Kalyon Güneş Enerjisi Üretim A.Ş. Istanbul, Turkey

Karapınar YEKA Solar Power Plant Project

Environmental and Social Impact Assessment

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ABBREVIATIONS AND ACRONYMS

Bern	Convention on the Conservation of European Wildlife and Natural Habitats
BMP	Biodiversity Management Plan
BMEP	Biodiversity Monitoring and Evaluation Programme
CCRA	Climate Change Risk Assessment
CHA	Critical Habitat Assessment
CITES	Convention on the International Trade in Endangered Species of Wild Flora and Fauna
CLO	Community Liaison Officer
CO_2	Carbon Dioxide
CR	Critically Endangered
dBA	A-weighted decibels
E&S	Environmental & Social
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMRA	Energy Market Regulatory Authority
EPFI	Equator Principles Financial Institutions
EPRP	Emergency Preparedness and Response Plan
EP	Equator Principles
ERP	Emergency Response Plan
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
ESMS	Environmental and Social Management System
ESR	Ecosystem Services Review
ETL	Energy Transmission Line
EU	European Union
GIIP	Good International Industry Practice
GISD	Global Invasive Species Database
GISP	Global Invasive Species Programme
GWH	Gigawatt-hour
HR	Human Resources
HRIA	Human Rights Impact Assessment
HSS	Health Safety and Security
IAS	Invasive Alien Species
IBA	Important Bird Areas
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IFC	International Finance Corporation
IFI	International Finance Institutions
ILO	International Labour Organization
IUCN	International Union for Conservation of Nature
KBA	Turkey's Key Biodiversity Areas
km	kilometre
.kmz	Google Earth files
KPI	Key Performance Indicator
kV	kilovolt
LAP	Land Acquisition Plan
LC	Least Concern

LLEP	Labour and Local Employment Plan
m	Metre
MoEU	Ministry of Environment and Urbanization
MV	Medium voltage
MW	Megawatt
NT	Near Threatened
NTS	Non-Technical Summary
OHS	Occupational Health and Safety
OSGB	Joint Health and Safety Unit
PCM	Public Consultation Meeting
PAP	Project Affected Parties
PDR	Project Description Report
PS	Performance Standards
PV	Photovoltaic
Ramsar	Convention on Wetlands of International Importance Especially as Waterfowl Habitat
RER	Renewable Energy Resource
SCADA	Supervisory Control and Data Acquisition
SEP	Stakeholder Engagement Plan
SMP	Security Management Plan
SoW	Scope of Work
TEİAŞ	Turkish Electricity Transmission Company
TIA	Technical Interaction Analysis
TTMP	Traffic and Transport Management Plan
VU	Vulnerable
WB	World Bank
WHO	World Health Organization
WRULDS	Work Related Upper Limb Disorders
WWMP	Waste and Wastewater Management Plan

1 INTRODUCTION

Kalyon Güneş Enerjisi Üretim A.Ş. (Kalyon) has been developing Karapınar YEKA Solar Power Plant Project (hereafter "Karapinar SPP", "the Project") with a total installed capacity of approximately 1.4GW_{DC}/1GW_{AC} on a land area of 19.2 square kilometres (km^2) to the northeast of the town of Karapınar, Konya Province in Turkey. The Project consists of a ground mounted photovoltaic (PV) plant ("the Plant") connecting to the national electricity grid via two separate grid connection points. The project construction has started in 2020 and will be completed in two phases over a 3-year period and be fully operational by August 2023.

Once operational the Project will have a total installed capacity of 1GW_{AC}, generating 2.3 TWh of electricity during the first year of operation after reaching the full capacity of 1.4GW_{DC} (1,348MW_{DC}). The Project components include the solar PV arrays covering an area of approximately 19.2 km^2 and the two electricity substations associated with the Project, one located in the northern section of the Project site and the other on the southern edge. The Karapınar SPP will connect to the grid via 2 separate connections: once through connection to the transmission line between 400 kV Konya-4 and Yeşilhisar Substations and the other via connection to 154kV Karapınar Substation. Details of the Project components are provided in Chapter 2.3 of this ESIA report.

The Project activities considered for the ESIA covers the construction phase, including associated facilities and operation of the SPP Project.

The Energy Generation Pre-License (Pre-License No: ÖN/7685-25/03862) for the Project was obtained from the Energy Market Regulatory Authority (EMRA) on February 15, 2018 (pre-licensing date) which is valid until February 15, 2021. In accordance with the Regulation on Electricity Market Licensing (Official Gazette date/number: November 02, 2013/28809), firms that hold pre-license should make application to obtain Energy Production License before the expiry date of the pre-licence. Kalyon has obtained Energy Generation License (EÜ/9531-2/04598) in September 2020.

EIA permitting process for "Konya-Karapınar Industrial Zone for Energy Generation, Section-1 1,500 MW_e Solar Power Plant Project" had been initiated in 2016 by the Ministry of Science, Industry and Technology, General Directorate of Industrial Sites who was the Project Owner at the time.

An EIA Report has been prepared by an approved Environmental Consultancy Company (Serdar Mühendislik Ltd., 2016) on behalf of the Project Owner and "EIA Positive Certificate" (Certificate No: 4387) was obtained from the Ministry of Environment and Urbanization (MoEU) on November 22, 2016. Following the hand-over of the Karapınar YEKA SPP Project to Hanwha-Kalyon Güneş Enerjisi Üretim A.Ş. (Company Name was updated to Kalyon Enerji Yatırımları A.Ş in August 2018), written approval on validity of the EIA Positive Certificate for Hanwha-Kalyon Güneş Enerjisi Üretim A.Ş. was obtained from the Konya Provincial Directorate of Environment and Urbanisation on November 28, 2017. Copies of the EIA Positive Certificate and EIA Transfer Certificate and Opinion Letters of Relevant Authorities are provided in **Appendix A** for reference.

1.1 OVERALL ESIA METHODOLOGY

This ESIA report has been developed in line with international best practices and includes the following:

- description of the proposed Project including its objectives, design concepts and use of resources;
- description of the Project alternatives and selection criteria;
- description of the local policies and legal framework and international standards applicable to the proposed project;
- description of the baseline conditions in the Project area of influence, covering the physical location, environmental settings, social and economic aspects;
- details of the anticipated impacts on the environment and socio-economic aspects of the surrounding area;
- identification of appropriate prevention and mitigation measures;
- a framework Environmental and Social Management Plan (ESMP) presenting the Project activities, potential impacts, and prevention/mitigation actions to be taken to manage the identified impacts and bring the Project in line with international Lender requirements and standards;
- a Stakeholder Engagement Plan (SEP); and

- development of an Environmental and Social Action Plan (ESAP) describing and prioritizing the actions that need to be taken to fulfil the identified gaps in order to satisfy lender requirements and thereby accessing the relevant project financing.

The above-described methodology identifies impacts resulting from the proposed Project, based on the baseline conditions and project design information provided by Kalyon.

This ESIA process has been undertaken based on the following key steps; these are described in more detail in the below subsections.

- Document Review
- Site Surveys
- Detailed İmpact Assessment studies
- Stakeholder Engagement.

1.1.1 Document Review

Project-related documents were reviewed for a clear understanding of the terms of reference, environmental and social status of the Project area, demographic trends, land use patterns in the affected areas, development strategies and plans as well as the applicable policy and legal framework; key documents reviewed included:

- Design documents provided by Kalyon;
- Local EIA Report of the Project;
- Geotechnical Survey Reports;
- IFC PSs and EHS Guidelines;
- EBRD PRs and EHS Guidelines;
- Relevant Turkish Legal, Policy and Regulatory documents;
- Literature review including International Best Practices;
- Report on Field Occupation and Physical Displacement (Etki Fabrikası, November 2020)
- Report on Grazing Activities and potential Project Impacts (Etki Fabrikası, November 2020).

1.1.2 Site Surveys

RINA undertook their first visit to the project site on December 6, 2017, as part of earlier ESIA engagement on the Project, to make visual observations of the relevant areas potentially affected by the Project and to assess the physical, biological and social environment of the Project area, as well as to undertake some preliminary engagement with local communities, including with Project Affected Parties (PAPs). The aim of this initial site visit was to verify the findings of the local EIA and studies undertaken for the project, and identify aspects that may not have been identified and to get a comprehensive picture of the existing status of the physical and biological environment at the project site and its surroundings, in order to support the findings of our desktop review of available information.

Prior to the site visits undertook in 2017 and 2020, RINA specialists undertook a preliminary review of project documents and observed the status of project activities, including on-site E&S management, stakeholder engagement and relevant plans. The landscape, biodiversity, social aspects were assessed both with onsite observations and through discussions with local people.

As part of this engagement Biodiversity Experts have recently conducted three site surveys during spring period on the dates listed below (details of the surveys are explained in Section 5.6 of this report):

- 1st Survey on 15-17 March 2020;
- 2nd Survey on ait 11-15 May 2020; and
- 3rd Survey on 27-31 May 2020.

Furthermore, between 16-18 June 2020, a site visit was conducted by the Social Expert to hold stakeholder meetings and to assess social aspects through onsite observations and discussions.

1.1.3 Public Consultations

In accordance with Article 9 of the Turkish Regulation on Environmental Impact Assessment (latest version published in the Official Gazette dated November 25, 2014, numbered 29186), Article 24 of the Regulation specifies that the EIA Process shall be determined by the Ministry for the exempt Projects listed in the same article as Organized Industrial Zones, Specialized Organized Industrial Zones, Industrial Zones, Free Zones and the projects planned to be established in Technology Development Zones are specified. Accordingly, no Public Participation Meeting was held for the Project and the EIA Report was disclosed for Public review as per the Ministry's decision.

A Public Consultation Meeting was planned to be held in Spring 2020; however, organising and holding meetings have been forbidden due to the governmental Covid-19 Pandemic restrictions so that a Public Consultation Meeting has not been organised to date. However, the Project Stakeholder Engagement Plan (SEP) defines the channels of information disclosure and communication with the stakeholders.

2 PROJECT DESCRIPTION

This section provides a detailed description of the Project; including key components, supporting infrastructure, associated facilities to be constructed and operated within the Project Area, as well as the overall project schedule, and permitting process. The Project Description is presented under the following main sections:

- Project Overview
- Project Location and Surroundings
- Key Project Components
- Land Preparation and Construction Phase Activities
- Operation and Maintenance Activities
- Project Emissions, Effluents and Wastes.

2.1 PROJECT OVERVIEW

Kalyon plans to develop and operate Karapınar YEKA Solar Power Plant Project (hereafter "Karapınar SPP", "the Project") with a total installed capacity of approximately 1GW$_{AC}$ on a land area of approximately 19.2 km^2 to the northeast of the town of Karapınar, Konya Province in Turkey. The project is planned to be built in two phases over a 3-year period (200MW Phase -1 is started to be partially commissioned in the September 2020 and 800MW Phase-2 is started to be partially commissioned the June of 2021) and be fully operational in 2023. Once fully operational the Project will generate 2,300 GWh of electricity annually.

The Project consists of a ground mounted PV plant ("the Plant") connecting to the national electricity grid through two separate grid connection points via two new substations, one in the northern section of the Project site and the other on the southern edge. Grid connection will be through two separate transmission lines: one 400 kV line between Konya-4 and Yeşilhisar Substations, and the other 154 kV line connecting to the Karapınar Substation.

A summary of key project characteristics is provided in Table 2-1. More details of the Project components are provided in Section 2.3 of this ESIA report.

Table 2-1: Key Project Characteristics

Project Characteristic	Description
Number of PV Panels	3,376,620
Number of Inverter Stations	800 MW Plant consists of 248 inverters stations 200 MW Plant consists of 66 inverter stations
Total Installed Capacity	1348 MW dc / 1000 MW ac with tracker
Substations	YEKA 400kV Substation will redirect 800 MW to existing Konya-4TM and Yeşilhisar TM YEKA 154kV Substation will redirect 200 MW to existing Karapınar Transformer Substation
ETL Connection to Network	400kV transmission lines connecting YEKA 400kV Substation to 400 kV Konya-4TM and Yeşilhisar TM (TM: Transformer Substations); and 154kV transmission line connecting YEKA 154kV Substation to Karapınar TM.

2.2 PROJECT LOCATION AND SURROUNDINGS

The Plant is located in Fatih Neighbourhood approximately 4.5km to the north of the Karapınar District Centre (the nearest residential building is 2.3 km away from the Project Site), Konya Province in the Central Anatolia Region of Turkey and covering an area of 19.2 km^2.

The site is located approximately 4.5 km to the north of the D330 Konya-Adana Highway, which runs through Centre of Karapınar. Furthermore, Eskil -Karapınar Road runs alongside the western border of the Project site. Konya City Centre is located 95 km to the west of the Project Site The closest airport to the project site is Konya Airport which is located 100 km west of the project site. The project location is shown in Figure 2-1.

The nearest settlements are located on the west of the Project Area and within the administrative boundaries of Reşadiye Neighbourhood. These settlements are, from north to south, Seyit Hacı, Ekmekçi, Kirkitoğlu, Küçükkarakuyu and Büyükkarakuyu. These settlements are within the boundaries of Reşadiye Neighbourhood which had a population of 2,120 in 2019 (Turkstat, 2019). However, these settlements are usually used for animal husbandry activities. Out of 60 households located within the five settlements, 57 of them have their main dwellings in the district centre of Karapınar and only use these buildings on a temporary basis for animal husbandry activities during summertime. Three households live here permanently, according to the information gathered from Mukhtars and the households interviewed.

The location of the surrounding settlements in relation to the Project are shown in Figure 2-2 and the distances to the Project Site are presented in Table 2-2 below.

Table 2-2: Surrounding Settlements

Number	Settlement	Distance of the nearest building (km)
1	Seyit Hacı	0.50
2	Büyük Karakuyu	0.18
3	Ekmekçi	0.20
4	Kirkitoğlu	0.23
5	Küçük Karakuyu	1.40
6	Karapınar District	2.30

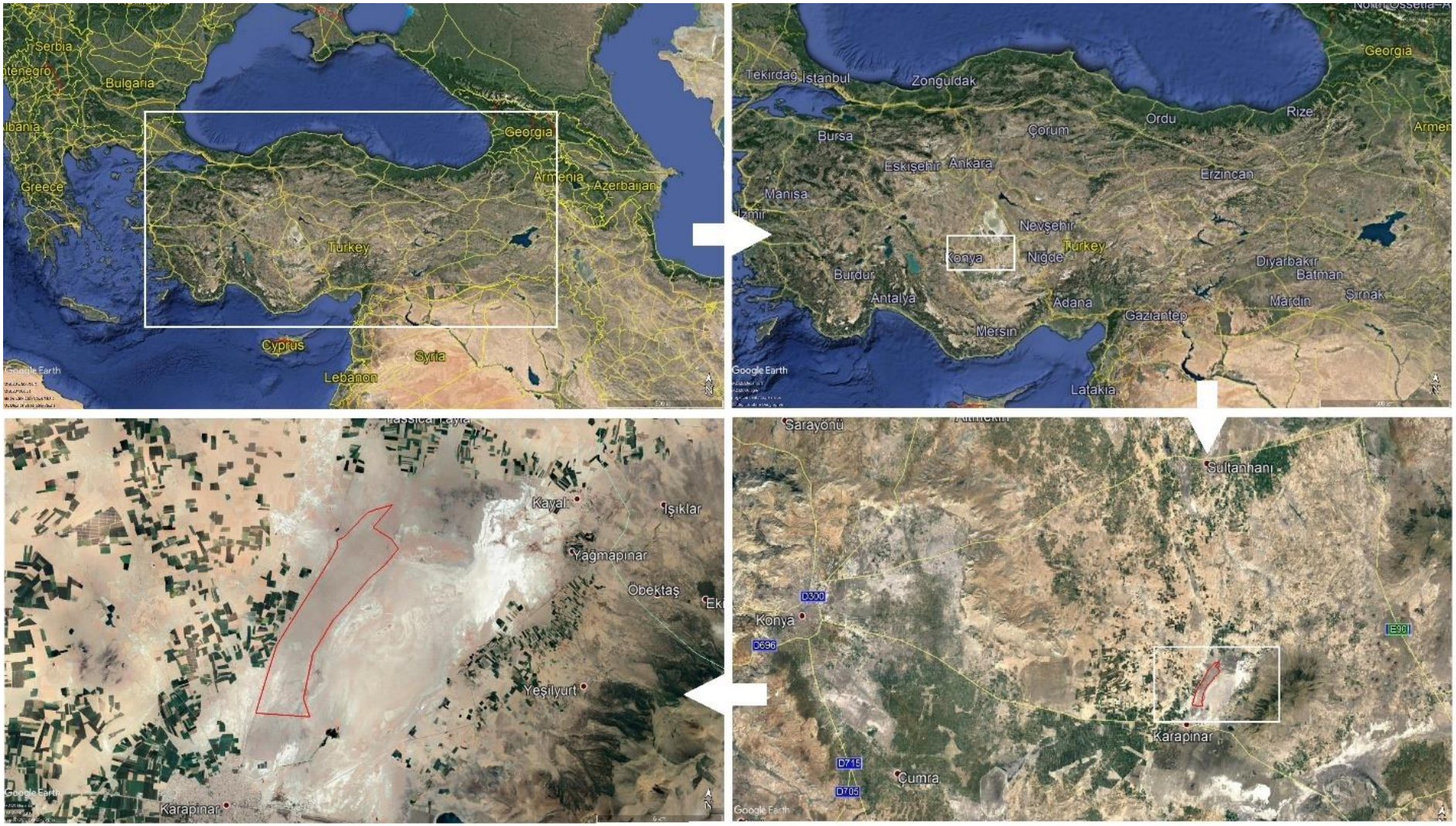

Figure 2-1: Project Location

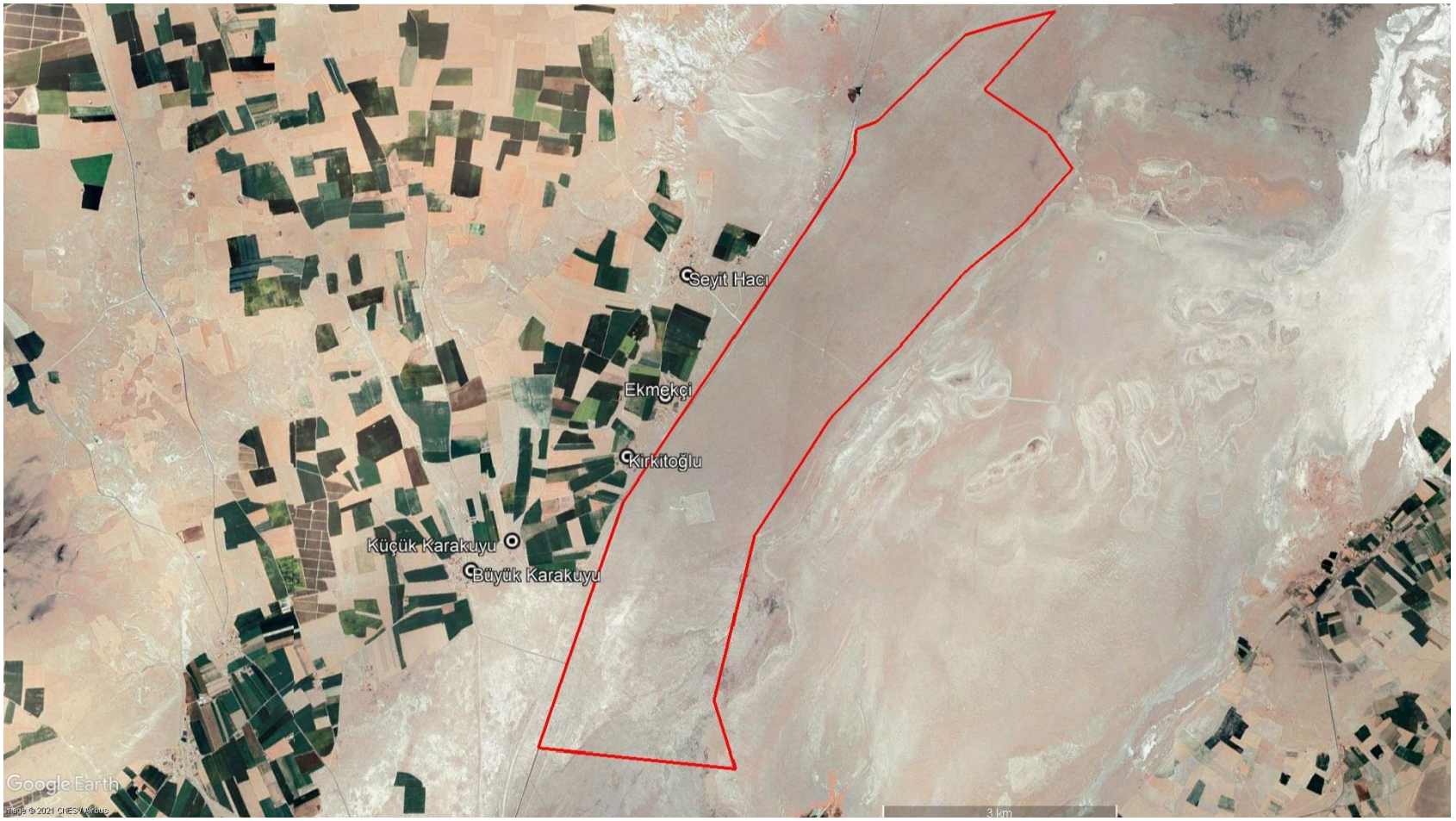

Figure 2-2: Project Site and Surrounding Settlements

2.2.1 Site Access

Vehicle access to the site during construction and operation phases of the Project is via access points on the adjacent Karapınar-Eskil road which runs along the western edge of the Project site; Figure: 2-3 below shows the principal roads that are being used to access the site.

The delivery route for PV panels between the panel factory in Ankara and Karapınar is served by dual carriageway roads (two lanes in each direction): the E90 road between Ankara-Aksaray-Karapınar and D715 road between Ankara and Konya and the D330 between Konya and Karapınar. The Karapınar-Eskil road is a single lane (each way) road that passes through urban areas of Karapınar and runs along the western boundary of the site.

According to the information obtained by Kalyon representatives during the consultations carried out with the Karapınar Municipality on 29 September 2020 and 3rd Regional Directorate of Highways on 08 October 2020, this road is planned to be widened in the future regardless of the Karapınar YEKA-1 SPP Project. However, project design stage is not expected to be started before June 2021.

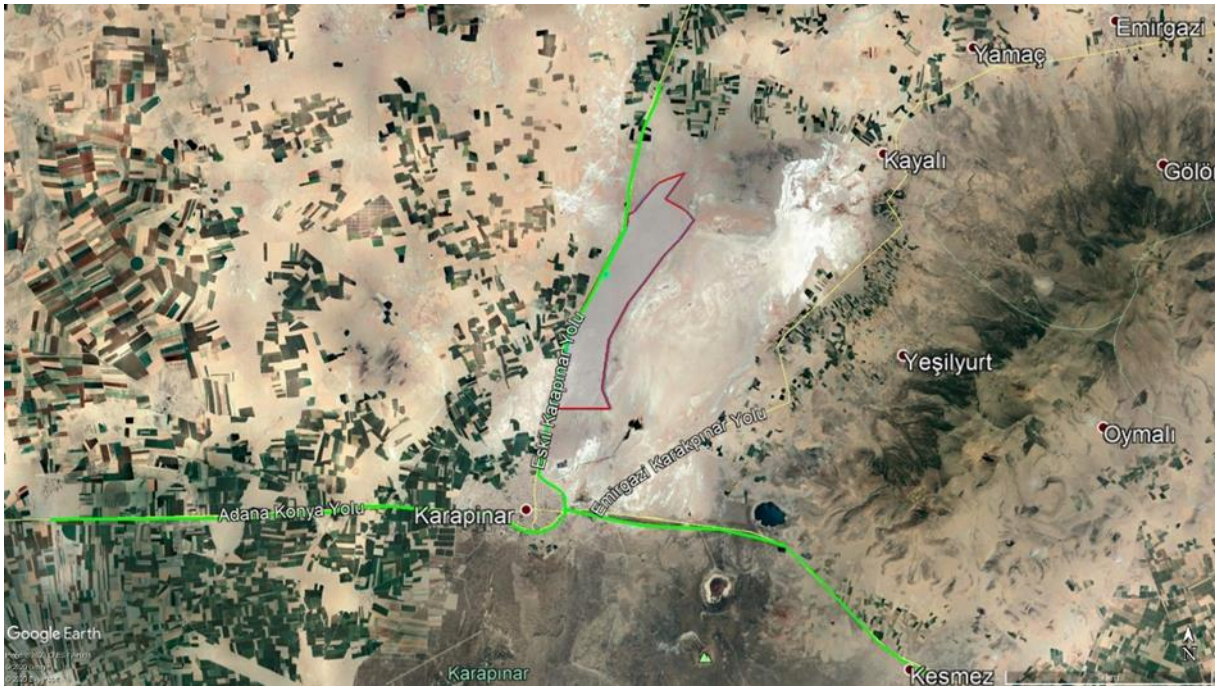

Figure: 2-3 Site Access

2.3 KEY PROJECT COMPONENTS

The main components of the SPP include:

- PV modules
- Mounting / Tracking Structures
- DC/AC current inverters
- Cabling
- Transformers
- Substations
- Energy Transmission Lines

- Supervisory Control and Data Acquisition (SCADA) System
- Associated infrastructure and utilities, including:
    - Site security, including fencing and CCTV
    - Buildings, including onsite substation, connection building, control building, guard cabin, and spare parts storage.
    - Access road and internal road network
    - Water supply infrastructure.

The main components of a utility scale grid connected solar PV power plant and their general arrangements are shown below in Figure 2-4.

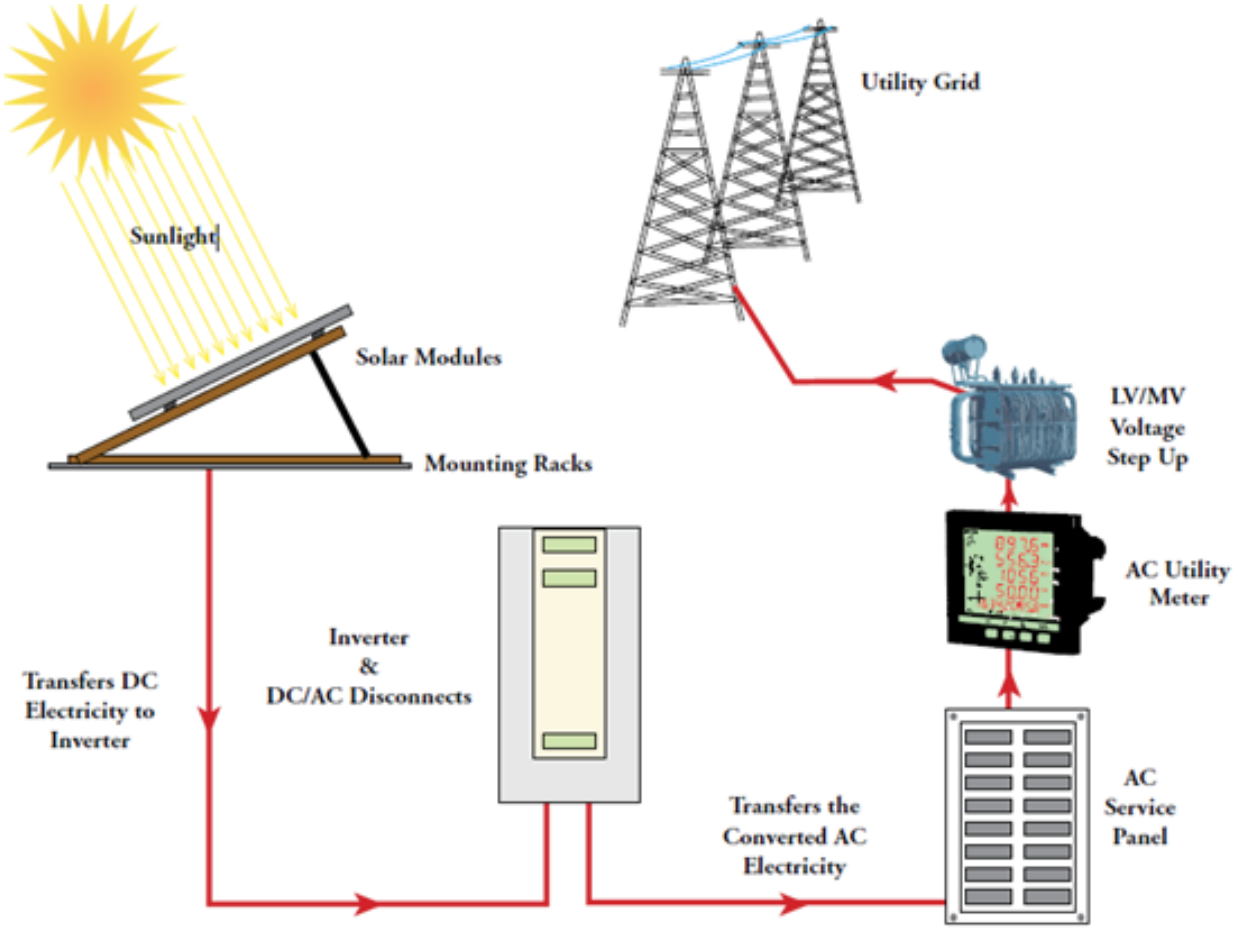

Figure 2-4: Main Components of a Utility Scale Solar PV Plant (IFC, 2015)

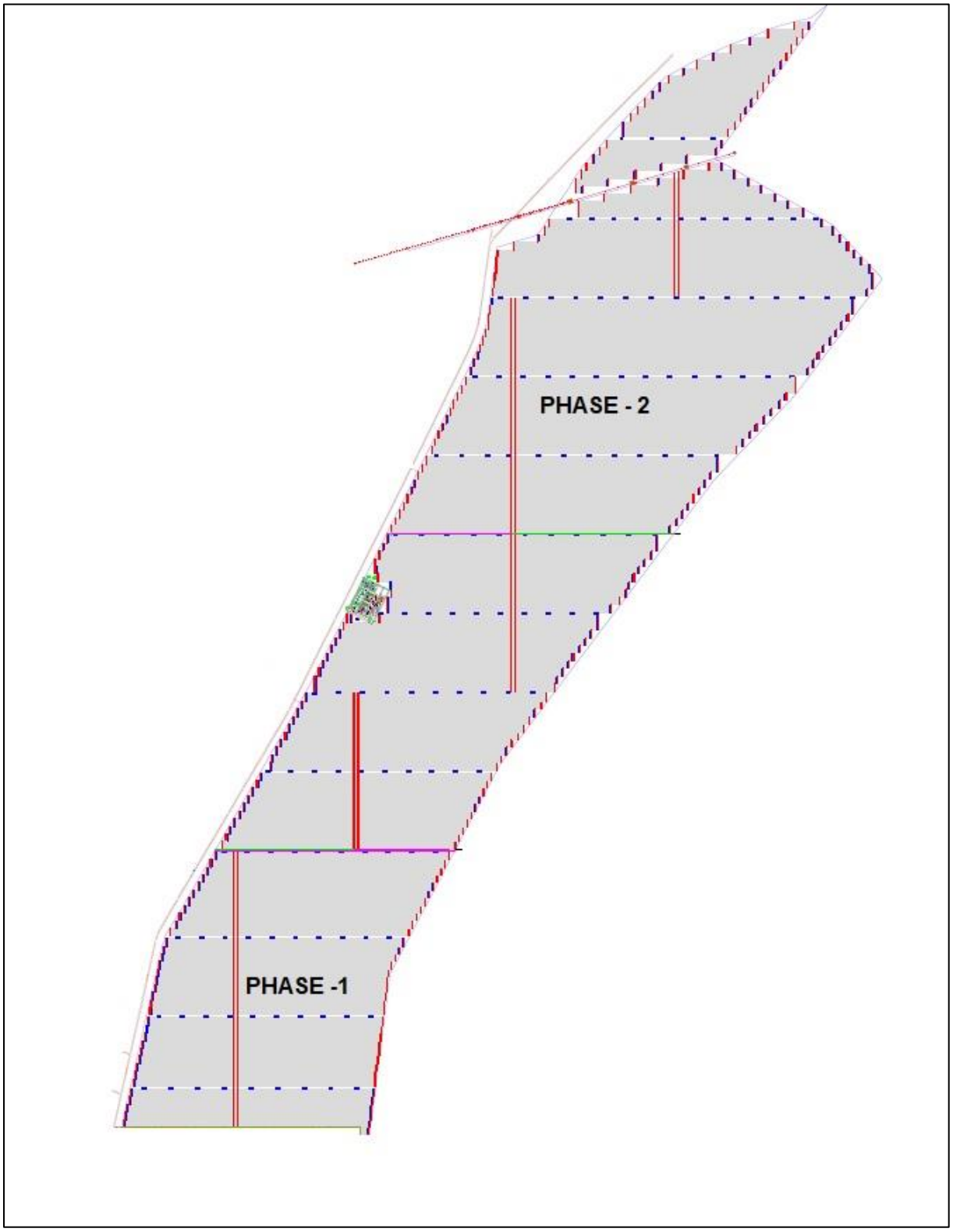

Figure 2-5: Preliminary Plant Layout

2.3.1 Photovoltaic Modules (PV Modules)

PV modules convert solar radiation directly into electricity through the photovoltaic effect in a silent and clean process. The PV effect is a semiconductor effect whereby solar radiation falling onto the semiconductor PV cells generates electron movement. The output from a solar PV cell is DC electricity. A PV power plant contains many cells connected together in modules and many modules connected together in strings to produce the required DC power output.

Bifacial mono PERC half-cell type modules at 1,500 V system voltage will be used for the Project which are manufactured at the Factory that has been established in Ankara, Turkey, for the purpose of supplying PV Modules to Karapınar YEKA SPP Project. Bifacial solar panels have solar cells that absorb light from both the front and the back which allows capturing sunlight that is reflected from the ground as well as from the front of the panel.

A total of 3,376,620 PV panels will be installed at the Karapınar YEKA Solar Power Plant once fully operational.

2.3.2 Mounting / Tracking Systems

Module mounting (or tracking) systems allow PV modules to be securely attached to the ground at a fixed tilt angle, or on sun-tracking frames; modules for the SPP are mounted on a tracking system.

East-west single axis horizontal trackers manufactured by NEXTracker or an equivalent will be used for the Project. Trackers will be driven by an electric motor and a control unit to follow the course of the sun during the day and will allow modules to tilt angle to an angle of between 50° or 60°. The whole tracker structure will be made of galvanized steel to resist corrosion with a design life of more than 25 years. Figure 2-6 presents a single axis tracker system with bi-facial modules and Figure 2-7 shows how trackers allow modules to tilt angle throughout the day.

Figure 2-6: Single Axis Tracker System in Combination with Bi-facial Modules[1]

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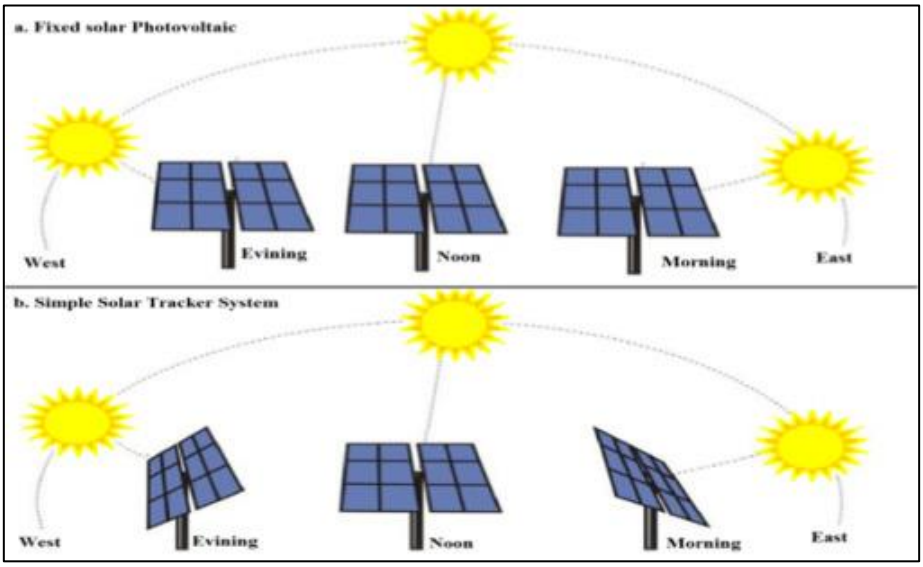
[1] *Source: https://www.solarpowerworldonline.com/2018/05/trending-in-mounting-single-axis-trackers-are-adapting-to-bifacial-designs/*



Source: AL-Rousan et. al, Advances in solar photovoltaic tracking systems: A review, Renewable and Sustainable Energy Reviews Volume 82, Part 3, February 2018)

Figure 2-7: Graphical Diagram Showing Tracking System

2.3.3 Combined Inverter and Step-up Transformer Stations

Inverters are required to convert the DC electricity generated by the PV modules to alternating current (AC) to allow connection to the transmission network.

The output from the inverters needs a further step-up in voltage to reach the AC grid voltage level. The step-up transformer takes the output from the inverters to the required grid voltage.

GE's Solar Power system that combines solar inverters, with medium voltage power transformer and Medium voltage Ring Main Unit within a single container are used for the Project.

For Phase 1 of the SPP (200 MW) 66 inverter stations are required and for Phase 2 (800 MW) 248 inverter stations are required. Accordingly, the inverters have been set up in the northern section of the Power Plant Site near the substation.

Layout showing the inverter stations' locations for Phase 1 is presented in Figure 2-8.

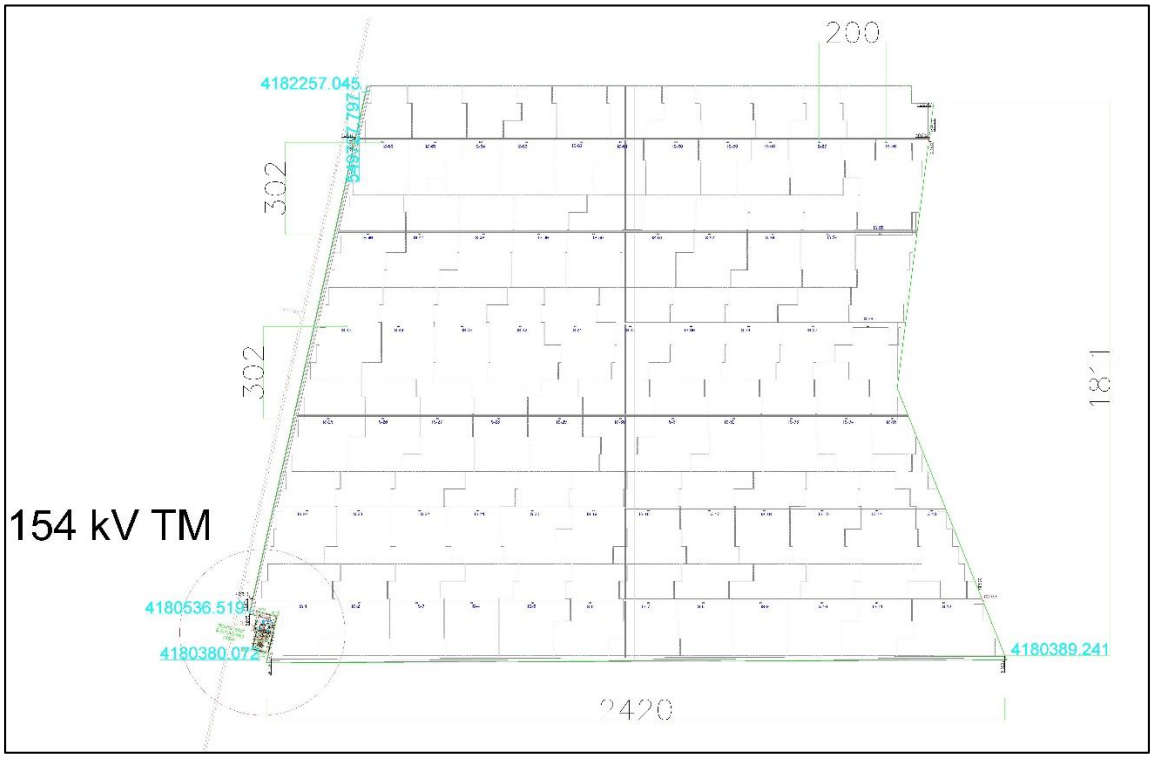


Figure 2-8: Layout of Inverter Stations (Phase 1)

2.3.4 Cabling

The PV arrays will be connected via cables that run either under the PV arrays or underground (at a depth of approximately 1 m) to combiner boxes. Combiner boxes combine the power generated by multiple arrays to larger cabling in order to transmit the power more efficiently to the Medium Voltage (MV) Power Units.

2.3.5 Substations & Energy Transmission Line (ETL)

The Plant will be connected to the national grid electricity transmission network via two connection points:

- 200 MW (Phase 1) will be exported via a high-voltage substation (YEKA 154kV Substation/Southern Side Substation) located on the southern border of the project site and this will connect to the existing Karapınar Transformer substation located 2 km southwest from the site via a new 154 kV overhead transmission line to be built for the project; the exact route for the overhead line is still to be determined but its length is estimated to be around 2.7 km.
- 800 MW (Phase 2) will be exported via a new high voltage substation (YEKA 400 kV Substation/Northern Side Substation) located on the north-western border of the project site connecting to the existing HV (400 kV) overhead transmission line running from Konya-4TM and Yeşilhisar TM (TM: Transformer Substations) via two HV overhead transmission lines 2.7 and 2.8 km length respectively;

In compliance with the national legislation, Connection and System Usage Agreement has been signed between the Project Company and the Turkish Electricity Transmission Company (TEİAŞ) on 03.03.2020, which is the authority responsible from the operation and maintenance of the high voltage ETLs in Turkey. This agreement is valid for the operational lifetime of the Project.

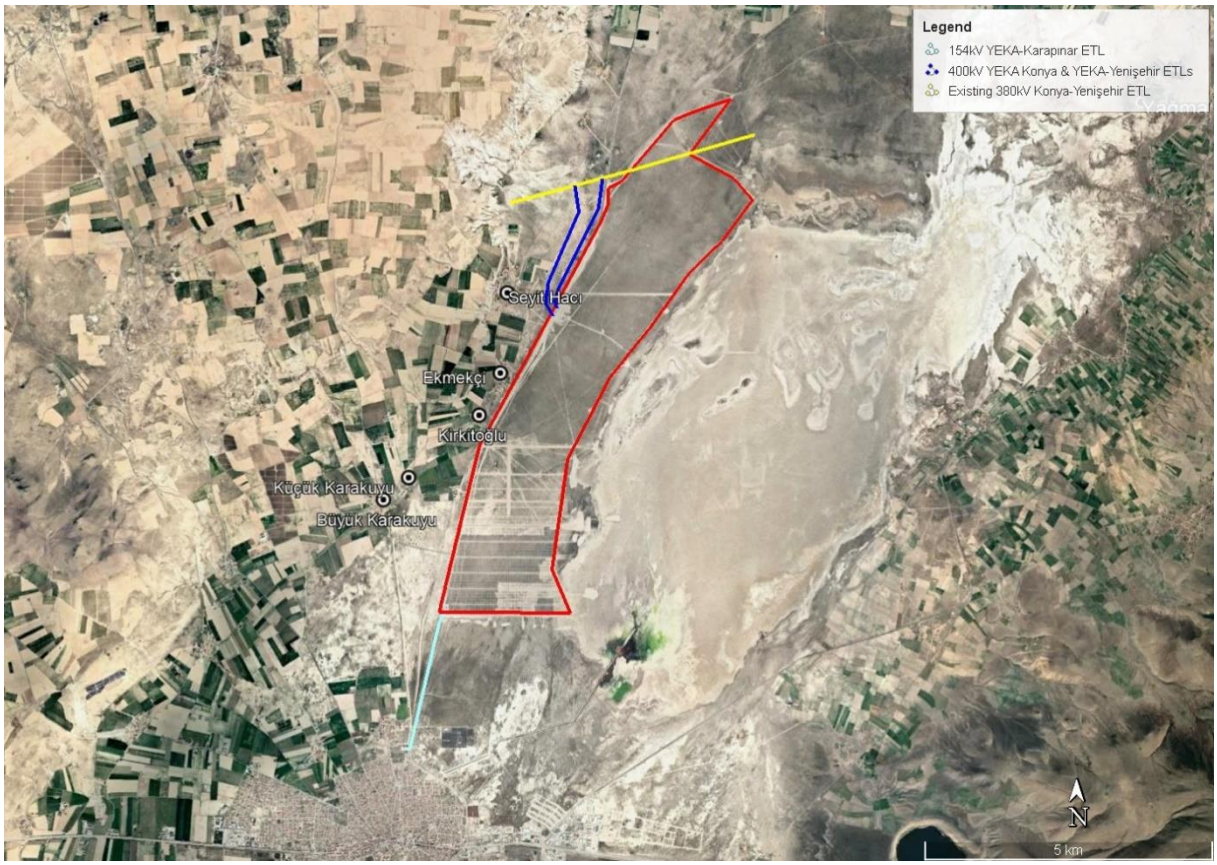


Figure 2-9: Map Showing the Proposed ETLs

2.3.6 Site Access and Internal Roads

There are four access points (two entrance and two exit) to the Phase -1 Area. The first entrance and exit for the Site Offices, which are located on the southern corner of the Site, are used only for light vehicles. The other two access points are for heavy vehicles use. Internal access roads will be built during land preparation for each phase. There will be internal access roads and a ring road surrounding the Project Site. Construction of internal roads is carried out phase by phase with the ring road currently under construction. As of February 2021, 100% of the Phase-1 internal roads was completed. Internal roads are planned in linear form running between PV Modules. Phase 1 internal roads and portion of ring road on the southern boundary of the Site is presented in Figure 2-10. Ring road is col-mixed asphalt to minimise dust generation and internal roads are chip sealed.

