings and therefore the presence of the species in the area is normal.

1 species is in the NT category and is not currently endangered, but is a candidate to be categorized as VU, EN or CR in the near future.

4.3. Evaluation

4.3.1. Flora

Since the flora species identified in the project area are cosmopolitan and the habitat is modified, there is no need to take any protection measures specific to the activity to be carried out. As a result, there is no harm in terms of flora for the planned SPP project.

4.3.2. Fauna

The interaction of the planned project implementations with the existing vertebrate biodiversity will be in the form of habitat loss, habitat change and habitat fragmentation. Since the project implementation area is an agricultural area and there are alternative habitats around the project area where vertebrate species that are users of the area can form niches, the species will gravitate towards these areas. The presence of undisturbed alternative areas around the project site will minimize the negative impact of fauna species from project activities. In addition, the fact that the area where SPP will be installed is used as an agricultural area ensures that fauna species are not seen much in these areas.

As a result of the studies conducted in and around the project site, 73 of the 78 vertebrate species identified are in the "LC", 2 are in the "NT" and 3 are in the "VU" protection category. Among the species identified in the area, the low number of species that need to be protected according to the IUCN Red List shows that the project area does not pose a risk for vertebrate species. In addition, *Miniopterus schreibersii* (Long-winged Bat) and *Vormela peragusna* (Marbled Polecat) which are VU species, are species that will be minimally affected by the project activities since they are not encountered in the project areas. However, *Testudo graeca* (Tortoise) may be negatively affected by the project activities. Therefore, measures that can be taken for this species will ensure that the species is protected and not affected by the project activities.

4.3.3. Nationally Protected and Internationally Recognized Areas

There are "Cultural Assets", "Natural Assets", "Sites" and "Protected Areas" in the Project area and its impact area. There are internationally protected areas in and around the project area that may be affected by project activities (Figure 4-12). The project area, which does not harbor significant biodiversity despite its internationally recognized status, is located within the boundaries of Mogan Lake Key Biodiversity Area (KBA) (Figure 4-13).

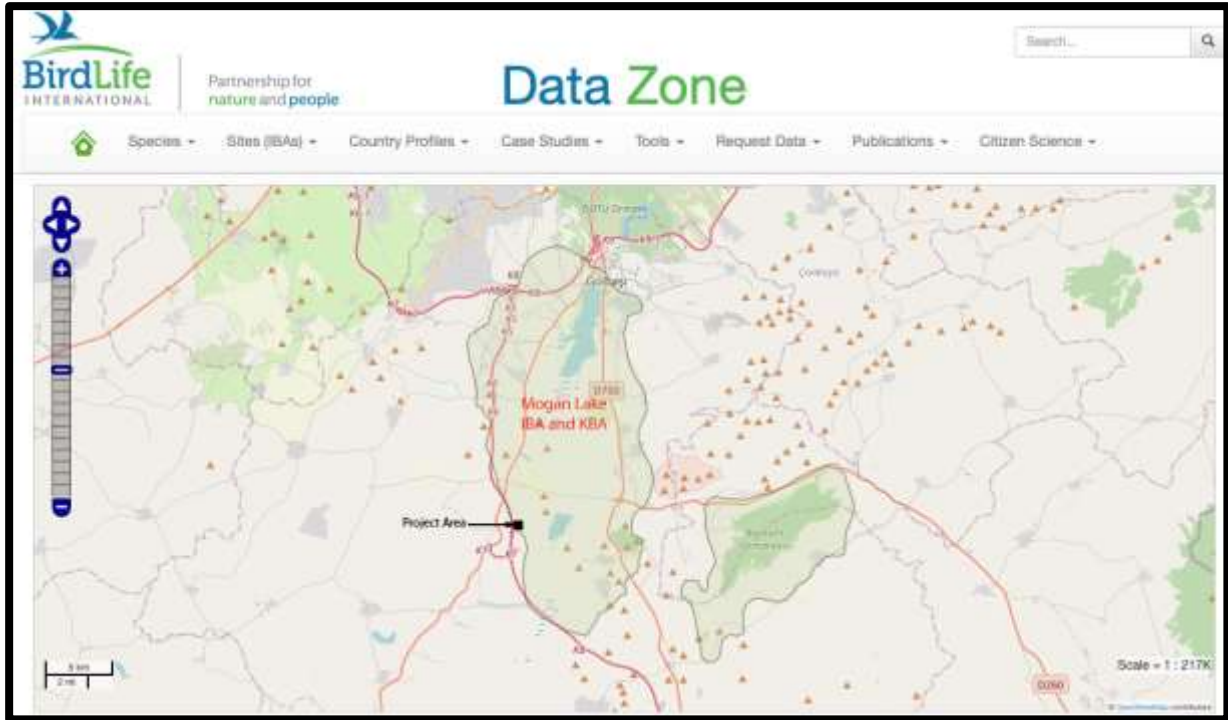


Figure 4-12 Nationally Protected and Internationally Recognized Areas in and around the Project area