Details of main access to the Project Site is described in Section 2.2.1.

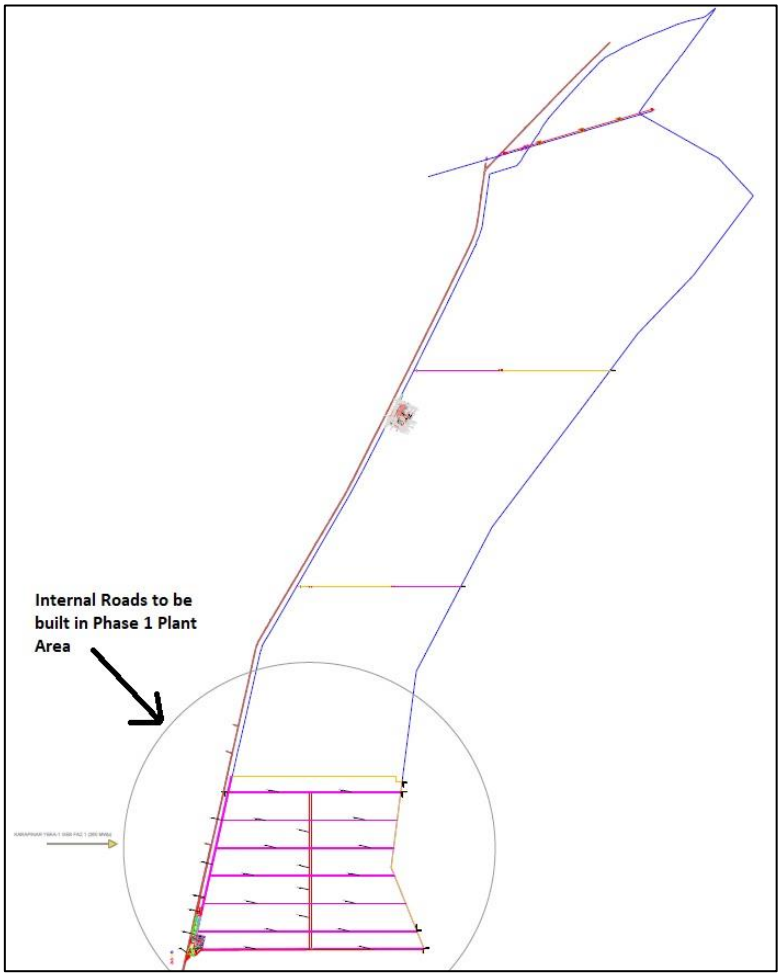


Figure 2-10: Internal Access Roads – Phase-1 Area

2.3.7 Administration Building and Control Centre

Area reserved for the Administration Building will cover an area of approximately 1 ha and located adjacent to the southern border of the YEKA 400kV Substation. There will be an administrative building, control centre, dining hall and warehouses within the administrative building area.

2.3.8 Temporary Construction Laydown Area

Construction Laydown has been established on the southern corner adjacent to the YEKA 154 kV Substation. Construction Laydown consists of the following from south to north:

- Site Offices – Project Company, EPC Contractor and other Contractors;
- Administrative Personnel's Accommodation;
- Administrative Personnel's Dining Hall, Cafeteria;
- Workers' Accommodation;
- Workers' Dining Hall, Kitchen, Cafeteria, Rest Rooms, Laundry Room;

- Prayer Room;
- Storage Area including Closed Storehouse, Chemical Storage Area, and Open Storage Area;
- Equipment Machinery Refuelling & Maintenance Area;
- Light Vehicle Parking Area and Heavy Vehicle Parking Area.

2.4 LAND PREPARATION AND CONSTRUCTION PHASE ACTIVITIES

Land preparation and construction activities as well as schedule, workforce and relevant construction machinery equipment are described below.

2.4.1 Schedule

Site mobilization has commenced in November 2019, with construction laydown area and the worker accommodation established. Land preparation activities at the Power Plant Site itself commenced in May 2020. Construction of SPP will be completed in two phases: Phase -1 will (200MW_{AC} / 260MW_{DC}) in the southern section and Phase -2 (1000 MW_{AC} / 1040 MW_{DC}). Construction and installation works of Phase-1 commenced at the end of June 2020 and planned for completion in June 2021. Construction and installation works of Phase-2 was commenced in March 2021 aiming that complete Karapınar YEKA SPP will be fully operational in August 2023. Phase 1 has started to be commissioned partially with initial 40MW in September 2020 while Phase 2 has started to be commissioned partially in June 2021. Total of 315MW of Phase-1 has been commissioned by July 08, 2021.

Earthworks for 154 kV Substation, 400 kV Substation and 154 kV ETL commenced in November 2019. 154 kV Substation was completed and Provisional Acceptance Certificate was obtained in August 2020. On the other hand, the construction of 400kV ETL was commenced in May 2020 and completed in January 2021.

Internal access roads are designed and constructed within the scope of each construction Phase. Construction of Phase-1 internal roads have commenced in May 2020 and completed by 100% as of end of January 2021.

2.4.2 Workforce and Workers' Accommodation

There are 950-1000 employees on site at the time of revising this ESIA report in December 2020. Around 70-75% of these employees are un-skilled and the rest is technical and administrative personnel according to the information gathered from the Project Company. Project working hours are planned in compliance with the Labour Law. Where possible workforce is being sourced from local communities during the project construction phase. Non-local workforce, including unskilled workforce, administrative staff and engineers, are accommodated at the Camp within the construction laydown area.

2.4.3 Construction Activities

The construction phase activities include the following key activities for Phase-1 and Phase-2:

- Land clearing for site preparation and access roads;
- Excavation and filling;
- Transportation of supply equipment, components and materials;
- Construction of foundations, involving excavations and placement of concrete;
- On-site assembly of tracker systems and installation of PV modules;
- Installation of electrical connection systems, including cabling;
- Construction of offices and warehouses;
- Construction of Substations and ETLs;
- Testing, commissioning and connection to the grid.

Land preparation works include removal of topsoil, excavations and construction of access roads and backfilling/site levelling where required. Firstly, topsoil is removed to a depth of 0.1 m then excavation is carried out. It is estimated that a total of 1.5 x 10^6 m^3 of soil will be excavated for the whole site when construction is over. All of excavation material will be used for backfilling while 20% of it will be used for levelling on site.

As of February 2021, 568,900 m³ of soil has been excavated (38% of total planned amount). All of the excavated soil has been used for backfilling and levelling on site after being temporarily stored on site near the excavation points until they are used for filling.

Table 2-3 summarizes estimated excavation/fill amounts for the Project.

Table 2-3: Estimated Excavation-Fill Volumes

Task	Volume (m^3)
Total Excavation Requirement	**1.5×10^6**
Amount of Excavated Materials to be Reused as Fill Material	1.2×10^6
Amount of Excavated Materials to be Reused for levelling	300×10^3
Total Fill Requirement	**1.5×10^6**

All materials, equipment, and components such as PV panels, inverters, transformers, ETL towers etc. are/will be transported to Site via road. The delivery of PV panels between Ankara and Karapınar is served by dual carriageway roads (two lanes in each direction), the E90 road between Ankara-Aksaray-Karapınar, D715 road between Ankara and Konya and the D330 between Konya and Karapınar. The Karapınar-Eskil road runs along the western boundary of the site and provides access to the Project.

GE, as the contractor responsible for engineering and material supply, manages the project logistics, including all material transportation and installation works for Karapınar YEKA SPP Project.

2.4.4 Construction Machinery and Equipment

Typical list of machinery and equipment that is used for construction activities is provided in Table 2-4. Electricity required during the construction phase will be supplied from on-site diesel generators.

Table 2-4: Construction Machinery and Equipment Planned to be Used

Machinery / Equipment	Current Number (Mobilization)	Estimated Maximum Number during Peak Time
Excavator	2	10
Grader	1	3
Vibratory Roller	2	4
Water Sprinkler	3	4
Loader	2	3
Backhoe loader	1	2
Truck	4	40
Dozer	1	3
Tractor	2	5
Crane	1	5
Diesel generators	2	5
Mobile Fuel Tanker	1	1
Lowbed	1	1
Pick-up Truck	1	5
Bus	1	6

Light Tower	5	7
Manitou	-	15
Rock Machine	-	2
Colon Pile Driver	-	7

2.5 OPERATION AND MAINTENANCE ACTIVITIES

2.5.1 Project Lifetime

The design lifetime of PV Panels is generally 20 years, but in practice panels should last longer with proper maintenance. According to the Technology Overview provided by Kalyon, the whole tracker structure will be made of galvanised steel to resist corrosion with a lifetime of over 25 years.

The Project operation phase will require routine (preventive) maintenance throughout the operation phase to ensure extended system lifetime, as well as compliance with manufacturer warranty and ensure efficiency in energy production.

Routine maintenance activities include regular cleaning of panels (considering the climatic conditions of the region frequent periods may be required) and maintenance of electrical components, control equipment and access roads.

2.5.2 Workforce

For the mobilisation phase 124 personnel were employed while the number of employees on site is around 950-1000 at the time of revising this ESIA in December 2020. The maximum number of personnel during peak construction time is estimated to be 1200. All non-local project staff including technical and administrative staff are accommodated at the Camp Site that was installed on site.

For the operation of Karapınar SPP, 121 personnel will be employed. Non-local operation personnel will be accommodated in Karapınar District.

2.6 WATER USE

Construction Phase

Water demand associated with the construction phase is principally for potable use by project personnel and water required for dust suppression. For operation phase the principal water demand will be for panel cleaning, with water also required for onsite personnel for potable use .

According to the information gathered from the Project Company, water demand for dust suppression varied between 260-320 m^3 during dry periods (rounded up to 10,000 tons for calculations) in 2020. Water demand was supplied from the KOSKI Water Works Potable Water Network for a period of March 2020 through September 2020 and where water supply from the network was not possible, as an alternative resource, groundwater from a well operated by a Quarry in Karapınar was reported to be utilised for a short period of time.

As a way forward the Project Company considered environmentally friendly options for water supply with least impact on resource efficiency and finally decided to meet water demand for dust suppression and green field irrigation through the effluent of the package type WWTP which was commissioned in March 2021. The WWTP was originally planned to be Secondary Treatment type; however, considering the significant water demand and potential discharge concerns, the Project Company has opted out for Advanced Treatment to be able to use the effluent for dust suppression.

The permit application for the WWTP was started in November 2020 with the Konya 3rd Regional Directorate of Highways and Provincial Directorate of Environment and Urbanisation for operating of the package type WWTP and potential discharge points. Provincial Directorate of Environment and Urbanisation requested the Project Company to provide additional information along with the application and application was renewed by the Project Company on 11 February 2021. Following that, the Directorate has requested additional information from the Project Company and the final opinion of the Directorate was permitting the use of treated effluent for irrigation purposes. Copies of available correspondences are provided in Appendix A for reference.

Water demand calculations were made for the period between 2021 and 2023 and the calculation is provided in Table 2-5, water demand calculations for the construction phase (in combination with PV panel cleaning demand of commissioned panels) were made based on the following:

- Maximum number of employees will be 1100 at peak;
- Water consumption of the employees who live at the Camp is 200lt/day;
- Water consumption of the employees who do not live at the Camp is 55lt/day at the Site;
- 11km of internal roads will be constructed between April and September in 2021;
- 28km of internal roads will be constructed between March and November in 2022;
- 8.6km of internal roads will be constructed between March and June in 2023;
- Potable water demand and water demand for panel cleaning will be met by KOSKI Network;
- Water demand for dust suppression and green field irrigation will be met by treated water on-site;
- 1.25 safety factor is applied to estimated water demand for dust suppression;
- Capacity of KOSKI Network is 3lt/s which corresponds to 7760 tons/month;
- Drinking water is purchased as bottled water from the local market and municipal (tap) water from Karapınar Municipality Network (KOSKI) is used for other potable uses.

Accordingly, maximum potable water demand is estimated to be 4,860 tons/month.

According to the up-to-date information gathered from the Project Company, water demand for dust suppression per km of road construction is estimated to be approximately 1,450 m^3 with 0.25 safety factor during the rest of the construction period.

While water for dust suppression and green field irrigation is planned to be supplied by the treated effluent, remaining portion of water demand (potable water and panel cleaning water) is planned to be supplied through the KOSKI Potable Water Supply Network.

According to the verbal communication held with KOSKI representatives, the network has capacity of supplying 3 l/s (7,760 tons/month) water to the Project. Additionally, Kalyon has applied to KOSKI requesting for provision of additional water via tankers where water supply through the network is interrupted or not sufficient to meet Project demand on 20 April 2021; KOSKI, on 22 April 2021, has issued an official letter confirming that where water supply through the network is interrupted or not sufficient to meet Project demand they will provide water via tankers in the bill of fee as response to the Project Company's request for confirmation. Copies of available correspondences are provided in Appendix A for reference.

It should be noted that the PV panels have been partially commissioned since September 2020 and capacity is being increased by 40MW every month in parallel to on-going construction activities. Based on the planned number of commissioned PV panels for each month and assumption that the PV Panel cleaning will be carried out via wet cleaning only (worst-case scenario), maximum water demand to be supplied through the KOSKI Network is estimated to be 5660, 6700 and 7460 tons/month in 2021, 2022 and 2023 respectively, KOSKI Network is considered sufficient to meet the Project's water demand during construction phase.

Operation Phase

Water demand during operation phase will be mainly for wet panel cleaning.

According to the most recent information gathered from the Project Company, alternative cleaning schemes including Dry Cleaning and Wet+ Dry Cleaning have been considered. However, the feasibility studies are not completed yet. Therefore, the Project Company has provided Rina with the estimated water demand for wet cleaning as worst case scenario during the operations (Water demand calculations for operation phase is provided in Table 2-6.).

Accordingly, when the Plant is fully operational, water demand for panel cleaning will be 15,600 m^3/year (2,600 m^3/month between April and September) in case wet cleaning is solely applied.

Wet cleaning is planned to be carried out in three cycles every year (between April-September). Once fully operational, it is planned to supply water for wet cleaning of PV Panels from the KOSKI Potable Water Network. As

explained above, according to the verbal communication held with KOSKI representatives, the network has capacity of supplying 3 l/s (7,760 m^3/month) water to the Project. Considering that water demand for PV Panel cleaning will be 2,600 m^3/month between April-September when it is fully operational and the fact that KOSKI, on 22 April 2021, has issued an official letter confirming that where water supply through the network is interrupted or not sufficient to meet Project demand they will provide water via tankers in the bill of fee as response to the Project Company's request for confirmation dated 20 April 2021.

KOSKI Network supply is considered to be sufficient during operations.

Consultations have been on-going to secure water supply from the Municipality's Potable Water Network and KOSKI has issued official letters confirming the capacity available to the Project. According to the recent official letter of KOSKI, the system has a capacity of 4 l/s which means that there is more available capacity than the capacity used in calculations (Table 2-5).

Since the minimum use of water is also aimed, dry cleaning alternative is also considered. An on-site demo was performed by a local company, but required cleaning efficiency to maintain the desired power generation efficiency could not be met posing a risk of production loss. The Project Company plans evaluation of additional technologies offered by other companies during construction.

As another alternative, the Project Company plans to try 2-cycle wet cleaning instead of 3-cycle between April 2021 and September 2021 to be able to evaluate cleaning efficiency. 33% reduction in water demand is anticipated by applying 2-cycle wet cleaning option providing that it does not yield loss of production. Evaluation of 2-cycle wet cleaning and additional dry cleaning technologies is expected to be finalised in October 2021.

Table 2-5: Water Demand /Supply Calculations for Dust Suppression and PV Panel Cleaning during Construction (Wet Cleaning Only Scenario)

		2021											
		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
DEMAND	Planned Number of Employees				700	850	1000	1100	1100	1000	900	750	500
	Number of Employees Living in the Camp				500	700	700	700	700	700	700	400	300
	Number of Employees not living in the camp	0	0	0	200	150	300	400	400	300	200	350	200
	Water Demand of Employees living in camps (200lt/cap)				3000	4200	4200	4200	4200	4200	4200	2400	1800
	Water Demand of Employees not living in camps (55 lt/cap) (ton/month)				330	247.5	495	660	660	495	330	577.5	330
	Total Potable Water Demand (ton / month)	0	0	0	3330	4447.5	4695	4860	4860	4695	4530	2978	2130
	Water Demand for Panel Cleaning (ton / month)					520	640	720	800	880			
	Water Demand for Dust Prevention (tons / month) (11 km road construction)				2656	2656	2656	2656	2656	2656			
	Total Water Demand (ton/month)	0	0	0	5986	7624	7991	8236	8316	8231	4530	2978	2130
	Green Field Irrigation Water (tons/month) (Treated Water – Demand for Dust Prevention)	0	0	0	674	1792	2039	2204	2204	2039	4530	2978	2130
SUPPLY	Treated Water (ton / month)	0	0	0	3330	4447.5	4695	4860	4860	4695	4530	2978	2130
	KOSKI Network (ton / month) (Capacity: 3 lt/s: 7760 tons/month)	0	0	0	3330	4967.5	5335	5580	5660	5575	4530	2977.5	2130
		2022											
		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
DEMAND	Planned Number of Employees	450	650	850	850	850	1000	1100	1100	1000	900	850	500
	Number of Employees Living in the Camp	250	350	700	700	700	700	700	700	700	700	700	300
	Number of Employees not living in the camp	200	300	150	150	150	300	400	400	300	200	150	200
	Water Demand of Employees living in camps (200lt/cap)	1500	2100	4200	4200	4200	4200	4200	4200	4200	4200	4200	1800
	Water Demand of Employees not living in camps (55 lt/cap) (ton/month)	330	495	247.5	247.5	247.5	495	660	660	495	330	247.5	330
	Total Potable Water Demand (ton / month)	1830	2595	4447.5	4447.5	4447.5	4695	4860	4860	4695	4530	4447.5	2130
	Water Demand for Panel Cleaning (ton / month)			1440	1520	1600	1680	1760	1840				
	Water Demand for Dust Prevention (tons / month) (28 km road construction)			4516	4516	4516	4516	4516	4516	4516	4516	4516	
	Total Water Demand (ton/month)	1830	2595	10403.5	10483.5	10563.5	10891	11136	11216	9211	9046	8963.5	2130
	Green Field Irrigation Water (tons/month) (Treated Water – Demand for Dust Prevention)	1830	2595	-68.5*	-68.5*	-68*	179	344	344	179	14	-68.5*	3514.5
SUPPLY	Treated Water (ton / month)	1830	2595	4447.5	4447.5	4447.5	4695	4860	4860	4695	4530	4447.5	3514.5
	KOSKI Network (ton / month) (Capacity: 3 lt/s: 7760 tons/month)	1830	2595	5887.5	5967.5	6047.5	6375	6620	6700	4695	4530	4447.5	2130
		2023											
		Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
DEMAND	Planned Number of Employees	450	650	850	850	850	1000	1100	1100	500	500	500	300
	Number of Employees Living in the Camp	250	350	700	700	700	700	700	700	350	350	350	100
	Number of Employees not living in the camp	200	300	150	150	150	300	400	400	150	150	150	200
	Water Demand of Employees living in camps (200lt/cap)	1500	2100	4200	4200	4200	4200	4200	4200	2100	2100	2100	600

	Water Demand of Employees not living in camps (55 lt/cap) (ton/month)	330	495	247.5	247.5	247.5	495	660	660	247.5	247.5	247.5	330
	Total Potable Water Demand (ton / month)	1830	2595	4447.5	4447.5	4447.5	4695	4860	4860	2347.5	2347.5	2347.5	930
	Water Demand for Panel Cleaning (ton / month)				2600	2600	2600	2600	2600	2600			
	Water Demand for Dust Prevention (tons / month) (8.6 km road construction)			3121	3121	3121	3121						
	Total Water Demand (ton/month)	1830	2595	7568.5	10168.5	9888.5	10416	7460	7460	4947.5	2347.5	2347.5	930
	Green Field Irrigation Water (tons/month) (Treated Water – Demand for Dust Prevention)	1830	2595	1326.5	1326.5	1326.5	1574	4860	4860	2347.5	2347.5	2347.5	930
SUPPLY	Treated Water (ton / month)	1830	2595	4447.5	4447.5	4447.5	4695	4860	4860	2347.5	2347.5	2347.5	930
	KOSKI Network (ton / month) (Capacity: 3 lt/s: 7760 tons/month)	1830	2595	4447.5	7047.5	6767.5	7295	7460	7460	4947.5	4947.5	4947.5	930

**: Water demand for green field irrigation will be supplied from KOSKI Network*

Table 2-6: Water Demand for PV Panel Cleaning when Fully Operation (Wet Cleaning Only Scenario)

KARAPINAR YEKA 1.3GWp SPP - PV MODULE CLEANING REQUIREMENTS						
Project Information						
Project Capacity	1348	MWp	**Wet Cleaning**	3	Times/Year	* Estimated wet cleaning per year. Each cylcle will be completed in two months by dividing panels into two groups.
PV Module Quantity	3,376,890	pcs				
PV Module Area	6,862,165	m2				
Structure Passaway Tolerance	10%					
Total area to be cleaned	7,548,381.13	m2/per cleaning				
Total area to be cleaned/year	22,645,143.38	m2/year				

Required Water		
Water Consumption	3.86	m3/MWp
Cleaning Water Consumption for whole plant	5200	m3/Cleaning

Yearly Water Consumption	15600	m3

Monthly Distribution of Water Consumption												
	January	**February**	**March**	**April**	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**
Consumption per Month (m3)	0	0	0	2600	2600	2600	2600	2600	2600	0	0	0
Average Water Consumption per Day(m3)	-	-	-	87	87	87	87	87	87	-	-	-

2.7 PROJECT ALTERNATIVES

Turkish Ministry of Energy and Natural Resources organized a competitive tender for the establishment of an integrated 500 MWp/year capacity photovoltaic (PV) solar module production plant, a Research and Development (R&D) Centre and 1GW solar energy power plant in the Karapinar district of Konya on land defined as Renewable Energy Resource Area (YEKA). Kalyon was awarded this tender in March 2017 and established a company called Kalyon Güneş Enerjisi Üretim A.Ş. The electricity generated from the solar power plant, will be purchased by the government based on the guarantee price offered for 15 years.

2.7.1 No Development Option

It is worth mentioning that if the “no-development” alternative be selected, the land for the development would still be used for other renewable energy projects as the site is designated as YEKA and has been designated for renewable energy projects.

Considering the type and nature of the single project and that its minimal potential impacts, the “no development” alternative has not been given further consideration.

2.7.2 Alternative Site Location

With reference to “Site Selection Survey Report” prepared by Ministry of Science, Industry and Technology, two alternative sites have been considered as YEKA site; and current project site has been selected as appropriate by the Government. Following that a competitive tender was organised for the subject YEKA Site and Kalyon was awarded this tender as described above.

2.7.3 Alternative Technologies

The project technology was also determined as photovoltaic solar energy by the Ministry during tender stage; therefore, no alternatives has been considered by the Project Company. However, PV systems are one of the most preferred and feasible do not release any air or water pollution into the environment. Also, photovoltaic systems are quiet and visually unobtrusive. Considering these facts, alternative technologies haven’t been given further consideration.

3 POLICY, INSTITUTIONAL AND LEGAL FRAMEWORK

This Chapter describes the institutional, national and international legal framework relevant to Karapinar YEKA SPP Project, covering national environmental, cultural, health and safety legislation, as well as international environmental and social standards, including the International Finance Corporation's (IFC) Environmental and Social (E&S) Sustainability Policy (2012) and related Performance Standards (PSs); EBRD E&S Policy (April 2019) and related Performance Requirements (PRs) and Equator Principals (EPs) IV.

3.1 NATIONAL REGULATORY FRAMEWORK

National regulation framework applicable to the management of environmental, social, labour and energy generation subjects within the scope of the Project are detailed in below sections.

3.1.1 RELEVANT INSTITUTIONS

The following ministries and directorates are considered as the relevant government institutional stakeholders:

- Ministry of Environment and Urbanization (MoEU)
- General Directorate of Nature Conservation and National Parks
- Provincial Directorate of Environment and Urbanization
- Ministry of Agriculture and Forestry
- Provincial Directorate of Agriculture and Forestry
- Ministry of Energy and Natural Resources
- Energy Market Regulatory Authority
- Ministry of Family, Labour and Social Services
- Ministry of Transport and Infrastructure
- Ministry of Health
- Provincial Directorate of Family, Labour and Social Services
- Governorship of Konya
- District Governorship of Karapınar
- Konya Metropolitan Municipality
- Karapınar Municipality.

3.1.2 Environmental and Social Legislation in Force

Turkish Environmental Law (No. 2872), which was first published in the Official Gazette No. 18132 dated August 11, 1983, defines the main principals for the protection of environment in line with sustainable environment and development principles, in addition to relevant institutional responsibilities. It also outlines the legislative framework for regulation of industries and their liabilities regarding the assessment and management of potential impacts on environment due to their activities.

The most recent amendments to the Environmental Law were introduced on December 10, 2018 (No: 7153) and February 22, 2019 (No: 7166).

In addition to Environmental Law and the associated regulations, there are other laws that complement the regulation related to the protection of environment, social rights and safety of community, including:

- Expropriation Law (Law No: 2942)
- Pasture Law (Law No:4342)
- Groundwater Law (Law No: 167)
- Law on National Parks (Law No: 2873)
- Law on Conservation of Cultural and Natural Assets (Law No: 2863)
- Traffic Law (Law No: 2918)
- Labour Law (Law No:4857)
- Law on Soil Conservation and Land Use (Law No:5403)
- Municipality Law (Law No: 5393)

- Public Health Law (Law No: 1593)
- Settlement Law (Law No: 5543).

Under the relevant laws, regulations, communiques and by-laws applicable to the Project include but are not limited to:

General

- Regulation on Environmental Impact Assessment
- Regulation on Environmental Permits and Licenses
- Regulation on Environmental Audit
- Regulation Concerning Environmental Management Services Consulting Firms
- Communique on Certificate of Competency
- Regulation for Starting Up and Opening a Workplace.

Air Quality

- Regulation on Assessment and Management of Air Quality
- Regulation on Control of Industrial Air Pollution
- Regulation on Control of Exhaust Gas Emission
- Regulation on Monitoring of Greenhouse Gas Emissions
- Regulation of Control of Air Pollution Originated from Heating
- Regulation on Reduction of Sulphur Rates in Certain Types of Fuels.

Noise

- Regulation on Assessment and Management of Environmental Noise (RAMEN)
- Regulation on Environmental Noise Emission Caused by Equipment Used Outdoors

Land Use and Soil Protection

- By-Law on Protection and Use of Agricultural Lands and Land Consolidation
- Implementation Regulation of 16th Article of the Forestry Law
- Implementation Regulation of 17/3rd and 18th Articles of the Forestry Law
- Regulation on Land Consolidation
- Regulation on the Control of Soil Pollution and Lands Contaminated by Point Sources.

Water Resources

- Water Pollution Control Regulation
- Regulation on Monitoring of Surface Water and Groundwater
- Regulation on Surface Water Quality
- Regulation on Protection of Groundwater against Pollution and Deterioration
- Regulation on Control of Pollution Caused by Hazardous Substances in the Aquatic Environment and Its Surroundings
- Regulation on Water Intended for Human Consumption
- Regulation on Pit Opening Where Sewer System Construction is not Applicable.

Waste Management

- Regulation on Waste Management
- Regulation on the Control of Excavation Soil, Construction and Demolition Waste
- Communique on Transportation of Wastes by Highway
- Regulation on the Landfill of Wastes
- Regulation on Control of Packaging Wastes
- Regulation on the Control of Medical Wastes
- Regulation on the Control of Waste Oils
- Regulation on the Control of Waste Batteries and Accumulators
- Regulation on the Control of Waste Tires
- Regulation on the Control of Waste Vegetable Oils

- Regulation on the Control of Waste Electrical and Electronic Equipment
- Communique on Recovery of Some Non-Hazardous Wastes
- Regulation on the Control of End-of-Life Vehicles
- Zero Waste Regulation.

Chemicals

- Regulation on Classification, Labelling and Package of the Materials and Mixtures
- Regulation on the Control of Polychlorinated Biphenyls (PCBs) and Polychlorinated Terphenyls (PCTs)

Labour, Health and Safety

- Regulation on Occupational Health and Safety Services
- Regulation on Risk Assessment for Occupational Health and Safety
- Communiqué on Hazard Classes List related to Occupational Health and Safety
- First Aid Regulation
- Regulation Concerning the Classification, Packaging and Labelling of Dangerous Substances
- Regulation Concerning the Protection of Workers from Risks Associated with Noise
- Regulation Concerning the Protection of Workers from Risks Associated with Vibration
- Regulation on Management of Dust
- Regulation on Personal Protective Equipment
- Regulation Concerning the Use of Personal Protection Equipment at Workplaces
- Regulation on Emergency Situations in Workplaces
- Regulation on Health and Safety at Construction Works
- Regulation on Health and Safety Conditions Regarding Use of Work Equipment
- Regulation on Health and Safety Regarding Temporary and Time Limited Works
- Regulation on Health and Safety Precautions Regarding Working with Chemicals
- Regulation on Health and Safety Signs
- Regulation on Material Safety Data Sheets on Hazardous Materials and Mixtures
- Regulation on Methods and principals for Workers Health and Safety Trainings
- Regulation on Protecting Workers from Hazards of Explosive Environments
- Regulation on Prevention and Mitigation of Impacts of Large-Scale Industrial Accidents
- Regulation on Subcontractors
- Regulation on Suspension of Work in Workplaces
- Regulation on the Transportation of Dangerous Materials on Motorways
- Regulation on Vocational Training of the Employees Working in Dangerous and Highly Dangerous Workplaces
- Regulation on the Protection of Buildings from Fire.

Social

- Regulation on Implementation of Resettlement Law.

3.1.2.1 Environmental Impact Assessment Regulation

In accordance with the Article 10 of the Environmental Law, the institutions, organizations and facilities that may lead to environmental issues because of their planned activities are obliged to submit an Environmental Impact Assessment (EIA) Report or a Project Description File to the Ministry of Environment and Urbanization (MoEU). Within this context, the EIA Regulation was first put into force after being published in the Official Gazette numbered 21489 and dated February 7, 1993. The last and currently in force EIA Regulation was published in the Official Gazette numbered 29186 and dated November 25, 2014. The latest amendment to the Regulation was done on November 28, 2019.

Annex-1 and Annex 2 of the EIA Regulation, based on activity type and/or facility capacity, categorize investments and facilities as projects subject to full-scale EIA process (Annex-1) or projects subject to screening-elimination process (Annex-2).

For the investments listed under Annex-2, initially a Project Description File is prepared in accordance with the format specified under Annex-4 of the Regulation, and the MoEU evaluates the necessity for a full-scale EIA study for the subject project.

Categorization of the solar power plant projects under the current EIA Regulation is described below:

- Full EIA process (Annex-1) is required for SPP projects with a project area of and above 20ha or capacity of 10 MWe and above;
- Screening-elimination process (Annex-2) is required for SPP projects with a project area of 2ha to 10ha and a total installed capacity of 1 MWe to 10 MWe (excluding roof and façade systems);
- SPP projects that have less than 1 MWe installed capacity are not subject to screening-elimination process.

Since the Project has been classified as Renewable Energy Resource Area (YEKA) under the Law on Utilization of Renewable Energy Resources for Electricity Generation (Law No: 5346), the EIA Process of such projects (YEKA Projects) are subject to the Ministry decision.

EIA permitting process for "Konya-Karapınar Industrial Zone for Energy Generation, Section-1 1,500 MWe Solar Power Plant Project" had been initiated by the Project Owner, who was the Ministry of Science, Industry and Technology, General Directorate of Industrial Sites at the time of EIA Process.

An EIA Report has been prepared by an Environmental Consultancy Company (Serdar Mühendislik Ltd., 2016) on behalf of the Project Owner and "EIA Positive Certificate" (Certificate NO: 4387) was obtained from the MoEU on November 22, 2016. Following the hand-over of the Karapınar YEKA SPP Project to Hanwha-Kalyon Güneş Enerjisi Üretim A.Ş. (Company Name was changed in August 2018 to Kalyon Enerji Yatırımları A.Ş), written approval on validity of the EIA Positive Certificate for Hanwha-Kalyon Güneş Enerjisi Üretim A.Ş. was obtained from the Konya Provincial Directorate of Environment and Urbanization on November 28, 2017. Copies of the EIA Positive Certificate and the EIA Transfer Certificate are provided in **Appendix A** for reference.

According to the Annex-1 and Annex-2 of the EIA Regulation, EIA process for ETL projects are categorized as follows:

- Full EIA process (Annex-1) is required for ETLs with voltage above 154 kV and length of 15 km and over;
- Screening-elimination process (Annex-2) is required for ETLs with voltage above 154 kV and length of 5-15 km;
- No EIA process is required for ETLs with voltage level below 154 kV or ETLs with voltage level above 154 kV but length less than 5 km.

Accordingly, no EIA process is required for the overhead transmission lines as their lengths are less than 5km. Related Decision Letter of Konya Provincial Directorate of MoEU is provided in **Appendix A** for reference.

3.1.3 Pasture Law

Pasture Law (Law No:4342) governs the identification and limitation of pastures, highlands, winter quarters, public grasslands and meadows that have been used immemorially (ancient use) or previously allocated by various laws; their allocation on behalf of legal entities; their usage, maintenance and improvement, increasing and maintaining their efficiency, continuous supervision protection and change of the allocation purpose when necessary.

The Project Area consists of lands previously registered as pasture lands; this was subsequently status of which was changed by the Ministry of Energy and Natural Resources (MoENR) to Karapınar Energy Specialized Industrial Zone (KESIZ) in accordance with the Pasture Law during the YEKA Project development prior to the EIA Process.

3.1.4 Expropriation Law

In Turkey, any expropriation needs to comply with the Expropriation Law No. 2942. The Expropriation Law, where public interest requires, sets out the procedures for expropriation of immovable property in possession of natural and private legal entities by the state and public legal entities, methods for calculation of the expropriation price, registration of the immovable property and the right of way in the name of the authority, and settlement of related disputes.

These provisions of the Law are also applicable for expropriations in the name of natural and private legal entities. Unlike in purchase procedures, the owner's consent will not be sought for the immovable property to be

expropriated. Expropriation involves compulsory appropriation of the immovable property by the State for public interest.

3.1.5 Labour Law and Regulations

The Labour Law governs subjects related to labours (No: 4857, published in Official Gazette numbered 25134 and dated June 10, 2003). The Labour Law also covers legislative framework for the regulation of industries and their potential impact on human health and safety.

In addition, Occupational Health and Safety Law (No: 6331, published in Official Gazette numbered 28339 and dated June 30, 2012) outlines the legal framework for health and safety at workplaces. Legislation in relation with these laws is provided in Section 3.1.1.

3.1.6 Biodiversity and Sensitive Areas

The importance of protecting biological diversity is emphasized in Article 9 of the Environmental Law (amendment came into force by the Law 5491 dated April 26, 2006) that introduces penal sanctions against damage to the environment, including destruction of biological diversity, if detected through inspection and audits. Associated laws and regulations governing the conservation of habitats and species in Turkey are:

- Regulation on Protection of Wildlife and Wildlife Development Areas
- Law on National Parks
- Law for the Protection of Cultural and Natural Assets
- Decree-Law Establishing the Special Environmental Protection Agency
- Terrestrial Hunting Law
- Law on Fisheries
- Law for the Protection of Animals
- Regulation for the Protection of Wetlands
- Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora
- Regulation on Fisheries.

In addition to these laws, other environmental regulations and legislations ensure management of environmental aspects (i.e. air quality, environmental permitting, management of chemicals, noise control, soil quality, water quality and waste management) that might have secondary impacts on biodiversity.

3.1.7 Cultural Heritage

In line with the Law on Preservation of Cultural and Natural Assets No. 2863 (amended by Law No. 3386), published in the Official Gazette No. 18113 and dated 23 July 1983, movable and immovable cultural and natural heritage assets are protected and should be conserved. According to the Law, key heritage assets that are identified as cultural and natural heritage under legal protection are defined as follows:

- Natural and immovable cultural assets of the 19th century and earlier.
- Any immovable cultural asset constructed after the end of the 19th century but categorized as “a significant asset which requires preservation” by the Ministry of Culture and Tourism.
- Immovable cultural assets located within the Protected Sites that are specified by the Law.

According to the Law on the Conservation of Cultural and Natural Assets No. 2863, all cultural and natural assets requiring protection are considered as state property. As stated in the same law, the Ministry of Culture and Tourism and its local branches (Boards for Conservation of Cultural Assets and Museums) are the main national government institutions that have the authority to conduct studies for the identification and registration of cultural assets and to define the conditions of conservation and use of these sites.

The requirements set out in Law on Preservation of Cultural and Natural Assets that will be complied with during the project activities are as follows:

- Obligation to notify (Article 4);

- Quality of state property (Article 5);
- Transfer to museums (Article 25).

3.1.8 Energy Production

There are multiple national laws and regulations on energy generation that are related to the Project; these include but are not limited to the following:

- Law on Utilization of Renewable Energy Resources for Electricity Generation (Law No: 5346)
- Electricity Market Connection and System Use Regulation
- Electricity Market Distribution Regulation
- Electricity Market License Regulation
- Regulation on Competitions Regarding Preliminary License Applications Made for Installation of Energy Generation Facilities Based on Wind and Solar Power.

Law on Utilization of Renewable Energy Resources for Electricity Generation has direct relation to the Karapınar YEKA SPP Project. The Project Site was classified as Renewable Energy Resource Area (YEKA) by the Government and a tender was held on March 23rd, 2017. Upon award on September 15th, 2017 Kalyon obtained Renewable Energy Production License, and therefore development, design, permitting and operation of the Project is governed by this Law.

3.2 PERMITS, LICENSES AND APPROVALS

Permits, licenses and approval applicable to the Karapınar YEKA SPP Project are listed in Table 3-1.

Table 3-1: Relevant Permits, Licenses and Approvals

Permit	Related Authority/Entity	Status/Remarks
Energy Generation Preliminary License (ÖN/7685-25/03862	Energy Market Regulation Authority	Obtained on February 15, 2018.
Energy Generation Final License (EÜ/9531-2/04598)	Energy Market Regulation Authority	Obtained for 1,300MW_{DC} on September 3, 2020 Valid until June 15, 2052 Following that the license was amended for 1,348MW_{DC} based on the latest configuration.
EIA Positive Certificate for the Plant (Certificate No: 4387)	Ministry of Environment and Urbanization	Obtained on November 22, 2016 under the name of Ministry of Science, Industry and Technology (which is replaced by Ministry of Industry and Technology). Confirmation of validity/transfer of the existing EIA Positive Certificate for the Project Company obtained on December 06, 2019.
ETL Connection Agreement	Turkish Electricity Transmission Company	Signed on March 03, 2020
Zoning Plan Approval	Ministry of Science, Industry and Technology (which is replaced by Ministry of Industry and Technology).	Obtained on September 13, 2018.
Preliminary and Final Design Approval	Ministry of Energy and Natural Resources	Preliminary Design Approval was obtained on April 01, 2020. Final Design Approval was obtained on September 09, 2020.

Building Permit for substations and administrative buildings	Metropolitan Municipality of Konya Municipality of Karapınar	Building permits for 154 kV and 400 kV substations were obtained on June 01, 2020 and September 08, 2020 respectively.
Opinion Letter on Military Forbidden Zones and Safety Zones	Presidency of General Staff	Obtained on May 29, 2020.
Waste Disposal Agreements	Municipality/Licensed Disposal Firms	Service agreement is expected to be signed in February 2021
Wastewater Disposal Agreement	Municipality	Permit is expected to be issued by the end of February 2021
Temporary Acceptance	Ministry of Energy and Natural Resources	Temporary Acceptance Certificate was obtained partially for 3,430 kWe installed capacity on January 28, 2021. This will be amended gradually as the Plant is being commissioned gradually.
Workplace Opening and Operating Permit	Municipality/Governorate	Expected timeframe for obtaining permits for different project components are listed below: Substation 154 kV (March 01, 2021) Substation 400 kV (August 01, 2021) Cluster 1 - 260 MW (August 01, 2020) Entire Plant – 1,348 MW (October 01, 2023)
Waste Management Plan Approval	Provincial Directorate of Environment and Urbanization	Application was completed approval is expected to be obtained in February 2021
Fire Compliance Report	Karapınar Department of Fire	Approval for 200MW operational area has been obtained September 03, 2020. Approvals will be obtained gradually for the rest of the Plant.

3.3 INTERNATIONAL STANDARDS

In addition to the applicable national Laws, this ESIA Report has been prepared with reference to the following international policies and procedures regarding the assessment and management of environmental and social impacts of the projects that are adopted by the international finance institutions (IFIs):

- Equator Principles (EPs) IV (which comes into force on 1st October 2020);
- IFC Performance Standards (PS) (2012);
- IFC General and Sector Specific Environmental Health and Safety (EHS) Guidelines;
- EBRD Environmental and Social Policy (2019) and Performance Requirements (PR);
- OECD Common Approaches (2016).

In addition, consideration has also been given to European Union EIA Legislation and relevant International Conventions and Protocols signed by Turkey.

3.3.1 Equator Principles IV

First issued in 2006, the Equator Principles is a risk management framework, adopted by 97 financial institutions (known as Equator Principles Financial Institutions or EPFIs) in 37 countries to support certain investment decisions by applying environmental and social standards to determine, assess and manage environmental and social risks in projects. EP IV (the fourth iteration of the EPs that in force since October 2020) comprises 10 core principles:

- **Principle 1 - Review and Categorization:** When a Project is proposed for financing, the finance institution will, as part of its internal environmental and social review and due diligence, categorize it based on the magnitude of its potential environmental and social risks and impacts. Such screening is based on the environmental and social categorization process of IFC (Category A, B or C). Using categorization, the finance institutions' environmental and social due diligence is commensurate with the nature, scale and stage of the Project, and with the level of environmental and social risks and impacts.
- **Principle 2 - Environmental and Social Assessment:** For all Category A and Category B Projects, the finance institution will require the client to conduct an Assessment process to address, to the finance institution's satisfaction, the relevant environmental and social risks and impacts of the proposed Project. The Assessment Documentation should propose measures to minimize, mitigate, and offset adverse impacts in a manner relevant and appropriate to the nature and scale of the proposed Project, and include assessments of potential adverse Human Rights impacts and climate change risks as part of the ESIA or other Assessment.
- **Principle 3 - Applicable Environmental and Social Standards:** The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.
- **Principle 4 - Environmental and Social Management System and Equator Principles Action Plan:** For all Category A and Category B Projects, the finance institution will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards.
- **Principle 5 - Stakeholder Engagement:** For all Category A and Category B Projects, the finance institution will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. The client will tailor its consultation process to the risks and impacts of the Project; the Project's phase of development; the language preferences of the Affected Communities; their decision-making processes; and the needs of disadvantaged and vulnerable groups. This process should be free from external manipulation, interference, coercion and intimidation.
- **Principle 6 - Grievance Mechanism:** For all Category A and, as appropriate, Category B Projects, the finance institution will require the client, as part of the Environmental and Social Management System, to establish a grievance mechanism designed to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The grievance mechanism is required to be scaled to the risks and impacts of the Project and have Affected Communities as its primary user.
- **Principle 7 - Independent Review:** For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the finance institution's due diligence, and assess Equator Principles compliance.
- **Principle 8 - Covenants:** An important strength of the Equator Principles is the incorporation of covenants linked to compliance. For all Projects, the client will covenant in the financing documentation to comply with all relevant host country environmental and social laws, regulations and permits in all material respects.
- **Principle 9 - Independent Monitoring and Reporting:** To assess Project compliance with the Equator Principles and ensure ongoing monitoring and reporting after Financial Close and over the life of the loan, the finance institution will, for all Category A and, as appropriate, Category B Projects, require the appointment of an Independent Environmental and Social Consultant, or require that the client retain qualified and experienced external experts to verify its monitoring information which would be shared with the finance institution.
- **Principle 10 - Reporting and Transparency:** For all Category A and, as appropriate, Category B Projects, the client will ensure that, at a minimum, a summary of the ESIA is accessible and available online; and the client will publicly report GHG emission levels during the operational phase for Projects emitting over 100,000 tons of CO_2 equivalent annually.

The EPs apply to the four financial products described below when supporting a new project:

- Project Finance Advisory Services where total project capital costs are US$10 million or more;
- Project Finance with total project capital costs of US$10 million or more;
- Project-Related Corporate Loans where all four of the following criteria are met: (i) the majority of the loan is related to a single project over which the client has Effective Operational Control; (ii) the total aggregate loan amount is at least US$100 million; (iii) the EPFIs' individual commitment is at least US$50 million; and (iv) the loan tenor is at least two years; and
- Bridge Loans with a tenor of less than two years that are intended to be refinanced by Project Finance or a Project-Related Corporate Loan that is anticipated to meet the relevant criteria described above.

While the EPs are not intended to be applied retroactively, EPFIs apply them to the expansion or upgrade of an existing project where changes in scale or scope may create significant environmental and social risks and impacts, or significantly change the nature or degree of an existing impact.

The fourth iteration of the Equator Principles (EP IV) includes revisions in four key areas:

- **The scope of applicability of the EPs:** The total threshold for Project-Related Corporate Loans (PRCLs) has reduced to US$50 million, where the total aggregate loan amount and the EPFI's individual commitment (before syndication or sell down) meets the new threshold.

  Project-related Refinancing and Project-related Acquisition Financing is added to the scope of the EPs with the following criteria:

  The underlying Project was financed in accordance with the EPs;

  There has been no material change in the scale or scope of the Project;

  The Project is not yet completed (see section Scope). For Project-Related Corporate Loans, the exception for sovereign borrowers is removed for Category A, and as appropriate for Category B Projects.

- **Applicable standards in designated vs. non-designated countries:** Principle 3 retains the list of 'Designated Countries' i.e. high-income OECD countries as a proxy for governance. However, it clarifies that the EPFI will evaluate the specific risks of the Project to determine whether one or more of the IFC Performance Standards could be applied to address those risks, in addition to host country laws. In addition, the EPs require that the EPFI's due diligence includes, for all Category A and Category B Projects, a review of how the Project meets each of the Equator Principles.

- **Human Rights and social risk:** The Preamble states that EPFIs will fulfil their responsibility to respect Human Rights in line with the UN Guiding Principles on Business and Human Rights. Principle 2 strengthens language on human rights, stating that the Environmental and Social Impact Assessment (ESIA) included in the Assessment Documentation should include the assessment of potential adverse Human Rights impacts.

- Human Rights Impact Assessment Scoping study has been carried out in line with EP IV requirements. The scoping study revealed that the Project does not pose any High Risks in terms of human rights and the medium or low risks can be adequately mitigated and addressed through existing E&S management plans and procedures, ESAP items, and additional mitigation measures identified within the ESIA. Therefore, no further HRIA study deemed necessary based on the Scoping Report findings.

  EP IV also discusses the requirement for 'Free, Prior and Informed Consent' (FPIC) where indigenous peoples may be present and impacted by the project. However, this requirement is not relevant to the project as there are no indigenous people in Turkey.

- **Climate change:** In the context of the Environmental and Social Impact Assessment for the Karapınar SPP, the execution of a Climate Change Risk Assessment is needed, in line with the latest version of the Equator Principles (IV, dated July 2020) and the Recommendations of the Task Force on Climate-related Financial Disclosures.

  A stand-alone Climate Change Risk Assessment study has been carried out in line with the prescriptions of Equator Principles IV, a full assessment of transition risks for the Project is not provided, since Karapınar SPP is a renewable power plant and has GHG emissions largely below the threshold of 100,000 tCO2e/y. However, the main potential areas for transition risks mentioned by TCFD recommendations (Policy and

Legal, Technology, Market, Reputation) have been screened and no significant climate-related transition risk has been identified for the Project.

3.3.2 International Finance Corporation (IFC) Sustainability Policies and Standards

IFC, a member of the World Bank (WB) Group, has published the most recent Performance Standards (PS) on Environmental and Social Sustainability in 2012 that defines clients' responsibilities for managing their Environmental and Social risks.

IFC uses a process of environmental and social categorization to reflect the magnitude of risk and impacts of the Project, as summarized below:

- Category A: business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented;
- Category B: business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures; and
- Category C: business activities with minimal or no adverse environmental or social risks and/or impacts.

The IFC PSs on Environmental and Social Sustainability has eight components, which provide guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way. The PSs are the standards that the client is to meet throughout the life of an investment. Guidance Notes that serve to explain the means to achieve compliance with the PSs support IFC PSs.

A brief description of each IFC PS is provided below:

PS 1: Assessment and Management of Environmental and Social Risks and Impacts

PS 1 establishes the importance of integrated assessment to identify the environmental and social impacts, risks and opportunities of the Project; also, for effective community engagement through disclosure. Objectives of PS 1 are:

- To identify and evaluate environmental and social risks and impacts of the Project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.
- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them.
- To ensure that relevant environmental and social information is disclosed and disseminated.

PS 2: Labour and Working Conditions

PS 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers. Objectives of PS 2 are:

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labour laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labour.

PS 3: Resource Efficiency and Pollution Prevention

PS 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. The objectives of PS 3 are:

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce project-related GHG emissions.

PS 4: Community Health, Safety and Security

PS 4 recognizes that project activities, equipment and infrastructure can increase community exposure to risks and impacts. The objectives of PS 4 are:

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

PS 5: Land Acquisition and Involuntary Resettlement

PS 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Objectives of PS 5 are:

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.
- To improve, or restore, the livelihoods and standards of living of displaced persons.
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.

PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The objectives of PS 6 are:

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

PS 7: Indigenous Peoples

PS 7 recognizes that indigenous people as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population and sets objectives to anticipate and avoid adverse impacts of projects on them through ensuring appropriate management and consultation principles. As there are no indigenous people in Turkey the requirements set out in this PS are not considered applicable to the Project.

PS 8: Cultural Heritage

Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. The objectives of PS 8 are:

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

In conclusion, PS 1 establishes the importance of:

- Integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects;
- Effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and
- Management of environmental and social performance throughout the life of the project.

PS's from 2 to 8 establish objectives and requirements to avoid, minimize and where residual impacts remain, to compensate for risks and impacts affective on workers, communities and the environment. All IFC PSs and related guidance notes will be applicable to the Project thus have been considered in the scope of the ESIA studies except for PS 7 which is not relevant to the Project since there are no indigenous people in Turkey.

3.3.3 IFC Environmental, Health and Safety Guidelines

3.3.3.1 IFC General EHS Guidelines

IFC has EHS Guidelines that are technical reference documents with general and industry specific examples of good international industry practice. The guidelines are developed to be used together with the relevant industry sector EHS guidelines that provide guidance to users on EHS issues in specific industries. The guidelines include performance levels and measures that are generally considered achievable in new facilities by existing technology at reasonable costs. When host country regulations and limits differ from the levels and measures presented in the IFC EHS Guidelines, projects should aim achieving the stricter one.

The organization of the IFC General EHS Guidelines are organized as presented in Table 3-2.

Table 3-2: Organization of the IFC General EHS Guidelines

Main Subject	Topic
Environmental	• Air Emissions and Ambient Air Quality • Energy Conservation • Wastewater and Ambient Water Quality • Water Conservation • Hazardous Materials Management • Waste Management • Noise • Contaminated Land
Occupational Health and Safety	• General Facility Design and Operation • Communication and Training • Physical Hazards • Chemical Hazards • Biological Hazards • Radiological Hazards • Personal Protective Equipment (PPE) • Special Hazard Environments • Monitoring
Community Health and Safety	• Water Quality and Availability

Main Subject	Topic
	• Structural Safety of Project Infrastructure • Life and Fire Safety • Traffic Safety • Transport of Hazardous Materials • Disease Prevention • Emergency Preparedness and Response
Construction and Decommissioning	• Environment • Occupational Health & Safety • Community Health & Safety

3.3.3.2 EHS Safety Guidelines for Electric Power Transmission and Distribution

IFC EHS Guidelines for Electric Power Transmission and Distribution include information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas.

3.3.4 EBRD Environmental and Social Policy and Performance Requirements

Throughout their life phases, EBRD financed projects are required to comply with the Bank's E&S Policy (2019) to ensure environmentally and socially sustainable development. In this regard, the projects are expected to meet the key environmental and social requirements outlined by the PRs set by the Bank. The EBRD PRs are described below.

EBRD PR 1: Assessment and Management of Environmental and Social Risks and Impacts

EBRD PR 1 covers integrated assessment to identify the environmental and social impacts and issues associated with projects and management of the environmental and social performance throughout the life of the project. EBRD PR 1 also outlines the responsibilities of the client in the process of assessing the potential environmental and social impacts and issues associated with the project, and developing and implementing procedures for managing and monitoring these impacts and issues.

EBRD PR 2: Labour and Working Conditions

EBRD PR 2 consists of general requirements on human resources policies, working relationships, child labour, forced labour, non-discrimination and equal opportunity, workers' organizations, wages, benefits and condition of work, Occupational Health and Safety (OHS), worker accommodation, retrenchment and grievance mechanism, non-employee workers, supply chain, security personnel requirements which are applicable to the Project. The PR requires the clients to respect and protect the fundamental principles and rights of workers and protect and promote the safety and health of workers, especially by promoting safe and healthy working conditions.

EBRD PR 3: Resource Efficiency and Pollution Prevention and Control

EBRD PR 3 consists of general requirements on resource efficiency, pollution prevention and control, greenhouse gases, water, waste and safe use and management of hazardous substances and materials which are applicable to the Project. The PR requires the clients to identify project-related opportunities for energy, water and resource efficiency improvements and waste minimization, adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource use and pollution released from the project and promote the reduction of project-related greenhouse gas emissions.

EBRD PR 4: Health, Safety and Security

This PR addresses the client's responsibility to identify and to avoid or minimize the risks and adverse impacts to community health, safety and security that may arise from project activities. General requirements for health and safety management (occupational health and safety, community health and safety) and specific requirements for

health and safety management (Infrastructure and equipment design and safety, hazardous materials safety, traffic and road safety, natural hazards, exposure to disease and emergency preparedness and response) are discussed in this PR.

EBRD PR 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

This PR outlines the requirements related to involuntary resettlement (physical and economic displacement) that can be full, partial, permanent, or temporary as a result of project-related land acquisition and/or restrictions on land use. The objectives of this PR are to avoid or, when unavoidable, minimize, involuntary resettlement by exploring alternative project designs, to mitigate adverse social and economic impacts from land acquisition or restrictions on affected persons' use, restore or, where possible, improve the livelihoods and standards of living of displaced persons8to pre-displacement levels and improve living conditions among physically displaced persons through the provision of adequate housing, including security of tenure at resettlement sites.

EBRD PR 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

This PR outlines the biodiversity conservation requirements, legally protected and internationally recognized areas of biodiversity value, invasive alien species and sustainable management of living natural resources, crop and livestock production, fisheries and aquaculture, natural and plantation forestry, supply chain and genetically modified organisms (GMOs). The objectives of this PR are to protect and conserve biodiversity using a precautionary approach, to adopt the mitigation hierarchy approach, and to promote good international practice (GIP) in the sustainable management and use of living natural resources.

EBRD PR7: Indigenous Peoples

This PR recognizes that projects can create opportunities for Indigenous Peoples to participate in and benefit from project-related activities that may help them fulfil their aspiration for economic and social development. As government often plays a central role in the management of issues related to Indigenous Peoples, clients should cooperate and collaborate, as appropriate, with the responsible authorities and relevant communities in managing the risks and impacts of their activities. As there are no indigenous people in Turkey the requirements set out in this PR are not considered applicable to the Project.

EBRD PR 8: Cultural Heritage

This PR outlines the requirements related to cultural heritage for present and future generations. The aim of this PR is to protect cultural heritage and to guide clients in avoiding or mitigating adverse impacts on cultural heritage in the course of their business operations. The client is expected to be precautionary in their approach to the management and sustainable use of cultural heritage.

EBRD PR 9: Financial Intermediaries

This PR recognizes that Financial Intermediaries (FIs) are a key instrument for promoting sustainable financial markets and provide a vehicle to channel funding to the micro, small and medium-sized enterprise (SME) sector. Such FIs include a variety of financial service providers, including private equity funds, banks, leasing companies, insurance companies and pension funds. FIs are engaged in a wide range of activities, such as microfinance, SME lending, trade finance, large-scale infrastructure finance, medium to long-term corporate or project finance, and housing finance.

EBRD PR 10: Information Disclosure and Stakeholder Engagement

This PR outlines the requirements related to an open and transparent engagement between the client, its workers, local communities directly affected by the project and, where appropriate, other stakeholders. The client is expected to outline a systematic approach to stakeholder engagement, to promote improved environmental and social performance of clients through effective engagement with the project's stakeholders and to ensure that grievances from affected communities and other stakeholders are responded to and managed appropriately.

Direct investment projects must meet PRs 1 to 8 and 10. Each PR defines, in its objectives, the desired outcomes, followed by specific requirements for projects to help clients achieve these outcomes. Compliance with relevant national law is an integral part of all PRs.

Of the PRs, PR 7 is not applicable since there are no indigenous people in Turkey; and PR 9 is not relevant to the Project. All other EBRD PRs will be applicable and have been considered in the scope of the ESIA studies.

3.3.5 EBRD Sub-sectoral Environmental and Social Guidelines

EBRD's sub-sectoral Environmental and Social Guidelines are designed to assist credit/investment officers in local financial institutions and other non-environmental experts. They help in identifying major environmental activity risks, important management actions, and the essentials of environmental and social due diligence in over 80 industry activities. EBRD's guidelines are published for guidance only.

Sub-sectoral Environmental and Social Guidelines: Building and Construction Activities cover construction operations that may take place on greenfield sites, areas designated for industrial development (often land with an industrial park) or at a site with existing or historic activities. These guidelines include reference to IFC's EHS Guidelines which have been taken into consideration for the Project.

3.3.6 OECD Common Approaches (2016)

Consistent with the mandate of the OECD Working Party on Export Credits and Credit Guarantees, members have, since the mid-1990s, been sharing information on their policies, practices and experiences with regard to addressing environmental and, more recently, social issues, leading to discussions to establish common approaches for taking such issues into account when providing officially supported export credits.

The result of these discussions has been a series of agreements and OECD Recommendations since the late 1990s relating to measures Members should take to address the potential environmental and social impacts of projects for which official export credit support is requested.

The current agreement is the OECD Recommendation of the Council on Common Approaches for Officially Supported Export Credits and Environmental and Social Due Diligence, which was adopted on 28 June 2012 and revised by the OECD Council on 6 April 2016. This agreements sets common approaches for undertaking environmental and social due diligence to identify, consider and address the potential environmental and social impacts and risks relating to applications for officially supported export credits as an integral part of Members' decision-making and risk management systems (www.oecd.org, tarih yok).

The main components of the due diligence process consist of the following:

- **Screening**: Members and non-Members adhering to the Recommendation ("Adherents") should screen all applications for officially supported export credits covered by the Recommendation with the aim of identifying which applications should be classified and, where appropriate, subsequently reviewed.
- **Classification**: Adherents should identify the potential positive and negative environmental and social impacts relating to the applications to be classified.
- **Environmental and Social Review**: Adherents should undertake an environmental and social review of projects, in accordance with the international standards applied to the project as set out in the Recommendation.
- **Evaluation, Decision and Monitoring**: Adherents should evaluate the information resulting from screening and review of a project, and decide whether to request further information, decline or provide official support.
- **Exchange and Disclosure of Information**: Adherents should publish national ECA environmental and other related policy statements or principles and procedural guidance relevant to the implementation of the Recommendation. Also taking into account the competitive context in which they operate and constraints of business confidentiality, for Category A projects, Adherents should disclose publicly project information, including project name, location, description of project and details of where additional information (e.g. ESIA report, summary thereof) may be obtained, such as a buyer and/or project sponsor

contact point and/or website link, as early as possible in the review process and at least 30 calendar days before a final commitment to grant official support; and require that environmental and social impact information (e.g. ESIA report, summary thereof) be made publicly available as early as possible in the review process and at least 30 calendar days before a final commitment to grant official support.

- **Reporting and Monitoring of the Recommendation**: Adherents shall; ensure, through appropriate measures and mechanisms, compliance with their policies and procedures pursuant to this Recommendation; monitor and evaluate, over time, the experience with the Recommendation at a national level, and share experiences with the other Adherents, including about the standards applied to those projects that were subject to a review as referred to in the Recommendation; continue to enhance and improve procedures at a national level to address the environmental and social impacts of projects, and to encourage their ECAs to allocate appropriate resources for this purpose.

3.3.7 European Union EIA Legislation

Compliance with the EU EIA Directive is also taken into consideration since Turkey is a candidate for EU membership. Turkey's environmental legislation is developed mostly in line with EU Directives and national EIA Regulation is consistent with the EU EIA Directive.

The EU EIA procedure can be summarized as follows: the developer may request the competent authority to state what should be covered by the EIA information to be provided by the developer (scoping stage); the developer must provide information on the environmental impact (EIA report – Annex IV); the environmental authorities and the public (and affected Member States) must be informed and consulted; the competent authority decides, taking into consideration the results of consultations. The public is informed of the decision afterwards and can challenge the decision before the courts.

The EIA Directive (2011/92/EU, amended in 2014 by 2014/52/EU) applies to a wide range of defined public and private projects, which are defined in Annexes I and II:

- Mandatory EIA: all projects listed in Annex I are considered as having significant effects on the environment and require an EIA.
- Discretion of Member States (screening): for projects listed in Annex II, the national authorities have to decide whether an EIA is needed. This is done by the "screening procedure", which determines the effects of projects based on thresholds/criteria or a case-by-case examination. However, the national authorities must take into account the criteria laid down in Annex III (criteria to determine whether the projects listed in Annex II should be subject to an environmental impact assessment), which evaluates the project in consideration with the size of the project, cumulative impacts, physical and ecological properties of the location, and characteristics of the potential impact, etc.

According to the EU EIA Directive, the Karapınar YEKA SPP Project is under Annex II activities, which includes "Industrial installations for the production of electricity, steam and hot water (projects not included in Annex I)".

Construction of overhead electrical power lines with a voltage of 220 kV or more and a length of more than 15 km are included in Annex I of the same Directive. However, overhead lines that will be constructed within the scope of the Project are either 154kV or 400kV with lengths shorter than 15km. Therefore, the overall Project can be considered as Annex II Project.

3.3.8 International Conventions and Protocols

Turkey is party to various conventions and protocols related to management of environmental resources, biodiversity and cultural heritage at global and regional scales. The international conventions and protocols related to the Project and to which Turkey is a party are listed below:

Environment, Biodiversity and Cultural Heritage

- Kyoto Protocol enforced on February 16, 2005 and ratified by Turkey on August 26, 2009.
- United Nations Framework Convention on Climate Change enforced on March 21, 1994 and ratified by Turkey May 24, 2004.
- European Landscape Convention enforced in 2000 and ratified by Turkey in 2003.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora enforced on July 01, 1975 and ratified by Turkey December 22, 1996.

- Convention on Biological Diversity enforced on December 29, 1993 and ratified by Turkey in 1996.
- International Convention on Wetlands of International Importance especially as Waterfowl Habitat (RAMSAR Convention) enforced on December 21, 1975 and ratified by Turkey in 1994.
- Bern Convention on the Conservation of European Wildlife and Natural Habitats enforced June 01, 1982 and ratified by Turkey in 1984.
- Convention on the Protection of the World Cultural and Natural Heritage enforced on December 17, 1975 and ratified by Turkey on February 14, 1983.

Labour

In 1932, Turkey became a member of the International Labour Organization (ILO), a specialized United Nations (UN) agency, which states its goals as "to promote rights at work, encourage decent employment opportunities, enhance social protection and strengthen dialogue on work-related issues". Conventions that are directly related to the Project in terms of providing a general labour management framework are listed below:

- ILO Safety and Health in Construction Convention enforced on January 11, 1991 and ratified by Turkey on March 23, 2015
- ILO Occupational Safety and Health Convention enforced on August 11, 1983 and ratified by Turkey on April 22, 2005
- ILO Worst Forms of Child Labour Convention enforced on November 19, 2000 and ratified by Turkey on August 02, 2001
- ILO Forced Labour Convention enforced on May 01, 1932 and ratified by Turkey on October 30, 1998
- ILO Minimum Age Convention enforced on June 19, 1976 and ratified by Turkey on October 30, 1998
- ILO Freedom of Association and Protection of the Right to Organize Convention enforced on July 04, 1950 and ratified by Turkey July 12, 1993
- ILO Worker's Representatives Convention enforced on June 30, 1973 and ratified by Turkey on July 12, 1993
- ILO Human Resources Development Convention enforced on July 19, 1977 and ratified by Turkey on July 12, 1993
- ILO Employment Policy Convention enforced on July 15, 1966 and ratified by Turkey on December 13, 1977
- ILO Social Security Convention enforced on April 17, 1955 and ratified by Turkey on January 29, 1975
- ILO Equal Remuneration Convention enforced on May 23, 1953 and ratified by Turkey on July 19, 1967
- ILO Discrimination (Employment and Occupation) Convention enforced on June 15, 1960 and ratified by Turkey on July 19, 1967
- ILO Abolition of Forced Labour Convention enforced on January 17, 1959 and ratified by Turkey on March 29, 1961
- ILO Right to Organize and Collective Bargaining Convention enforced on July 18, 1951 and ratified by Turkey on January 23, 1952

3.4 PROJECT ENVIRONMENTAL AND SOCIAL CATEGORISATION CRITERIA

For projects considered by IFIs for financing, the process for the assessment of environmental and social risks and impacts could range from full-scale ESIA to limited or focused assessments depending on the scale of the project and significance of the risks and impacts.

IFC, as part of the review of environmental and social risks and impacts of a proposed investment, uses a process of environmental and social categorization to reflect the magnitude of risks and impacts. The resulting category also specifies IFC's institutional requirements for disclosure in accordance with IFC's Access to Information Policy. These categories, which are also adopted by Equator Principles IV are as follows:

- Category A: Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.
- Category B: Business activities with potential limited adverse environmental or social risks and/or impacts that are few, generally site-specific, largely reversible, and readily addressed through mitigation measures.
- Category C: Business activities with minimal or no adverse environmental or social risks and/or impacts.
- Category FI: Business activities involving investments in financial institutions (FIs) or through delivery mechanisms involving financial intermediation (This category is further divided in 3 as FI-1, FI-2, and FI-3).

In IFC's Guidance Note 1 on the Assessment and Management of Environmental and Social Risks and Impacts, it is further stated that "For certain projects, and particularly for greenfield investments and projects (including, but not limited to, major expansion or transformation-conversion activities) involving specifically identified physical elements, aspects and facilities that are likely to generate potentially significant adverse environmental and social risks and impacts, the client should conduct a comprehensive full-scale ESIA".

The EBRD also categorizes each project to determine the nature and level of environmental and social investigations, information disclosure and stakeholder required. EBRD's description of each category is as follows:

- Category A: Projects that could result in potentially significant adverse future environmental and/or social impacts which, at the time of categorization, cannot readily be identified or assessed, and which, therefore, require a formalized and participatory environmental and social impact assessment process.
- Category B: Projects with potential adverse future environmental and/or social impacts that are typically site-specific, and/or readily identified and addressed through mitigation measures.
- Category C: Projects that are likely to have minimal or no potential adverse future environmental and/or social impacts and can readily be addressed through limited environmental and social appraisal.

The EBRD also provides an indicative list for Category A projects in the scope of its Environmental and Social Policy (2019) where Solar Power Projects are not included.

Project Categorization is discussed in Section 9.3 of this ESIA Report.

4 IMPACT ASSESSMENT METHODOLOGICAL APPROACH

This section presents the methodological approach used for the assessment of the potential environmental and socio-economic impacts associated with the construction and operation of the proposed Project and associated facilities and indicates how the relevant mitigation measures to be adopted for avoiding, reducing or compensating such impacts will be considered as part of the impact assessment process.

Impact identification and assessment starts with scoping. Once identified, potential impacts need to be assessed in order to enable a judgement of their significance that allows for the prioritization of the mitigation/enhancement and management measures. Potential Project impacts are assessed in relation to environmental and biological resources as well as socio-economic resources (community, individuals, and social, economic and cultural assets) within the Project Area of Influence (AoI).

The principal ESIA steps comprise the following:

- Impact prediction: to determine what could potentially happen to resources or receptors because of the Project and its associated activities – potential impacts are identified during the ESIA scoping phase.
- Impact evaluation: to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource or receptor.
- Mitigation and enhancement: to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- Residual impact evaluation: to evaluate the significance of impacts assuming effective implementation of identified mitigation and enhancement measures.

4.1 PROJECT AREA OF INFLUENCE (AOI)

According to the IFC Performance Standard 1 “where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project’s area of influence (AoI)”, which is defined as to encompass the following (IFC, 2012):

- The area likely to be affected by: (i) the project and the client’s activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project; (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities’ livelihoods are dependent.
- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.
- Cumulative impacts that result from the incremental impact, on areas or resources used or directly affected by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

The Project AOI consists the environmental and social aspects within the following:

- Project Site;
- Surrounding settlements (i.e. Seyit Hacı, Ekmekçi, Kirkitoğlu, Büyükkarakuyu, Küçükkarakuyu, Karapınar District);
- Project access roads and their 500m corridor; and
- ETL routes and their 500m corridor.

The environmental and social baseline conditions within the AOI are described for each aspect under relevant impact assessment sections in Chapter 5 and Chapter 6.

4.2 IDENTIFICATION AND CHARACTERISATION OF IMPACTS

An 'impact' is any change to a resource or receptor caused by the presence of a project component or by a project-related activity. Impacts can be negative or positive and are defined in terms of their characteristics, including the impact's type (direct, indirect, induced, cumulative) and the impact's spatial and temporal features (i.e. extent, duration, scale and frequency).

Types of impacts are described as below:

- Direct: applies to an impact which can be clearly and directly attributed to a particular environmental or social parameter (e.g. dust generation directly affects air quality).
- Indirect: applies to impacts which may be associated with or subsequent to a particular impact on a certain environmental or social parameter (e.g. high levels of dust could entail nuisance and health effects to workers on site).
- Induced: applies to impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project.
- Cumulative: applies to impacts that arise as a result of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect.

Impact characteristics are defined Table 4-1 below.

Table 4-1: Impact Characterization Criteria

Duration	Short-term: impacts with relatively short duration with respect to the whole duration of the project (e.g. limited to five-year period).	Long-term: impacts whose effects last longer than a period of five years, but limited to within the project lifetime.	Permanent: impacts that cause a permanent change in the baseline conditions and therefore also evaluated as irreversible
Extent	Local: impact affecting the environment or communities within the Project AoI.	Regional: impact affecting a wider area or socio-economic asset of importance going beyond the communities in the Project Area of Influence.	National: impact extending to the national level, or affecting assets of national importance.
Frequency	One-off/ Occasional: impacts that occur once only or occasionally.	Intermittent: impacts that occur periodically or repeatedly.	Continuous: impacts that happen continuously
Intensity/Impact scale	**Low**: limited impacts not causing any change or causing change hardly distinguishable from background conditions	**Medium**: impacts causing change, but not affecting the core structures/functions of the resource/receptor	**High**: impacts causing evident changes of core structures/functions of the resource/receptor
Likelihood	Unlikely: The event is unlikely but may occur at some time during normal operating conditions	Possible: The event is likely to occur at some time during normal operating conditions.	Likely: The event will occur during normal operating conditions (i.e. it is essentially inevitable).

4.3 EVALUATION OF IMPACTS

A consistent approach to the assessment of impacts will be followed to enable environmental and social (E&S) impacts to be broadly compared across the ESIA. A set of generic criteria are used to determine impact significance and are applied across the various environmental and social parameters.

Environmental and social impacts are quantified as much as possible. For cases where quantification is not possible/applicable, a qualitative assessment is conducted using professional judgement, experience and available knowledge, and including the consideration of stakeholder views. Where there are limitations to the data, and/or uncertainties, these are recorded in the relevant sections, along with any assumptions made during the assessment.

In order to determine the significance of each impact, two overall factors are considered:

- Magnitude and nature of impacts
- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions.

4.3.1 Magnitude of Impact

Once impacts are characterised as per Table 4-1, they are assigned a 'magnitude' which is typically a function of some combination (depending on the subject receptor) of the following characteristics:

- Duration
- Extent
- Frequency
- Scale.

Magnitude is a continuum from small to large, along which evaluation requires professional judgement and experience. Each impact is evaluated on a case-by-case basis and the rationale for each determination is noted. Magnitude designations for negative effects are ***negligible, small, medium*** and ***large***. The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation is assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a positive impact.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is used. In addition, the likelihood factor is also considered, together with other impact characteristics, when assigning a magnitude designation while likelihood is considered either possible or likely for impacts from a planned activity.

For biophysical impacts, the semi-quantitative definitions for the spatial and temporal dimension of the magnitude of impacts used in this assessment are provided as follows:

Negligible Magnitude Impact results in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes are regarded as having no impact and characterised as having a negligible magnitude.

Low Magnitude Impact affects a specific area, system, aspect (physical), group of localised individuals within a population (biological) and at sufficient magnitude to result in a small increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) over a short time period (one plant/animal generation or less, but does not affect other trophic levels or the population itself), and localised area.

Moderate Magnitude Impact affects a portion of an area, system, aspect (physical), population or species (biological) and at sufficient magnitude to cause a measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) and may bring about a change in abundance and/or distribution over one or more plant/animal generations, but does not threaten the integrity of that population or any population dependent on it (physical and biological). A moderate magnitude impact may also affect the ecological functioning of a site, habitat or ecosystem but without adversely affecting its overall integrity. The area affected may be local or regional.

High Magnitude Impact affects an entire area, system (physical), aspect, population or species (biological) and at sufficient magnitude to cause a significant measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) or a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from

unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations (physical and biological). A high magnitude impact may also adversely affect the integrity of a site, habitat or ecosystem.

For socioeconomic impacts, the magnitude considers the perspective of those affected by taking into account the likely perceived importance of the impact, the ability of people to manage and adapt to change and the extent to which a human receptor gains or loses access to, or control over socio-economic resources resulting in a positive or negative effect on their well-being. The quantitative elements are included into the assessment through the designation and consideration of scale and extent of the impact.

4.3.2 Sensitivity of Receptors

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are ranges of factors to be considered when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. Where the receptor is physical (for example, a water body) its current quality, sensitivity to change, and importance (on a local, national and international scale) are considered. Where the receptor is biological or cultural (i.e. the marine environment or a coral reef), its importance (local, regional, national or international) and sensitivity to the specific type of impact are considered. Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity of receptor is low, medium and high.

For ecological impacts, sensitivity is assigned as negligible, low, medium or high based on the conservation importance of habitats and species. For socio-economic impacts, the degree of sensitivity of a receptor is defined as the level of resilience (or capacity to cope) with sudden social and economic changes. Criteria for deciding on the value or sensitivity of biological and socioeconomic receptors are presented as follows:

Negligible: A resource/receptor that has no or very low importance and rarity. The value of the resource/receptor is easily replaceable, or the resource/receptor is commonplace in the context of the assessment scope.

Low: A resource/receptor that has a high capacity to resist change. Recovery/regeneration is spontaneous upon cessation of Project activities. The value of the resource/receptor is considered low or easily replaceable or the resource/receptor is commonplace in the context of the assessment scope.

For ecological receptors, not protected or listed as common / abundant, or not critical to other ecosystem functions (e.g. key prey species to other species). For social receptors, those affected are able to adapt with relative ease and maintain pre-impact status.

Medium: A resource/receptor that has a moderate capacity to resist change. Recovery may require some intervention measures and/or time after cessation of project activities. A resource/receptor that is important locally or regionally in the context of the assessment scope.

For ecological receptors, not protected or listed but may be a species common globally but rare in Turkey with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline. For social receptors, those able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.

High: A resource/receptor with limited or no capacity to resist change and is vulnerable. Recovery will require a long time or may not be possible (permanent loss). A resource/receptor that is important nationally or globally in the context of the assessment scope.

For ecological receptors, specifically protected under national legislation and/or international conventions. Listed as rare, threatened or endangered. For social receptors, those affected will not be able to adapt to changes and continue to maintain pre-impact status.

4.3.3 Assessment of Impact Significance

In order to assess the significance of an impact, the sensitivity of the receiving environmental or social parameter is considered in association with the magnitude of the impact, according to the matrix shown in Table 4-2.

Table 4-2: Impact Significance Matrix

Magnitude of impact	Sensitivity of receptor			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Minor	Moderate
Moderate	Negligible	Minor	Moderate	Major
High	Minor	Moderate	Major	Major

While the above matrix provides a framework for the determination of significance and enables comparison across environmental and social parameters, a degree of professional judgement is required, and some parameter-specific factors considered in making a determination of impact significance.

Additional guidance to the degrees of significance in the ESIA is provided below. Positive impacts provide resources or receptors, most often people, with positive benefits. Note that positive impacts are defined, but not rated for significance.

- **Negligible significance**: The impact is hardly distinguishable from background conditions and expected development in a no-project situation or the predicted effect is deemed 'imperceptible' or is indistinguishable from natural background variations.
- **Low significance**: a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
- **Medium significance**: has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
- **High significance**: an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of impact assessment is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP[2] has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

4.3.4 Mitigation Potential and Residual Impacts

A key objective of an ESIA is to identify and define socially, environmentally and technically acceptable and cost-effective mitigations measures to avoid, reduce, remedy or compensate for potential negative impacts, and to enhance potential environmental and social benefits.

Impacts with negligible and low significance usually do not require any additional mitigation measure. This means that these impacts are within acceptable limits because:

- they are very unlikely to happen; and/or
- the sensitivity of receiving environment is very low; and /or
- project designs have installed sufficient control mechanisms.

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[2] ALARP, which stands for "as low as reasonably practicable" is a principle that aims to reduce residual risk while not incurring unrealistic costs or effort.

For negligible and low significance impacts, should inherent control measures fail, the implementation of additional control measures should ensure impacts remain acceptable.

Impacts with medium significance, deemed as significant impacts, require additional mitigation measures to reduce the impacts at acceptable levels. These impacts can be minimized in order to reach negligible or low levels that are also deemed as acceptable level of impacts (using effective control measures).

Impact with high significance generally require imperative mitigation to reduce the significance to lower levels before proceeding with the Project.

Positive impacts should be subject to enhancement measures where possible.

The approach followed to define mitigation measures is based on a typical hierarchy of decisions and measures, as described in Figure 4-1. The priority is to first apply mitigation measures to the source of the impact (i.e. to avoid or reduce the magnitude of the impact from the associated Project activity); and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e. to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

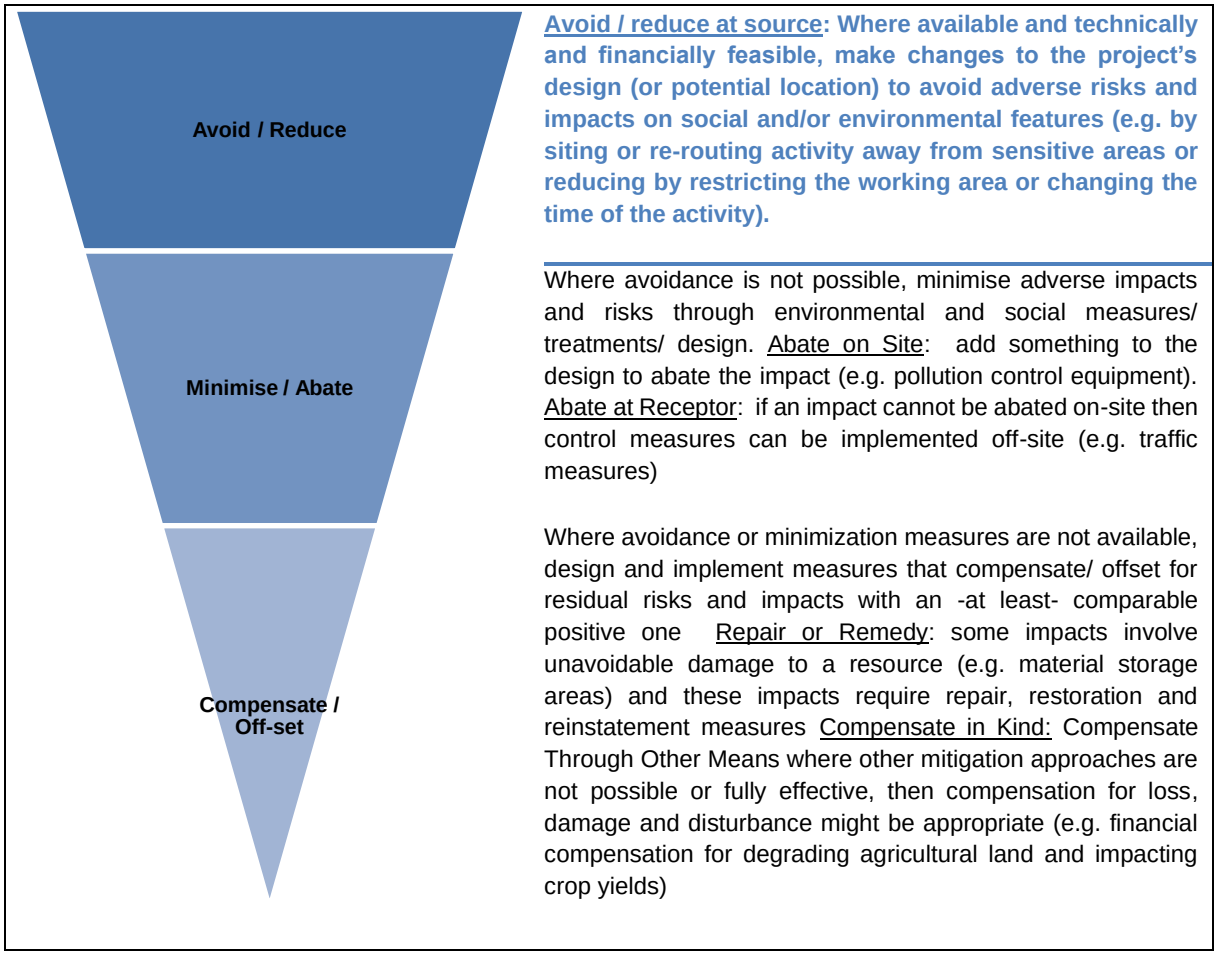

Figure 4-1: Mitigation Hierarchy

4.3.5 Residual Impact Assessment

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

4.3.6 Cumulative Impacts

Cumulative impacts result from combination of an impact from the Project with an impact from another activity / project. How the impacts and effects are assessed is strongly influenced by the status of the other activities (e.g. already in existence, approved or proposed) and how much data is available to characterise the magnitude of their impacts.

The approach for assessing cumulative impacts is to screen potential interactions with other projects based on:

- Projects that are already in existence and are operating;
- Projects that are approved but not as yet built or operating; and
- Projects that are a realistic proposition but are not yet built.

There are two operational solar power projects near the Project Area: Afta SPP and Solana Konya SPP. The cumulative impact assessment will consider these facilities and foreseeable Gitaş - 1 SPP which has valid Electricity Generation License, their current impact on the local environment.

5 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 AMBIENT AIR QUALITY

5.1.1 Project Standards

The Project will comply with the following regulations and standards:

- Turkish Air Quality Assessment and Management Regulation (AQAMR).
- Turkish Industrial Air Pollution Control Regulation (IAPCR).
- IFC General EHS Guidelines: Environmental Air Emissions and Ambient Air Quality, April 30, 2007.
- Directive 2008/50/EC on ambient air quality and cleaner air for Europe.
- World Health Organization (WHO) Ambient Air Quality Guidelines.

Regulation on Assessment and Management of Air Quality published in Official Gazette numbered 26898 and dated June 6, 2008 and Regulation on Industrial Air Pollution Control published in Official Gazette numbered 27277 dated on July 3, 2009 are regulations that govern the ambient air quality in Turkey. Ambient air quality standards for pollutants defined in Turkish regulations are presented in Table 5-1 for 2024 and subsequent years. These limit values are based on a tiered system and decrease gradually to reach the target criteria in 2024.

Industrial Air Pollution Control Regulation aims to protect human health and environment from negative impacts of air pollution in the receiving environment by controlling emissions in the form of smoke, dust, gas, vapour and aerosols generated because of industrial activities and energy production. Emission limits are defined for stack and non-stack emission sources in the Regulation (Annex 2, Table 2.1). When these emission limits are exceeded, the contribution to air pollution should be calculated with an internationally recognized dispersion model.

Table 5-1: Turkish Ambient Air Quality Limit Values

Parameter	Duration	Limit Value (µg/m^3)
SO_2	Hourly (cannot be exceeded more than 24 times a year)	350
	24 hour	125
	Long term limit	60
	Annual and winter season (October 1 - March 31)	20
NO_2	Hourly (cannot be exceeded more than 18 times a year)	200
	Annual	40
PM_{10}	24 hour (cannot be exceeded more than 35 times a year)	50
	Annual	40
CO	8 hour daily maximum	10.000
O_3	8 hour daily maximum	120
VOC*	Hourly	280
	24-hour	70

**: Limit Value for VOC is provided in Industrial Air Pollution Control Regulation while others are in Regulation on Assessment and Management of Air Quality*

IFC EHS Guideline refers to the limit values recommended by the World Health Organization (WHO) Ambient Air Quality Guidelines as given in Table 5.2 below. In addition, the IFC EHS Guidelines suggest that air emissions from project activities should not result in pollutant concentrations higher than the relevant national ambient quality guidelines and standards.

Table 5-2: IFC - WHO Ambient Air Quality Guideline Values

Parameter	Duration	Guideline Value (µg/m^3)
SO_2	10 minute	500
	24 hour	20
NO_2	Hourly	200
	Annual	40
Particulate Matter (PM_{10})	24 hour	50
	Annual	20
Particulate Matter ($PM_{2,5}$)	24 hour	25
	Annual	10
O_3	8 hour daily maximum	100

5.1.2 Baseline Conditions

5.1.2.1 Climate and Meteorological Data

In order to evaluate the meteorological conditions of the project area, long-term statistical data recorded by Karapınar Meteorology Station for the period 1989 – 2019 was obtained from the Ministry of Agriculture and Forestry - General Directorate of Meteorology and reviewed; the findings are summarised below and the overall data is presented in Annex A for reference.

In Karapınar, typical continental climate is observed, the summers are very hot and dry, and winters are cold and snowy. The average annual temperature is 11.4 °C according to the last 31 years' observation data. Temperature difference between night and day is around 16-22 °C in summer. In spring and winter, temperature difference decreases to 9-12 °C due to the humidity. Monthly maximum and minimum temperatures have been recorded as 41.2 °C and 2.8 °C in summer; and as 22.3 °C and -27 °C in winter.

The monthly average, maximum and minimum temperature records are provided in Table 5-3 and graphical representation is given in Figure 5-1.

Table 5-3: Long Term Temperature Observations for 1989 - 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Average Temperature (°C)	-0.7	1	6	11	15.7	20.1	23.3	22.9	18.2	12.4	5.7	1.4
Monthly Maximum Temperature (°C)	18.5	22.3	29	34	36	37	41.2	40	37.2	33.2	25.3	22
Monthly Minimum Temperature (°C)	-27	-26.8	-18.2	-8	-2.3	2.8	6.4	5.3	-3.3	-6.4	-17.7	-23.8

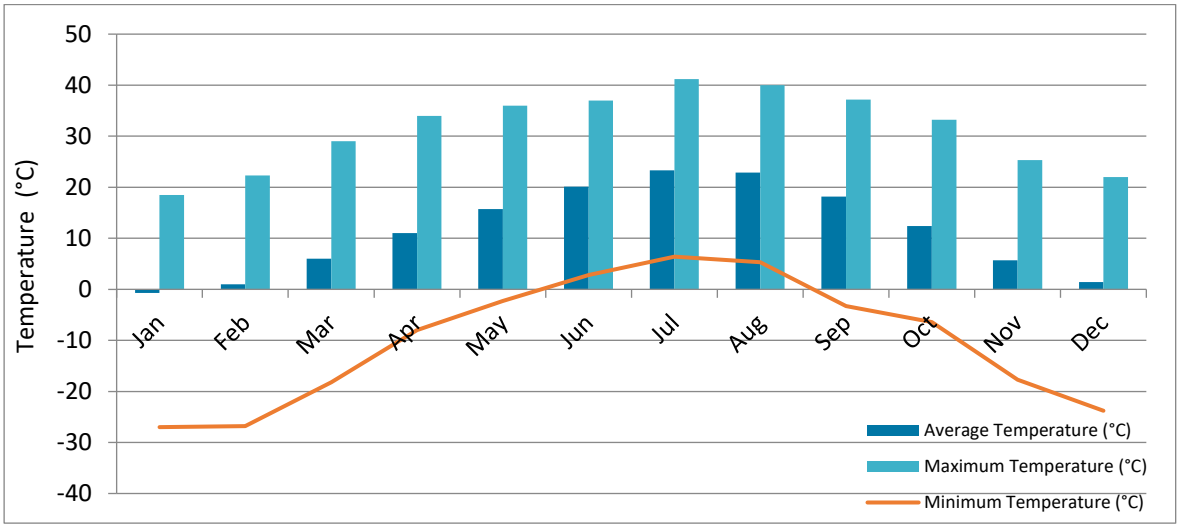

Figure 5-1: Long Term Temperature Observations for 1989 - 2019

Karapınar is one of the lowest rainfall areas in Turkey; with an annual average precipitation of 295.2 mm according to the last 31 years observation data. The highest precipitation falls in December and the lowest in August and September. For this reason, the vegetation is weak and non-forested. The long term rainfall observation data is given in Table 5-4 and the rainfall distribution graph by months is given in Figure 5-2.

Table 5-4: Long Term Rainfall Observations for 1989 - 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average Monthly Rainfall (mm)	30.2	24.7	22.7	31.8	31.7	27.7	21	5.8	11.1	20.3	29.1	39.1
Mean number of days with precipitation	7.65	6.58	6.03	6.48	6.84	3.58	0.94	0.71	1.90	4.55	5.06	7.58

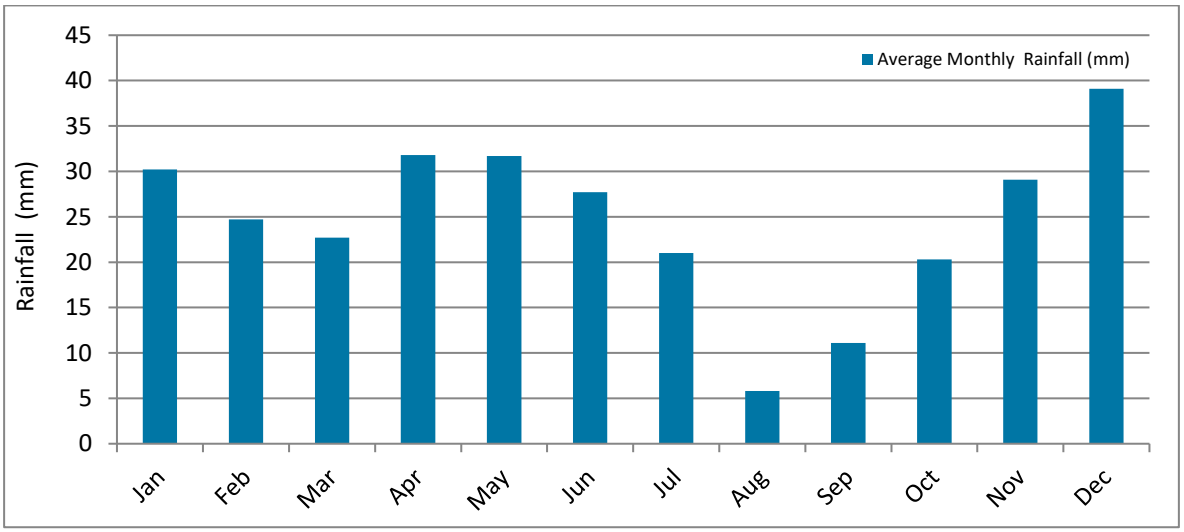

Figure 5-2: Long Term Rainfall Observations for 1989 - 2019

The annual average number of snowy days is 11.6 and annual average number of days with snow cover is 21.42 according to 1989-2019 observation data. Monthly distribution of these data can be seen in Table 5-5.