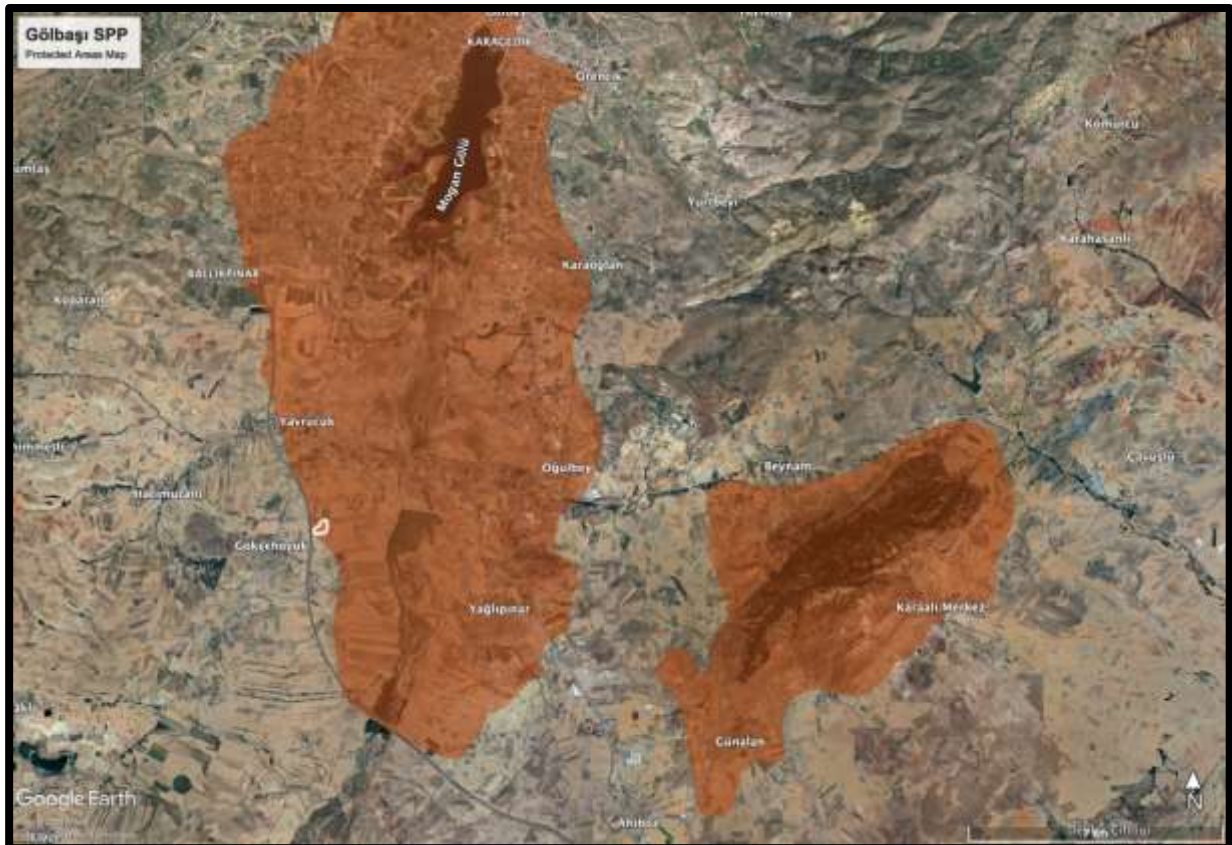


Figure 4-13. KBA view of Beynam Forests and Lake Mogan of the project site

When the situation of the region where the solar power plant will be installed in terms of migratory birds is evaluated, it is determined that the project site is not on the main migration route but is close to the secondary migration route. However, considering the current altitude of the project site (1020-1030 m) and the flight altitude of migratory birds, it was determined that there is no risky situation for migratory birds.