Table 5-5: Long Term Snow Observations for 1989 - 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean number of days with snow	3.74	2.94	1.87	0.32	0.03						0.58	2.10
Mean number of days with snow cover	7.58	6.61	1.58	0.13							0.87	4.65
Mean thickness of snow (cm)	6.8	9.6	6.3	2.8							3.6	6.0

According to the Karapınar Meteorological Station's data records between 1989-2019, the prevalent wind direction is north-northeast (NNE), whereas the highest average wind speed is blowing from south-southeast (SSE) direction with an average speed of 4.88 m/sec (see Figure 5-3).

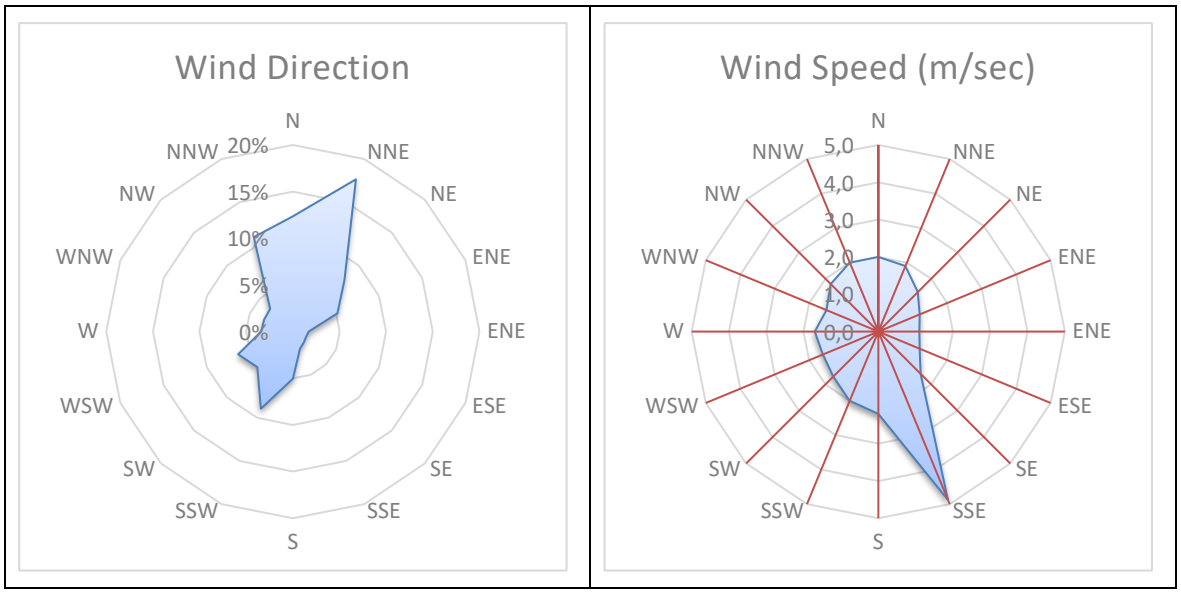

Figure 5-3: Long Term Temperature Records for 1989 - 2019

Although the average wind speed is recorded to be between 1.7-2.5 range, strong winds with a speed of 22 m/s to 45 m/s are recorded in the region. Annual average number of days with strong winds is recorded as 73.6; and strong winds are observed between March to June the most. As a matter of fact, Karapınar and the surrounding area, is prone to wind erosion.

Table 5-6: Long Term Wind Speed and Direction Observations for 1989 - 2019

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean wind speed (m/s)	2.0	2.3	3.5	3.4	3.1	2.2	2.4	2.2	1.9	1.7	1.7	1.9
Maximum wind speed and direction (m/sec)	SSE 22.3	SSE 24.9	SE 40.0	N 45.0	NNE 40.0	W 30.2	NNE 36.0	NW 24.7	NW 22.2	NNW 21.3	SE 20.7	SSW 23.2
Mean number of days with strong wind	5.35	5.48	9.26	9.23	8.55	7.61	6.90	5.74	3.52	3.52	3.71	4.77

Mean number of days with storm	0.84	1.26	1.52	1.52	0.58	0.74	0.32	0.19	0.35	0.29	0.48	0.74

5.1.2.2 Air Quality

National Air Quality Monitoring Stations record air pollutions statistics for each province in Turkey. These stations have an automatic data recording system that allows the data to be presented through the national air quality-monitoring network of the MoEU. In Konya, there are five operation monitoring stations. However, the closest Air Quality Monitoring Station (AQMS) to the Project is located in Aksaray Province, which is approximately 67km to the north-east of the Project Site. Online air quality data including 5-year (2015-2019) annual average concentrations of (PM_{10}, SO_2, NO, O_3, CO, NO_X) measured in Aksaray AQMS are presented in Table 5-7 together with the national and international standard values. As it is seen from the table, PM10 annual average concentration has been above Turkish Ambient Air Quality Limits between 2015 and 2017, while it is above IFC/WHO Ambient Air Quality Limits Values during all these 5 years. It should be noted that annual average concentrations of SO2 and NO2 are in compliance with Turkish and IFC/WHO limit values.

Table 5-7: Aksaray AQMS - Measured Annual Average Concentrations

Year	Annual Average Concentration (µg/m^3)					
	PM_{10}	SO_2	NO_2	O_3	CO	NO_X
2015	62.99	9.84	NM*	NM	NM	NM
2016	60.34	6.63	NM	NM	NM	NM
2017	67.6	7.38	NM	NM	NM	NM
2018	35.21	7.68	NM	NM	NM	NM
2019	36.8	13.46	15.46	56.87	421.02	17.64
Turkish Ambient Air Quality Limits (Annual)	40	20	40	-	-	-
IFC/WHO Ambient Air Quality Limits (Annual)	20	-	40	-	-	-

Source: Official Website of National Air Quality Monitoring Station (http://www.havaizleme.gov.tr); ** NM: Not measured*

As the records of Aksaray Air Quality Monitoring station would not provide representative data for the project site, baseline measurements were required in order to further understand the ambient air quality at the project area.

Considering the nature of the project, the emissions during construction and operation phases will be limited to the exhaust emissions from light and heavy vehicles and dust emissions due to land preparation and construction activities. Also knowing that Karapınar region has high potential for wind erosion and dust formation, 24-hour PM_{10} measurements were conducted at two nearby settlements between 7-10 July 2018. The measurement locations were selected in order to represent the baseline conditions at the closest settlements located to the west of the project site and Karapınar District to the south of the project site. PM_{10} measurement locations are shown in Figure 5-4 and results are presented in Table 5-8. All PM_{10} measurement results were found to be significantly higher than the 24-hour limit value (50 µg/m^3) set by both the Turkish Regulation on Assessment and Management of Air Quality and IFC/WHO Ambient Air Quality Guidelines. These results also indicate that PM_{10} concentrations in ambient air could be of importance during construction phase and need to be monitored frequently and necessary mitigation measures are implemented to avoid further dust formation.

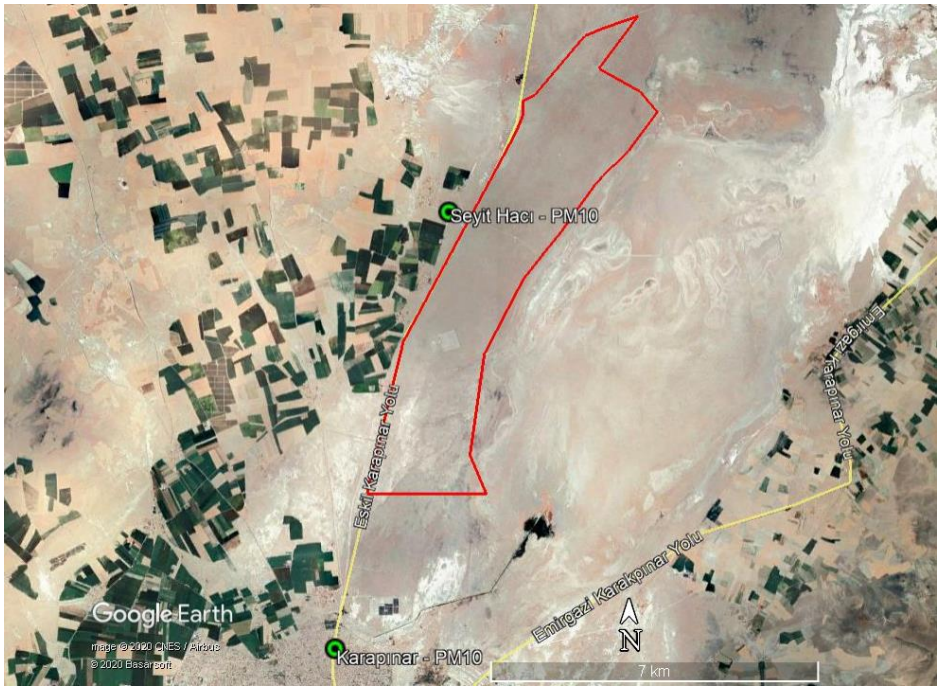

Figure 5-4: PM10 Measurement Locations (2018)

Table 5-8: PM10 Measurement Results (24 hour) (July 7-10, 2018)

Settlement where Measurement were taken	Coordinates		PM10 ($\mu g/m^3$)
	X	Y	
Karapınar	548770	4175614	117
Seyit Hacı	550970	4184893	103
Turkish Ambient Air Quality Limits (24hr)			50
IFC/WHO Ambient Air Quality Limits (24hr)			50

Further to 2018 PM_{10} measurements, 24-hours PM10 monitoring was conducted between in September and December in 2020 for five days in Ekmekçi and Seyit Hacı Settlements to better identify the PM_{10} concentrations while construction activities are on-going at the Project Site. According to the measurement results presented in Table 5-9, PM_{10} concentrations were below 24-hour limit value (50 $\mu g/m^3$) set by both the Turkish Regulation on Assessment and Management of Air Quality and IFC/WHO Ambient Air Quality Guidelines despite of on-going construction activities. Furthermore, PM_{10} concentrations declined between two measurement campaigns the average of 5-day measurement results were 37.8 $\mu g/m^3$ and 35 $\mu g/m^3$ in Ekmekçi and Hacı Seyit, respectively in September while on the first day of December monitoring campaign PM_{10} concentration was measured as 16.65 $\mu g/m^3$ and 12.47 $\mu g/m^3$ in Ekmekçi and Hacı Seyit when no precipitation occurred. PM_{10} concentrations were drastically decreased on other day on which precipitation occurred. The Laboratory representatives were consulted to understand the factors that have caused decrease in PM_{10} concentrations between two campaigns and they concluded that:

- The meteorological factors of the region, the prevailing wind direction and changes in seasonal conditions in September and December are thought to affect the sampled dust concentration;
- No precipitation was encountered during the September measurements, while precipitation occurred during the December measurements except for the first day. Additionally, moist soil structure was formed

during nights and early mornings due to weather events such as fog, frost and frost during December measurements which reduced the dust emission to be released.

- Laboratory representatives observed that external factors (vehicle traffic on the road, agricultural activities around the facility, animal husbandry, etc.) as well dust generating construction activities on the Project Site were decreased in Karapınar by around 50-60% from September to December.

As seen above, meteorological conditions affect dust emission and corresponding PM_{10} concentrations in the area. Although it was not possible to compare August 2018 results with more recent data for the same period of year, considering the distance of residential buildings in the nearby settlements from the Project Site it is found unlikely for dust generated on site to reach these receptors at high concentrations. All measurement reports are provided in **Appendix B**.

Table 5-9: PM10 Measurement Results (24 hour) (September - December, 2020)

Settlement where Measurement were taken	Coordinates		Measurement Day	PM10 (µg/m^3)	
	X	Y		17-21 September 2020	09 -13 December 2020
Ekmekçi	550527	4183291	Day 1	46	16.65
			Day 2	38	4.17
			Day 3	42	4.16
			Day 4	34	4.19
			Day 5	29	4.17
			Average	**37.8**	**6.67**
Seyit Hacı	551103	4185157	Day 1	42	12.47
			Day 2	33	4.16
			Day 3	38	4.17
			Day 4	29	4.16
			Day 5	33	4.17
			Average	**35**	**5.83**
Turkish Ambient Air Quality Limits (24hr)				50	
IFC/WHO Ambient Air Quality Limits (24hr)				50	

Online data gathered from Turkstat (Turkish statistical Institute, 2018) on Greenhouse Gas (GHG) emissions for all sectors (energy, industry, agriculture and waste) in Turkey between 2014 and 2018 are presented in Table 5-10 and GHG emissions by sectors are presented in Table 5-11. According to Turkstat data, total GHG generation in 2018 was 520.9 million tons CO_{2eq} which decreased by 1 % when compared to the previous year.

Table 5-10: Total GHG Emissions in Turkey over Years (2014-2018)

Year	**Total (CO_{2eq})** (Million Tonnes)	**CO_2** (Million Tonnes)	**CH_4** (Million Tonnes)	**N_2O** (Million Tonnes)	**F-gases** (Million Tonnes)
2014	**458.0**	361.7	57.3	33.9	5.1
2015	**472.2**	381.3	51.3	34.7	4.8
2016	**498.5**	401.2	53.9	37.1	6.3
2017	**526.3**	425.3	54.2	38.5	8.2
2018	**520.9**	419.2	57.6	38.9	5.2

Source: www.tuik.gov.tr, TurkStat, Greenhouse Gas Emissions Statistics; http://tuik.gov.tr/PreIstatistikTablo.do?istab_id=614

Table 5-11: GHG Emissions by Sectors (2014-2018)

Year	**Total** (Million Tonnes)	**Energy** (Million Tonnes)	**Industrial processes and product use** (Million Tonnes)	**Agriculture** (Million Tonnes)	**Waste** (Million Tonnes)
2014	**458.0**	325.8	58.5	55.5	18.2
2015	**472.2**	340.9	57.0	55.4	18.8
2016	**498.5**	359.7	62.2	58.2	18.4
2017	**526.3**	379.9	66.5	62.5	17.4
2018	**520.9**	373.1	65.2	64.9	17.8

Source: www.tuik.gov.tr, TurkStat, Greenhouse Gas Emissions Statistics; http://tuik.gov.tr/PreIstatistikTablo.do?istab_id=488

5.1.3 Sensitivity of Receptor

The sensitivity of the receptors was defined based on the criteria provided in Section 4.3.2 of this ESIA and associated baseline conditions. Receptors of the ambient air quality impact and their sensitivity are presented in Table 5-12 below:

Table 5-12: Sensitivity Criteria for Air Quality Receptors

Receptors	High	Medium	Low	Negligible
Human / Livestock / Agricultural Lands	Residents of nearby settlements (i.e. Seyit Hacı, Büyük Karakuyu, Küçük Karakuyu, Ekmekçi, Kirkitoğlu, Karapınar District) Users of agricultural lands Livestock at nearby settlements Site workers	Agricultural lands near the License Area	-	Industrial Areas to the east and south

5.1.4 Impact Assessment

5.1.4.1 Land Preparation and Construction Phase

The main emission sources of the land preparation and construction period are:

- Dust emissions due to land preparation and general construction activities including earthworks; and
- Exhaust emissions from the construction machinery and equipment.

Dust generation comprises the major source of air pollution caused by construction activities especially the earthworks. Project earthworks will comprise land levelling and excavation, construction of access roads, excavations for underground cable trenches, ETL towers and substations. Particulate matter is present in the atmosphere for only a short period after release, as particles are heavy enough to settle relatively quickly. Therefore, impacts of dust emission will be localised and will not cause long-term or widespread changes to local air quality. However, deposition of particulate matter will cause short-term impacts on the settlements and agricultural areas in close proximity to the project area.

It is estimated that a total of 1.5 x 10^6 m^3 of soil will be excavated during land preparation. 80% of excavation material will be used for backfilling and 20% will be used for levelling on site. As of end of December 2020, 568,904.6 m^3 of soil has been excavated (72.5% of total planned amount). All of the excavated soil has been used for backfilling and levelling on site. Excavated materials are temporarily stored on site near the excavation points until they are used for filling. There is no dedicated storage location for excavated materials.

Considering that construction of substation and 154 KV and 400 KV ETL has been completed at the time of writing this report and excavation works on the ETL routes are short-term and insignificant activities compared to the SPP area it is not accounted as part of the emission calculations. Dust emissions are closely related to the specific source conditions, such as type of activity, nature of earth, and the meteorological conditions. However, dust emissions due to site preparation activities can be predicted using the typical emissions factors as presented in the following table (US EPA, 2016).

Table 5-13: Uncontrolled Particulate Emission Factors for Open Dust Sources

Sources	TSP Emission Factors	Unit
Topsoil removal by scraper	0.029	kg/ton
Truck loading by power shovel	0.018	kg/ton
End dump truck unloading	0.004	kg/ton

** Emission factors derived from Section 11.9, Table 11.9-4 of AP-42 (US EPA, 2016).*

Site preparation activities and corresponding dust emissions are calculated based on the following assumptions on cut and fill amounts, bulk density of soil, duration of earth works, size of the area on which activities take place, etc. The variables used in estimation of dust emissions are presented in Table 6.8 and the estimated controlled and uncontrolled dust emissions are presented in Table 5-15. It is assumed that 30% of Total Suspended Particulate (TSP) emissions is due to PM_{10}.

Table 5-14: Parameters used in Estimation of Dust Emissions

Excavation	Excavation amount	1,500,000	m^3
	Excavation amount per day	2000	m^3/day
	Bulk density of sandy soil	1.60	ton/m^3
	Mass of excavated soil	2,400,000	ton
	Area of concern	1920	ha
Fill	Fill amount	1,500,000	m^3
	Mass of soil to be filled	2,400,000	ton
	Daily amount of fill	2000	m^3/day

Table 5-15: Estimated Dust Emissions due to Site Preparation Works

Activity	Uncontrolled TSP Emission (kg/hr)	Uncontrolled PM10 Emission (kg/hr)	Controlled TSP Emission (kg/hr)	Controlled PM10 Emission (kg/hr)	Total PM Flux ($g/m^2.sec$)
Topsoil removal by scraper	3.87	1.16	1.93	0.58	1.5×10^{-4}
Truck loading by power shovel	2.40	0.72	1.20	0.36	9.4×10^{-4}
End dump truck unloading	0.53	0.16	0.27	0.08	2.1×10^{-5}

As it is seen in Table 5-15 estimated dust emissions resulting from excavation works could exceed the limit value (1kg/hr) defined in the Industrial Air Pollution Control Regulation when uncontrolled. Although the Regulation suggests carrying out an Air Dispersion Modelling when the estimated dust emissions exceed the limit value it is thought that the Project will not benefit from the modelling study since the land preparation and construction activities have been on-going at the time of preparation and revision of this ESIA.

When all measurement results presented in Section 5.1.2.2 are compared, it is seen that meteorological conditions have significant impact on PM_{10} concentrations in the area. Therefore, periodic PM_{10} measurements at Seyit Hacı and Ekmekçi will be conducted as per the schedule provided below during dry-period. Simultaneous, PM10 measurements will also be conducted at the western site boundary to identify the contribution of current activities on the measured PM10 concentrations at the receptors. Measurement point at the western boundary should be determined by the site team at the time of measurement depending on where majority of the activities take place (in between construction area and measurement points at the settlements Seyit Hacı and Ekmekçi) .

Table 5-16: Recommended Air Monitoring Schedule

Month	Planned Monitoring Activity
April	5-day PM10 measurement at the end of April (if precipitation occurs / or there is chance for precipitation according to weather forecasting this measurement can be postponed to May)
May	
June	5-day PM10 measurement
July	5-day PM10 measurement
August	5-day PM10 measurement
September	5-day PM10 measurement if measurement results of August Campaign is close to or higher than limit value

In addition to PM10 measurements, daily visual checks should be carried out throughout the construction site to oversee the level of dust generation on Site and where required necessary additional measures such as stopping/pausing work at the construction areas close to the western edge of the project site during the windy/dry weathers will be applied.

If any grievance related with dust is received from the settlements where the residual impact significance is identified to be Moderate, the complaint will be evaluated and where found necessary/applicable one-off PM10 measurements will be conducted at these locations and necessary corrective actions will be implemented.

PM_{10} measurements will be conducted by an accredited laboratory and measurement methods will be in compliance with Turkish Standards and EPA norms.

In addition to dust emissions, there will be exhaust gases emissions from operation of construction machinery and equipment. Construction machinery and equipment that is planned to be used during the construction phase and associated fuel consumption are listed in Table 5-17. Calculation of exhaust emissions is based on the following assumptions:

- Diesel fuel will be used for all construction machinery and equipment;
- All machinery and equipment will operate at the same time but not in the same position and that they will be scattered at different locations within the license area;
- All machinery and equipment will comply with Stage V emissions[3].

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[3] Machinery complying with the European Commission's proposed 'Stage V' emission limits.

Table 5-17: Estimated Fuel Consumption of Planned Construction Machinery and Equipment

Machinery / Equipment	Maximum Number	Engine Power (kW)	Fuel Consumption (g fuel / kWh)
Excavator	10	500	250
Grader	3	228	250
Vibratory Roller	4	55	260
Water Sprinkler	4	88	255
Loader	3	183	250
Backhoe loader	2	183	250
Truck	40	367	250
Dozer	3	130	250
Tractor	5	130	250
Crane	5	367	250
Colon Pile Driver	7	135	250

EMEP/EEA Air Pollutant Emission Inventory Guidebook (2016) – Update May 2017, Tier 2 approach for Category 1.A.2.g.vii: Mobile combustion in manufacturing industries and construction was adopted for the calculation of NOx, CO, PM and SO_2 emissions. Tier 2 emission factors (EFs) presented in Table 5-18 below have been used for calculations:

Table 5-18: Tier 2 Emission Factors for Diesel Construction Equipment

	NOx	CO	PM
Emission Factors (g/ton fuel)	7,663	7,352	116

Source: EMEP/EEA Air Pollutant Emission Inventory Guidebook (2016) Tier 2 Emission Factors for Non-road mobile sources and machinery, Table 3-2.

The generic algorithm for calculating emissions using the Tier 2 approach is:

$$\mathrm{E_i} = \sum \mathrm{FC} \times \mathrm{EF_i}$$

where:

Ei = mass of emissions of pollutant i [g/sec],

FC= fuel consomption [ton fuel/sec],

EFi = average emission factor for pollutant i [g/ton fuel],

i = pollutant type.

Fuel consumption (FC) above is calculated as follows:

$$\mathrm{FC}\left[\frac{\text{ton fuel}}{\text{sec}}\right] = \text{Engine Power}\ [\text{kW}] \times \mathrm{FC}\left[\frac{\text{g fuel}}{\text{kWh}}\right] \times \frac{1\ \text{ton}}{10^6 g} \times \frac{1h}{3600 sec}$$

SO_2 emissions are estimated by assuming that all sulphur in the fuel is transformed completely into SO_2 using the formula given below:

$$E_{\mathrm{SO2}} = 2 \sum \mathrm{k}_S \times \mathrm{FC}$$

where:

kS = weight related sulphur content of fuel [kg/kg] (taken as 400 ppm),

FC = fuel consumption [kg] (given in Table 5-17).

Calculated emissions of NOx, CO, PM and SO_2 for the peak time of construction activities (assuming that all construction machinery is operational at the same time) are presented in Table 5-19 below.

Table 5-19: Estimated Exhaust Emissions from Construction Machinery and Equipment

Parameters	Estimated Emission Rates (g/sec)
NO_x (as NO_2)	6.35 (1.27 as NO_2)
CO	6.09
PM	0.096
SO_2	0.663

Exhaust Emissions from Road Transportation was also calculated based on Tier 2 exhaust emission factors for heavy-duty vehicles as presented in Table 5-20. Calculations were based on the assumptions that maximum estimated number of heavy-duty vehicles will operate at the same time with 60km/hr speed. Calculated emissions due to road transport are provided in Table 5-21 below.

Table 5-20: Tier 2 Emission Factors for Diesel heavy-duty vehicles

	NOx	CO	PM
Emission Factors (g/veh.km)	0.012	0.121	0.0013

Source: EMEP/EEA Air Pollutant Emission Inventory Guidebook (2016) Tier 2 Emission Factors for Non-road mobile sources and machinery, Table 3-2.

Table 5-21: Estimated Exhaust Emissions from Road Transportation

Parameters	Estimated Emission Rates (g/sec)
NO_x (as NO_2)	0.34 (0.06 as NO_2)
CO	0.008
PM	0.080
SO_2	0.134

The most critical phase occurs, when several concurrent activities on site will involve a higher number of different heavy equipment for construction and earth moving. As such, the exhaust emissions will be effective for a limited period of time and mostly effective within the boundaries of the construction area (local scale of influence). The potentially induced impact on air quality due to exhaust emissions from road transport and construction equipment during construction phase is evaluated of **low significance** and **reversible**.

Based on above calculations and baseline conditions of the License Area, evaluation of the potential impact on air quality, mainly due to dust emissions from land preparation and construction activities is summarised in the following table.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Residents of nearby settlements, mainly Seyit Hacı, Büyük Karakuyu, Küçük Karakuyu, Ekmekçi, Kirkitoğlu	High	Short-term	Local	Intermittent	High	Minor to Moderate	Moderate to Major
Residents of Karapınar District	High	Short-term	Local	Intermittent	Medium	Low	Moderate
Livestock at nearby settlements	High	Short-term	Local	Intermittent	Medium	Moderate	Major
Agricultural lands near the License Area	Medium	Short-term	Local	Intermittent	Medium	Low	Minor
Users of agricultural lands	High	Short-term	Local	Intermittent	Medium	Low	Moderate
Site Workers	High	Short-term	Local	Intermittent	High	Minor to Moderate	Moderate to Major
Industrial areas	Low	Short-term	Local	Intermittent	Low	Low	Negligible

5.1.4.1.1 *Mitigations, Management and Monitoring*

The following measures are in place to avoid or minimise the potential impacts on air quality during the land preparation and construction phase of the Project:

- Construction Dust and Air Emission Control Plan is in place and implemented.
- Daily Visual Checks and periodic PM_{10} monitoring conducted at the selected nearby settlements located to the west of the project site (Ekmekçi and Seyit Hacı) during dry periods (May-September) as explained in the Dust and Air Emission Control Plan and Section 5.1.4.1 of this report and necessary mitigations such as stop/pause of construction activities will be taken where required;
- Dust control methods such as covers, or wind barriers/curtains implemented for open materials storage piles and at locations where dust generating activities are carried out;
- Access roads are chip sealed to prevent dust generation by vehicle movements;
- Speed limits in place for vehicles travelling inside the construction site;
- Loads in all trucks transporting dust-generating materials covered to prevent dust generation;
- Loading and unloading of materials applied without throwing and scattering;
- Vehicle engines and other machinery turned off when not in use, avoiding any unnecessary emissions;
- Periodical maintenance of machinery and equipment carried-out to ensure their good working condition and compliance with standards and technical regulations for the protection of the environment and have appropriate certifications;
- Minimum number of machinery and equipment operate at the same time where possible;
- Project Grievance Mechanism is in place as part of Stakeholder Engagement Plan. If any comment related with dust and air quality is received through the Grievance Mechanism, the complaint is evaluated and where necessary corrective actions will be implemented;
- If any comment related with dust is received at settlements where the residual impact significance is identified to be Moderate, the complaint is evaluated and where found necessary/applicable one-off PM_{10} measurements will be conducted at these locations and necessary corrective actions will be implemented.

5.1.4.1.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential air quality impacts are summarized below.

Receptor	Construction Phase Residual Impact
Residents of nearby settlements, mainly Seyit Hacı, Büyük Karakuyu, Küçük Karakuyu, Ekmekçi, Kirkitoğlu Livestock at nearby settlements	Minor to Moderate
Residents of Karapınar District	Minor
Livestock at nearby settlements	Moderate
Agricultural lands near the License Area	Negligible
Users of agricultural lands	Minor
Site Workers	Minor to Moderate
Industrial areas	Negligible

5.1.4.2 Operation Phase

During the operation of the plant, electrical energy will be used for heating of the administrative building therefore no emissions will occur, and also vehicle traffic will be minimal. Therefore, the operation of the plant is not anticipated to cause air emissions and have any adverse impact on local air quality.

Accordingly, the anticipated impact on local ambient air quality during operations will be **negligible**.

5.1.4.3 Greenhouse Gas Emissions

GHG Protocol of the World Business Council on Sustainable Development and World Resources Institute was followed for GHG assessment of Karapınar SPP Project.

GHG assessment is based on definition of the operational boundaries and scope of the direct and indirect emissions for operations within an organizational boundary. The operational boundaries of consideration are classified as Scope 1, Scope 2 and Scope 3; an overview of these scopes and their associated emissions are illustrated in Figure 5-5.

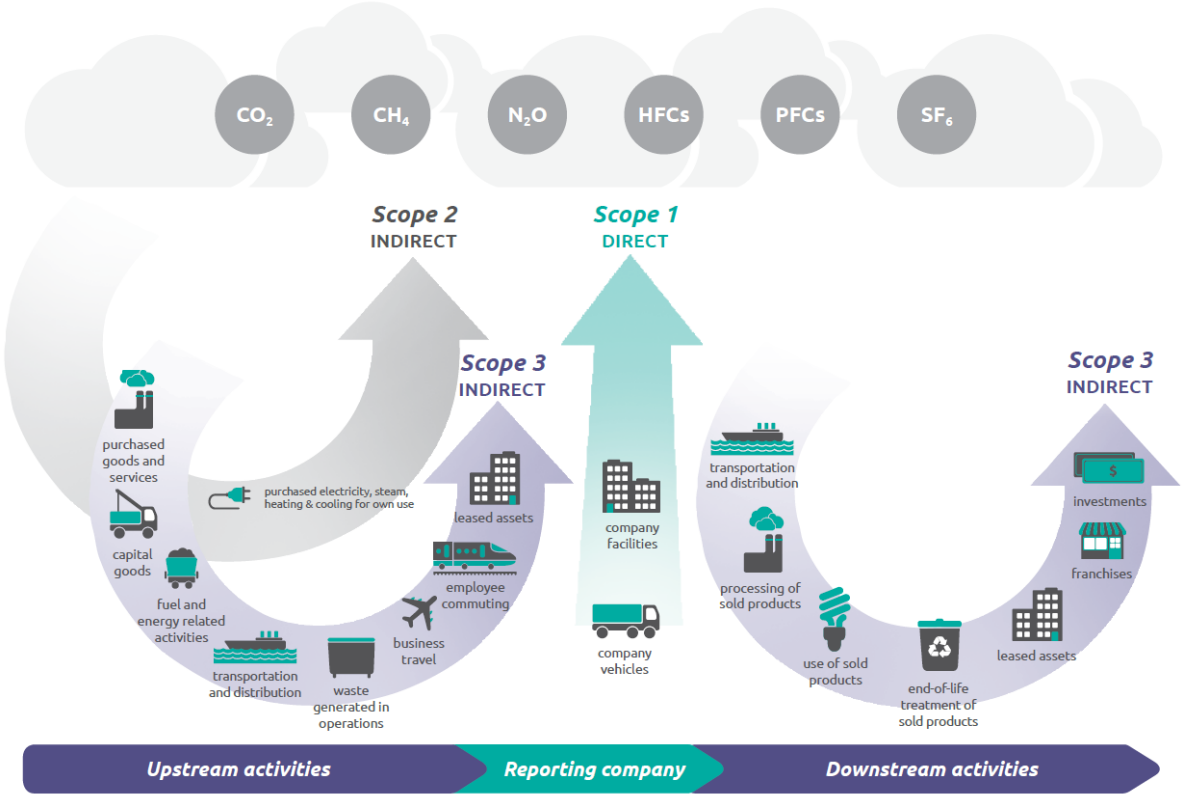

Figure 5-5: GHG Scopes and Associated Emissions4

Scope 1 – Direct GHG Emissions are typically direct GHG emissions from company owned facilities and vehicles.

Scope 2 – Electricity Indirect GHG Emissions include emissions from the generation of purchased electricity that is consumed in company's owned or controlled equipment or operations.

Scope 3 – Indirect GHG Emissions include extraction and production of purchased materials and fuels, transport – related activities, electricity-related activities not included in Scope 2, leased assets, franchises and outsourced activities, use of sold products and services and waste disposal.

GHG Protocol mandates calculation of Scope 1 and Scope 2 while calculation of Scope 3 emissions is optional.

According to the World Bank, energy generated from renewable sources avoids emissions that would otherwise be generated wholly or partly from more carbon-intensive sources.[5] In other words, renewable energy projects displace emissions associated with other electricity generation on the grid. Furthermore, the World Bank notes that the construction phase emissions for renewable energy projects may be excluded from GHG assessment.

In order to calculate the Project's contribution to displacement of emissions associated with other electricity generation on the national grid, annual energy production of the project was multiplied by the combined margin (CM) emission factor for Turkey, which was reported as 0.497 tCO_2e/MWh in 2017[6]. Noting that annual energy production of Karapınar SPP will be about 2.3 TWh in the first-year operation after fully operational, energy production by the Project will annually displace 1.14 million tCO_2e emission on the national grid.

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[4] https://ghgprotocol.org/

[5] IFI Approach to GHG Accounting for Renewable Energy Projects (World Bank, 2015)

[6] https://www.climate-transparency.org/wp-content/uploads/2017/07/B2G2017-Turkey.pdf

Based on GHG emission calculations provided above and the baseline characteristics of the area, summary of the impact evaluation for GHG Emissions associated with the operation phase is provided below.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
GHG Emission Displacement due to Operations	Medium	Long-term	International	Continuous	High	High (Positive)	High **(Positive)**

5.1.4.4 Decommissioning Phase

Potential air emission sources (mainly dust and exhaust emissions) will be similar to the construction phase during the decommissioning phase. Mitigation measures will be similar to the ones that will be taken during construction and be in place to minimise the impacts until the decommissioning activities are complete. Therefore, **limited impacts** are anticipated on ambient air quality.

5.1.5 Climate Change Risk Assessment

A stand-alone Climate Change Risk Assessment (CCRA) study has been carried out in line with the prescriptions of Equator Principles IV, a full assessment of transition risks for the Project is not provided, since Karapınar SPP is a renewable power plant and has GHG emissions largely below the threshold of 100,000 tCO2e/y. However, the main potential areas for transition risks mentioned by TCFD recommendations (Policy and Legal, Technology, Market, Reputation) have been screened and no significant climate-related transition risk has been identified for the Project.

CCRA Report is provided in **Appendix C**.

5.2 NOISE IMPACTS

5.2.1 Project Standards

The Project is required to comply with the following regulations and standards:

- Turkish Regulation on the Assessment and Management of Environmental Noise (RAMEN).
- IFC General EHS Guidelines: Noise Level Guidelines, April 30, 2007.
- WHO Guidelines for Community Noise, 1999.

The Turkish RAMEN sets noise limits for different types of areas including industrial zones, residential areas or combination of both for three periods; day (07:00-19:00), evening (19:00-23:00) and night (23:00-07:00) which is presented in Table 5-22. The Regulation also sets specific limit values for the construction activities as provided in Table 5-23. Construction activities are not allowed near or within the residential areas during evening and night-time (between 19:00-- and 07:00). In line with RAMEN, construction activities will only take place in daytime therefore day-time limit values of both RAMEN and IFC/WHO Guidelines which are stricter need to be met.

Table 5-22: Environmental Noise Limits for Industrial Facilities (RAMEN)

Area Type	L_{Aeq} Day (07:00- 19:00) (dBA)	L_{Aeq} Evening (19:00- 23:00) (dBA)	L_{Aeq} Night (23:00- 07:00) (dBA)
Areas where sensitive receptors are located including education, culture, health, summer houses and camping areas	60	55	50
Commercial and residential areas where residential buildings dominate	65	60	55
Commercial and residential areas where workplaces dominate	68	63	58
Industrial areas	70	65	60

Table 5-23: Environmental Noise Limits for Construction Areas (RAMEN)

Construction Activity (construction, demolition, maintenance)	L_{Aeq} day (07:00- 19:00) (dBA)
Building	70
Road	75
Other	70

According to the IFC General EHS Guidelines, noise levels at the receptors should not exceed the noise levels set by WHO Guidelines for Community Noise as provided in Table 5-24 or result in a maximum increase in background levels of 3 dB at the nearest receptor off-site.

Table 5-24: IFC – WHO Noise Limits at the Receptors

Receptor	L_{Aeq} Day (07:00- 22:00) (dBA)	L_{Aeq} Night (22:00- 07:00) (dBA)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

** IFC EHS Guidelines define the daytime as 07:00-22:00 and night-time as 22:00-07:00.*

5.2.2 Baseline Conditions

Baseline environmental noise measurements were conducted by an accredited laboratory in July 7-10, 2018 at two locations: Karapınar District and Seyit Hacı Settlement. Seyit Hacı was selected to represent other closest settlements to the west of the Project site and the measurement location in Karapınar is the closest residential building to the Plant site and 154kV ETL in the District Centre; Figure 5-6 shows the measurement locations. The noise measurements were performed for 48 hours (covering one week-day and one weekend day).

Noise measurements were undertaken with SVAN 971 and SVAN 975 devices, which comply with the standards of ANSI S1.4, IEC 651, IEC 61672-1:2002 and IEC 804. Calibration of the equipment was done before and after each measurement with an SV 30A SN: 22502 acoustic calibrator at 94 and 114dBA. All measurement systems were set to log LAeq noise levels over the required fifteen-minute intervals during measurement period. Noise measurements were undertaken 1.5m above ground level and at least 3.5 m far from any vertical reflective surfaces.

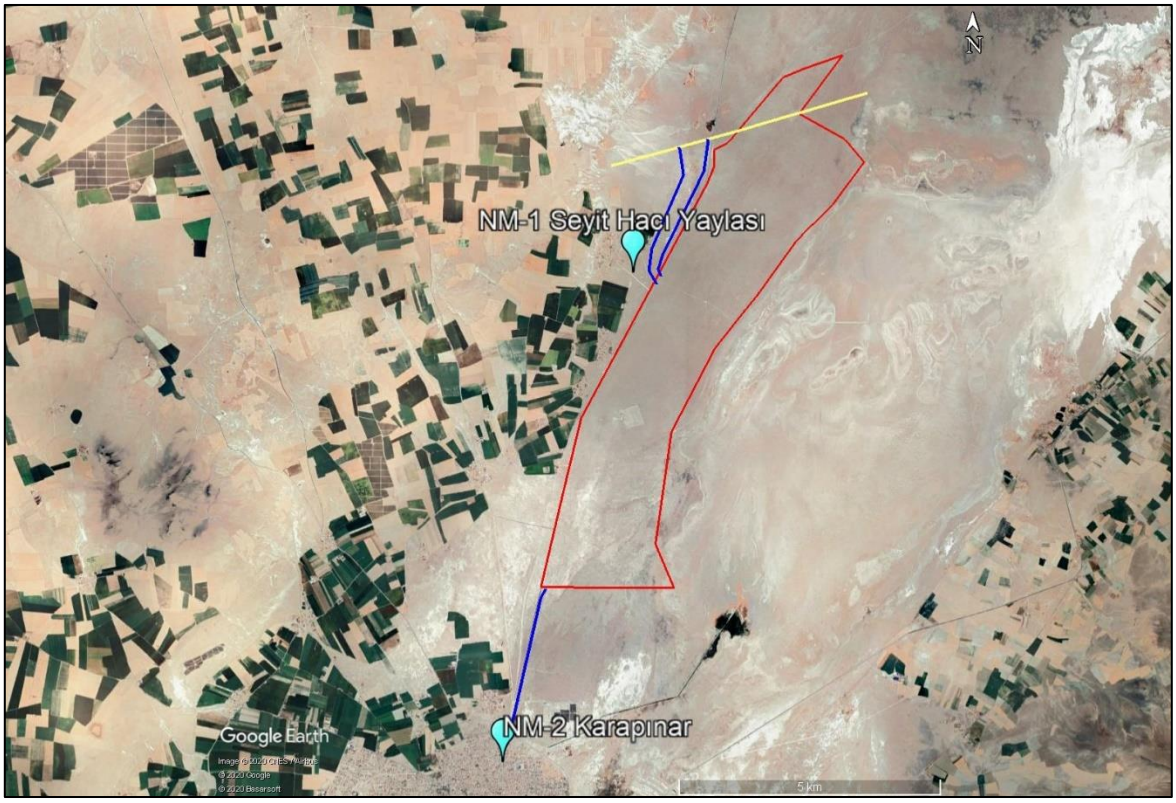


Figure 5-6: Background Noise Measurement Locations

The noise measurement locations and results with respect IFC/WHO standards are provided in Table 5-25. Results were compared with IFC/WHO standards since they are stricter than RAMEN standards.

As shown in Table 5-25, there is exceedance of IFC/WHO limit value for evening time (22:00-07:00) at Karapınar District while noise levels were below the limits values at Seyit Hacı during the measurement interval. Measurement location in Karapınar is within the District Centre where residential and commercial buildings are dominant. On the other hand, Seyit Hacı and other settlements to the west of the Project Site are rural areas where people carrying out agricultural and animal husbandry activities reside seasonally. Background noise is considered to be mainly due to the transportation on Karapınar-Eskil Road.

Table 5-25: Noise Measurement Results with Respect to IFC/WHO Standards (August 2018)

Noise Measurement Locations	Coordinates		Distance from the Project Site Nearest Boundary (km)	Results with respect to IFC/WHO Standards Leq (dBA)*	
	X	Y		Day Time (07:00-22:00)	Evening Time (22:00-07:00)
				55 dBA	45 dBA
Karapınar	548770	4175614	3	53	**48.9**
Seyit Hacı	550970	4184893	0.54	40.7	36.9

*: Average of week-day and weekend measurement results is presented in the table.

In September 2020 and December 2020, 5-day noise measurements were repeated to identify potential noise emissions from the construction site in combination with the background noise levels at Seyit Hacı and Ekmekçi Settlements. Results of these measurements are discussed in 5.2.4.1. All Laboratory Noise Measurement Report is provided in **Appendix D**.

5.2.3 Sensitivity of Receptors

Receptor sensitivity was defined by following the approach that Turkish RAMEN defined to set ambient noise levels for different receptors and taking the criteria provided in Section 5.2.2 of this ESIA and associated baseline conditions into account.

Receptors sensitivity criteria is presented in Table 5-26 below. Residents of settlements Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu that are within the administrative boundaries of Reşadiye Neighbourhood (to the West of the Project Site) and Karapınar District (3km to the South of the Project Site) have been identified as the noise sensitive receptors (NSR) [**High sensitivity**] of the Project activities. In addition, residents of the houses within the 500m corridor along the ETL routes were also identified as noise sensitive receptors.

There are also agricultural lands near the nearby settlements users of which might be affected by noise generation by Project activities.

Table 5-26: Sensitivity Criteria for Noise Receptors

Receptors	High	Medium	Low	Negligible
Human receptors	Areas where sensitive receptors are located including education, culture, health, summer houses and camping areas i.e. Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu Residents of the houses within the 500m corridor along the 154kV ETL route in Karapınar District and 400kV ETL route in Seyid Hacı	Commercial and residential areas where residential buildings dominate	Commercial and residential areas where workplaces dominate And Users of the agricultural lands to the west of the Project Site	Industrial areas

5.2.4 Impact Assessment

5.2.4.1 Land Preparation and Construction Phase

Operation of construction machinery and equipment, excavation and construction and vehicle transit will generate noise during construction of the Plant, substations and ETLs, consequently, noise impacts on noise receptors will occur.

Generated noise levels (at source) will be a function of number and type of operating machinery and equipment at the construction sites. Noise levels at the receptors will differ depending on:

- Alignment of the machinery and equipment throughout the Project area;
- Distance to the receptor;
- Ground and air absorption and barrier effects.

Type, number and sound power levels of construction machinery and equipment are provided in Table 5-27.

Table 5-27: Sound Power Levels of Construction Machinery and Equipment

Machinery / Equipment	Maximum Number Planned	Lmax @50ft (dBA)
Excavator	10	85
Grader	3	85
Vibratory Roller	4	85
Water Sprinkler	4	80
Loader	3	85
Backhoe loader	2	80
Truck	40	84
Dozer	3	85
Tractor	5	84
Crane	5	85
Diesel generators	5	82
Mobile Fuel Tanker	1	85
Lowbed	1	85
Pick-up Truck	5	75
Bus	6	85
Light Tower	7	70
Manitou	15	85
Stone Breaker	2	85
Colon Pile Driver*	7	135
Cable Drawing Machine (only during ETL construction works)	2	85

Cumulative Noise Level at the Source is calculated based on the assumption that maximum number of all machines/equipment will operate at the same time at one location with maximum sound levels in order to demonstrate the worst-case situation. Total noise level generated by all noise sources, is calculated with the formula (RAMEN, Annex-I) given below:

$$L_{WT} = 10Log\left(\sum_{i=1}^{n} 10^{Lwi/10}\right)$$

where;

n: Number of noise source

LWi: Sound power level of each source (dBA)

LWT: Cumulative noise level at the source

Accordingly, total noise level at the source has been calculated as 104.7 dBA. It should be noted that Pile Driver generates sound intermittently while piling; therefore, it isn't considered as a continuous noise source. When calculations made taking into pile drivers account it is identified that noise level at source may increase up to 143.5 dBA intermittently during piling works.

Cumulative Noise Level at the Receptor is calculated by using the following formula:

$$L_{PT} = L_{WT} + 10 \times \log\left(\frac{Q}{4.\pi.r^2}\right)$$

where;

LPT: Noise power level at the receptor (dB);

Q: Ground absorption coefficient (assumed as 1 due to reflect land);

r: Distance between the source and the receptor.

The noise levels at different distances are given in Table 5-28 and noise propagation diagram with respect to distance from the source is presented in Figure 5-7.

Table 5-28: Noise Levels with Respect to Distance

Distance (m)	Max. LAeq (dBA) due to construction activities	Max. LAeq (dBA) during Piling Activities
At source (0m)	104.7	143.5
10	73.7	112.5
50	59.7	98.5
100	53.7	92.5
180 (Büyükkarakuyu)	48.6	87.4
200 (Ekmekçi)	47.7	86.4
250	45.8	84.5
500	39.7	78.5
750	36.2	75.0
1000	33.7	72.5
2000	27.7	66.4
3000	24.2	62.9

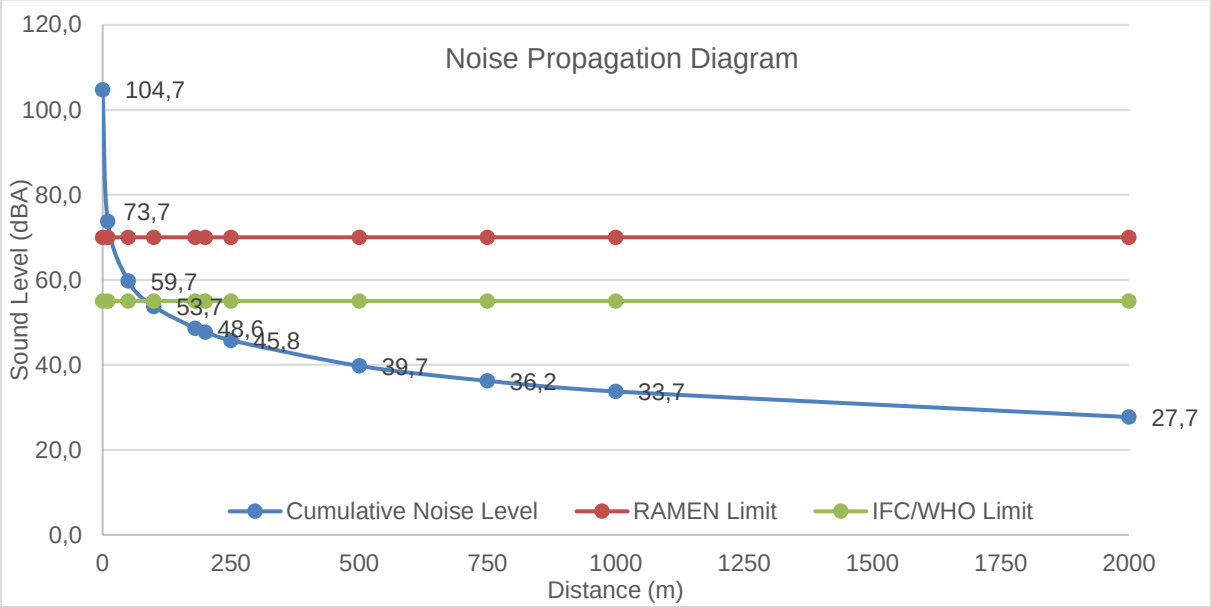


Figure 5-7: Noise Propagation with Respect to Distance from the Source

Cumulative noise levels at the baseline measurement locations in Karapinar District and Seyit Hacı are calculated by taking the background noise levels at these receptors into account. Comparison between the results and corresponding RAMEN limits are presented in Table 5-29 . Furthermore, noise levels due to construction activities (excluding and including piling) at closest sensitive receptors Büyükkarakuyu and Ekmekçi are also presented in the table.

It should be noted that calculations are based on the worst-case scenario in which maximum number of construction machinery and equipment will operate at the same time, at one location, with maximum sound levels. Furthermore, no atmospheric or barrier effect (artificial barriers, topographical conditions, vegetation) was taken into account to simulate the worst-case conditions. Ground absorption coefficient was applied as 1 to reflect land effect on calculations.

As it is seen from the table, cumulative noise levels at noise measurement location in Karapınar will be well below the national limits during the construction works. However, there will be exceedance of limits at the Noise Measurement Location in Hacı Seyit when all pile drivers operate in parallel to the maximum number of construction equipment which is would be worst case with low possibility.

Table 5-29: Calculated Noise Levels at the Measurement Locations with respect to IFC/WHO Standards

Noise Measurement Locations	L_{day} (07:00- 19:00) (dBA) Baseline Noise Level	Noise Level at the Receptor due to Construction Activities	Noise Level due to Construction Activities Including Piling	Cumulative Noise Level at the Receptor due to Construction Activities	Cumulative Noise Level due to Construction Activities Including Piling	Limit Value set by IFC/WHO
Karapınar	53	24.2	**62.9**	53	**62.9**	55
Seyit Hacı	40.7	39.1	**77.8**	40.7	**77.8**	55

Table 5-30: Calculated Noise Levels at the Nearest Receptors with respect to IFC/WHO Standards

Noise Measurement Locations	L_{day} (07:00- 19:00) (dBA)			Limit Value set by IFC/WHO
	Baseline Noise Level	Noise Level at the Receptor due to Construction Activities	Noise Level due to Construction Activities Including Piling	
Büyükkarakuyu	-	48.6	**87.4**	55
Ekmekçi	-	47.7	**86.4**	55

In 17-21 September 2020 and 09-14 December 2020, 5-day noise measurements were repeated to identify potential noise emissions from the construction site in combination with the background noise levels at Seyit Hacı and Ekmekçi Settlements. No hourly data was available for September 2020 measurements; however, hourly data from December 2020 measurements (Provided in Appendix D) were compared to IFC/WHO limit values indicating no exceedances.

Although the calculations for the worst-case scenarios indicate that noise limits will be exceeded from time to time when piling activities are ongoing, results of December 2020 noise measurements were in line with IFC/WHO limits.

Average values for IFC defined time periods were provided in Table 5-31 below while Laboratory Noise Measurement Reports are provided in Appendix D. As seen, average noise levels are below the standard value most of the time. Also, noise levels have shown decreasing trends between September and December. Based on the field observation of the laboratory that undertook these measurements, this decrease can be attributed to the decreased traffic on the Karapınar-Eskil Road which is between the western Project Site boundary and the settlements and less volume of construction activities compared to the September measurements.

Only measurement results for Seyit Hacı can be roughly compared to the baseline results of 2018 (when no construction or mobilisation activity was in place). Accordingly, September 2020 results are higher than 2018 baseline results while December 2020 are lower. Technicians who carried out the measurements reported that there is a poultry farm closed to the measurement point at Karapınar, which resulted in recording higher background noise levels here compared to Ekmekçi.

Measurement results of September and December 2020 campaigns also support the estimation that exceedance of standards at the sensitive receptors might occur from time to time for short periods of time unless mitigations are not in place. Periodic noise monitoring will be carried out at the same locations in Ekmekçi and Seyithacı to ensure there are no exceedances. Furthermore, if any grievance related to noise is received from the Noise Sensitive Receptors (NSR), noise monitoring will be conducted at these receptors and corrective actions will be taken where necessary.

Table 5-31: Noise Measurement Results with Respect to IFC/WHO Standards (Sep – Dec 2020)

Noise Measurement Locations	Coordinates		Distance from the Project Site Nearest Boundary (km)	Results with respect to IFC/WHO Standards Leq (dBA)*			
				September 2020		December 2020	
	X	Y		Day Time (07:00-22:00)	Evening Time (22:00-07:00)	Day Time (07:00-22:00)	Evening Time (22:00-07:00)
				55 dBA	45 dBA	55 dBA	45 dBA
Ekmekçi	550527	4183291	0.15	44.76	43	39.61	30.61
Seyit Hacı	550970	4184893	0.52	48.84	**46.06**	39.11	32.08

*: Average of week-day and weekend measurement results is presented in the table.

It should be noted that sound level generation due to ETL construction activities occur intermittently and in insignificant values. Therefore, sound level due to ETL Construction equipment is not taken into account for sound level calculation of SPP and Substation Construction activities. Separate calculation and respective diagram are provided below.

Construction works for ETL routes consists simultaneous operation of two excavators, three cranes and two cable drawing equipment at maximum. Total noise level at the source has been calculated as 93.5 dBA by using the same formula as above. Accordingly, the noise levels at different distances due to the ETL construction works are given in Table 5-28 and noise propagation diagram with respect to distance from the source is presented in Figure 5-7.

Table 5-32: Noise Levels (ETL Construction) with Respect to Distance

Distance (m)	Max. LAeq (dBA) due to ETL Construction
At source (0m)	93.5
5	68.5
10	62.5
50	48.5
100	42.5
250	28.5
500	25.6
750	23.4
1000	22.5

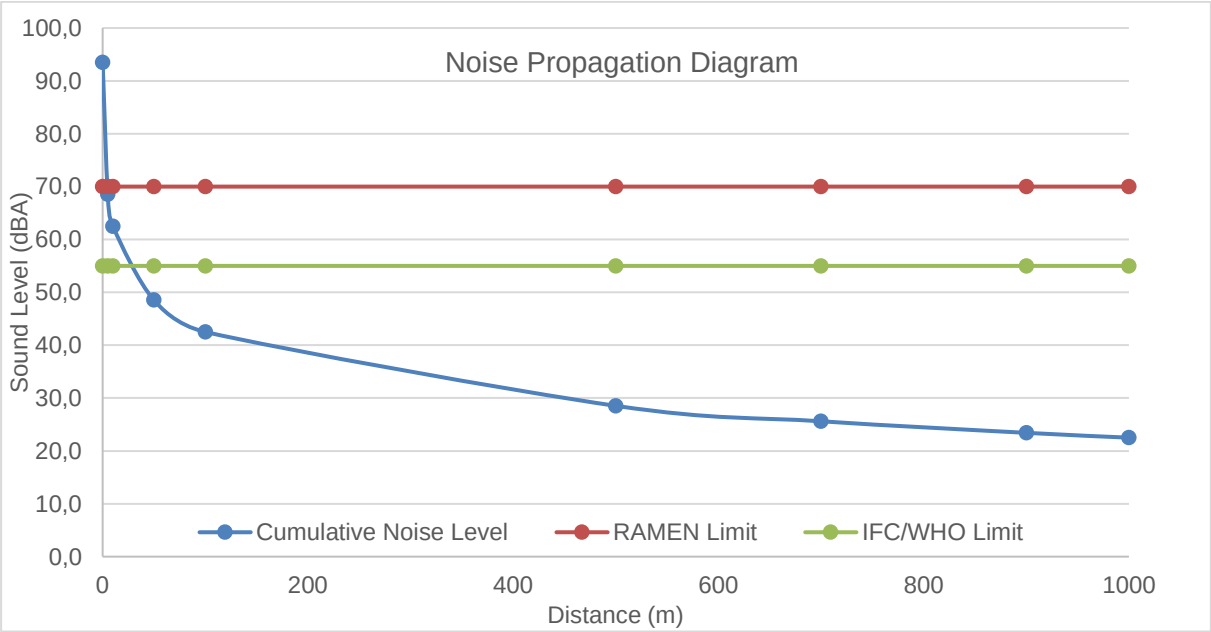


Figure 5-8: Noise Propagation (ETL Construction) with Respect to Distance from the Source

Based on baseline conditions, nature of the receptors and abovementioned calculations, noise impact evaluation for Land Preparation and Construction Phase is summarised below:

Noise Sensitive Receptors	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Residents of Karapınar	High	Short-term	Local	Intermittent	Low	Negligible	Negligible
Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu	High	Short-term	Local	Intermittent	Medium	Medium	Moderate
Livestock at nearby settlements	Medium	Short-term	Local	Intermittent	Medium	Moderate	Moderate
Users of the agricultural lands located in the west of the Project Site	Low	Short-term	Local	Intermittent	Medium	Negligible to Low	Negligible

5.2.4.1.1 *Mitigations, Management and Monitoring*

The following mitigations and monitoring activities are implemented in order to minimise and monitor the potential noise impacts on the sensitive receptors during land preparation and construction phase:

- Project specific Construction Noise Management Plan is in place and implemented;
- Periodic noise monitoring is conducted in line with the Noise Management Plan;
- Construction activities are carried out between 08:00 and 18:00 only;
- Construction vehicle engines and other machinery are turned off when not in use, avoiding any unnecessary noise generation;
- When piling works are conducted other machinery are turned-off to avoid exceedances at the nearest noise sensitive receptors;
- Periodical maintenance of machinery and equipment is carried out to ensure their good working conditions;
- The number of machinery and equipment operating at the same time is kept minimal where possible;
- Portable noise barriers are used to create barrier effect between the construction sites where piling is carried out and the nearest receptors;
- Grievance mechanism is implemented in line with the Project Stakeholder Engagement Plan. If any grievance related with noise is received from the Noise Sensitive Receptors (NSR) identified in this ESIA, noise monitoring is conducted at these receptors and corrective actions taken where necessary.

5.2.4.1.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential construction noise impacts are summarized below.

Receptor	Impact Significance
Residents of Karapınar	Negligible
Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu	Minor
Livestock at nearby settlements	Minor
Users of the agricultural lands located in the west of the Project Site	Negligible

5.2.4.2 Operation Phase

Noise sources during operation are very limited; transformers and inverters will be enclosed and there will be minimal noise emissions from traffic caused by employee transportation. Noise emissions will therefore be minimal when compared to the construction phase.

GE Central type Inverter Stations will be installed . Phase 1 (200 MW Plant) will consist of 66 inverters while Phase 2 (1000 MW Plant) will consist of 248 inverters stations. Inverter stations will be enclosed in prefabricated units which include inverters, step-up transformers and MV Ring Main Units. Sound pressure levels of GE inverter stations are known to be around 85/75 dBA at 1m/10m in front of the enclosure and 1m above ground.

The inverter stations will be installed in a layout as shown in Figure 2-8. Accordingly, distance between each inverter station will be 200m on east-west direction and 300m on north-south direction. Also, the nearest inverter station will be located approximately 150m inside the fence line. According to the noise propagation calculations, sound level of each station will drop below 52dBA at 150m distance. Therefore, noise level generated by the inverter stations is not expected to cause any increase at the background noise levels at the closest sensitive receptors.

Cumulative noise levels at the closest noise sensitive receptors are predicted to be well below the IFC/WHO Guideline Limit Values, which are stricter than Turkish RAMEN limits. Noise impact evaluation for the operation of the Karapınar YEKA SPP is summarised below:

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu	High	Long-term	Local	Continuous	Low	Negligible	Negligible
Residents of Karapınar	High	Long-term	Local	Continuous	Low	Negligible	Negligible
Livestock at nearby settlements	Medium	Long-term	Local	Continuous	Low	Negligible	Negligible
Users of the agricultural lands located in the west of the Project Site	Low	Long-term	Local	Intermittent	Low	Low	Negligible

5.2.4.2.1 *Mitigations, Management and Monitoring*

The following mitigations and monitoring activities are implemented in order to minimise and monitor the potential noise impacts on the sensitive receptors during the operation phase:

- Grievance mechanism is in place in line with the Project Stakeholder Engagement Plan. If any grievance related with noise is received , noise monitoring is conducted at these receptors to verify compliance with the standards and corrective actions taken where necessary.
- Periodical maintenance of plant components such as inverters, transformers and other equipment and vehicles used for transportation to and from the Site carried out to ensure their good working conditions.

5.2.4.2.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential operational noise impacts are summarized below.

Receptor	Impact Significance
• Residents of Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu and Karapınar District • Livestock • Users of Agricultural Lands	Negligible

5.2.4.3 Decommissioning Phase

The magnitude of the noise impact during decommissioning phase is anticipated to be similar to the construction noise for a shorter period. Mitigation measures will be similar to the ones taken during the construction. The evaluation of the decommissioning noise impact is summarised below:

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu and Karapınar District Livestock Users of Agricultural Lands	Moderate to High	Short-term	Local	Intermittent	Low	Low to Moderate	Negligible to Minor

5.2.4.3.1 *Mitigations, Management and Monitoring*

The Project Company should ensure that the decommissioning contractor(s) have a detailed plan in place prior to the decommissioning activities for taking necessary mitigations to avoid/minimise noise impacts on the nearest sensitive receptors.

5.2.4.3.2 *Residual Impact*

Significance of residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential decommissioning noise impacts are summarized below.

Receptor	Impact Significance
• Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu and Karapınar District • Livestock • Users of Agricultural Lands	Negligible

5.3 LANDUSE, SOILS AND VISUAL IMPACTS

5.3.1 Project Standards

Activities to be conducted within the scope of the Karapınar YEKA SPP Project will be subject to provisions of the following national laws and regulations in Turkey:

- Law on Soil Conservation and Land Use (Law No:5403);
- Pasture Law (Law No:4342);
- Expropriation Law (Law No: 2942); and
- Regulation on the Control of Soil Pollution and Lands Contaminated by Point Sources.

Table 5-33 presents limit values specified in Dutch Target and Intervention Values (4 February 2000), while Table 5-34 shows sector specific (Electric Power Generation) Generic Contaminant Limit Values specified in the Turkish Regulation on Soil Pollution Control and Contaminated Sites by Point Source.

Table 5-33: Dutch Target and Intervention Values for Soil Remediation (4 February 2000)

Parameter	Dutch Limits (mg/kg)	
	Target Value[1]	**Intervention Value**
Total Petroleum Hydrocarbons (TPH)	5	5,000
Arsenic	29	55
Barium	160	625
Cadmium	0.8	12
Chromium	100	380
Copper	36	190
Mercury	0.3	10
Molybdenum	3	200
Lead	85	530
Antimony	3	15
Selenium[3]	0.7	100
Zinc	140	720

[1]: Target value indicates the level at which there is a sustainable soil quality.

[2]: Intervention Value indicates the action limit for particular parameter.

[3]: In the absence of intervention and corresponding target value for Selenium, the indicative level for serious soil contamination and the accompanying target value is referred

Table 5-34: Sector Specific Parameters and Limit Values Specified in Turkish Regulation on Soil Pollution Control and Contaminated Sites by Point Source for Electricity Generation Facilities

Parameter	Turkish Regulation on Soil Pollution Control and Contaminated Sites by Point Source[1]				
	Engulfment of the soil and absorption by means of dermal contact (mg/kg)	Inhalation of volatile matter in external environment (mg/kg)	Inhalation of fugitive dust in the external environment (mg/kg)	Moving of the contaminants to the surface water and drinking of the surface water (mg/kg)	
				Dilution Factor[3] = 10	Dilution Factor = 1
Total Organic Halogens (TOX)[2]	-	-	-	-	-
Total Petroleum Hydrocarbons (TPH)	188,496	-	-	175	17.4
Arsenic	0.4	-	471	3	0.3
Boron[2]	-	-	-	-	-
Barium	15,643	-	433,702	288	29
Cadmium	70	-	1,124	27	3
Chromium	235	-	24	900,000	1
Copper	3,129	-	-	514	51
Mercury	23	3	-	3	0.6
Molybdenum	391	-	-	14	1
Lead	400	-	-	135	14
Antimony	31	-	-	2	0.2
Selenium	391	-	-	0.5	0.05
Zinc	23,464	-	-	6,811	681

[1]: Generic Contaminant Limit Values (for Generation of Electric Power, NACE Code:3511) specified in Regulation on Soil Pollution Control and Contaminated Sites by Point Source, Official Gazette No. 27605 dated June 8, 2010.

[2]: No limit value is provided for TOX and Boron, however these two parameters are presented in sector specific indicator parameters list provided in the Annex-2 of the regulation.

[3]: In occurrence of one the events such as the distance to the aquifer is less than 3 m; existence of fractured or karstic aquifer; and the area of the contaminant source is equal to or greater than 10 ha; the Dilution Factor shall be taken as "1", in other cases, the Dilution Factor shall be taken as 10.

5.3.2 Baseline Conditions

5.3.2.1 Land Use and Land Cover

Karapınar region covers an area of 293,917ha and Land Use is dominated by agricultural (51.03%) and pasture (44.38%) lands while 3.9% is forest land (see Table 5-36 below).

Table 5-35: Land Use Distribution in Karapınar District

Land Use Type	Area (ha)	Percentage (%)
Agricultural	150,000	51.03
Pasture	130,444	44.38
Forest	2,013	0.68
Other	11,460	3.90
Total	293,917	100

Source: Karapınar Energy Specialised Industrial Zone , Strategic Environmental Assessment Report, 2016.

The Project License Area was declared as Karapınar Energy Specialized Industrial Zone (KESIZ) with the decision of the Council of Ministers that came into force by the Official Gazette dated 08/09/2012 and numbered 28405. According to the local EIA Report, the Project Area consists of lands previously registered as pasture lands; this was subsequently changed by the MoENR to KESIZ in accordance with the Pasture Law during the YEKA Project development prior to the EIA Process.

According to the Corine 2018 data for land cover of Karapınar, 97.6% of the Project Area consists of Forest and Semi Natural Areas while 2.4% consists Wetlands at Level 1. When more detailed Level 3 characteristics are assessed, the Project Site consists of natural grasslands (72.21%), sparsely vegetated areas (25.42%) and Salt Marshes (2.37%). Distribution of Corine Land Cover including the corresponding areas of Level 1, Level 2 and Level 3 type lands are provided in Table 5-36 while the map presenting the Level-3 land cover of the Project Site. Corine maps homogeneous landscape patterns, i.e. more than 75% of the pattern has the characteristics of a given class from the nomenclature. This nomenclature is a 3-level hierarchical classification system and has 44 classes at the third and most detailed level.

Table 5-36: CORINE Land Cover of the Power Plant Site

Level 1	Level 2	Level 3	Area (ha)	Percent
Forest and Semi Natural Areas	Scrub and/or herbaceous vegetation associations	Natural grasslands	1,404.55	72.21
	Open spaces with little or no vegetation	Sparsely vegetated areas	494.43	25.42
Wetlands	Maritime Wetlands	Salt Marshes	46.03	2.37
		TOTAL	**1,945.01**	**100**

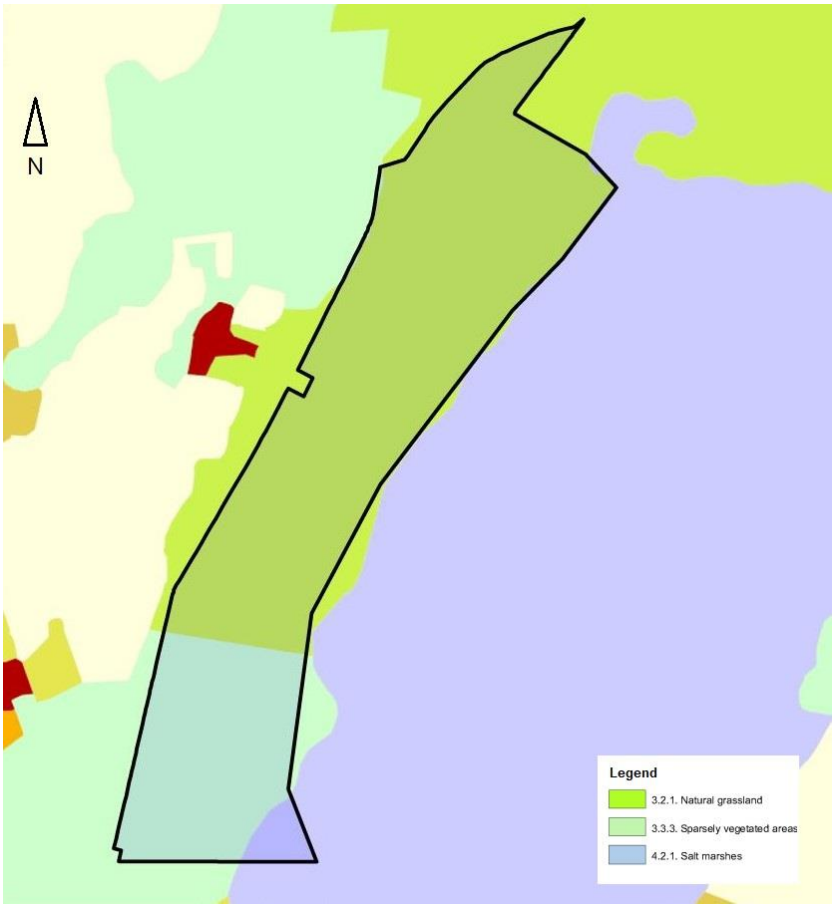


Figure 5-9: Level 3 Land Cover Classification of the License Area (Corine, 2018)

5.3.2.2 Land Use Capability Class

Land use capability classes defined by the Ministry of Agriculture and Forestry (former Ministry of Agricultural and Rural Services) are provided in Table 5-37.

Table 5-37: Land Use Capability Classes

Arability	Capability Class	Description	Factors Limiting Agriculture
Agricultural lands suitable for soil cultivation	I	It is arable for many crop types.	There is no or little limitation.
	II	It is suitable for long-term cultivation of several types of crops.	Special mitigation measures are required for soil and water loss.
	III	It is suitable for the cultivation of specific crops that provide special mitigation measures. Generally, it needs special care during agricultural use.	It is prone to erosion and artificial drainage is required during cultivation.
	IV	With suitable ploughing, some special agricultural crops can be cultivated. Generally, it needs special care during agricultural use.	There are serious limitations related with soil depth, stone content, humidity and inclination.
Agricultural lands not suitable for soil	V	This class includes soils that are even or slightly inclined, stony or very moist. These are not suitable for ploughing and cultivation. Generally, they are used for meadow or forestry area.	They have weak drainage and a structure not suitable for ploughing.

cultivation	VI	This is not suitable for ploughing and cultivation. They are mostly used as pasture and forestry area.	Very serious limitations are present owing to inclination and shallow soil.
	VII	It is not economic for agricultural activities; however, it is suitable for weak pasture or afforestation areas.	There are limitations owing to shallow soil, stone content, inclination and erosion.
Non-arable lands	VIII	It is not suitable for vegetation. It can be used for recreational purposes or as wildlife protection area.	It is lacking soil.

According to the 1/100,000 scale Land Use Map (See Figure 5-10) showing the Project Area and its vicinity, the majority of the License Area is composed of Class I and Class II soils while small portion is composed of Class IV and Class V soils; this indicates that large portion of soils within the License Area are agricultural lands suitable for soil cultivation while the rest is not suitable for soil cultivation.

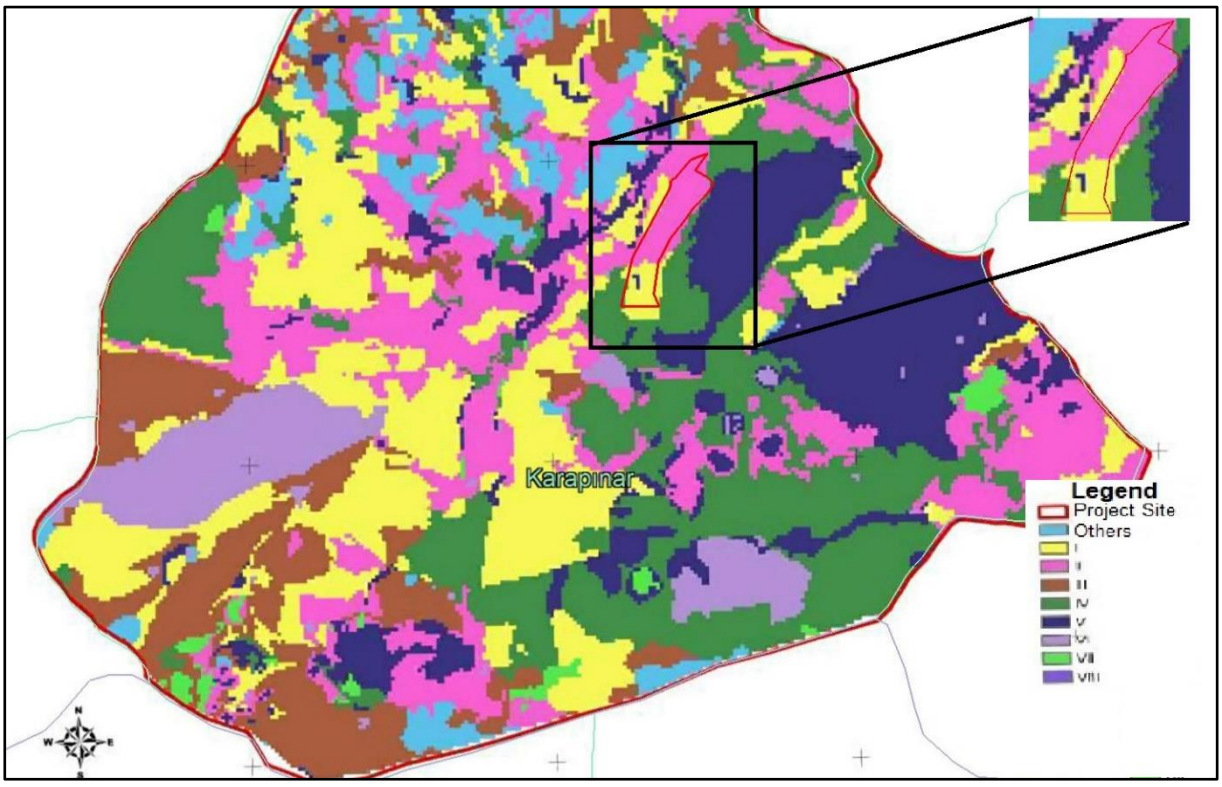


Figure 5-10: Karapınar Land Use Capability Map showing the Project Area

The suitability of different land classes for cultivation, grazing and forestry activities is defined in the Technical Procedure on Soil and Land Classification Standards dated 2008 by the former Ministry of Agricultural and Rural Services as presented in Table 5-38. Accordingly, soils within the License Area (Classes I, II; IV and V) are fully suitable for pasture/grazing, and partly (only Class I, II and IV) suitable for Intensive and very intensive agricultural activities.

Table 5-38: Land Use Capability Classes and their Suitability for Land Use

Land Use Capability	Wildlife	Forestry	Pasture/Grazing			Agriculture			
			Limited	Moderate	Intensive	Limited	Moderate	Intensive	Very Intensive
Class I	■	■	■	■	■	■	■	■	■
Class II	■	■	■	■	■	■	■	■	
Class III	■	■	■	■	■	■	■		
Class IV	■	■	■	■	■	■			
Class V	■	■	■	■	■				
Class VI	■	■	■	■					
Class VII	■	■	■						
Class VIII	■								

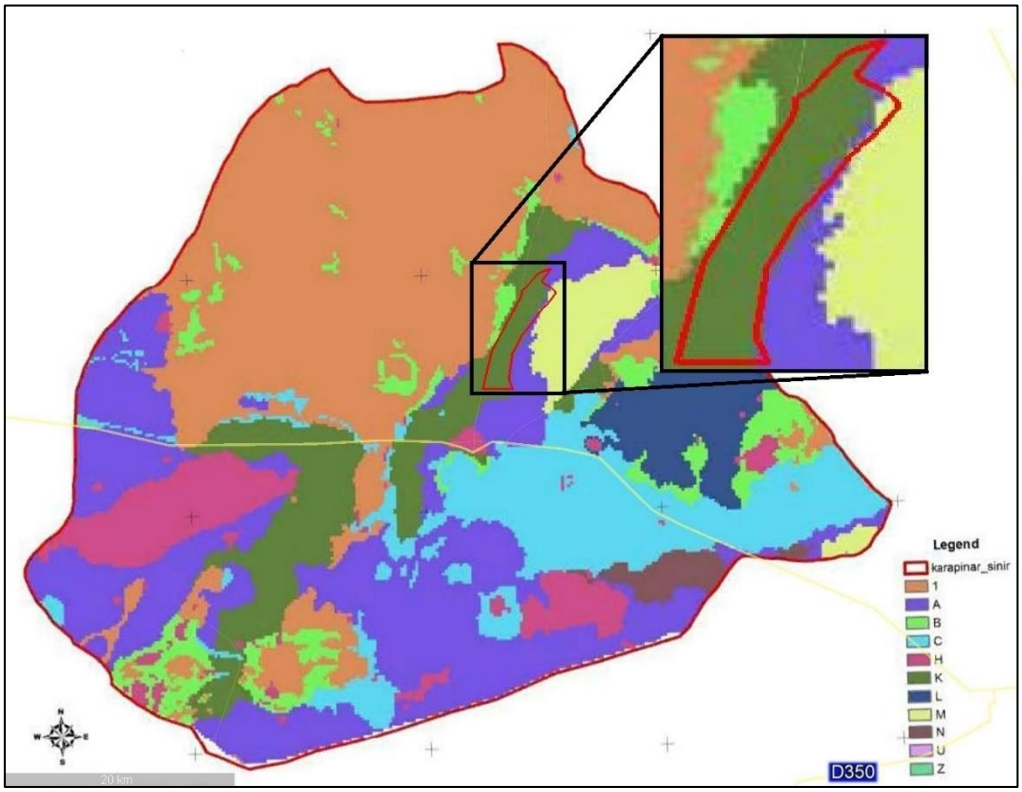
Source: Technical Procedure on Soil and Land Classification Standards, 2008.

5.3.2.3 Major Soil Groups

Lands of Karapınar are formed of four major soil groups: Alluvial, Colluvial, Sierosem and Regosols. The ground is rich in lime and potassium but poor in organic material and phosphorus. Sand content is approximatley 90% at upper layers and decreases as we go deeper while the lime content increases. Mostly loose and calcareous grounds are observed in north and north-west of Karapınar. In the South (the erosion zone) fine sand deposits are present and therefore excessive erosion occurs in this ara.

Old or new paedogenesis periods led to the formation of a clay, lime and anchored crust formation weakening and even eliminating the mobility of these elements. On the other hand, salt shells and crystallization prepares a suitable environment for deflation by easing the evaporation of water in the ground and its loosening and taking a powder-like brittle state (KESIZ SEIA Report 2016).

As seen from Figure 5-11, the Project Site is largely dominated by colluvial soils (K) while only a small area in the north-east corner consists brown forest soils (M) and small sections on the western boundary consists alluvial soils (A). Similarly, planned ETL routes are also located on colluvial soils except for a small portion of 400kV ETL route falling on brown soil groups.



K: colluvial soils, M: brown forest soils, A: alluvial soils

Figure 5-11: Large Soil Groups (Karapınar)

5.3.2.4 Geology

Number of geological and hydrogeological surveys have been conducted on site. Baseline information presented in this section is based on the findings of these surveys.

The project site is located on İnsuyu Formation which is formed of lacustrine sediments of Pliocene age and lacustrine alluvial sediments of Quaternary age. These units are composed of loose, unconsolidated material together with porous limestone, dolomitic limestone, marl, clay and locally evaporite clay deposits.

In 2017, Wasser and Bonden was contracted by the Project Company to conduct soil investigations at site. Deep trial pits were drilled at 32 locations (designated YTP01 – YTP32) 2.0 – 2.6 m and the geological strata was documented during this survey. Soil samples were collected at trial pits YTP09, YTP10, YTP16, YTP26 and YTP31. Grain size analyses were carried put on soil samples of YTP09 and YTP10.

Geological characteristics of the Project Site was summarised as follows: The soil structure on of the site was reported to be homogeneous. A typical humus topsoil layer is not developed, only the uppermost layer of soil is slightly more brownish than the ground below. The brownish topsoil layer is followed by light grey to grey-brown carbonate rich silt with increasing clay content to depth. The soil contains only a very low proportion of sand on maximum. The soil is free from gravel, stones or other coarser components which could form impenetrable obstacles for rammed steel profiles. No dune formations were available at the time of conducting the survey.

The encountered soil type was reported to be suitable for the construction of rammed steel pole foundations. Application of smooth steel posts as foundation elements was recommended rather than earth screws. The Project Company representatives have confirmed that the final project design considered these recommendations.

The soil type on site was reported to be very sensitive to water, i. e. in wet weather the ground rapidly goes soft. The retaining forces of the soil under wet conditions are 15 % lower than those under dry conditions.

5.3.2.5 Erosion Degree

Alluvial, colluvial, sieoresm and regosol soils, which are formed of light sandy loam in the upper layers and heavy clay texture in the lower layers, are most active area in terms of wind erosion in Karapınar. These soil groups are rich in potassium and lime but poor in organic matter and phosphorus which creates an environment suitable for wind erosion. Sand content is approximatley 90% at upper layers and decreases as you move deeper down while the lime content increases, resulting in a condition that is suitable for erosion (KESIZ SEIA, 2016).

Therefore, wind erosion has become a problem in Karapınar over years due to soil characteristics, low precipitation and strong winds in the region. Long term meteorological data obtained from Karapınar Monitoring Station is presented in Section 5.1 of this ESIA report.

Number of studies have been carried out, by local and national institutions in order to prevent / minimise the hazards of strong sandstorms caused by strong winds on settlements and agricultural areas and revive vegetation in arid areas.

5.3.2.6 Natural Hazards

According to the database of the Disaster and Emergency Management Presidency of Turkey (AFAD)[7], occurrence of natural hazard events in Konya in last 50 years is as follows: 40 earthquakes, 63 floods; 36 landslides and 54 storms. Available information is provided in below

Earthquakes

Big portion of Konya province is located in 4th and 5th degree seismic zones (67%) while only 33% is located in 1st to 3rd degree zones. According to the AFAD's Earthquake Zoning Map of Turkey (see Figure 5-13), Karapınar where the Project is located is within the 5th Degree seismic zone which is classified as non-hazardous.

In Konya, there has been 40 earthquakes in last 50 years none of them caused deaths.

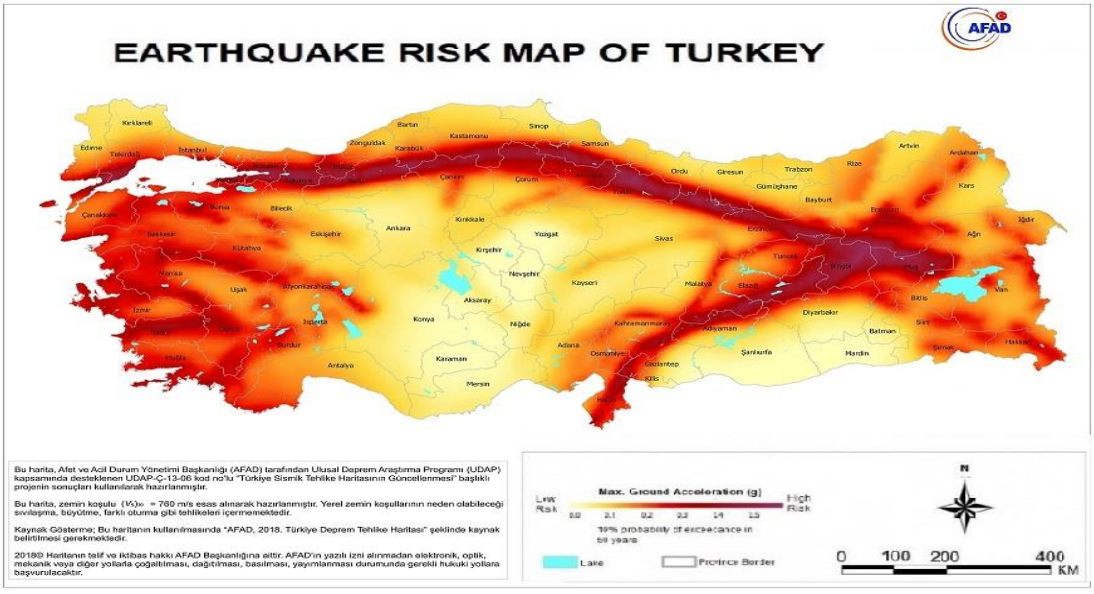


Figure 5-12: Earthquake Risk Map of Turkey (AFAD, 2018)

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[7] https://tabb-analiz.afad.gov.tr/Genel/Raporlar.aspx.

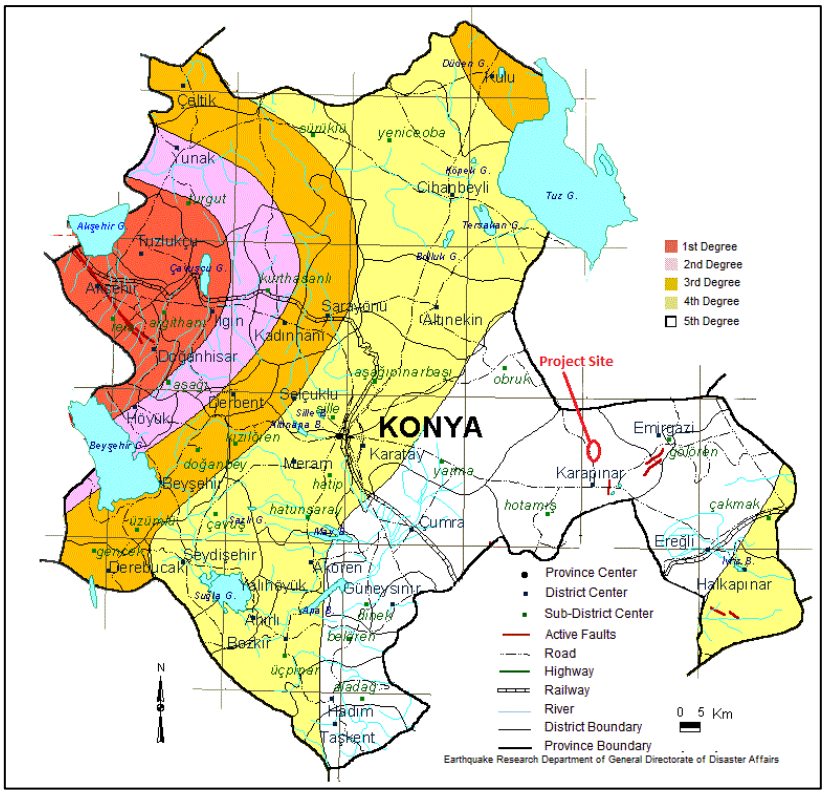

Figure 5-13: Earthquake Zoning Map of Konya (AFAD)

Sinkholes

Overuse of groundwater and sudden changes in groundwater level in conjunction with the geological characteristics of the region cause sinkhole (obruk) formations in Karapınar. Sinkholes that show geological disaster characteristics are reported to be mostly formed in limestones and clayey limestones of maximum 30m thickness that belong to Neogene aged İnsuyu formation.

19 sinkhole formations have occurred in the region between 1977 and 2011. Depths of these sinkholes vary between 0.5 and 78m.

According to the Karapınar Energy Specialised Industrial Zone Strategic Environmental Assessment Report (2016), Section 1 of the Zone where Karapınar YEKA 1 SPP Project is located is classified as very low to low risk class while the Section 2 of the Zone which is located northwest of the Project site is classified as medium to high risk. (Please see Figure 5-14 for Sinkhole Formation Risk Map) Karstic formation (dissolution of soluble rocks) has not been observed during the surveys performed to date at the Project Site.

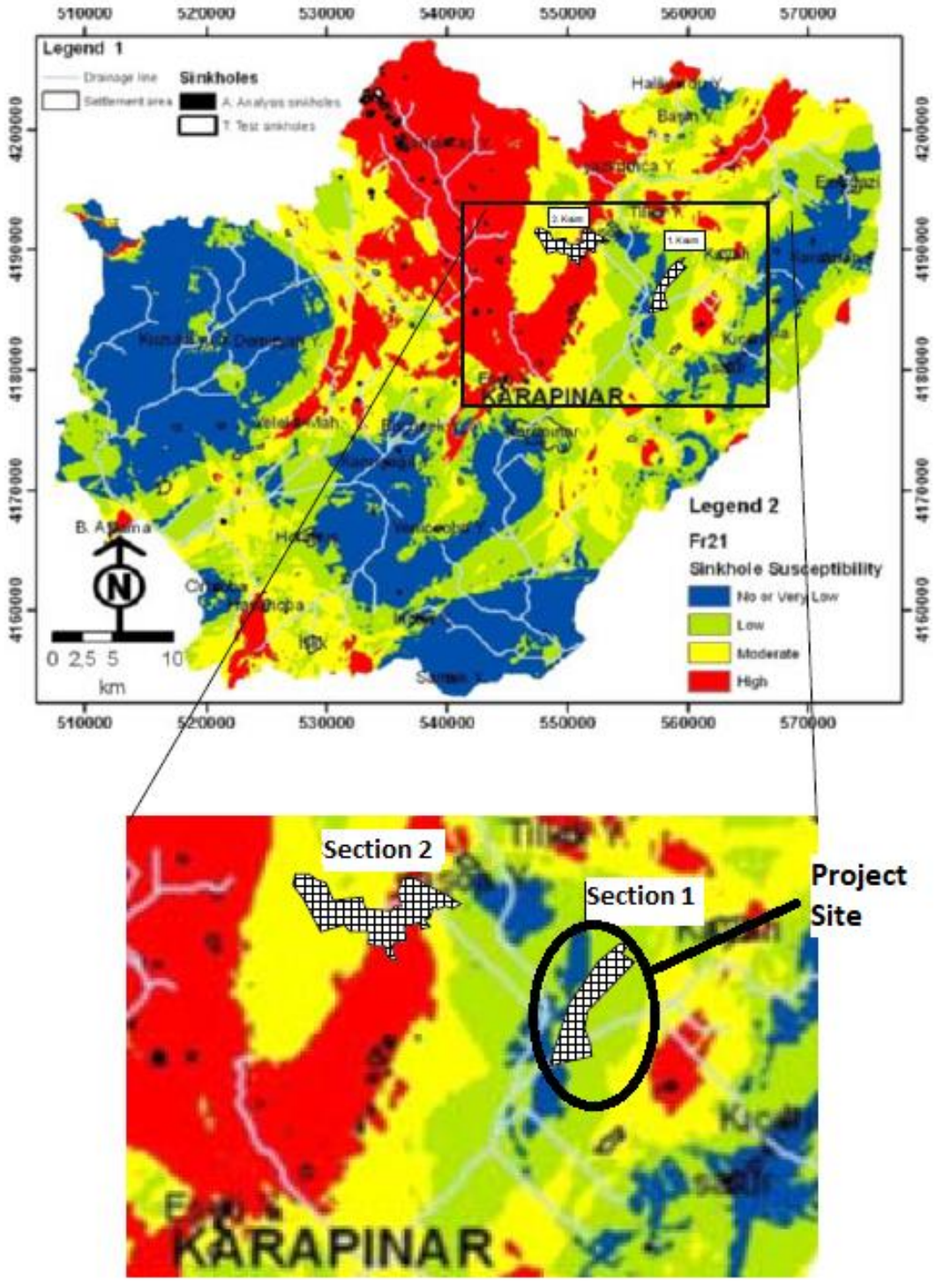

Figure 5-14: Sinkhole Formation Risk Map

Figure 5-15: Sinkholes Present on the West of the Project Site

A Hydrogeological Survey was conducted by Akson Engineering on behalf of RINA in 2018 in order to assess the hydrogeological conditions and sink hole formations around the Project Site and to identify hydrogeological properties of the Project Site. According to the findings of this report, groundwater was identified to be present within the first 2.5-11m (mostly at 2.5-3.0m level) from the ground.