5. RECOMMENDED MEASURES

Today, it is almost obligatory for every organization and individual to contribute to the sustainable conservation of biodiversity. For this reason, although *Cyanus tchihatcheffii* (Gölbaşı love flower, iridescent), which is locally endemic and has an IUCN Endangerment category of "Critical, CR", is not distributed in the project area, collecting the seeds of this species from the areas where the species is distributed in the appropriate period (June) and planting them in the parts of the planned Solar Power Plant that will not be affected by the activity and establishing healthy populations will be an exemplary work as it will show the sensitivity of the activity on sustainable protection. Since the species is short in stature, it does not damage the panels, so the gaps between the solar panels can be a habitat for the species.

For the minimization of degradation or change on the ecosystem in any human activity in ecosystems;

- Minimize habitat loss, habitat degradation and habitat fragmentation,
- Ensuring the continuity of energy flow,
- To ensure that the species that realize their niches in the activity area remain in the niche creation areas=habitats closest to the area, not to interrupt the contact of the activity area with the niche creation areas=habitats of neighboring populations,
- Restoration of ecosystem services are the most fundamental measures to be taken.

These four phenomena are interdependent on each other; therefore, practices should be planned, implemented and measures should be taken by taking these four ecological substances into consideration during the planning, implementation and operation of the activity.

The fact that the vertebrate species identified in the area are not directly affected by the activity depends on the timing of its implementation. For example, spring is the breeding period for all vertebrate species. Depending on climatic characteristics, winter is the hibernation period for reptiles. In these periods, the precautions mentioned in the following sections should be taken to prevent the impact of surface stripping and clearing practices on vertebrates and their populations.

Amphibians use puddles, marshes and stagnant water to lay eggs during their breeding season (spring). For frogs, clean puddles in wet swamps or meadow marshes can be breeding grounds. Especially stagnant waters, ponds, swamps and puddles are egg-laying areas. For this reason, if there is activity in such habitats during the spring period, the eggs of two-living organisms may be destroyed. Since there are no habitats suitable for the breeding and accommodation of amphibians in the activity area, these species will not be adversely affected during the works.

In reptiles, they lay eggs in the spring and the hatchlings can move independently. They can be directly affected by activity during the egg period. In addition, they can also be affected by

surface stripping operations. They also remain under the soil during the hibernation period and may be affected by surface stripping during this period. During these periods, the area around the project site should be carefully checked before the surface stripping and field opening operations to be carried out, the observed individuals should be moved away from the area by making noise, making light impacts on the soil, and individuals with limited mobility should be duly moved to alternative habitats available in the vicinity.

There are very few bird species that are permanent users of the Project implementation area and its immediate surroundings. Neighboring alternative habitats are available for these species.

Mammals nest in leaf litter, rock crevices, tree branches and underground galleries during the spring breeding season. If activities are carried out in nesting habitats, the young of mammal species may be harmed. Especially some rodents (rodents) may use these areas. In order to prevent these species from being harmed during the works, the area should be carefully checked before surface stripping and area opening operations, observed individuals should be moved away from the area by methods such as making noise, and individuals with limited mobility should be duly moved to alternative habitats available in the vicinity.

5.1. Construction Phase Measures

- Vertebrate species present in the application area should be removed from the area before the surface is cleaned of vegetation.
- In any area to be used, all existing stones, regardless of size, should be removed and the vertebrate species underneath them should be allowed to move away (people who will do this should wear gloves).
- Especially when a tortoise is seen, it should be given time to move away from the area.
- If any vertebrate species is encountered during the use of any area, it should be allowed to move away from the area on its own without intervention.
- Permanent roads and buildings in the project area should be planned and constructed in a way to minimize the impact.
 - The buildings are as small as possible,
 - Generating minimum heat and light,
 - The structure should not contain any form of insect collecting or harboring features.
- Noise, vibration, lighting and other disturbing effects during construction works should be minimized.
- Whenever possible, existing ways of implementation should be used.

- Biodiversity training should be provided to workers before and during construction. Brochures and descriptive posters should be prepared for priority biodiversity elements.

5.2. Operational Phase Measures

- Vehicle drivers and workers should be educated about vertebrate species so that they can recognize the species they may frequently encounter in the area and be informed about what to do when they encounter these species.
- All outputs (sound, light, exhaust gas, etc.) of the vehicles to be used in transportation should be periodically checked and minimized.
- After loading the vehicles, the body of the vehicle must be covered to prevent the material from spreading to the environment.
- The maximum speed in the whole area must not exceed 30 km/h.
- The plant should be operated by minimizing sound generation during operation.
- The light sources used by the facility, especially at night, should be directed and non-LED light sources so that they do not illuminate the surrounding vertebrate habitats.
- All waste generated by the facility must be transferred to waste treatment and storage facilities. During transfer, the designated route and transfer vehicles must operate in such a way that they do not release waste into the environment.