A sinkhole was observed at 1 km west of the project site in Seyit Hacı Settlement during the Site Visit on June 27, 2018. When the Google Earth image of the area is reviewed it's seen that there are more sinkholes present at the same area. Google Earth image showing the area and photo taken at the same site visit are presented in Figure 5-15.

The findings of the Hydrogeological Survey are concluded that the units forming the aquifers in the study area are limestones which are white coloured, horizontally bedded, with vertical cracks, melting spaces. Their average thickness is around 200 m and marn interlayered from place to place. Although limestones have a conductivity feature due to their fractured and cracked structure, the feeding of the basin is weak due to being located in the feeding area. There are no high flow resources discharged from the unit.

Big portion of the Project Site is formed of a unit consisting of the Plioquaternary aged clay, silt, pebble and limestones which was formed by the deposition of the clayey, silty material transferred by surface run-off to the dry lake area.

There are no streams or creeks within or near the Project Site. There are no Groundwater Operation Sites designated by State Hydraulics near the Project Site.

Flooding

According to the statistics of the Disaster and Emergency Management Presidency of Turkey (AFAD), 63 flooding events with no losses have been observed in Konya in last 50 years while no floods have occurred in Karapınar District (https://tabb-analiz.afad.gov.tr/Genel/Raporlar.aspx).

Landslides

AFAD reported that 36 landslide events occurred in Konya in last 50 years. The baseline information for landslides near the Project Site was received from the Geosciences Portal of the General Directorate of Mineral Research and Exploration of Turkey (yerbilimleri.mta.gov.tr).

Landslide classifications in Geosciences Portal are based on 5 categories:

- Old landslides,
- Active landslides,
- Creeps, flooding, slides and shallow landslide areas,
- Regional mappable active slides and
- Regional mappable old slides.

Based on this information, no historical and active landslide has been recorded near Project Site or in Karapınar. The nearest landslide (old landslide) to the Project Site was recorded in Halkapınar district, which is 77 km south-east of the Project Site.

Storms / Typhoons

According to the statistics of AFAD, 54 storm / typhoon events occurred in Konya since last 50 years . Majority of these has occurred in 90's and 2000's. One loss was recorded in the storm that occurred in 2000 and one another in 2015.

5.3.3 Sensitivity of Receptors

The sensitivity of the receptors (i.e. land use, land cover and natural hazards risks in and around the Project Site) was defined based on the criteria provided in Chapter 4.3.2 of this ESIA and associated baseline conditions.

Table 5-39: Sensitivity Criteria for Water Resources

Receptors	High	Medium	Low	Negligible
Ecosystem Receptors	Ecosystem features important nationally or globally	Ecosystem features important locally or regionally	Ecosystem features with low importance or easily replaceable	Ecosystem features with no or very low importance

5.3.4 Impact Assessment

5.3.4.1 Land Preparation and Construction Phase

The major Project impacts and/or risks on soils during land preparation and construction phase are summarised below:

- Loss of topsoil (in terms of quantity and/or vegetative quality);
- Soil disturbance and erosion, due to earthworks;
- Sinkhole formation due to over extraction of groundwater and changes in local drainage patterns;
- Soil contamination risk from accidents and improper management of hazardous materials and waste.

Loss of Top-Soil

Along the Project Site, topsoil will be stripped for land preparation and construction with an average stripping depth of 10 cm where required.

Stripped topsoil will be used for reclamation of slopped areas and rehabilitation of the marshy area at the Project Site's eastern section. According to the Project Botanic Expert's opinion, the soil type in Karapınar is not usable for landscaping as it is suitable for only halophillus vegetation making use for reclamation a good option.

It is recommended to limit topsoil removal during land preparation in order to reduce potential adverse impacts.

Considering above facts, receptors sensitivity is determined as low and potential impact of top-soil stripping is anticipated to be moderate in magnitude with minor significance.

Soil Disturbance and Erosion

As described in Section 5.3.2.3 and Section 5.3.2.5, the Project site consits predominantly colluvial soils except for the small section in the north-east corner consisting brown forest soils and small section on the western boundary consisting alluvial soils. Therefore, Project Site is largely vulnerable to wind erosion.

Construction activities generally include wide landscape alteration works such as earthworks, vegetation removal, grading, ground compaction and construction of access roads which lead soil loss by wind erosion if necessary precautions are not taken during construction. Also, because of reduced vegetation even a small reduction in weed and shrub density could cause increased dust generation.

When installed, PV panels may serve as a physical barrier to reduce local wind movement like a windbreaker; however, it won't be able have to overcome/reverse the effects on the upper ground that occurred during construction process.

Sinkhole formation due to over extraction of groundwater

Sinkhole formation is a common problem in Karapınar due to overuse of groundwater and sudden changes in groundwater levels in combination of limestones and clayey limestones which are geological characteristics of the region.

The Project Company is not planning to use any groundwater for project construction activities. Although main mitigation measure for dust management is wet suppression, other applications that do not require water consumption such as paved access roads, using dust curtains/barriers and others as specified in Construction Dust and Air Emission Control Plan are also implemented where applicable.

Although no groundwater use is planned for the Project, it is known that the region is already vulnerable to sinkhole formations due to geological characteristics of the region, sudden changes in groundwater levels and precipitation patterns at wet season; therefore, there will be still potential for sinkhole formation in the Project Site which may pose risk to the Plant components.

Flooding Risk and Drainage

It is known that rain waters accumulate at the dry lake area to the south-east of the Project Site in wet season. Considering that there is a drainage channel constructed by State Hydraulics to collect water and the Project Site is in integrity with the natural drainage system, no flood event is anticipated in the Project Site.

Accidental Soil Contamination

Soil contamination during the land preparation and construction phase of the Project may occur as a result of accidental spills and releases of hazardous materials and wastes. Management and mitigation strategies needs to be implemented in the event that soil contamination takes place depending on the level and extent of contamination.

Pollution Prevention Control Plan and Emergency Preparedness and Response Plan have been developed for the Project and will be in place during construction phase. Through the implementation of relevant mitigation, management and response measures, the extent of accidental releases can be limited such that impact of spills or leakages can be kept at minimum levels.

Necessary mitigation and management measures (see below) should be in place to avoid and minimise potential impacts due to soil contamination by accidental spills and leaks, therefore no significant impact is anticipated during construction.

Potential Impact / Risk	Sensitivity against impact	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Loss of top-soil	Low	Long-term	Local	One-off	Low	Moderate	Minor
Soil Disturbance and Erosion	High	Short-term	Local	Intermittent	Medium	Moderate	Major
Project Site Geology - Sinkhole Formation	High	Long-term	Local	One-off	Medium	Moderate	Moderate
Soil Contamination	Medium	Short-term	Local	Intermittent	Low	Low	Minor

5.3.4.1.1 *Mitigations, Management and Monitoring*

The following measures are in place to avoid or minimise the potential impacts on soils and geology of site during land preparation and construction phase:

Soil Loss and Erosion

- Topsoil removal and excavation is kept minimum and limited to the areas where strictly required;
- Grading is in line with the natural slope and drainage conditions;
- Use of herbicides for removal of local vegetation should be avoided / forbidden;
- Erosion control measures are applied following the completion of excavation works and slopes are improved;
- Dykes are established to prevent loss of soil around the excavated material stored at designated storage sites if long term storage is planned;
- Re-vegetation is considered to be applied at disturbed areas to the most possible extent in a timely manner following the completion of stripping and excavation works.

Site Geology – Sinkhole Formation

- Groundwater use for construction activities is prohibited;
- In order to avoid any impacts of potential sinkhole formations on Site, project foundation elements are selected considering the recommendation of the Project Site Geological-Geotechnical Survey Report of Wasser und Bonden to ensure project elements strength.

Soil Contamination

- Discharge of wastes and hazardous materials into soil is prohibited;
- Septic tank integrity checking is carried out regularly and septic tanks are emptied regularly via vacuum trucks;
- Accidental spills and leakages are managed through implementation of the Emergency Preparedness and Response Plan;
- Solid wastes, hazardous wastes and wastewater generated at site is managed through implementation of the Waste and Wastewater Management Plan;
- Hazardous Materials are stored in a dedicated enclosed bunded area and managed through implementation of the Pollution Prevention Control Plan;
- Training Programme covering aspects related with management of hazardous substances is in place;
- Hazardous waste is temporarily stored on-site in a designated area which is appropriately enclosed and with concrete paved surface;
- Waste storage out of the designated storage areas is prohibited; and
- Oil changes, refuelling, or lubrication of vehicles are conducted in a dedicated area. Storage tanks and refuelling stations are equipped with drip trays and spill control equipment.

5.3.4.1.2 *Residual Impact*

Potential Impact / Risk	Impact Significance
Loss of top-soil	Minor
Soil Disturbance - Erosion	Moderate
Project Site Geology - Sinkhole Formation	Moderate
Soil Contamination	Negligible

5.3.4.2 Operation Phase

Soil Disturbance and Erosion

Project Site is largely vulnerable to wind erosion. However, provided that necessary measures are taken during and post construction, there will be no more project activities that may cause soil distrubance or erosion during operation.

Considering that the revegetation is planned to be applied as part of the Biodiversity Management Plan at selected areas, risk of wind erosion during the operation lifetime of the Project can be minimised.

Sinkhole formation due to over extraction of groundwater

Provided that no groundwater will be used for panel cleaning during operation, no impact on groundwater levels posing sinkhole risk is anticipated due to operation of the Karapınar YEKA SPP. However, it is known that the region is already vulnerable to sinkhole formations due to geological characteristics of the region, sudden changes in groundwater levels and precipitation patterns at wet season; therefore, there will be still potential for sinkhole formation in the Project Site which may pose risk to the Plant components.

Accidental Soil Contamination

There is minimal need to the use of hazardous materials during the operation phase, however soil contamination may still occur during the operation phase due to accidental spills and releases of hazardous materials and wastes. Management and mitigation strategies needs to be implemented in the event that soil contamination takes place depending on the level and extent of contamination.

Pollution Prevention Control Plan and Emergency Preparedness and Response Plan need to be developed and implemented to minimise potential negative impacts in case of any spill or leakage.

No significant impact is anticipated during operation provided that necessary measures are in place to avoid or minimise soil contamination.

Visual Impact

Visual effects of PV Plants arise from changes in the composition and character of views available to receptors affected by the proposed development (e.g. residents, recreational users, tourists etc.). Visual impact assessment considers the response of the receptors who experience these effects, and it considers the overall consequence of these effects on the visual amenity of the view.

Receptors of visual impacts are identified as transient drivers of Karapınar – Eskil Road and residents of the settlements on the other side of this Road.

The Project site will be fenced so its visibility will be minimum from the road or the nearby settlements. Thus, the visual effect of the project is identified as minimal.

Potential Impact / Risk	Sensitivity against impact	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Soil Disturbance	Medium	Short-term	Local	Intermittent	Low	Low	Minor
Project Site Geology - Sinkhole Formation	High	Long-term	Local	One-off	Medium	Moderate	Moderate
Soil Contamination	Medium	Short-term	Local	Intermittent	Low	Low	Negligible
Visual Impact	Low	Lon-term	Local	Continuous	Low	Low	Negligible

5.3.4.2.1 *Mitigations, Management and Monitoring*

- A waste management plan will be developed for the project to comply with the national legislation;
- If used during operations, septic tank integrity checking will be carried out regularly;
- An Emergency Preparedness Response Plan will be developed against acute spill scenarios;
- Groundwater use for operational activities should be avoided;
- Hazardous waste and materials will be stored at designated and appropriately designed storage areas;
- The Project site is recommended to be fenced preferably with panels to prevent its visibility from the road and nearby settlements.

5.3.4.2.2 *Residual Impact*

Potential Impact / Risk	Impact Significance
Soil Disturbance - Erosion	Negligible
Project Site Geology - Sinkhole Formation	Moderate
Soil Contamination	Negligible
Visual Impact	Negligible

5.4 WATER AND WASTEWATER

5.4.1 Project Standards

The Project will comply with the following regulations and standards:

- Guidelines for Drinking Water Quality – World Health Organisation (WHO), 2011.
- Regulation on Water Intended for Human Consumption (RWIHC), Chemical Parameters and Indicator Parameters – Turkish Ministry of Health, 2005;
- Water Pollution Control Regulation (WPCR); (Official Gazette Date: 31.12.2004, No: 25687), Standards for Discharge of Domestic Wastewater into Receiving Water Bodies (Population 84-2000);
- IFC's General Environmental, Health and Safety (EHS) Guidelines, Indicative Values for Treated Sanitary Sewage Discharges.

Table 5-40 combines the national standards for drinking and utility water (water intended for human consumption) set by RWIHC and limit values set by WHO Drinking Water Guidelines. As can be seen from the Table below the RWIHC standards are more stringent and therefore take precedence; the Project will be required to comply with these standards during all phases.

Table 5-40: National (RWIHC) and International (WHO) Limits for Drinking Water

Parameter	Turkish RWIHC Limit Values	IFC Limit Values (WHO Drinking Water Guidelines)
Antimony (mg/L)	0.005	0.020
Arsenic (mg/L)	0.01	0.01
Barium (mg/L)	-	0.7
Benzene (mg/L)	0.001	0.01
Boron (mg/L)	1	2.4
Cadmium (mg/L)	0.005	0.003
Chromium (mg/L)	0.05	0.05
Copper (mg/L)	2	2
Cyanide (mg/L)	0.05	-
Fluoride (mg/L)	1.5	1.5
Lead (mg/L)	0.01	0.01
Mercury (mg/L)	0.001	0.006
Nickel (mg/L)	0.02	0.07
Nitrate (mg/L)	50	50
Nitrite (mg/L)	0.5	3
Selenium (mg/L)	0.01	0.04
Aluminium (mg/L)	0.2	-
Ammonium (mg/L)	0.5	-
Chloride (mg/L)	250	-
Conductivity (µS/cm)	2500	-
pH	6.5≤pH≤9.5	-
Iron (mg/L)	0.2	-
Manganese (mg/L)	0.05	-
Sulphate as SO_4 (mg/L)	250	-
Sodium (mg/L)	200	-
Uranium (mg/L)	-	0.03

Sanitary (domestic) wastewater management is regulated by the Water Pollution Control Regulation (WPCR) in Turkey. If it is discharged to receiving environment, final discharge of wastewater is subject to the Environmental Permit obtained from the Provincial Directorate of Environment and Urbanization of the related Province according to the WPCR. Limits for domestic wastewater discharge are set for different BOD Load and population ranges in the WPCR.

IFC EHS guideline values applicable to sanitary wastewater discharges should be met; according to the IFC EHS Guidelines, sanitary discharges should also comply with national or local standards

Table 5-41 presents the relevant limit values set by the WPCR and IFC General EHS that will be applicable to the Project; the most onerous standard for each parameter should be applied to the Project.

Table 5-41: National and International Limits for Domestic Wastewater Discharge

Parameter	WPCR (BOD Load 5-120 kg/day; Population 84- 2000)		IFC General EHS Guidelines: Wastewater and Ambient Water Quality
	Limit (2 hr Composite Sample)	Limit (24 hr Composite Sample)	
BOD (mg/L)	50	45	30
COD (mg/L)	180	120	125
Total Suspended Solids (mg/L)	70	45	50
pH	6-9	6-9	6-9
Total Nitrogen (mg/L)	-	-	10
Total Phosphorus (mg/L)	-	-	2
Oil and Grease (mg/L)	-	-	10
Total Coliform Bacteria (Most Probable Number/100mL)	-	-	400

5.4.2 Baseline Conditions

5.4.2.1 Surface Waters

Konya, where the License Area is located, is within the Konya Closed Basin. Annual surface water flow capacity of Konya Closed Basin is reported as $6.04x10^9$ m^3, which is 3.29% of Turkey's surface water potential. The Basin's water supply potential for drinking, utility and industrial purposes is estimated as $3.02x10^9$ m^3/yr, which corresponds to 50% of its total Basin potential (Tubitak, Preparation of Basin Protection Action Plans Project, Konya Closed Basin Area).

Karapınar District is very poor in terms of surface water resources. Although there is a 19 km^2 marsh area in Karapınar, 15.2 km^2 of these wetlands have completely lost this feature due to insufficient rainwater entrance and decreasing groundwater levels (Karapınar Energy Specialised Industry Zone, Strategical Environmental Assessment Report, 2016).

The closest surface water bodies to the Project Area are two important water bodies: Acıgöl and Meke Lakes 7.5km and 8.5km south-east to the Project Area. Water levels of both lakes have significantly decreased over years. There is also a small wetland within the AOI which is at approximately 1.5 km south-east of the Project Site and known to be fed by direct discharge of the Karapınar Municipality Sewerage Network.

Streams in Konya Closed Basin and Karapınar are mostly seasonal and stream regimes are irregular due to irregular precipitation. Due to the closed basin characteristics and topography, these streams are short, and they disappear in the marshes of the plain.

There are no perennial streams in the study area or its vicinity. The closest streams to the Project Site are several small to large scale intermittent streams near Meke and Acıgöl Lakes located 5-10km south-east from the Project Site.

In Konya, there are 18 ponds and 7 dams under operation by State Hydraulics Works (Konya Closed Basin Protection Action Plan, 2018). There is no dam or pond in the vicinity of the Project Site and the closest water storage structure is Ayrancı Dam located 48km south of the Site. Water structures of Konya, their feeding stream, purpose of use and surface area are listed in Table 5-42.

According to the Konya Province Environmental Status Report (2019), 75% of potable water demand of the province was supplied through groundwater resources while 22% was supplied through surface water resources and 2% was through springs. Altınapa and Bağbaşı Dams are two dams that feed the KOSKI (Konya Water and Sewerage Directorate) Water Supply Network. Altınapa Dam has 32,000,000 m^3 water storage capacity and it is fed by number of surface waters including Uluçay, Küçükmuhsine, Akpınar Creeks and other resources such as water and snow drainage water. Bağbaşı Dam, which has 205,000,000m^3 capacity, is built on Eğiste Stream and have been supplying water to Konya since 2019.

Table 5-42: Water Storage Structures in Konya Province

Structure Type	Name	Stream	Purpose of Use	Area (m^2)
Dam	Altınapa	Meram	Irrigation, Flood Protection, Potable and Drinking Water	3,823,919
	Bağbaşı	Eğiste	Potable and Drinking Water	1,774,892
	Apa	Çarşamba	Irrigation	15,506,487
	Damlapınar	Damlapınar	Irrigation	960,78
	Derebucak	Kocaçay	Irrigation	938,835
	İvriz	İvriz	Irrigation and Flood Protection	4,663,876
	May	Meram	Irrigation and Flood Protection	11,588,765
	Sille	Sille	Irrigation and Flood Protection	240,231
Pond	Akören Pond	Bayındır	Irrigation	888,234
	Aydoğmuş Pond	Boğaz	Irrigation	331,009
	Aydoğmuş Pond	Boğaz	Irrigation	331,009
	Başhüyük Pond	Kurudere	Irrigation	296,177
	Bostandere Pond	Kalaycı	Irrigation	405,092
	Cihanbeyli Pond	İnsuyu	Irrigation	1,574,576
	Çağlayan Pond	Yayla	Irrigation	889,403
	Çavuş Pond	İlmen	Irrigation	276,139
	Çiftliközü Pond	Karakaya	Irrigation	356,115
	Çukurçimen Pond	Çöküк	Irrigation	165,53
	Derbent Pond	Belbaşı	Irrigation	151,639
	Erenkaya Pond	Çarşak	Irrigation	919,179
	Evliyatekke Pond	Arkil	Irrigation	268,759
	Güneydere Pond	Gavur Deresi	Irrigation	2,354,084
	Kızılören Pond	Yayla Deresi	Irrigation	145,67
	Malas Pond	Uludere	Irrigation and Potable Water	235,065
	May-Kayasu Pond	Peynirli	Irrigation	159,458
	Sefaköy Pond	Kavakdere	Irrigation	140,738
Storage Structure	Suğla Storage	Suberte, Irmak Çayı		44,359,924
	Hotamış Storage	*Goksu Basin	Irrigation	52,138,774

5.4.2.2 Groundwater

Groundwater capacity of Konya Basin is reported as 1,508 x10^6 m^3/yr in Konya Province Environmental Status Report (2018) which refers to most recent 4th Regional Directorate of State Hydraulics Data.

The units forming the aquifer in the study area are limestones which are horizontally bedded, vertically cracked, melting space and white coloured with an average thickness of 200 m. In these limestones, upper levels of breccias are dominant.

Overuse of groundwater for agriculture is known to cause rapid reduction in groundwater levels in Konya Closed Basin. It is reported that the groundwater levels decreased by approximately 0.2 - 0.9 m/year in Konya Closed Basin and 0.7 m/year in Karapınar between 1982 and 2007 (Karapınar Energy Specialised Industry Zone, Strategical Environmental Assessment Report, 2016). Figure 5-16 presents the significant changes in water levels over years.

Significant decrease in groundwater levels in over 25 years stresses the water scarcity in the basin and sudden changes result in sinkhole formations in the region. Although 40% of groundwater reserve of Turkey is within this Basin, groundwater resources of Konya Closed Basin are under pressure due to uncontrolled water extraction.

According to the opinion letter of 4th Regional Directorate of State Hydraulic Works (DSI) regarding Karapınar Energy Specialised Industry Zone Development on 14 February 2011, there is not adequate groundwater reserve in the aquifer that the Zone including Karapınar YEKA-1 SPP is developed; therefore, groundwater extraction for process and industrial use is not allowed.

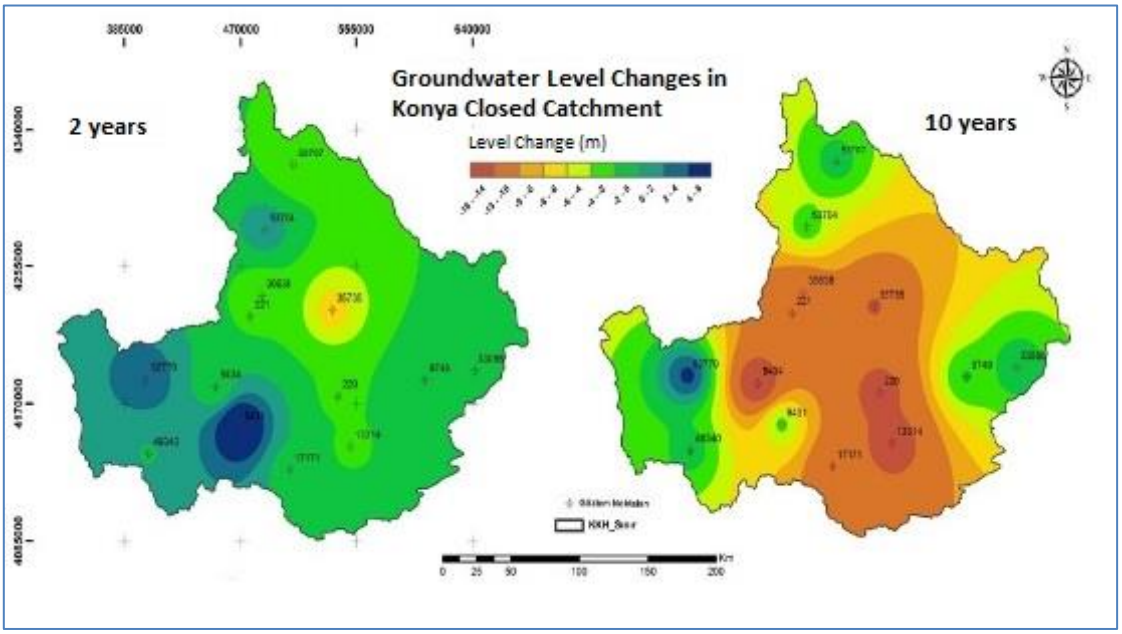

Figure 5-16: Groundwater Level Changes in Konya Closed Basin over Years

Total well number within the administrative boundaries of 4th Regional Directorate of DSİ is 93,948. 70% of these wells (66,808wells) are illegal wells that were drilled without obtaining any permits.

During soil and groundwater investigations conducted by Wasser und Bonden in 2017, 2.0-2.6m deep trial pits were opened. Slightly confined groundwater was observed in the trial pits at depths between 1.2 - 2 m in the south-eastern section of the Project Site close to the existing wetland area, during the soil & groundwater investigations conducted in 2018. The ground water level raised to a maximum of 1m below ground surface in the course of a few hours and maintained this piezometric level for several days. In the rest of the investigation area, all trial pits with final depths of down to approx. 2.5 m remained dry (Wasser and Boden, 2018)

Furthermore, in August 2018 a hydrogeological survey was conducted by Akson Engineering on behalf of RINA. According to the survey report:

- No deep wells owned by State Hydraulic Works (DSI) or other institutions have been identified near the Project Area during this survey.
- Groundwater wells opened and used by the residents of the nearby villages to the north of the Project Site are used for irrigation and animal grazing. The closest well is located in Yassıca that is located 4.5km north of the Project Site. According to the interviews conducted with the local people, it is understood that groundwater quality is not suitable for drinking purposes. Drinking water demand of the nearby settlements is supplied via KOSKI's drinking water network.
- Groundwater flow directions of the Sub-Basin where the Project is located are indicated in Figure 5-17. As it is seen from the figure, groundwater flow direction is northwest – southeast near the Project Site.

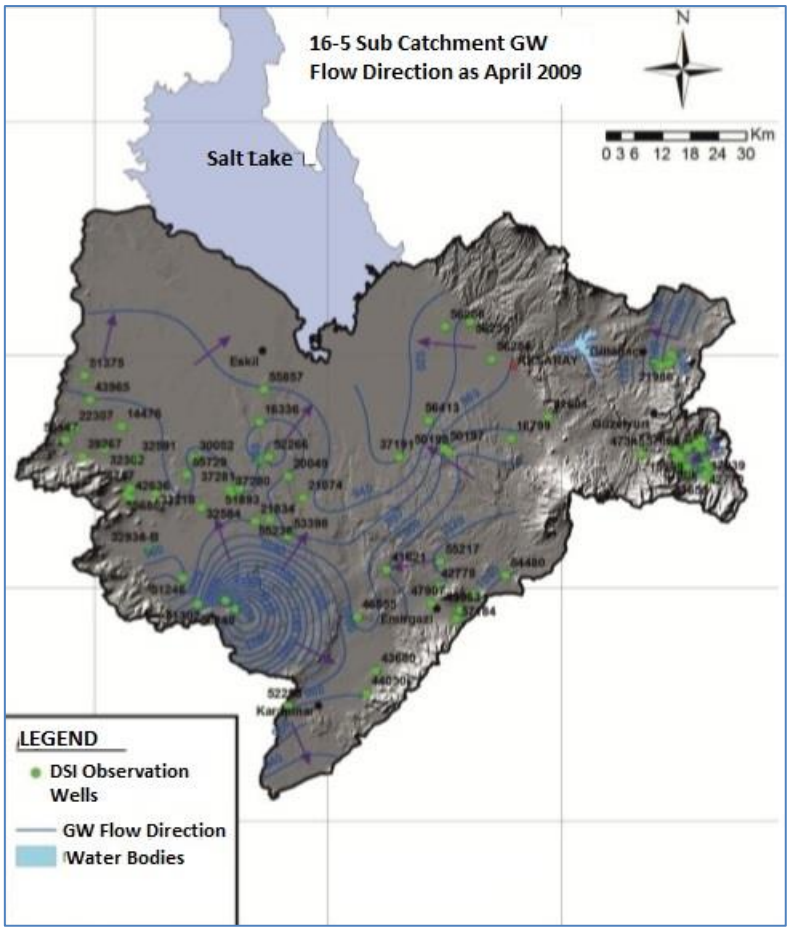

Figure 5-17: Groundwater Flow Direction in Sub-Basin 16-5 (April 2009)

5.4.3 Sensitivity of Receptors

The sensitivity of the receptors (i.e. water resources near the Project Area) was defined based on the criteria provided in Chapter 4.3.2 of this ESIA and associated baseline conditions. As explained in Section 5.4.2of this ESIA, the closest surface water to the Project Area are Lake Acıgöl and Lake Meke (7.6km and 8.6km to the south-east). Both Lakes are Natural Protection Sites of 1st Degree (SIT) and Lake Meke is also RAMSAR Area. Despite of the long distance between these Lakes and the Project Area their sensitivity has been designated as High due to their importance.

Table 5-43: Sensitivity Criteria for Water Resources

Receptors	High	Medium	Low	Negligible
Ecological Receptors	Water resources important nationally or globally - Groundwater Level of the Aquifer below Project Site - Surface Water Quality of Acıgöl and Meke Lakes	Water resources important locally or regionally -Groundwater Quality of the Aquifer below Project Site *(note that the aquifer is not drinking water resource therefore groundwater quality is considered to have medium sensitivity)* Capacity of Altınapa and Bağbaşı Dams and Groundwater resources that feed KOSKI Water Supply Network	Water resources with low importance or easily replaceable - Intermittent Creeks near Acıgöl and Meke	Water resources with no or very low importance

5.4.4 Impact Assessment

5.4.4.1 Land Preparation and Construction Phase

Potential impacts on water resources due to the land preparation and construction phase include (1) Impacts on Surface Water Resources and (2) Impacts on Groundwater by means of water use and degradation of water quality due to wastewater generation and settled dust.

Impacts on Surface Water Resources

Water demand related to the land preparation and construction phase of the Project consists of drinking and utility water consumption by project personnel and water use for construction activities such as dust suppression.

Water demand estimation for all project phases are provided in detail in Chapter 2.6. According to the information gathered from the Project Company, water demand for dust suppression varied between 260-320 m^3 during dry periods (rounded up to 10,000 tons for calculations) in 2020. Water demand was supplied from the KOSKI Water Works Potable Water Network for a period of March 2020 through September 2020 and where water supply from the network was not possible, as an alternative resource, groundwater from a well operated by a Quarry in Karapınar was reported to be utilised for a short period of time.

As a way forward the Project Company considered environmentally friendly options for water supply with least impact on resource efficiency and finally decided to meet water demand for dust suppression and green field irrigation through the effluent of the package type WWTP which was commissioned in March 2021. The WWTP was originally planned to be Secondary Treatment type; however, considering the significant water demand and potential discharge concerns, the Project Company has opted out for Advanced Treatment to be able to use the effluent for dust suppression.

The permit application for the WWTP was started in November 2020 with the Konya 3rd Regional Directorate of Highways and Provincial Directorate of Environment and Urbanisation for operating of the package type WWTP and potential discharge points. Provincial Directorate of Environment and Urbanisation requested the Project Company to provide additional information along with the application and application was renewed by the Project Company on 11 February 2021. Following that, the Directorate has requested additional information from the Project Company and the final opinion of the Directorate was permitting the use of treated effluent for irrigation purposes. Copies of available correspondences are provided in Appendix A for reference.

Water demand calculations were made for the period between 2021 and 2023 and the calculation is provided in Table 2-5, water demand calculations for the construction phase (in combination with PV panel cleaning demand of commissioned panels) were made based on the following:

- Maximum number of employees will be 1100 at peak;
- Water consumption of the employees who live at the Camp is 200lt/day;

- Water consumption of the employees who do not live at the Camp is 55lt/day at the Site;
- 11km of internal roads will be constructed between April and September in 2021;
- 28km of internal roads will be constructed between March and November in 2022;
- 8.6km of internal roads will be constructed between March and June in 2023;
- Potable water demand and water demand for panel cleaning will be met by KOSKI Network;
- Water demand for dust suppression and green field irrigation will be met by treated water on-site;
- 1.25 safety factor is applied to estimated water demand for dust suppression;
- Capacity of KOSKI Network is 3lt/s which corresponds to 7760 tons/month;
- Drinking water is purchased as bottled water from the local market and municipal (tap) water from Karapınar Municipality Network (KOSKI) is used for other potable uses.

Accordingly, maximum potable water demand is estimated to be 4,860 tons/month.

The Project Company has calculated the water demand for dust suppression for road construction as summarised in Table 2-5.

While water for dust suppression and green field irrigation is planned to be supplied by the treated effluent, remaining portion of water demand (potable water and panel cleaning water) is planned to be supplied through the KOSKI Potable Water Supply Network.

According to the verbal communication held with KOSKI representatives, the network has capacity of supplying 3 l/s (7,760 tons/month) water to the Project. Additionally, Kalyon has applied to KOSKI requesting for provision of additional water via tankers where water supply through the network is interrupted or not sufficient to meet Project demand on 20 April 2021; KOSKI, on 22 April 2021, has issued an official letter confirming that where water supply through the network is interrupted or not sufficient to meet Project demand they will provide water via tankers in the bill of fee as response to the Project Company's request for confirmation. Copies of available correspondences are provided in Appendix A for reference.

It should be noted that the PV panels have been partially commissioned since September 2020 and capacity is being increased by approximately 40MW every month in parallel to on-going construction activities. Based on the planned number of commissioned PV panels for each month and assumption that the PV Panel cleaning will be carried out via wet cleaning only (worst-case scenario), maximum water demand to be supplied through the KOSKI Network is estimated to be 5660, 6700 and 7460 tons/month in 2021, 2022 and 2023 respectively, KOSKI Network is considered sufficient to meet the Project's water demand during construction phase.

Currently, the wastewater generated on site is collected at the septic tanks and transferred to the Karapınar Municipality's Wastewater Network. However, according to the information provided by Kalyon's representative, Municipality has no operating wastewater treatment plant (WWTP) and wastewater collected is directly discharged to the receiving environment (Gegen region) without treatment. Kalyon has been in communication with the Municipality regarding the Municipality's WWTP. As recorded in the stakeholder activities tracking list, the latest meeting on WWTP was held with Karapınar Municipality on 15 October 2020. According to the latest information provided by Kalyon, the WWTP construction was completed in April 2021. Despite, considering the best environmentally friendly option, the Project Company has been proceeding with installation of two package type WWTPs (each with 400 people capacity) which are in commissioning stage since March 2021. The WWTP is advanced type and will be operated upon obtaining necessary environmental permit from the Provincial Directorate of Environment and Urbanisation.

No impact of construction works on water quality of nearby surface waters (5 to 10km from the Project Site) is anticipated due to the long distance between the Project Site and the nearest surface water bodies.

Providing that dust suppression water demand will be met through on-site WWTP's effluent during dry seasons and the potable water and PV panel cleaning water will be met through the KOSKI Network, the impact magnitude would be Moderate and considering the Medium Sensitivity of the Altınapa and Bağbaşı Dams and other feeding water resources. Therefore, the impact significance is considered as Moderate.

Furthermore, although the package WWTP capacity is reported by the supplier as adequate for the current number of workers, the Project Company should oversee the future increase in worker number and take necessary measures to increase treatment capacity when a future capacity extension requirement is identified.

Impacts on Groundwater Resources

There are no springs or wells existing within the Project site and the closest aquifer is formed of limestones and clayey limestones which are impermeable. There will be no wastewater discharge to the groundwater during project activities. Furthermore, groundwater wells used by local people for irrigation and livestock are at higher levels than the Project Site.

Accidental spill/leakage of hazardous materials such as fuel, oils, lubricants, cement, etc. may contaminate the groundwater within the Project Site considering the shallow groundwater depths especially in the south-eastern section of the Project Site if necessary, mitigation measures are not taken.

It should be noted that management of hazardous materials will be carried out in accordance with the Project Specific Pollution Prevention and Control Plan. In addition, designated storage areas are available in the laydown area.

Given that the baseline conditions of the region in terms of water resources and the opinion letter of the 4th Regional Directorate of DSI regarding Karapınar Energy Specialised Industry Zone Development dated 14 February 2011 which states that there is not adequate groundwater reserve in the aquifer that the Zone including Karapınar YEKA-1 SPP is developed; therefore, groundwater water extraction for process and industrial use is not allowed.

Evaluation of impacts on surface water and groundwater resources due to the land preparation and construction activities are presented in the table below.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Degradation in surface water quality due to silty water run-off and settled dust	Acıgöl and Meke Lakes: High	Short-term	Local	Intermittent	Low	Negligible	Negligible
	Intermittent Creeks near Acıgöl and Meke	Short-term	Local	Intermittent	Low	Negligible	Negligible
Degradation in surface water quality due to hazardous materials spill/leakage	Acıgöl and Meke Lakes: High	Short-term	Local	One-off	Low	Negligible	Negligible
	Intermittent Creeks near Acıgöl and Meke	Short-term	Local	One-off	Low	Negligible	Negligible
Degradation in groundwater quality due to hazardous materials spill/leakage	Groundwater quality of aquifer Medium	Short-term	Local	One-off	Low	Low	Minor
Reduction in feeding water resources of KOSKI Water Supply Network due to use for project activities	Groundwater Level and Altınapa and Bağbaşı Dams Capacity Medium	Short-term	Local	Intermittent	Medium	Moderate	Moderate

5.4.4.1.1 *Mitigations, Management and Monitoring*

The following measures are in place to avoid or minimise the potential impacts on water resources:

- Groundwater use for construction activities is strictly avoided;
- Project Dust and Air Emissions Control Plan is in place and implemented by the Project Company and the contractors;
- Project Waste Management Plan is in place and to ensure proper wastewater management during the construction;
- Construction Pollution Prevention and Control Plan, which covers the necessary hazardous materials handling measures, is in place and implemented by the Project Company and the contractors;
- Construction Emergency Preparedness and Response Plan is in place and implemented by the Project Company and the contractors;
- Hazardous materials management is in line with the Construction Pollution Prevention and Control Plan;
- Spill kits, absorbent pads and sands are available and easily reachable on site at all times;
- Hazardous Materials are stored in proper designated areas in line with Project Pollution Prevention and Control Plan;
- Stored fuels and waste oils are contained within bunded areas sufficient to contain spills and leaks;
- Dust minimising measures are applied in line with the Dust and Air Emissions Control Plan;
- Regular checks of hazardous materials storage areas are carried out to ensure there are no spill/leakage and all requirements are met;
- All maintenance activities are performed on suitable impermeable ground to avoid potential transport of contaminants to surface waters and groundwater;
- Regular checks and maintenance of construction machinery and vehicles are carried out in order to prevent spills and leakages of fuel and other hazardous materials;
- Domestic wastewater generated during construction phase is collected in non-leaking septic tanks installed and periodically vacuumed by vacuum trucks and discharged to the Municipality's sewage system until the package type WWTP is operational;
- Necessary permits will be obtained for operation and discharge of package type WWTP;
- Quality of WWTP effluent will be monitored in line with the legislative and permit requirements of the Provincial Directorate of Environment and Urbanisation;
- Septic tank integrity checks are conducted regularly;
- National/local permitting requirements are fulfilled for the management, collection and discharge of domestic wastewaters.

5.4.4.1.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential impacts are summarized below.

Receptor	Residual Impact
Degradation in surface water quality due to silty water run-off and settled dust	Negligible
Degradation in surface water quality due to hazardous materials spill/leakage	Negligible
Degradation in groundwater quality due to hazardous materials spill/leakage	Negligible
Reduction in feeding water resources of KOSKI Water Supply Network due to use for project activities	Moderate

5.4.4.2 Operation Phase

Similar to the land preparation and construction phase, potential impacts on surface and groundwater resources are associated with water demand and wastewater generation. Assuming that daily water demand per capita is 221 litres (reported 2018 value by TUIK for Konya Province), daily water demand will be around 26.7 m^3 for 121 employees during operations. Domestic wastewater generation is estimated to be equal to water consumption which equals to 26.7 m^3/day during operation.

Drinking water will be purchased as bottled water from the local market and utility water will be supplied from the Water Supply Network of the Karapınar Municipality, in both cases sources will be in compliance with RWIHC. No surface water or groundwater resources will be utilized for this purpose.

Domestic wastewater will be collected in septic tank(s)/mobile toilets to be built/ provided in the Project Area and periodically collected by vacuum trucks to be transferred to the Municipality's WWTP subject to required permits.

Therefore, **no impacts** in terms of wastewater discharge are anticipated since there will not be any wastewater discharges or impacts to the environment during the operation phase.

Water Demand for PV Panel Washing

PV Panels' cleaning can be carried out in different ways: Wet Cleaning and Dry Cleaning are commonly used methods. Wet cleaning includes spraying the modules with low-pressure water that is closely matched in temperature to the temperature of the module while dry cleaning includes using a dry brushing technique.

Water demand during operation phase will be mainly for wet panel cleaning.

According to the information gathered from the Project Company, alternative cleaning schemes including Dry Cleaning and Wet+ Dry Cleaning have been considered by them. However, the feasibility studies are not completed yet. Therefore, the Company has provided Rina with the estimated water demand for wet cleaning as worst case scenario during the operations.

Accordingly, based on the worst case scenario for panel cleaning, estimated water demand for wet cleaning(Water demand calculations for operation phase is provided in Table 2-6.), when the Plant is fully operational, water demand for panel cleaning will be 15,600 m^3/year (2,600 m^3/month between April and September) in case wet cleaning is solely applied. This value is well below the KOSKI Network capacity (7,760 m^3/month).

Wet cleaning is planned to be carried out in three cycles every year (between April-September).

Consultations have been on-going to secure water supply from the Municipality's Potable Water Network and KOSKI has issued official letters confirming the capacity available to the Project. According to the recent official letter of KOSKI, the system has a capacity of 4 l/s which means that there is more available capacity than the capacity used in calculations (Table 2-5).

Since the minimum use of water is also aimed, dry cleaning alternative is also considered. An on-site demo was performed by a local company, but required cleaning efficiency could not be met posing a risk of production loss. The Project Company plans evaluation of additional technologies offered by other companies during construction.

As another alternative, the Project Company plans to try 2-cycle wet cleaning instead of 3-cycle between April 2021 and September 2021 to be able to evaluate cleaning efficiency. 33% reduction in water demand is anticipated by applying 2-cycle wet cleaning option providing that it does not yield loss of production. Evaluation of 2-cycle wet cleaning and additional dry cleaning technologies is expected to be finalised in October 2021.

Based on current configuration (3-cycle wet cleaning), the impact on sources that feed the KOSKI Potable Water Network is considered to be **moderate** (worst case) during the operation phase.

There is very limited need for the use of hazardous materials during the routine operation of a solar PV project, although if necessary mitigation measures are not in place accidental spill/leakage of hazardous materials such as fuel, oils, lubricants, cement, etc. could occur and may reach the groundwater resulting in contamination water resources. However, contamination of water resources by accidental spills is not anticipated as there are no surface waters existing in close proximity to the Project site and groundwater resources will be adequately protected from accidental spill/leak infiltration. Storage of chemicals and fuels will be at designated areas with adequate size and containment and amount of these materials will be minimal during the operations. Therefore, potential impact is considered to be minimal and unlikely to occur during the operations. In conclusion, **negligible** impacts on groundwater resources are anticipated during the operation phase.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Degradation in groundwater quality due to hazardous materials spill/leakage	Groundwater quality of aquifer Medium	Short-term	Local	One-off	Negligible	Negligible	Negligible
Reduction in feeding water resources of KOSKI Water Supply Network due to use for panel cleaning	Groundwater Level and Altınapa and Bağbaşı Dams Capacity through KOSKI Network Medium	Long-term	Local	Intermittent	Low	Medium	Moderate

5.4.4.2.1 *Mitigations, Management and Monitoring*

Although no impacts are identified/anticipated as a result of operation of the Project, the following measures will be in place during operation to ensure the proper waste management:

- Groundwater usage for project activities will be avoided;
- Operation Phase Water Management Plan will be developed and implemented to ensure water utilisation is managed efficiently and in integrity with the project environment;
- Operation phase Waste Management Plan will be developed and implemented to ensure proper management wastewater;
- Operation phase Pollution Prevention and Control Plan will be developed and implemented;
- Operation phase Emergency Preparedness and Response Plan will be developed and implemented;
- Hazardous materials management will be carried out in line with the Operation Phase Pollution Prevention and Control Plan;
- Stored fuels and waste oils will be contained within bunded areas sufficient to contain spills and leaks;
- Regular checks of hazardous materials storage areas will be carried out to ensure there are no spill/leakage and all requirements are met;
- All maintenance activities will be performed on suitable impermeable ground to avoid potential transport of contaminants to surface waters and groundwater;
- Regular checks and maintenance of vehicles to be used during operations will be carried out in order to prevent spills and leakages of fuel and other hazardous materials;
- Domestic wastewater will be collected in non-leaking septic tanks installed and periodically vacuumed by vacuum trucks discharged to the Municipality's sewage system;
- National/local permitting requirements will be fulfilled for the management, collection and discharge of domestic wastewaters.

5.4.4.2.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential impacts are summarized below.

Receptor	Impact Significance
Degradation in groundwater quality due to hazardous materials spill/leakage	Negligible
Reduction in feeding water resources of KOSKI Water Supply Network due to use for panel cleaning	Moderate

5.4.4.3 Decommissioning Phase

Amount of water demand and wastewater generation in decommissioning phase will be similar to the land preparation and construction phase. In addition, mitigation measures identified for land preparation and construction phase will be applicable to decommissioning phase. Considering the nature of the project activities and baseline conditions any impacts on water resources will be **negligible** during this phase.

5.5 WASTE MANAGEMENT

5.5.1 Project Standards

The Project will comply with but not limited to the following regulations and standards:

- Regulation on Waste Management;
- Regulation on Control of Packaging Wastes;
- Regulation on the Control of Waste Oils;
- Zero Waste Regulation;
- IFC, Environmental, Health, and Safety (EHS) Guidelines, General EHS Guidelines: Waste Management and Construction and Decommissioning parts (2007).

5.5.2 Sensitivity of Receptor

Potential receptors that are assessed for the impacts of improper waste management activities are listed as follows:

- existing local infrastructure including Municipality Landfill Facilities and Waste Recycling/Management Facilities;
- environmental aspects (i.e. Soil, surface water and groundwater) and
- project personnel and community health and safety.

The sensitivity of the receptors was defined based on the criteria provided in Chapter 5.2.2 of this ESIA and associated baseline conditions as summarised below:

Receptors	High	Medium	Low	Negligible
Human / Ecological /Infrastructure Receptors	Community Health and Safety (i.e. project personnel and residents of nearby settlements)	Loss of valuable material	Existing Waste Management Infrastructure	-

5.5.3 Impact Assessment

Potential impacts associated with improper management of hazardous and non-hazardous wastes will include:

- Additional load to the existing waste management infrastructure (i.e. landfill sites and recycling facilities);
- Soil, surface water and groundwater contamination and environmental nuisance;
- Potential degrading impacts on personnel and public health and safety; and
- Loss of materials that have potential to be reused/ recovered/ recycled.

5.5.3.1 Land Preparation and Construction Phase

Main waste types that are generated during the land preparation and construction phase include domestic waste, packaging waste, excavation and construction waste, hazardous waste, and other special hazardous wastes such as medical waste, waste electric/electronic equipment, waste batteries and accumulators, waste oils, waste vegetable oils, end-of-life tires and vehicles, etc.

The Project Company and the contractors are dedicated to avoid and/or minimize impacts due to waste generation by complying with the requirements of Project Waste Management Plan and national legislation as well as applying international standards on waste management.

Domestic Waste and Packaging Waste

According to the most recent data published by Turkstat, average daily domestic waste generation was 1.07 kg per capita in Konya Province in 2018, which was slightly less than the country average of 1.16 kg per capita. According to the Konya Province Environmental Status Report (2019), daily solid waste generation of Konya Province was 1,479 tons in 2018.

In Konya, management of domestic waste in the Province and its districts is responsibility of Konya Metropolitan Municipality. There are six sanitary landfill areas designated in the Province three of them are operational while the rest is under planning stage.

Currently, domestic waste collected by Karapınar Municipality is transferred and temporarily stored in open dumping area (Municipality's current dumping area is understood to be not in line with the national legislation requirements) located at 5.1km east of the Project Site until they are transferred to a landfill in Ereğli on daily basis. According to the latest meeting held between Kalyon representatives and Karapınar Municipality (Technical Department on 21 December 2020, construction of municipal waste storage area has not been completed. On the other hand, the Municipality did not provide a completion date to Kalyon.

According to the Konya Province Environmental Status Report (2019), 46.06% of the generated waste is composed of domestic waste and 22.46% is composed of packaging waste while the rest is composed of metals, glass, ashes, organic wastes of recreational areas etc.

Estimated domestic waste generation for construction phase has been calculated based on above provided statistics and presented in Table 5-44. As shown, domestic waste generation is estimated to be 133kg/day during land preparation and 1,284 kg/day during peak construction time.

Table 5-44: Construction Phase Domestic Waste Generation and Additional Load to the Local Infrastructure

Project Phase	Manpower	Average Daily Waste Generation in Konya (ton/day)	Average Daily Domestic Waste Generation at the Site (kg/day)	Additional Load to the Local Landfill Facilities (%)
Land Preparation	124	1,479	133	0.008
Construction (peak time)	1200	1,479	1,284	0.09

**Please note that in the absence of data on capacity of Ereğli Landfill and waste amount transferred to this Landfill, figures for Konya overall Province were used for calculations.*

According to the Environmental Indicators published by the Ministry of Environment and Urbanization, 30% of generated municipal waste (by weight) consists of packaging waste (i.e. recyclable waste) (Ministry of Environment and Urbanization, 2018)[8]. Therefore, the daily packaging waste generation as part of domestic wastes is estimated to be approximately 385kg during the peak construction period. However, it should be noted that there will be generation of higher amounts of packaging waste due to use of construction materials.

Generated domestic waste is stored at dedicated containers on site and regularly collected by the Karapınar Municipality's trucks and transferred and temporarily stored in open dumping area located at 5.1km east of the Project Site until they are transferred to a landfill in Ereğli on daily basis.

Recyclable waste bins are available in common areas of the Site. According to the available waste registers, scrap metal, paper and cardboards are being segregated at Site. The Project Company will take necessary action and make arrangements to segregate waste plastic and glass and send off-site at the earliest.

The firm KONATIK was appointed as waste management service provider on February 09, 2021

Currently, no licensed environmental service providers are contracted but the Company has reports that tender process is on-going at the time of revising this report.

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[8] Environmental Indicators, Ministiry of Environment and Urbanisation, 2018 (https://cevreselgostergeler.csb.gov.tr)

It should be noted that some of the project personnel are residents in Konya, Karapınar and other nearby settlements during the peak time. Therefore, considering that the personnel living at the local area are already contributing to the waste generation of the province, the actual load on the capacity of the region's waste management facilities caused by the Project is expected to be lower than the estimated amount. In addition, waste management training is provided, and separate collection of packaging waste is encouraged to decrease the total generated amount of municipal waste that will be landfilled. Therefore, the potential additional load on the capacity of existing waste recycling/landfilling facilities is considered **low.**

Furthermore, as the additional load on landfill facilities by the Project construction activities is anticipated to correspond to maximum of 0.09% (for the peak time which is considered as worst-case scenario) of the currently landfilled daily waste in Konya Province, potential contribution to GHG emissions from landfill sanitary waste is considered **negligible**.

Excavation and Construction Waste

Total of 1.5 x 10^6 m^3 excavation material is anticipated to be generated once the construction is complete. 80% of this total amount will be used for backfilling while 20% will used for levelling.

As of February 2021, 568,900 m^3 of soil has been excavated (38% of total planned amount). All of the excavated soil has been used for backfilling and levelling on site after being temporarily stored on site near the excavation points until they are used for filling. No excavation waste was or will be disposed of site during construction.

Other types of construction specific waste include timber, shavings, wooden pallets, metal scraps and cement bags etc. Segregation and temporary storage of these wastes will be carried out in line with requirements of Project Waste Management Plan and regularly collected by a licensed waste management/recycling company.

Hazardous and Special Wastes

Materials contaminated with hazardous materials (i.e. fuels, chemicals, paints, oils, solvents et.), waste oils, waste vegetable oils, waste tires, used batteries and accumulator, electronic waste, fluorescents and trace amount of medical wastes are generated during land preparation and construction. The Pollution Prevention and Control Plan and Waste Management Plan are in place for the construction phase and requires all hazardous waste to be stored in a dedicated and secure area that provides the necessary protection to the environment and workers. Management of hazardous wastes are carried out in compliance with these management plans.

Temporary storage of wastes are implemented at designated waste storage areas in compliance with the Project Waste Management Plan and national legislative requirements. Thus, **no significant impact** is anticipated.

Waste PV Panels

Potential impacts due to waste PV Panels are evaluated in Section 5.5.3.2 – operation phase.

Summary of Construction Phase impacts is provided below:

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significant
		Duration	Extent	Frequency	Intensity		
Community Waste Management Facilities	Low	Short-term	Local	Continuous	Low	Low	Negligible
Soil, surface and groundwater	Medium	Short-term	Local	Intermittent	Low	Low	Minor
Personnel and Community Health and Safety	High	Short-term	Local	Intermittent	Low	Low	Moderate
Loss of valuable recyclable/reusable material	Low	Long-term	Regional	Intermittent	Low	Negligible	Negligible

5.5.3.1.1 *Mitigations, Management and Monitoring*

The following measures are in place in order to avoid/minimize potential impacts of waste generated during land preparation and construction activities:

- The Project follows the principles of waste hierarchy of reduce, reuse, recycle and disposal;
- Waste Management Plan for the construction is in place and implemented by the Project Company and the contractors. The plan forms a framework for the key aspects of waste management;
- Dedicated and appropriate waste storage areas (i.e. waste storage containers with adequate size, separate waste containers for different waste types, secondary containment and impermeable floor) are available on site;
- Waste minimization, segregation, labelling, storage, transportation and recycling/disposal strategies are applied in order to meet the national and international standards;
- Necessary environmental permits are / will be obtained from the related Municipality and Directorate of Environment and Urbanization for all waste management activities;
- Licensed waste transportation, recycling, recovery and disposal companies holding necessary permits will be engaged;
- Training covering waste generation and management are provided to construction phase personnel to raise awareness; and
- Regular visual checks are carried out to ensure waste segregation and disposal practices are in line with the Waste Management Plan.

5.5.3.1.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential impacts related to waste management are summarized below.

Receptor	Impact Significant
Community Waste Management Facilities	Negligible
Soil, surface and groundwater	Negligible
Personnel and Community Health and Safety	Minor
Loss of valuable recyclable/reusable material	Negligible

5.5.3.2 Operation Phase

Domestic and Packaging Waste

Number of project personnel will significantly decrease (121 people) once the construction is over and the plant is fully operational leading to reduced amount of domestic waste, estimated to be 91 kg/day (See Table 5-45 for details). This number corresponds to approximately 0.006% of the current load on the local waste management facilities. Similar to the construction phase, domestic waste will be temporarily stored near the substations and administrative buildings and regularly collected by Karapınar Municipality and disposed at the Municipality Sanitary Landfill. A licensed recycling company will regularly collect packaging waste. All, waste management practices will be carried out in compliance with the Project Waste Management Plan and national regulations. Therefore, potential impact from waste management will be **negligible**.

Table 5-45: Operation Phase Domestic Waste Generation and Additional Load to the Local Infrastructure

Project Phase	Manpower	Average Daily Waste Generation in Konya(ton/day)	Average Daily Domestic + Package Waste Generation (kg/day)	Average Daily Domestic Waste Generation (kg/day)	Additional Load to the Local Landfill Facilities (%)
Operation	121	1,479	129	91	0.006

Hazardous and Special Wastes

During operation phase, there will be limited quantities of hazardous wastes potentially including materials contaminated with hazardous substances, waste oils, waste vegetable oils, waste tires, used batteries and accumulator, electronic waste, fluorescents. The Project will comply with the national regulations and apply international standards to waste management strategies in line with the Project Waste Management Plan. **No significant impact** is anticipated.

Waste PV Panels

PV Panel waste classification follows the basic principles of waste classification. This also considers material composition by mass or volume and properties of the components and materials used (e.g. solubility, flammability, toxicity). It accounts for potential mobilisation pathways of components and materials for different reuse, recovery, recycling and disposal scenarios (e.g. materials leaching to groundwater, admission of particulate matter into the soil)(https://www.irena.org/documentdownloads/publications/irena_ieapvps_end-of-life_solar_pv_panels_2016.pdf).

From a regulatory point of view, PV panel waste still largely falls under the general waste classification. An exception exists in the EU where PV panels are defined as e-waste in the WEEE Directive. The term ‘electrical and electronic equipment’ or EEE is defined as equipment designed for use with a voltage rating not exceeding 1,000 V for alternating current and 1,500 V for direct current, or equipment dependent on electric currents or electromagnetic fields in order to work properly, or equipment for the generation of such currents, or equipment for the transfer of such currents, or equipment for the measurement of such currents (EU, 2012).

In the EU, the solar cells manufacturers are bound by law to fulfil specific legal requirements and recycling standards in order to make sure that solar panels do not become a burden to the environment.

There are two main types of solar panels, requiring different recycling approaches. Both types—silicon based, and thin-film based—can be recycled using distinct industrial processes. A schematic presentation of recycling process of both panel types is provided in Figure 5-18 (https://www.greenmatch.co.uk/blog/2017/10/the-opportunities-of-solar-panel-recycling).

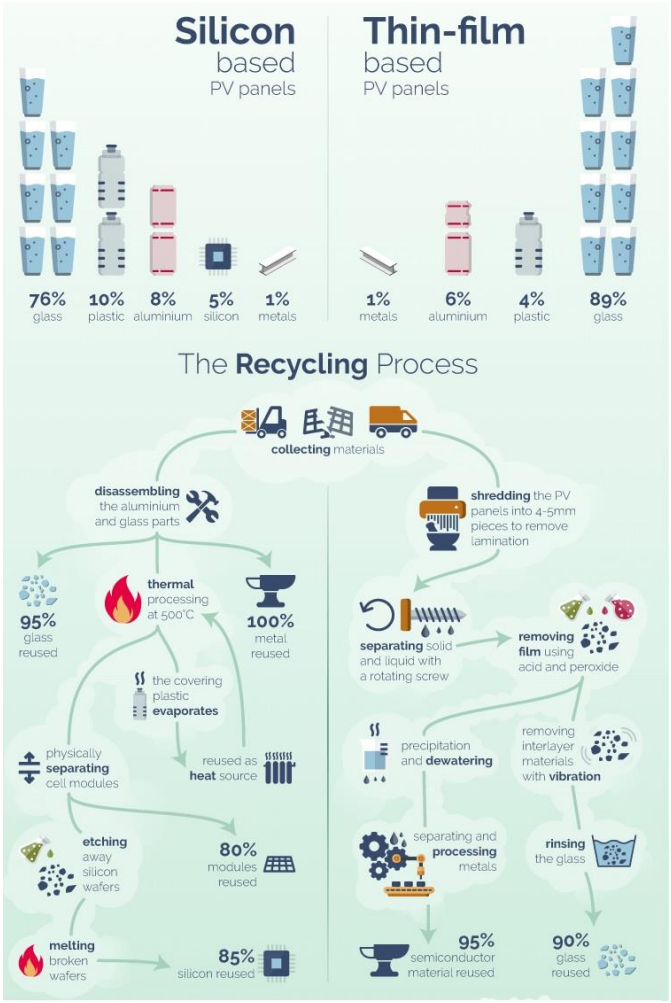

Figure 5-18: Recycling Process of PV Panels

Most defective panels are typically returned to the contract partner, a producer service partner or the manufacturer itself for inspection and repair to be reused.

Since currently only moderate PV waste quantities exist on the global waste market, there are not sufficient quantities or economic incentives to create dedicated PV panel recycling plants. End-of-life PV panels are thus typically processed in existing general recycling plants in most countries. Here, the mechanical separation of the major components and materials of PV panels is the focus. This still achieves high material recovery.

In Turkey, there are no known PV Panel Recycling Plants as currents there are not significant quantities of waste PV panels.

The Project Company has liaised with the PV panel Manufacturer (who is another Kalyon Holding Group Entity) to secure an appropriate and effective recycling/re-use mechanism for end-of-life and broken or damaged solar panels. Accordingly, broken/damaged panels are stored at a dedicated storage area with adequate bunding and sent to the Manufacturer for evaluation when a reasonable amount that is easy to transfer is reached. Upon evaluation, if there is a fault that can be fixed at the factory the manufacturer takes necessary action and sends the fixed panel(s) to the Project Site. If the panels need recycling, then the manufacturer sends these panels to their own certified waste management company for recycling of broken / damaged panels as electronic wastes. According to the information received from the Project Company, rate of wastage from the beginning of installation of panels is approximately 0.17% (500 broken or damaged panels / 300,000 panels installed).

Based on above information and discussions, significance of potential impacts associated with operation phase are summarised below:

Receptor		Sensitivity	Nature of Impact				Impact Magnitude	Impact Significant
			Duration	Extent	Frequency	Intensity		
Community Waste Management Facilities		Low	Long-term	Local	Continuous	Low	Negligible	Negligible
Soil, surface and groundwater		Medium	Long-term	Local	Intermittent	Low	Negligible	Negligible
Personnel and Community Health and Safety		High	Long-term	Local	Intermittent	Low	Negligible	Negligible
Loss of valuable recyclable/reusable material - general		Low	Long-term	Regional	Intermittent	Low	Negligible	Negligible
Management of damaged PV Panels		High	Long-term	Regional	Intermittent	Low	Low	Moderate

5.5.3.2.1 *Mitigations, Management and Monitoring*

- Operation phase Waste Management Plan is implemented;
- Proper waste storage areas (i.e. waste storage containers with adequate size, separate waste containers for different waste types, secondary containment and impermeable floor) are available on site;
- Waste minimization, segregation, labelling, storage, transportation and recycling/disposal strategies are applied in order to meet the national and international standards;
- Necessary environmental permits will be obtained from the related Municipality and Directorate of Environment and Urbanization for the operation phase;
- Licensed transportation, recycling, recovery and disposal companies will be engaged;
- Training covering waste generation and management will be provided to operation personnel to raise awareness;
- Broken or damaged solar panels are/will be immediately shifted to a designated area to avoid any type of land contamination; and
- A waste management company certified for electronic waste management and recycling will be appointed.
- The broken/damaged panels are/will be stored at a dedicated storage area with adequate bunding until the time of transfer to the recycling facility.
- Regular visual checks will be carried out to ensure waste segregation and disposal practices are in line with the Operation phase Waste Management Plan.

5.5.3.2.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential impacts related to waste management are summarized below.

Receptor	Impact Significant
Community Waste Management Facilities	Negligible
Soil, surface and groundwater	Negligible
Personnel and Community Health and Safety	Negligible
Loss of valuable recyclable/reusable material	Negligible
Management of Damaged PC Panels	Minor

5.5.3.3 Decommissioning Phase

Waste generation during the decommissioning phase is anticipated to be similar to the construction phase. However, depending on the relevant legislative requirements, removal of project infrastructure may lead to plant components, ETL components, electrical equipment, scraps, waste cables and demolition wastes that will require proper management in addition to the general construction wastes. End-of Life PV panels will be the main concern at the time of commissioning if not managed/recycled appropriately It is recommended to develop an appropriate recycling/re-use mechanism for end-of-life and broken or damaged solar panels in cooperation with the PV panel Manufacturer (who is another Kalyon Holding Group Entity). If this option is found inapplicable, other recycling facilities should be engaged for this purpose.

Based on above information and discussions, significance of potential impacts associated with decommissioning are summarised in following table:

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significant
		Duration	Extent	Frequency	Intensity		
Community Waste Management Facilities	Low	Short-term	Local	Intermittent	Low	Negligible	Negligible
Soil, surface and groundwater	Medium	Short-term	Local	Intermittent	Low	Low	Minor
Personnel and Community Health and Safety	High	Short-term	Local	Intermittent	Low	Low	Moderate
Loss of valuable recyclable/reusable material	Low	Long-term	Regional	Intermittent	High	High	Moderate
Management of end-of-life PV Panels	High	Short-term	Regional	One-off	High	High	Major

5.5.3.3.1 *Mitigations, Management and Monitoring*

The following measures will be taken to avoid/minimise potential impacts of decommissioning related waste management:

- The Project Company will engage with the relevant authorities regarding the decommissioning of the Solar Power Plant;
- The Project Company will ensure that the decommissioning contractor(s) will have in place a detailed plan prior to the decommissioning activities for reuse, recycling, recovery and management of panel components, substations, waste cables, electrical equipment and other demolition waste based on the available most recent technologies and in line with the requirements of the relevant authorities;
- The Project Company should either secure panel recycling agreement and procedure with the panel manufacturer or engage with other recycling companies; and
- Licensed waste transportation, recycling, recovery and disposal companies will be engaged.

5.5.3.3.2 *Residual Impact*

Residual impacts that might incur after the implementation of the mitigation hierarchy and mitigation measures addressing potential impacts related waste management are summarized below.

Receptor	Impact Significant
Community Waste Management Facilities	Negligible
Soil, surface and groundwater	Negligible
Personnel and Community Health and Safety	Minor
Loss of valuable recyclable/reusable material	Minor
Management of end-of-life PV Panels	Moderate

5.6 BIODIVERSITY

This section presents the baseline conditions and the assessment of Project impacts on biodiversity associated with the construction, operation and decommissioning of the Project. It identifies the relevant framework of the legislation and other requirements, and identifies and assesses potential significant impacts, prior to defining appropriate mitigation measures that will be implemented as part of the Project throughout its lifetime. The baseline includes protected areas, habitats and species, with information being used from primary and secondary sources.

In line with the national legislation, international standards and the best practices, the ultimate objective of biodiversity studies is to ensure that there are no-net-losses in natural habitats and species' populations, and net gains are achieved in critical habitats. Accordingly, following a thorough baseline study, it is required to take necessary measures to minimize potential impacts on biodiversity and ecosystem services adopting an adaptive management system and following a mitigation hierarchy in compliance with the provisions of IFC PS6.

The revised Critical Habitat Assessment is provided in Appendix E of this ESIA.

5.6.1 Project Standards

The biodiversity section of this ESIA follows the IFC PS6 (2012) and associated Guidance Note (GN6 published on January 1, 2012 and last updated on June 27, 2019) on biodiversity conservation and sustainable management of living natural resources.

The IFC PS6 main objectives are:

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

IFC PS6 requires that a conservation value is allocated to the ecological features (protected areas, habitats and species) which are likely to be directly or indirectly impacted in the Project AoI. Under the IFC guidance, the requirements of PS6 apply to projects in all habitats, whether or not those habitats have been previously disturbed and whether or not they are legally protected. Specifically a project is required to:

- Assess significance of project impacts on all levels of biodiversity as an integral part of the social and environmental assessment process
- Take into account differing values attached to biodiversity by specific stakeholders
- Assess major threats to biodiversity, especially habitat destruction and invasive alien species

In accordance with IFC PS6, habitats are divided into modified, natural and critical habitats. Critical habitats can be either modified or natural habitats supporting high biodiversity value, including:

- Habitat of significant importance to critically endangered and/or endangered species (International Union for Conservation of Nature and Natural Resources (IUCN) Red List)
- Habitat of significant importance to endemic and/or restricted-range species
- Habitat supporting globally significant concentrations of migratory species and/or congregatory species
- Highly threatened and/or unique ecosystems
- Areas associated with key evolutionary processes

Since habitat destruction is recognised as a major threat to the maintenance of biodiversity and to assess likely significance of impacts, IFC PS6 requires the following depending on habitat status:

Modified Habitat: exercise care to minimise any conversion or degradation of such habitat, depending on scale of project, identify opportunities to enhance habitat and protect and conserve biodiversity as part of operations.

Natural Habitat: developer will not significantly convert or degrade such habitat unless no financial/technical feasible alternatives exist, or overall benefits outweigh cost (including those to biodiversity), and conversion or

degradation is suitably mitigated. Mitigation must achieve no net loss of biodiversity where feasible; offset losses through creation of ecologically comparable area that is managed for biodiversity, compensation of direct users of biodiversity.

Critical Habitat: in areas of critical habitat the developer will not implement project activities unless there are no measurable adverse impacts on the ability of the critical habitat to support established populations of species described or on the functions of the critical habitat; no reduction in population of a recognised critically endangered or endangered species and lesser impacts mitigated as per natural habitats.

The Birds Directive (2009/147/EC)[9]

Often migratory, wild bird species can only be protected by cooperating across borders. Urban sprawl and transport networks have fragmented and reduced their habitats, intensive agriculture, forestry, fisheries and the use of pesticides have diminished their food supplies, and hunting needs to be regulated in order not to damage populations. Concerned with their decline, Member States unanimously adopted the Directive 79/409/EEC in April 1979. It is the oldest piece of EU legislation on the environment and one of its cornerstones. Amended in 2009, it became the Directive 2009/147/EC PDF.

Habitat loss and degradation are the most serious threats to the conservation of wild birds. The Directive therefore places great emphasis on the protection of habitats for endangered and migratory species. It establishes a network of Special Protection Areas (SPAs) including all the most suitable territories for these species. Since 1994, all SPAs are included in the Natura 2000 ecological network, set up under the Habitats Directive 92/43/EEC.

500 wild bird species across Europe are protected under the five annexes to the Birds Directive as explained in Table 5-46.

Table 5-46: Annexes to the EU Birds Directive

Annex	Explanation
I	194 species and sub-species are particularly threatened. Member States must designate Special Protection Areas (SPAs) for their survival and all migratory bird species.
II	82 bird species can be hunted. However, the hunting periods are limited and hunting is forbidden when birds are at their most vulnerable: during their return migration to nesting areas, reproduction and the raising of their chicks.
III	Overall, activities that directly threaten birds, such as their deliberate killing, capture or trade, or the destruction of their nests, are banned. With certain restrictions, Member States can allow some of these activities for 26 species listed here.
IV	The directive provides for the sustainable management of hunting but Member States must outlaw all forms of non-selective and large scale killing of birds, especially the methods listed in this annex.
V	The directive promotes research to underpin the protection, management and use of all species of birds covered by the Directive, which are listed in this annex.

The Habitats Directive (92/43/EEC10)

Adopted in 1992, the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive

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[9] *Source: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm*

[10] *Source: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm*

and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

Annex I lists 233 European natural habitat types, including 71 priority (i.e. habitat types in danger of disappearance and whose natural range mainly falls within the territory of the European Union).

All in all, over 1.000 animal and plant species, as well as 200 habitat types, listed in the directive's annexes are protected in various ways:

Annex II species (about 900): core areas of their habitat are designated as sites of Community importance (SCIs) and included in the Natura 2000 network. These sites must be managed in accordance with the ecological needs of the species.

Annex IV species (over 400, including many annex II species): a strict protection regime must be applied across their entire natural range within the EU, both within and outside Natura 2000 sites.

Annex V species (over 90): Member States must ensure that their exploitation and taking in the wild is compatible with maintaining them in a favourable conservation status. Table 5-47: Species Protection under the Habitats Directive

International Conventions and Protocols

Conventions on different aspects of biological diversity that Turkey is party to and thought to be relevant to this Project are:

- Convention on Biological Diversity (CBD) (1997) and the Cartagena Protocol on Biosafety
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Convention on the Conservation of Migratory Species of Wild Animals (CMS) / Agreement on the Conservation of Populations of European Bats (EUROBATS)
- Convention to Combat Desertification (CCD)
- Convention on Wetlands of International Importance, Especially as Waterfowl Habitat (RAMSAR)
- Convention for the Protection of World Cultural and Natural Heritage
- Convention on Plant Genetic Resources for Food and Agriculture
- Convention for the Conservation of European Wildlife and Natural Habitats (BERN)
- European Landscape Convention

IUCN Red List of Threatened Species[11]

The IUCN Red List of Threatened Species is the world's most comprehensive information source on the extinction risk of animals, fungi and plants. Assessors place species into one of the IUCN Red List Categories, based on a series of assessment criteria. For each species, The IUCN Red List provides information about its range, population size, habitat and ecology, use and/or trade, threats and conservation actions. The IUCN Red List Categories indicate how close a species is to becoming extinct. The nine Red List Categories are shown in Figure 5-19.

Species are assessed against five criteria (see below) based on geographic range, population size and population decline/increase, in addition to extinction probability analyses. These criteria determine which category is most appropriate for the species.

Species in the Vulnerable, Endangered and Critically Endangered categories are collectively described as 'threatened'. The IUCN Red List does not include Not Evaluated species. Critically Endangered species may also be tagged as Possibly Extinct or Possibly Extinct in the Wild.

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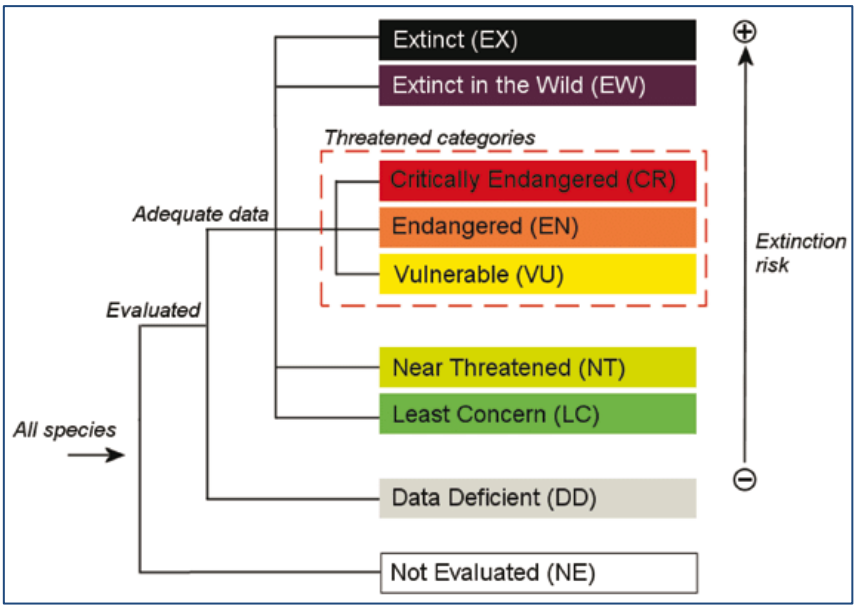
[11] https://www.iucnredlist.org/



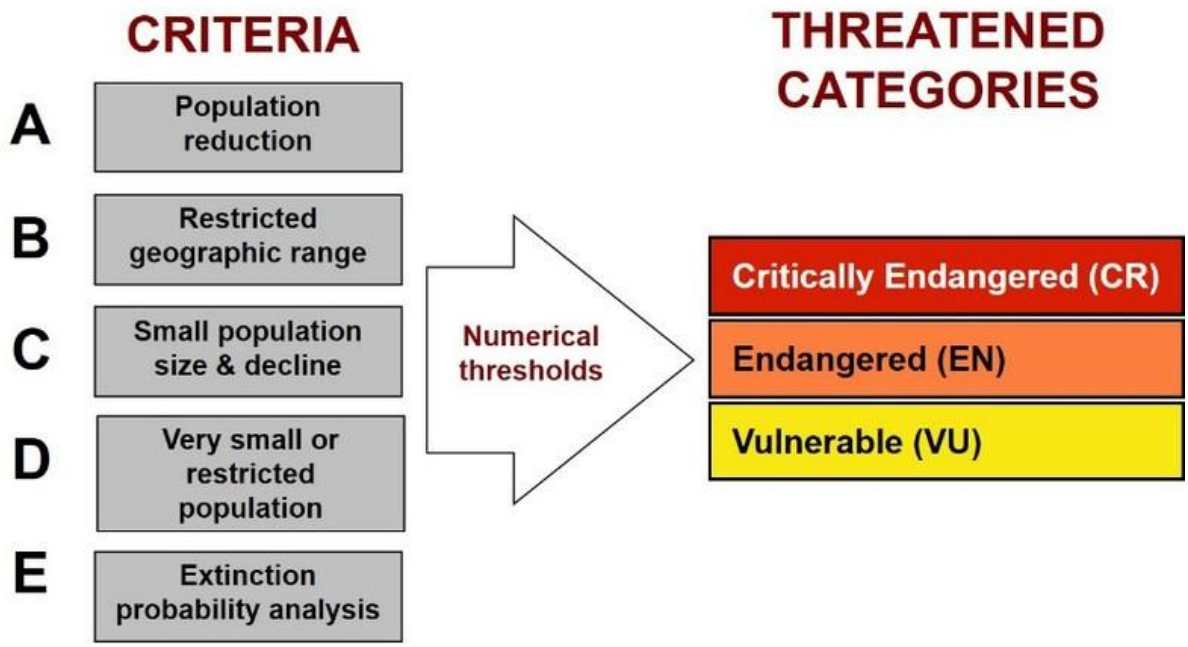


Figure 5-19: Structure of the IUCN Red List Categories and Criteria

5.6.2 ASSESSMENT METHODOLOGY

5.6.2.1 Ecological Area of Influence

The Ecological Area of Influence (AoI) was determined to include the areas directly affected by the Project and areas which will be temporarily affected during construction as follows:

- Project Area and 100m buffer zone around it (consisting the Karapınar-Eskil Road to the west);
- ETL routes and 500m corridor around them.

The field surveys consisted of the defined AoI while the desktop review, critical habitat assessment and ecological impact assessment studies consisted of internationally recognised and protected areas (i.e. Karapınar Plain KBA/IBA/IPA, Meke Maar Ramsar Site). Please note that the Ecologically Appropriate Area of Analysis (EAAA) was formed by overlapping Karapınar Plain KBA and IPA.

A data search covering an area of 50 km was completed using the Integrated Biodiversity Assessment Tool (IBAT) in order to further inform the identification of potential valued ecological receptors as well as the EAAA. In additional to the IBAT search attempts were made to consult with Plantlife, Botanical Species Specialist and BirdLife Partner in Turkey. Responses were not received from Plantlife / Botanical Specialist and the response from the BirdLife Partner was that their policy was not to share data with commercial enterprises or professional consultants.

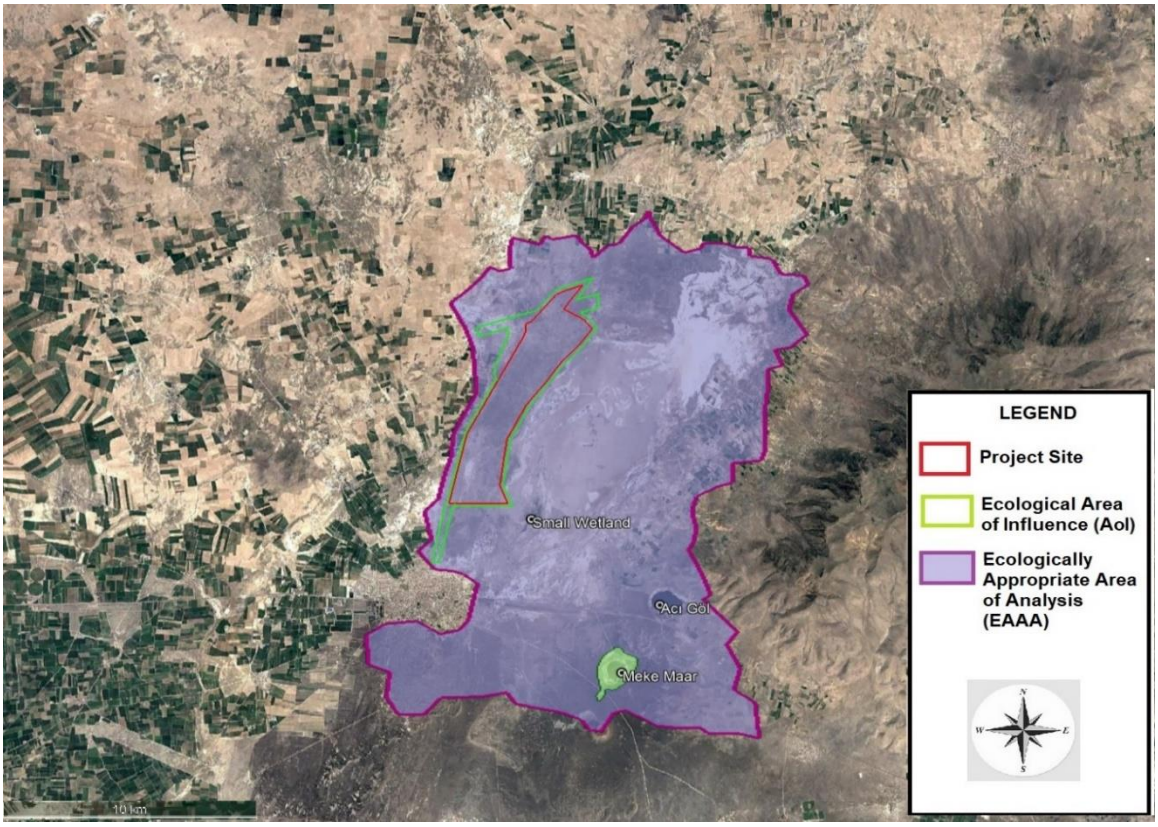


Figure 5-20: Ecological Area of Influence (AoI) and EAAA

5.6.2.2 Desktop Review

A desktop based literature review of national and international, sources was undertaken, this has included a full IBAT report covering a 50 km search area.

Furthermore, literature data on the following nature conservation areas and other protected areas (existing or proposed) has also been collected and reviewed:

- Ramsar sites
- Key Biodiversity Areas (KBA)
- Important Bird Areas (IBA)
- Important Plant Area (IPA)
- Protected areas in Turkey.

The relevant literature review findings are provided in Section 5.6.3 Baseline Conditions of this report and full reference list is provided in Section 10 – References.

5.6.2.3 Biodiversity Field Studies

Biodiversity surveys were undertaken in June 2018 and between 21 March - 31 May 2020 within the context of Faunistic, Floristic and Ecological studies in 2020 spring period for 15 days. Surveys in the April 2020 were abridged due to travel restrictions as a result of the Covid-19 outbreak within Turkey.

Survey team included Ornithologist Prof. Dr. Ali Erdogan as bird specialist, survey supervisor and coordinator, Botanist Prof. Dr. Ahmet Aksoy, Zoologist Prof. Dr. Hakan Sert as Mammalian specialist, and Zoologist Prof. Dr. Mehmet Öz from Akdeniz University as the amphibian and reptile specialist.

5.6.2.3.1 *Flora and Vegetation Survey*

Two field studies were undertaken during the period when vegetation in the region was at its optimum state, in June 2018 and May 2020.

Field studies were conducted at the predefined ecological AOI. During the field work, both flowering plants and flower species in dry form with flowering time were assessed.

Detailed studies at the habitat and species levels were undertaken by Prof. Ahmet Aksoy from Akdeniz University with the main objective of identifying flora species and developing conservation measures for flora and vegetation in the area. Field studies were carried out in accordance with the schedule presented in Table 5-48.

Table 5-48: Karapınar YEKA SPP Project Flora and Vegetation Survey Schedule

Flora and Vegetation Survey	Survey Date
1	27-28 June 2018
2	12 May 2020

Plant specimens were evaluated considering the underground and above ground organs, flower status, fruit, etc., which are systematic importance for the family level. Plant specimens were pressed during fieldwork in such a way that their morphological appearance would not deteriorate. Based on field surveys, a list of flora species including directly observed species with the study area has been prepared.

Threat statuses for flora species identified within the biodiversity study area were evaluated according to the categories and criteria presented in the reference book of Red Data Book of Turkish Plants (Ekim et al., 2000).

Turkish plant names have been identified based on Turkish Plant Names Dictionary and The Plant List of Turkey (Vascular Plants) (Baytop 1994, Güner et al., 2012). In addition, other scientific databases such as TUBIVES, Noah's Ark Biological Diversity Database (www.tubives.com, www.nuhungemisi.gov.tr) have been referred for flora studies.

Identified habitats of the AoI were evaluated according to the European Nature Information System (EUNIS) and a detailed classification was made. These habitats and also identified flora species were also compared to species lists and habitat information provided in the Karapınar Plain KBA (Eken et al., 2006) and IPA (Ozhatay et al. 2008) inventories.

Project flora and vegetation studies are conducted by Prof. Ahmet Aksoy from Akdeniz University, who is a botanical expert.

5.6.2.3.2 *Mammals (excl. Chiroptera) and Herpetofauna Surveys*

The first fauna survey was conducted between 27-28 June 2018 and an additional 15 day field survey was conducted in 2020 to determine the mammal and herpetofauna (Amphibian and Reptile) species within the AoI between 22 March and 31 May 2020. Fieldwork could not be performed in April due to the Governmental restrictions for COVID-19 pandemic.

Surveys for mammals, amphibians and reptiles and were carried out through direct observations, track and faeces detection in the survey area (Sargent and Morris, 1997, Mayle et. al. 1999, Sutherland, 2003) (Figure 5-31 and Figure 5-32). Fixed transect surveys were performed and species identification was performed by referring to guides Demirsoy (1996), MacDonald & Barrett (2005) and Bang and Dahlstrom (1980) for mammals and Baran (2005) and Arnold & Ovenden (2003) for reptiles as well as existing literature (Başoğlu and Özeti 1973, Başoğlu and Baran 1988, Özeti and Yılmaz 1994, Demirsoy et al. 1996, Kence et al. 1996, Baran and Atatür 1998, Yiğit et al. 2002, Kryštufek and Vohralík 2009).

The occurrence of the species within the Study Area was determined in two categories:

- Measurement of abundance based on the total number of individuals of a species recorded within given area
- Measurement of commonness based on the number of locations within which a species is observed in a given area (Sutherland 2006).

Abundance is categorized in 3 levels: i) abundant; species with high density, ii) relatively abundant; species with moderate density, and iii) rare; species with low density (e.g. only 1-2 individuals of species were observed). Commonness is categorized in 3 levels: i) very common; when the species were observed in the Project site, its surroundings and settlements close to projects site, ii) common; when the species were observed in Project site and its surroundings, and iii) uncommon; when the species were seen only a part of Project site or some parts of Project site.

Fauna species have been assessed according to the IUCN Red List, Habitats Directive, and international conventions; Bern and CITES, in order to better identify species' statuses. In the analysis of each species though, due to lack of sufficient population data on many of the fauna species, population estimates and potential impact assessments were based on expert judgment and assessment of potential impacts.

5.6.2.3.3 *Avifauna Surveys*

Initial avifauna survey consisted of a desktop literature survey and two day field study between 27-28 June 2018. Additional surveys were carried out for Spring (March – May) 2020 to cover migratory and breeding bird species. The findings of the surveys are presented within the scope of this Report. Table 5-49 presents the Spring 2020 Survey Schedule.

The need for wintering bird surveys within the AoI were scoped out following a review of desk study data and an assessment of the habitats on the site which was completed following on from the 2018 flora surveys. The Project site and AoI do not support habitats which would be important for species of wintering wildfowl and wading birds (*e.g.* large areas of open water for roosting or extensive grassland for grazing).

Table 5-49: Avifauna Spring 2020 Survey Schedule

Month	Date
March	22-26 March 2020
May	11-15 May 2020
	27-31 May 2020

For bird surveys, fixed transect and fixed-point surveys were performed. In the fixed transect designed in a 'zig zag' pattern, with the transect being started on the northern field boundary, then crossing the plot every 100m until the southern field boundary is reached. The length of the transect therefore varied from site to site but was roughly the same distance (Bibby et al 2000, Sutherland et al. 2004). One or two observers carried out the surveys each day between 08.00 and 18.00 for almost 8-10 hours in a day. With the method, both the project site and its close proximity up to 5 km were observed and assessed.

Information on animal diversity and avian activity was also collected from residents and shepherds in the region.

For the fixed-point surveys, three vantage points (OP 1, OP 2 and OP 3) were chosen, and one observer recorded the birds at each vantage point (Table 5-50).

- OP 1 was located at the entrance of the project Site and the birds passing over approximately at a distance of 3-5 km from the project Site could be observed from this point.
- OP 2 was located at the centre of the project site. Most of the migratory bird movement over project could be observed from this point.
- OP 3 was located at the northern border of the project site, near the Tilkili village road. 400kV ETLs could also be observed from this point.

Fixed-point surveys are standard monitoring method for detection of soaring migrant and other birds (Bibby et al. 2000, Sutherland et al. 2004, 2006, Panuccio et al. 2013, 2017). Avifauna surveys also covered Lakes Acı Göl and Meke which are located approximately 7-8 km southeast to the Project Site.

Avian species were identified by visual contact. Species identification was made by referring to Mullarney et al. (2003). Due to the limitations such as poor visibility, high flight heights of soaring birds, difficult field and bad weather conditions in the project site, photography was also used to identify of soaring birds. Photography is one the best option for difficult to detect species, has regularly been used for birds under poor visibility, or difficult field and bad weather conditions (Wehrmann et al. 2019). Binoculars (Nikon 8x40 and Olympus 10x50), HD cameras (Canon 7D and Canon 70D) with tele-lenses (Canon 400 mm and Canon 100-400 mm) were used as field equipment.

Further information was also collected through interviews with local people within the Study Area and review of contemporary literature and Study Team's previous field surveys in the region (Kılıç 1999, Kiziroğlu 2008, Svensson et al. 2010, Kirwan et al. 2010, Kiziroğlu 2015).