Table 5-1. Potential Impacts of Construction /Operation periods on Fauna and Impact-Measure Matrix

| Risks | | Impact | Magnitude of Impact | | | Preventive/Minimizing Measures | Responsibility | Follow-up of Measures Taken |
|-------------------------|---|---|---------------------|--------|------|--|----------------|--|
| | | | Low | Medium | High | | | |
| Construction | | | | | | | | |
| Birds | Damage to the nest and young individuals due to scraping of the surface soil | Possibility of population decline due to reduced reproductive success | X | | | Checking for the presence of nests of these species by making checks before each type of surface stripping, and if nests or young are found, transferring nests to the nearest suitable habitat with appropriate methods without touching the juveniles, etc. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| | Avoidance of bird species due to dust and noise during stripping of surface soil | Possibility of population decline due to shrinking roaming and feeding areas | | X | | Watering should be done to prevent dust formation. Noise should not be above the standard set by the ministry. Night work should be avoided unless necessary. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| | Dust formation | Possibility of birds feeding on plant seeds and pollen leaving the habitat as a result of dust cover/damage to plants | X | | | Suppression of dust by irrigation | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| Reptiles and Amphibians | Damage to the nest and young individuals due to scraping of the surface soil | Decline in the population of the species due to decreased reproductive success | | X | | Checks should be carried out before each stripping of the surface soil to check for the presence of nests of these species, and if nests or young are found, nest transplantation to the most suitable habitat with appropriate methods without touching the young, etc. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| | Removal of herpetofauna species due to dust and noise during surface soil stripping | Population decline due to shrinking roaming and feeding areas | X | | | Watering should be done to prevent dust formation. Noise should not be above the standard set by the ministry. Night work should be avoided unless necessary. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |

| | | | | | | | | |
|----------------------|--|--|---|---|--|---|------------|--|
| | Not allowing slow-moving herpetofauna such as land turtles to move away from the area in order not to be harmed by the works | Shrinking populations | X | | | Gradual removal of species from the area at the beginning of the work | Contractor | Expert biologist, Project Owner, General Directorate of Nature Conservation and National Parks |
| | Dust formation | Damage to the invertebrate fauna in the environment and consequently decrease in the food sources of herpetofauna elements | X | | | Suppression of dust by irrigation | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| Mammals | Damage to the nest and young individuals due to scraping of the surface soil | Decline in the population of the species due to decreased reproductive success | X | | | Carrying out controlled surface soil stripping activities, checking for the presence of nests of these species by conducting checks before stripping all types of surface soil, if nests or young are found, transferring nests to the nearest suitable habitat with appropriate methods without touching the young, etc. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| | Removal of large mammal species due to dust and noise during surface soil stripping | Population decline due to shrinking roaming and feeding areas | X | | | Watering should be done to prevent dust formation. Noise should not be above the standard set by the ministry. Night work should be avoided unless necessary. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| | Increasing anthropogenic pressure on fauna | Damage to fertilization/offspring formation/eggs etc. during the reproductive periods of the species | | X | | During soil stripping operations, if any vertebrate species are observed in the area during the breeding period for all vertebrate species, the activity should be started after the transportation-transfer is carried out by scanning with a team under the supervision of a vertebrate specialist. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| | Not allowing slow-moving species to move away from the area to avoid damage from the work | Monitoring loss population | X | | | Gradual removal of species from the area at the beginning of the work | Contractor | Expert biologist, Project Owner, General Directorate of Nature Conservation and National Parks |
| Flora and Vegetation | Decreased photosynthesis ability of cultivated plants due to activity- induced dust | Damage to vital functions such as photosynthesis, respiration, excretion, | | X | | Screening of dust sources, frequent watering while the activity is ongoing | Contractor | Project Owner, General Directorate of Nature Conservation |

| | | | | | | | | |
|----------------------|---|--|---|--|--|---|---------------|---|
| | formation | sweating | | | | | | and National Parks |
| | <i>Cyanus tchihatcheffi</i> was not found in the impact area. It is also unlikely to be found in the project area in terms of habitat suitability. However, populations in the immediate vicinity may be slightly affected. | Although no individuals of <i>Cyanus tchihatcheffi</i> were found in the project area and impact area, seeds can be collected from the areas where the species is found and grown in the unaffected parts of the project area. | X | | | Brochures, posters, etc. about the <i>Cyanus tchihatcheffi</i> species should be prepared and introduced to the project team. In addition, specific biodiversity trainings on this species should be provided. As a good practice, seeds collected from nearby areas can be planted and developed to establish a new population in the project area. | Contractor | Project Owner, General Directorate of Nature Conservation and National Parks |
| Operation | | | | | | | | |
| Flora and Vegetation | Habitat degradation | Habitat degradation through increased vegetation loss | X | | | Vegetation cover will be enhanced and maintained as far as possible on land surrounding project area to prevent erosion. Areas with poor vegetation cover will be identified by the Biodiversity Expert. Vegetation restoration will be ongoing and concurrent to operations. Maintenance of vegetation should be manual, by trimming the overgrown vegetation | Project Owner | Project Owner, General Directorate of Nature Conservation and National Parks |
| Fauna | Disturbance | Habitat and species disturbance by vehicle movement | X | | | Restrict vehicle movement to the existing roads that connect the Project site with the surrounding areas. Off-road driving shall be prohibited in order to avoid any unnecessary disturbance of natural vegetation and fauna. The speed limit of 30km/h should be adhered to. Adequate signage and awareness through induction should enforce this. | Project Owner | Project Owner, General Directorate of Nature Conservation and National Parks |
| | | Habitat and species disturbance by operational activities | X | | | All staff working on site will undergo induction training covering the key procedures and protocols relevant to an individual's area of work that are included within this BMP. The Biodiversity Expert will input into the site induction. Induction will provide | Project Owner | Project Owner, General Directorate of Nature Conservation and National Parks |

| | | | | | | | |
|--|--|--|--|--|---|--|--|
| | | | | | an introduction to the ground and vegetation disturbance, traffic movement restrictions and hygiene, threatened flora and fauna identification and handling and locations of environmentally sensitive areas. | | |
|--|--|--|--|--|---|--|--|

6. TRAINING, MONITORING AND REPORTING

6.1. Training

The Expert biologist will provide biodiversity training to all relevant project staff in order to get capacity building with regards to biodiversity importance as part of their Environmental Training.

The expert/s will receive “environmental training” as well as specialized training for the procedures to follow for all ground disturbance activities. These trainings will be repeated periodically. The records of the training such as attendee list, the presentation made during the training, etc. will be kept by the biodiversity experts as hard copy and electronic copy.

6.2. Monitoring

A comprehensive biodiversity monitoring program will be established and implemented throughout the land preparation/construction and operation phases of the Project. A provisional program is provided below (Table 6-1).

Table 6-1. Monitoring Program

| Biodiversity Element/Issue | Timeline and frequency | Indicator | Responsibility | |
|---|--|--|----------------|---------------|
| | | | Construction | Operation |
| Health status of flora species in the project area will be monitored. | Throughout all construction and operation phases | Effective protection of all populations direct/indirect impacts | Contractor | Project Owner |
| All Fauna nests within the project area will be monitored. | Throughout all construction and operation phases | Effective protection of all populations direct/indirect impacts | Contractor | Project Owner |
| Translocation sites identified for Fauna Species will be periodically monitored for any signs of stress or disturbance. | Monthly during the entire construction phase and seasonal during the operation phase | Creating new self-sustaining and stable populations | Contractor | Project Owner |
| Wildlife related incidents or observation of live animals or carcasses along the access road or at the project area will be recorded. | Incident/observation reports to be submitted every 3 months | No accidents involving wildlife or observing carcasses Record of wildlife observations by employees/contractors | Contractor | Project Owner |
| Additional mitigation measures will be taken if necessary to deter the presence of wildlife in the area and prevent road mortality. | | | | Project Owner |

6.3. Reporting, Reviewing and Updating

The Project Owner will ensure that the BMP is periodically reviewed and updated with new field data from field surveys and report on the progress and status of the BMP measures provided. New measures may be developed based on the progress made on the current biodiversity targets set out in this BMP. Expert biologist will be involved in collecting field data and reviewing/updating the BMP and reporting on its progress if necessary.

This Plan is a living document, and the responsibilities, procedures and compliance actions shall be updated as required (e.g. after a change in related legislation or insufficiencies in the implementation of this plan). It is the responsibility of the sub-contractor's expert to be fully aware of its contents, to provide relevant training to staff and to ensure that procedures are being implemented to achieve compliance with this Plan. Gölbaşı Municipality will be responsible for overall management and control of the day-to-day implementation of the Plan and to ensure compliance with Project standards.

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