Table 5-50: Coordinates of the Vantage Points

Observation post (Vantage Point)	Coordinate
OP 1 (G1)	37°45'19.54"N- 33°33'33.17"E
OP 2 (G2)	37°48'5.98"N- 33°34'52.90"E
OP 3 (G3)	37°50'20.31"N- 33°36'52.51"E

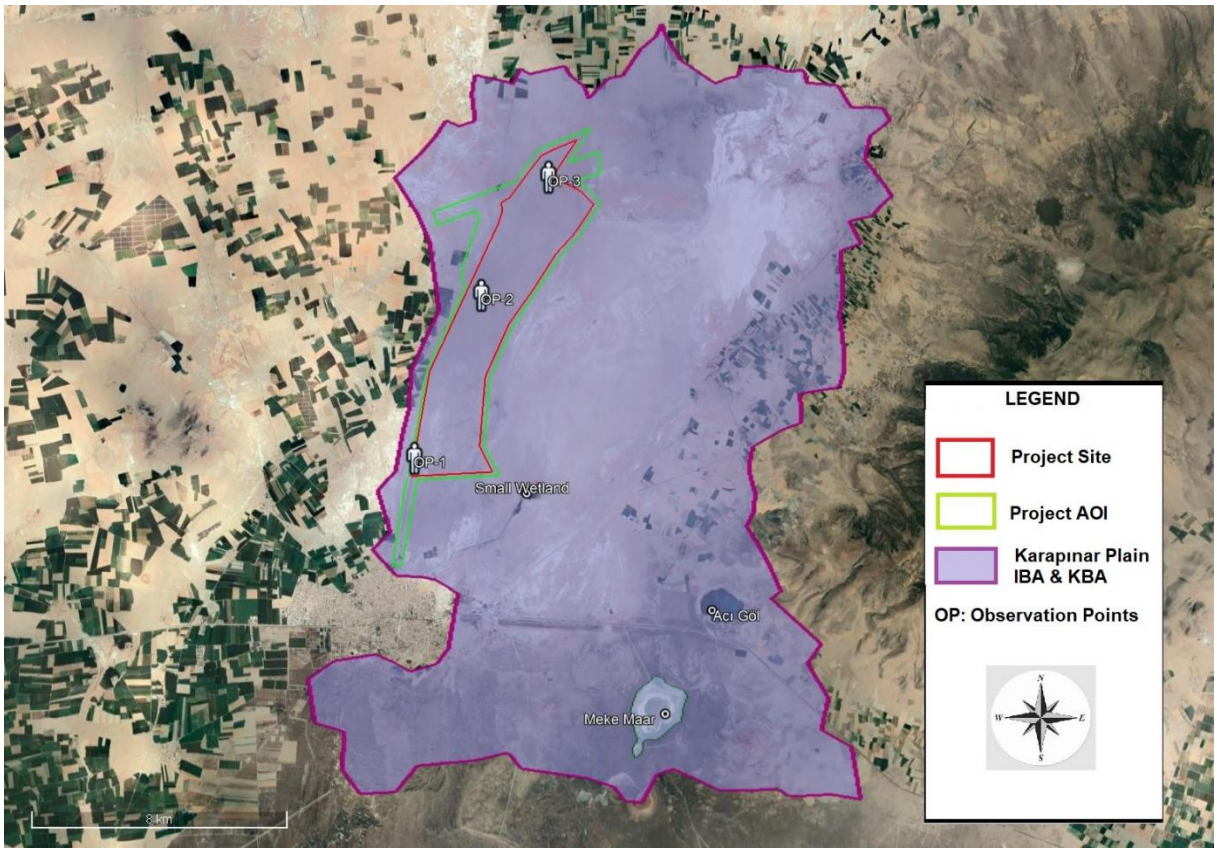


Figure 5-21: Vantage Points' Location

5.6.2.4 Impact Assessment

The magnitude of the potential impacts upon each ecological feature (Table 5-51) is assessed for the construction, operation and decommissioning of the Project.

In accordance with IFC PS6, the conservation value (sensitivity) or weighting attributed to each ecological feature which occurs within the Project AOI needs to be assessed, and these are defined in Table 5-52.

In order to categorise the sensitivity on the basis of biodiversity-specific criteria typically adopted for the assessment of ecological impacts, slightly differs from the evaluation matrix presented in Chapter 4 – Impact Assessment Methodological Approach.
Significance has been determined by the interaction between the magnitude of impacts and the sensitivity of receptors affected, as depicted in the impact evaluation matrix shown in Chapter 4.

Table 5-51: Impact Magnitude Criteria

Category	Definition
High	Fundamental change to the specific environmental conditions assessed resulting in long term or permanent change, typically widespread in nature (regional national and international), would require significant intervention to return to baseline; exceeds national standards and limits.
Moderate	Detectable change to the specific environmental conditions assessed resulting in non-fundamental temporary or permanent change
Low	Detectable but minor change to the specific environmental conditions assessed.
Negligible	No perceptible change to the specific environmental conditions assessed

Accordingly, overall magnitude of each impact was estimated as a factor of the foreseen geographic extent, duration, and frequency of the impact. Sensitivity criteria used in the assessment of impacts on these biodiversity groups are presented in Table 5-52.

Table 5-52: Criteria for determining conservation value (sensitivity of the biodiversity receptors)

Conservation Value (Sensitivity)	Species Criteria	Habitat or Site Criteria
High	IUCN Critically endangered, endangered and Vulnerable species. Nationally protected species of significant population size and importance. Local endemic flora species Bird species with elevated conservation concern; species with declining local population; breeding residents.	Internationally designated sites (or equal status). Nationally designated sites (or equal status). Critical habitats of significant international or national ecological importance.
Medium	IUCN Near Threatened species. Nationally protected species or rare species, but not a significant population size and not of national importance. Regional endemic flora species	Regionally important natural habitats. Priority habitats listed under Annex I of the Habitats Directive. Modified habitats with high biodiversity or under significant threat of loss within the region.
Low	IUCN Least Concern. Widespread species Non-breeding and non-resident bird species	Undesignated sites and habitats of natural habitats of some local biodiversity and cultural heritage interest. Modified habitats with limited ecological value. Other sites with little or no local biodiversity and cultural interest. Modified habitats with limited biodiversity value.
Negligible	Species of no national importance / no relevance to the site	Highly modified habitats of no biodiversity value.

5.6.3 BASELINE CONDITIONS

5.6.3.1 Protected Areas

According to IFC PS 6, there are two different types of protected areas; Legally Protected Areas and Internationally Recognized Areas. Legally Protected Areas meet the IUCN definition for a protected area, while Internationally Recognized Areas are defined as UNESCO World Heritage Sites, UNESCO Man and Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Ramsar Convention.

Similarly, EBRD PR6 is guided by the International Union for Conservation of Nature (IUCN) definition of “Protected Area” and Protected Area is “a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”.

5.6.3.1.1 *Legally Protected Areas*

IFC PS 6 recognised legally protected areas that meet the IUCN definition: *“clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.”*

In Turkey, Ministry of Agriculture and Forestry is the main official body responsible for development and implementation of national biodiversity conservation policies, action plans, designation of conservation areas, and many other related tasks conducted by its central and local directorates within the Ministry’s organizational structure.

IUCN Protected Area Management Categories are adopted to the Turkish Protected Area System in 2006 through the Biodiversity and Natural Resource Management Project. Accordingly, legally protected areas in Turkey, were re-classified under the 6 protected area management categories in line with IUCN Guidelines:

I	**Strict protection [Ia) Strict nature reserve and Ib) Wilderness area]**
II	Ecosystem conservation and protection (i.e. National park)
III	Conservation of natural features (i.e. Natural monument)
IV	Conservation through active management (i.e. Habitat/species management area)
V	Landscape/seascape conservation and recreation (i.e. Protected landscape(seascape)
VI	Sustainable use of natural resources (i.e. Managed resource protected area)

Karapınar SPP Project Site is not located within any of Turkey's Legally Protected Areas. The closest protected area is the Meke Maar Lake Nature Protection Area which is located 8km south-east of the Project Site. Distances to the nearest legally protected areas from the Project Site are provided in Table 5-53 and Figure 5-22.

It should be noted that Tuz Lake Special Environmental Protection Area, Akgöl Nature Protection Area and Bozdağ Wildlife Development Area are not included in the AoI due to their considerable distance to the Project Site.

Meke Maar

Meke Maar has been designated as Ramsar Site and Wetland of International Importance in 2005 and a national protected area as Natural Monument and Natural SIT of 1st Degree[12]. Meke Maar, within the boundaries of Karapınar Plain KBA, is a volcanic system which contains typically a volcanic rock mass and a crater lake up above. The system differs from other volcanic systems with its caldera lake surrounding the volcanic mass.

Meke Maar, which is known as the most important wetland in Karapınar Plain, is considered as an important area for breeding waders and wintering wildfowl. The lake is surrounded by grasslands and mud plains and is virtually inaccessible during wet periods. During summer it dries up completely (BirdLife International, 2020a).

Eren (1994) studied the birds of Make Maar between 1992 and 1993 and observed 37 bird species. According to the study findings, of those species 23 were resident, 10 were migrant and 4 were accidental species.

Candan et al. (2020) studied the amphibian and reptile species of Meke Maar and detected 15 species including one anuran, one tortoise, seven lizards and six snakes.

Kılıç (1999) identified Pelecanus onocrotalus at Meke Maar although no breeding was detected during the study.

*****

[12]

Natural SIT areas belong to geological periods and have extraordinary features because of their rarity, above ground, underground or under water (Article 3 of Law No: 2863)

1st Degree Natural SIT Areas are areas that have environmental value in terms of Scientific Preservation, must be protected for the public interest due to their interesting features and their rarity. Protection status under IUCN Protected Area Management Categories falls into Category II and III

Table 5-53: Nearest Legally Protected Areas to the Project Site

Name	Protected Area Category	Distance from the Project License Area
Meke Maar Lake	Nature Protection Area	8
Akgöl (Ereğli Marsh)	Nature Protection Area	16
Bozdağ Yaban Hayatı Geliştirme	Wildlife Development Area	33
Tuz Lake	Special Environmental Protection Area	53

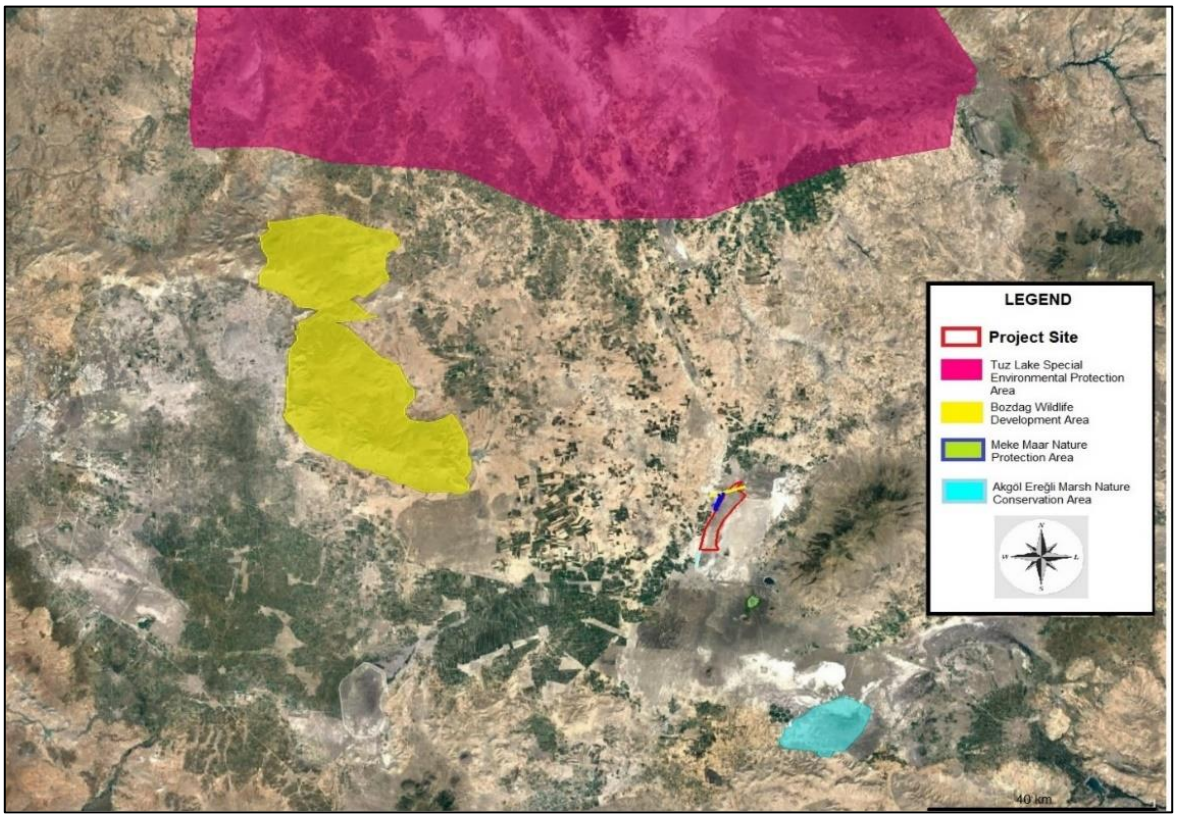


Figure 5-22: Location of the Legally Protected Areas

5.6.3.1.2 *Internationally Recognized Areas*

According to the IFC PS6, Internationally Recognized Areas are “areas of recognized importance to biodiversity conservation but are not always legally protected”. Also, IFC PS 6 GN54 states that Projects that are located within internationally and/or nationally recognized areas of high biodiversity value (i.e. Key Biodiversity Areas (KBAs), which encompass Important Bird and Biodiversity Areas (IBAs)) or areas that meet the criteria of the IUCN’s Protected Area Categories Ia, Ib and II. may require a critical habitat assessment.

The following sources were utilised for understanding status of the area in terms of internationally recognised areas :

- “122 Important Plant Areas of Turkey”, Ozhatay et al. (2005) define important plant areas (IPAs) in Turkey, based on internationally recognised criteria and locally collected data. Each IPA is explained in terms of

its general characteristics, detailed flora species' composition, threats it faces and related conservation efforts if there are any.

- Important Bird and Biodiversity Areas (IBA) by BirdLife International.
- Key Biodiversity Areas (KBAs) of Turkey, Doğa Derneği (2006). The inventory defines 305 KBAs in terms of their outstanding characteristics and provides a detailed list of species and their global and regional threat statuses (Eken et al., 2006).

Karapınar Plain KBA

The Project Site is within the boundaries of Karapınar Plain KBA with an assigned code of ORT-027 (Eken et al, 2006), covering an area of 28,386ha, where the elevation changes between 980 and 1300 meters. The KBA is located in the southern part of the Konya Closed Basin. The conservation priority of the KBA is classified as "Subject to Conservation" by Eken et al. which states for an area, a significant portion of which is in danger of extinction, unless it is regularly detained and interventions are made to individual problems. Also, Eken et al, noted that there had been no serious change in the natural structure of the area in the past years prior to publication of their study.

Karapinar Plain KBA is classified as Regional KBA: a KBA of international significance that was identified using previously established criteria and thresholds for the identification of Important Bird and Biodiversity Areas (IBAs) and for which available data indicate that it does not meet global KBA criteria and thresholds set out in the Global Standard.

The Karapinar Plain KBA encompasses the Karapinar Plain Important Plant Area (IPA) and the Karapınar Plain Important Bird Area (IBA), which is its rationale for qualifying as an KBA.

The KBA is mainly composed of Central Anatolian salt steppes, dry calcareous grassland, standing freshwater, brackish water and saltwater (Key Biodiversity Areas 2020). It is considered important for endemic and narrowly spread plant species and endangered bird species. There are 17 endemic plant species present in the KBA that meet KBA criteria. The KBA is rich in Geven (*Astragalus*) species of which *Astragalus gigantostegius* is known to be present only in Karanar Plain KBA (it should be noted that none of the KBA-listed species were detected within the AOI during the field studies).

The major problems in the Karapınar Plain are agricultural activities, livestock farming and ranching, nomadic grazing, abstraction of ground water for agricultural use, natural habitat modification (Key Biodiversity Areas 2020).

There are two lakes (Make Lake and Acı Lake) and a small wetland in the Karapınar Plain. Meke Lake is located at approximately 8.5 km (Meke Maar Protection Boundary is approximately 7km away) south-east of the Project Site and considered as Natural Protected Area and Ramsar Site. Acı Lake is located approximately 7.5 km south-east of the Project Site.

There is also a small wetland within the AOI which is at approximately 1.5 km south-east of the Project Site and known to be fed by direct discharge of the Karapınar Municipality Sewerage Network.

A map showing the KBA including IBA (within the boundary of the KBA), IPA and the Project AOI boundaries is presented in Figure 5-23. Boundaries of the Karapınar IPA were digitised in reference to the book "122 Important Plant Areas of Turkey" (Ozhayat et al (2005).

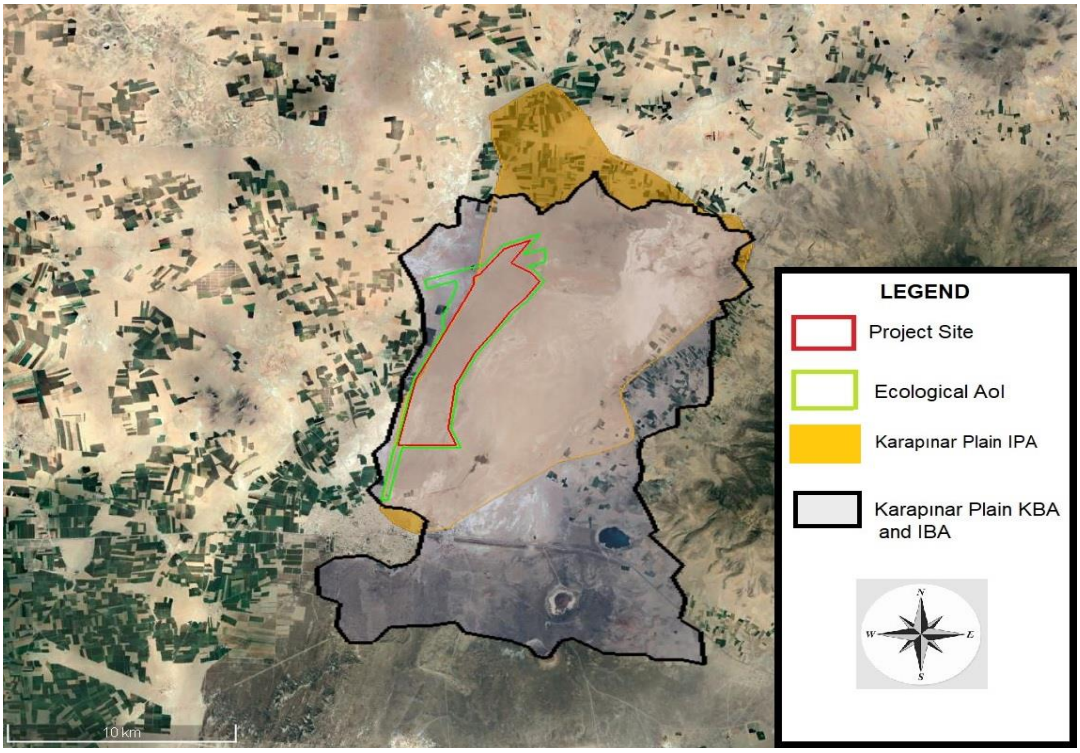


Figure 5-23: Karapınar Plain Key Biodiversity Area

The Karapınar Plain IPA was identified by "122 Important Plant Areas of Turkey" (Ozhayat et al (2005)). According to the book, the IPA covers 1,843ha area and is recognised for a number of globally endemic and endangered plant species. Of these endemic species: Critically Endangered; CR (*Astragalus cicerellus, Astragalus gigantostegius, Astragalus victoria*), Endangered; EN (*Campanula antalyensis*, *Gladiolus humulus*), Vulnerable; VU (*Acantholimon halophilim, Allium vuralii, Delphinium cinereum, Gladiolus halophilus, Lepidium caespitosum, Onobrychis paucijuga, Sphaerophysa kotschyana, Trigonella isthmocarpa, Verbascum pyroliforme*) meet KBA Triggering Criteria A1, A2.

According to the BirdLife International (2020) Important Bird Areas factsheet: Karapınar Plain, Karapınar Plain meets the IBA criteria A4i, B1i, B2. Biodiversity elements that trigger IBA criteria are Greater White-fronted Goose (*Anser albifrons*) with IBA criteria: A4i, B1i; Greater Sandplover (*Charadrius leschenaultia*) with IBA criteria: B1i, B2 and Ruddy Shelduck (T*adorna ferruginea*) with IBA criteria: A4i, B1i. All these species are LC Category according to the IUCN Red List. The IBA is important for breeding waders and wintering wildfowl. 30-50 pairs of *Pelecanus onocrotalus* were found in 1985 but have apparently not bred since.

Estimated population and season information of the IBA triggering species are presented below:

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Greater White-fronted Goose Anser albifrons	LC	winter	1987	14,000 individuals	A4i, B1i
Ruddy Shelduck Tadorna ferruginea	LC	winter	1989-1996	477-900 individuals	A4i, B1i
Greater Sandplover Charadrius leschenaultii	LC	breeding	-	30-90 breeding pairs	B1i, B2

KBA-listed species, their IUCN Category and KBA Triggering Criteria are listed in Table 5-54:

Table 5-54: Karapınar Plain KBA-Listed Flora and Fauna

Species	IUCN Red List Category	KBA Triggering Criteria
PLANTS		
Acantholimon halophilum	VU	A1, A2
Allium sieheanum	LC	A2
Allium vuralii	VU	A1, A2
Astragalus cicerellus	CR	A1, A2
Astragalus gigantostçgius	CR	A1, A2
Astragalus victoriae	CR	A1, A2
Campanula antalyensis	EN	A1, A2
Caragana leiocafycina	-	A2
Delphinium cinereum	VU	A1, A2
Gladiolus halophilus	VU	A1, A2
Gladiolus humilis	EN	A1, A2
Lepidium caespitosum	VU	A1
Limoniun Lilacinum	LC	A2
Onobrychis paucijuga	VU	A1, A2
Sphaerophysa kotschyano	VU	A1
Trigonella isthmocarpa	VU	A1
Verbascum pyroliforme	VU	A1, A2
BIRDS		
Anser albifrons – Anatolia and Southern Blacksea	LC	B3, C3
Burchinus oedicnemus – Eastern Europe	VU	B1, C1
Calandrella rufescens niethammeri	VU	B1
Charadrius leschenaıdtii columbinus	LC	B1, B3, C1, C3
Glareola pratincola – Southern Mediterrenean and Black Sea	LC	C1
Tadorna ferruginea – Mediterrenean and Black Sea	(LC)	B3, C1, C3
MAMMALS		
Lutra lutra	-	C1
REPTILES		
Testudo graeca	NT	A1, C1

Source: https://www.dogadernegi.org/wp-content/uploads/2015/09/06_ORTA_ANADOLU.pdf

Available data has been screened with an attempt to identify an IUCN Protected Area Management Category to Karapınar Plain KBA; the KBA has no official conservation status and neither it is being managed. Therefore, it is open to access by local people, as well as others for recreation and grazing activities. There are also agricultural areas across the KBA.

Given the current practices in the area, it is suggested that the KBA is categorised as “Category V: Protected Landscape / Seascape” for areas that are used for agriculture and other activities by humans. For Category V, the primary goal is to protect and sustain important landscapes / seascapes and the associated nature conservation

and other values created by interaction with humans through traditional management practices. When assigned, Category V requires that the area should have unique or traditional land-use patterns and human settlements that have evolved in balance with their landscape.

If the KBA was to be considered for active management practices, considering the scale of the area, and different management objective for already existing zones, it would be inevitable to assign different categories as suggested.

5.6.3.2 Habitat Classification

The European Nature Information System (EUNIS) puts forward a system for identification and classification of European habitat types. Classification area is quite large including the entire European mainland and seas including islands that are close to the mainland (except for Cyprus, Iceland and Greenland), EU states' archipelagos (Canary Islands, Madeira Islands and Azore Islands) and the European mainland to the west of Ural Mountains that cover Turkey and the Caucasus. The aim of the EUNIS habitat classification is to create a European reference set of habitat types including a description of all types and hierarchical classification (EEA, 2012).

The AoI habitats have been assessed based on the EUNIS classification scheme, which has been a useful tool not only in terms of relation to national vegetation definitions to regional/international level, but also putting forward a correspondence to the Habitats Directive Annex I habitats, to further assess within the scope of the critical habitat assessment and designation of special areas of conservation under the Directive.

The AoI (specifically the Project Site) has been identified to be dominantly covered by E6.2 Continental Inland salt steppes according to EUNIS Habitat Directive 2011 while the wetland and roadside vegetation are not of special characteristics to be under EUNIS classification scheme. Some sample photographs of the major vegetation are presented in Figure 5-25, Figure 5-26 and Figure 5-27.

The AoI was observed to be dominated by natural habitat except for the modified road-sides and the area in the middle of the Project Site where barns existed. Figure 5-24.

It should be noted that a further stand-alone Critical Habitat Assessment has been undertaken and is included as **Appendix E.** The Project site is located in an area with overlapping ecological designations (IBA, KBA, IPA) for which the selection criteria are synonymous with the criteria used to define Critical Habitat and as such it is considered that the Project site is located in an area of Critical Habitat, further details of this are included in the appendix noted above.

Vegetation types identified within the biodiversity study area are described below:

Salt Steppe Vegetation: This is the dominant vegetation type in the Study Area. Salt plants that cover the Project Site were observed to be subject to grazing. *Peganum harmala, Camphorosma monspeliaca subsp. monspeliaca, Artemisia santonicum subsp. patens, Alhagi maurorum subsp. maurorum, Thymelaea hirsuta, Arthrocnemum fruticosum, Limonium meyeri, Cousinia brandiana* plants are the most dominant species in the Project Site. While *Peganum harmala* is dominant throughout the whole Project Site, *Camphorosma monspeliaca* and *Arthrocnemum fruticosum* forms denser in the central and eastern sections of the Project Site.

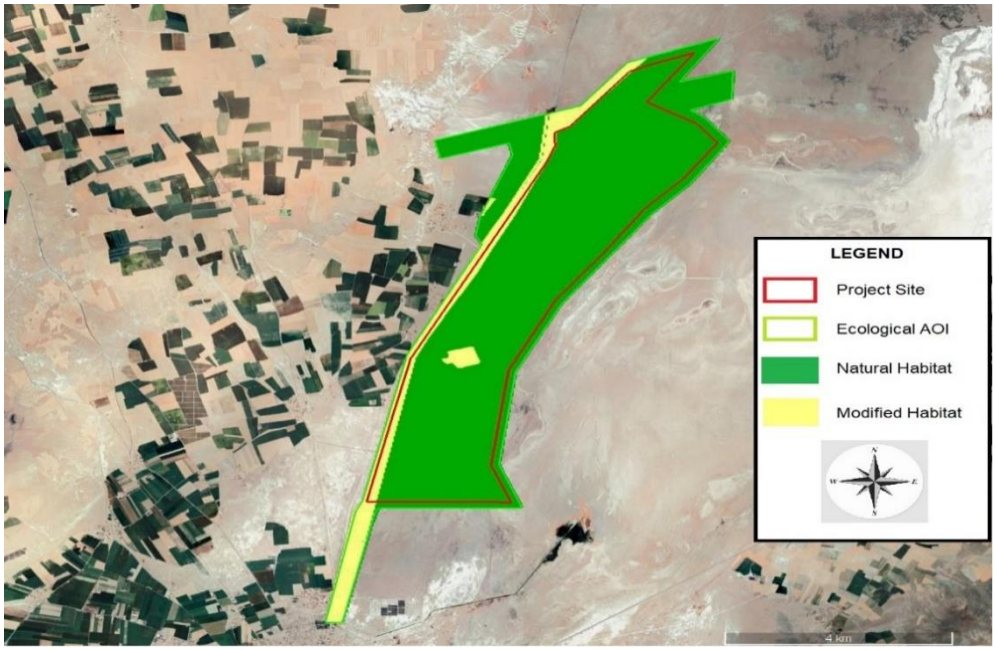


Figure 5-24: Natural and Modified Habitats within the AOI

Peganum harmala

Camphorosma monspeliaca ssp. *monspeliaca*

Cousinia brandiana

Arthrocnemum fruticosum

Figure 5-25 Dominant Plant Species of Inland Salty Steppes within the Study Area

Wetland Vegetation: Small wetland was observed at approximately 1.5km south-east away from the Project Site. According to the information gathered from the Project Company Karapınar Municipality's Sewerage Network directly discharges untreated wastewater to this area which is understood to promote reed growth.

Although this wetland area was observed to be dried up and covered with salty plants during June 2018 field survey, Common Reed (*Phragmites australis*) was observed during the site visit conducted by Lenders' Advisor in October 2020. *Phragmites australis* is listed in IUCN's Invasive Alien Species Database. *P. australis* is especially common in alkaline and brackish (slightly saline) environments (Haslam 1972, 1971b, in Marks et al., 1993) and can also thrive in highly acidic wetlands (Rawinski, pers. comm. 1985, in Marks et al. 1993). However, it does not require, nor even prefer these habitats to freshwater areas. It is often found in association with other wetland plants including species from the following genera: Spartina, Carex, Nymphaea, Typha, Glyceria, Juncus, Myrica, Triglochin, Calamagrostis, Galium, and Phalaris (Howard et al. 1978, in Marks et al. 1993). It is especially common along railroad tracks, roadside ditches, piles of dredge spoil, and wherever even slight depressions hold water (Ricciuti 1983, in Marks et al. 1993). Various types of human manipulation and/or disturbance are thought to promote P. australis (Roman et al. 1984, in Marks et al. 1993).

Marks *et al*. (1993) suggest that increases in nutrient concentrations, especially nitrates, are primarily responsible for increases in *Phragmites* populations. Ironically, eutrophication and increases in nitrate levels are sometimes blamed for the decline of *P. australis* populations in Europe (Den Hartog et al. 1989, in Marks *et al.* 1993).

The site visit conducted by Lenders' Advisor in October 2020 identified presence of the following bird species at the wetland: marsh harrier *Circus aeruginosus* (LC), little egret *Egretta garzetta* (LC), long-legged buzzard *Buteo rufinus* (LC), northern lapwing *Vanellus* (NT), and a gull species (larus sp.)

Figure 5-26: General View of wetland vegetation outside of the Project Site

Roadside Vegetation: *Peganum harmala*, *Cousinia brandiana, Eryngium campestre, Cichorium inthybus, Scabiosa argentea, Acantholimon venustum* var. *venustum, Xanthium orientale* subsp. *italicum, Heliotropium dolosum, Echium italicum, Verbascum cheiranthifolium* var. *cheiranthifolium, Carlina oligocephala, Scolymus hispanicus, Centaurea iberica, Concolvulus arvensis, Erysimum crassipes* were the common species observed on the roadsides (Figure 5-27).

Figure 5-27: Roadside Vegetation near the Project Site

5.6.3.3 Flora and Vegetation

The Study Area is floristically located within the boundaries of Irano-Turanian phytogeographical region under the influence of semi-arid very cold type of Mediterranean climate. It is within the C4 grid of the squares system of Flora of Turkey (Figure 5-28).

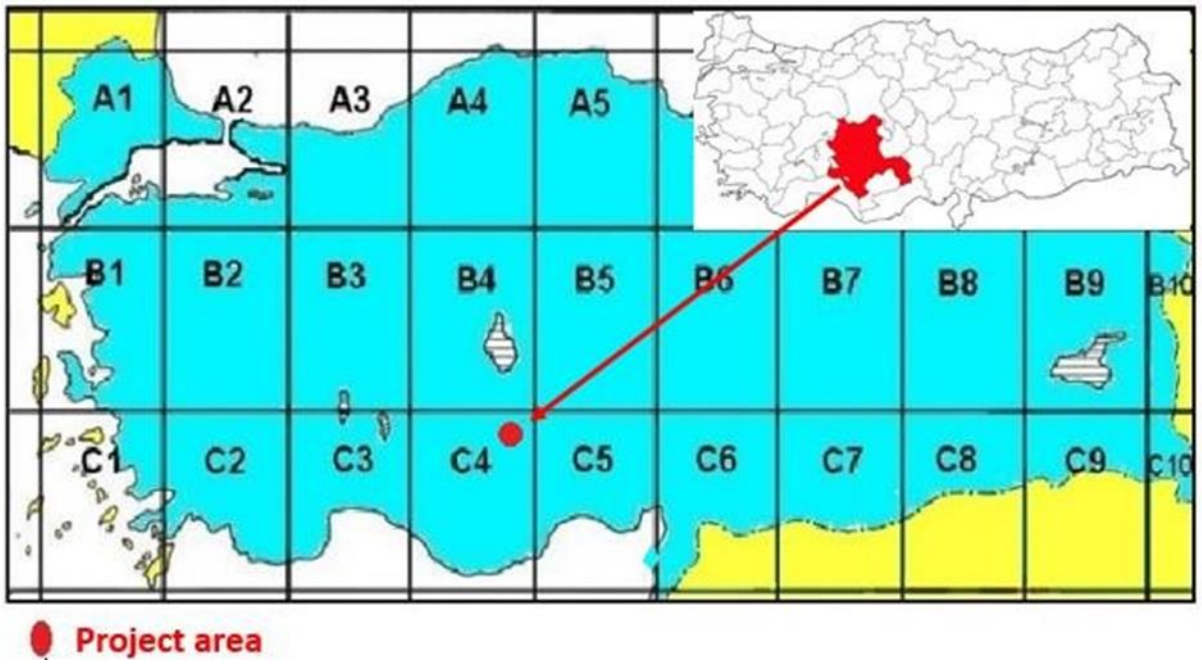


Figure 5-28: Location of the Project Site According to the Flora of Turkey

A literature survey was conducted as part of the baseline studies. According to the desk-top survey no literature, directly related to the flora characteristics of the Study Area, was identified.

On the other hand, since the Project Site is within the Karapınar IPA as presented in Figure 5-23, studies conducted within the Karapınar Plain IPA (Bağçı 1993; Eken et al., 2006; Özhatay et al., 2005; Kurt et al., 2013) were also reviewed as part of desktop review. These studies recorded number of endemic species including:

- Critically Endangered (CR): *Astragalus cicerellus, Astragalus gigantostegius, Astragalus victoria*,
- Endangered (EN): *Campanula antalyensis, Gladiolus humulus*
- Vulnerable (VU): *Acantholimon halophilim, Allium vuralii, Delphinium cinereum, Gladiolus halophilus, Lepidium caespitosum, Onobrychis paucijuga, Sphaerophysa kotschyana, Trigonella isthmocarpa, Verbascum pyroliforme*
- Least Concern (LC): *Allium sieheanum, Limonium liliacinum.*

It should be noted that none of these species were identified at the Study Area during the field surveys conducted in June 2018 and May 2020. Flora composition directly identified during the field surveys is listed in Table 5-55.

A total of 121 taxa that belong to 26 different families were identified during the field studies (see Table 5-55). Of these taxa, six (6) are identified as endemic and none of them are rare. Relative abundance of the species within the AOI was determined through a scale 1-5. Legend is provided below the table.

Six endemic species, distributions of which are regional, are *Anthemis fumarifolia, Astragalus lycius, Petrosimonia nigdeensis, Cousinia birandiana, Cousinia iconica* and *Linaria corifolia*. IUCN Red List Category of all endemic

species are Least Concern. Photographs of the sampled endemic flora species at the Site are presented in Figure 5-29. None of these species are listed under Karapınar Plain KBA or IPA Species.

Genera and species are listed alphabetically for clear presentation. While listing the species, their phytogeographic region, endemism levels, threat statuses of endemic and rare plant species, their inclusion in Bern or CITES lists, habitats and abundance in the AoI where field studies were conducted are also presented in Table 5-55 .

Table 5-55: Flora Species Recorded with the AoI in 2018 and 2020

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
ANGIOSPERMAE															
DICOTYLEDONES															
AMARANTHACEAE															
Amaranthus albus	Kömüş mancarı	Tumble amaranth	+	+						-	N, E and Central Anatolia	-	-		3
Atriplex tatarica var. *tatarica*	Unluca	Tatarian orache	+	+						-	N, W, SE and Central Anatolia	-	-		3
Bassia prostrata	Yatık ateştopu	Prostrate Summercypress	+	+						-	E and Central Anatolia	-	-		4
Camphorosma monspeliaca subsp. *monspeliaca*	Ezgen	Stinking ground-pine	+	+						-	E and Central Anatolia	-	-		5
Chenopodium album subsp. *iranicum*	Tel pancarı	Ambsquarters	+	+						-	S, N, E and Central Anatolia	-	-		3
Noaea mucronata subsp. *mucronata*	Hölmezotu	Thorny saltwort	+	+						-	E, W, S, N and Central Anatolia	-	-		4
Petrosimonia brachiata	Çatalacı	-	+	+						-	E and Central Anatolia	-	-		5
Petrosimonia nigdeensis	Kuruacı	-	+	+						Ir.-Tur.	Central Anatolia (Endemic)	-	-	LC	5

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Salsola crassa	Etli soda	-	+	+						Ir.-Tur.	Central Anatolia	-	-	-	4
Suaeda acuminata	Sivri cirim	Seepweeds	+	+						-	E and Central Anatolia	-	-	-	5
Suaeda altissima	Cirimotu	-	+	+						-	W, E and Central Anatolia	-	-	-	4
APIACEAE															
Caucalis platycarpos	Kavkal	Hedgehog parsley		+						-	Thrace and Inner Anatolia	-	-	-	3
Echinophora tenuifolia subsp. *sibthorpiana*	Sarıçördük	Prickly parsnip		+						Ir.-Tur.	Widespread (Except NE Anatolia)	-	-	-	4
Eryngium campestre	Kırsenet	Field eryngo		+	+					-	Widespread	-	-	-	4
Scandix stellata	Dağ kişkişi	Starry shepherd's needle		+	+					-	Widespread	-	-	-	5
Tordylium apulum	Kafkalida	Mediterranean hartwort		+	+					Med.	W and S Anatolia	-	-	-	3
ASTERACEAE															
Achillea santolinoides	Kardaşkınası	Yarrow		+						-	Widespread	-	-	-	5
Anthemis fumarifolia	Çorakpapatyası	-		+						Ir.-Tur.	Central Anatolia (Endemic)	-	-	LC	4
Artemisia santonicum subsp. *patens*	Kumul alan	-	+	+						-	NE and Central Anatolia	-	-	-	5

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Bidens cernua	Su keteni	Nodding beggarticks		+						-	N, S, E and Central Anatolia	-	-	-	3
Carduus nutans ssp. *nutans*	Eşek dikeni	Musk thistle	+	+						-	Widespread	-	-	-	3
Carlina oligocephala subsp. *oligocephala*	Domuz dikeni	-		+						-	S, N and Inner Anatolia	-	-	-	4
Centaurea iberica	Deligözdikeni	Iberian starthistle		+						-	Widespread	-	-	-	3
Centaurea solstitialis subsp. *solstitialis*	Çakırdikeni	Yellow star thistle		+						-	Widespread	-	-	-	4
Centaurea virgata	Acı süpürge	Squarrose Knapweed		+						Ir.-Tur.	Widespread	-	-	-	5
Chondrilla juncea	Karakavuk	Hogbite		+	+					-	Widespread	-	-	-	4
Cirsium arvense	Köygöçüren	Woolly canada-thistle		+						-	Widespread	-	-	-	3
Cichorium intybus	Hindiba	Chicory	+	+						-	Widespread	-	-	-	5
Cousinia birandiana	Bey kızanı	-	+	+						Ir.-Tur.	Central Anatolia (Endemic)	-	-	LC	4
Cousinia iconica	Çatal kızan	-	+	+						Ir.-Tur	Central Anatolia (Endemic)	-	-	LC	3
Crepis foetida subsp. *rhoeadifolia*	Sakarkanak	Stinking hawksbeard		+						-	Widespread (Except South coast)	-	-	-	4

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Echinops ritro	Topuz	Small globe thistle		+						-	NW, S, W and Central Anatolia	-	-	-	3
Filago arvensis	Keçeotu	Field cudweed		+						-	Widespread (Except SE Anatolia)	-	-	-	3
Filago pyramidata	Ateşpamuğu	Broad-leaved cudweed		+						-	Widespread	-	-	-	3
Gundelia tournefortii var. *tournefortii*	Kenger	Tumble thistle		+						Ir.-Tur.	S and Inner Anatolia	-	-	-	3
Scolymus hispanicus subsp. *hispanicus*	Şevketibostan	Golden thistle		+						Med.	Thrace and Central Anatolia	-	-	-	4
Senecio vernalis	Kanarya otu	Spring Groundsel	+	+						-	Widespread	-	-	-	5
Xanthium spinosum	Pıtrak	Spiny cocklebur		+						-	N and Inner Anatolia	-	-	-	3
Xeranthemum annuum	Kağıtçiçeği	Pink everlasting		+						-	Widespread	-	-	-	5
BORAGINACEAE															
Anchusa hybrida	Tatlıbaba	Undulate alkanet		+						Med.	S, W, N and Central Anatolia	-	-	-	4
Anchusa leptophylla subsp. leptophylla	Ballık	Bugloss		+						-	N, W and Central Anatolia	-	-	-	4
Echium italicum	Kurtkuyruğu	Pale bugloss		+						Med.	Widespread	-	-	-	4
Heliotropium dolosum	Bambulotu	Heliotrope		+	+					-	N, S and Inner Anatolia	-	-	-	3

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
BRASSICACEAE															
Alyssum strigosum subsp. *cedrorum*	Kaya kuduzotu	Small-anthered alyssum		+	+					-	S, E and Central Anatolia	-	-	-	5
Capsella bursa-pastoris	Çoban çantası	Shepherd's purse		+	+					-	Widespread	-	-	-	5
Crambe tataria var. tataria	Tatarlahanası	Tartarian seakale		+						-	Central Anatolia	-	-	-	5
Draba verna	Çırçırotu	Spring whitlow grass		+						-	Widespread	-	-	-	4
Erysimum crassipes	Zarifeotu	Wallflower		+	+					-	Anatolia				4
Lepidium draba	Diğnik	hoary cress		+						-	Thrace, NW, W, E and Central Anatolia	-	-	-	3
Microthlaspi perfoliatum	Giyle	Perfoliate Penny-Cress		+						-	Widespread	-	-	-	5
Sinapis arvensis	Hardal	Wild mustard		+	+					-	Widespread	-	-	-	5
Sisymbrium loeselii	Bülbülotu	Hedgemustard		+	+					-	Widespread	-	-	-	4
CAPRIFOLIACEAE															
Scabiosa argentea	Yazı süpürgesi	Silvery Scabious		+	+					-	Widespread	-	-	-	5
CARYOPHYLLACEAE															
Cerastium dichotomum subsp. *dichotomum*	Çatal boynuzotu	Forked Chickweed	+	+						-	W, E and Central Anatolia	-	-	-	4

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Gypsophila perfoliata var. *perfoliata*	Helvacı çöveni	Perfoliate Babysbreath		+	+					-	W, E and Central Anatolia	-	-	-	4
Holosteum umbellatum	Şeytanküpesi	Jagged chickweed		+	+					-	Widespread	-	-	-	4
Herniaria incana	Kabayaran	Gray rupturewort		+	+					-	Widespread	-	-	-	3
Silene subconica	Mahruti nakıl	Cone catchfly		+	+					-	W, S, E and Central Anatolia	-	-	-	4
Helianthemum salicifolium	Söğüt güngülü	Willow-leaved frostweed	+	+						-	Widespread	-	-	-	4
Minuartia anatolica var. *polymorpha*	Tıstısotu			+						-	Central Anatolia	-	-	-	3
CONVOLVULACEAE															
Concolvulus arvensis	Tarla sarmaşığı	Redge glorybind		+	+					-	Widespread	-	-	-	5
Convolvulus lineatus	Top yayılgan	Silvery-leaved pink convolvulus		+	+					-	Inner Anatolia	-	-	-	4
ELAEAGNACEAE															
Elaeagnus angustifolia var. *angustifolia*	İğde	Russian olive/ oleaster		+						-	Widespread	-	-	-	2
FABACEAE															
Alhagi maurorum subsp. *maurorum*	Aguldikeni	Camel thorn	+	+	+					Ir.-Tur.	W, S, E and Central Anatolia	-	-	-	5
Astragalus lycius	Bozkırmumu	-	+	+						-	S, E and Central Anatolia (Endemic)	-	-	LC	4

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Astragalus microcephalus subsp. *microcephalus*	Anadolu kitresi	Milkvetch		+						Ir.-Tur.	Inner Anatolia	-	-	-	4
Lotus corniculatus var. *corniculatus*	Gazalboynuzu	Bird's-foot Trefoil		+	+					-	Anatolia	-	-	-	4
Medicago minima var. *minima*	Gurnik	Small medick		+	+					-	Widespread	-	-	-	4
Medicago fischeriana	Mızrak yonca	Yellow fenugreekmonspelia		+	+					Ir.-Tur.	S and Inner Anatolia	-	-	-	4
Onobrychis oxyodonta var. *armena*	Kır korungası	Sainfoin		+	+					-	NW, W, S and Central Anatolia	-	-	-	5
Ononis spinosa subsp. *leiosperma*	Demirdelen	Spring restharrow		+	+					-	Widespread	-	-	-	4
Robinia pseudoacacia	Yalancıakasya	Black locust, false acacia		+						-	Widespread	-	-	-	1
Trifolium campestre subsp. *campestre* var. *campestre*	Üçgül	Common hop trefoil		+						-	Widespread	-	-	-	3
FRANKENIACEAE															
Frankenia hirsuta	Tülpembe	Hairy Sea Heath)	+	+						-	W, E and Central Anatolia	-	-	-	5
GERANIACEAE															
Erodium cicutarium ssp. *cicutarium*	İğnelik	Common storks bill		+	+					-	Widespread	-	-	-	4
LAMIACEAE															

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Lamium macrodon	Balbaşı	Large-toothed deadnettle		+	+					Ir.-Tur.	Inner Anatolia	-	-	-	4
Marrubium parviflorum subsp. *parviflorum*	Bozotu	Hoarhound	+	+						Ir.-Tur.	Inner Anatolia	-	-	-	5
Nepeta nuda subsp. *albiflora*	Karaküncü	Hairless catmint		+	+					-	NW and W Anatolia	-	-	-	4
Phlomis armeniaca	Boz şavlak	-								Ir.-Tur.	Widespread	-	-	-	
Teucrium polium subsp. *polium*	Acıyavşan	Felty germander	+	+						-	Widespread	-	-	-	5
Thymus zygioides	Bodur kekiği	-	+	+						Akd.	Thrace, W, SW and Central Anatolia	-	-	-	4
LINACEAE															
Linum austriacum subsp. *glaucescens*	Puslu zeyrek	Austrian Flax		+						-	W, S, E and Central Anatolia	-	-	-	3
Linum tenuifolium	Narin keten	Narrow-leaved flax		+	+					-	N, SW, E, SE and Central Anatolia	-	-	-	3
NITRARIACEAE															
Peganum harmala	Üzerlik	Syrian rue		+						-	Widespread	-	-	-	5
PAPAVERACEAE															
Fumaria officinalis subsp. *cilicica*	Yersofrası	Common fumitory, drug fumitory		+	+					Ir.-Tur	S, SE, NE and Central Anatolia	-	-	-	3

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Hypecoum procumbens subsp. *procumbens*	Yavruağzı	Sickle Fruited Hypecoum		+	+					Med.	Thrace, N, S and Central Anatolia	-	-	-	3
Papaver rhoeas	Gelincik	Common poppy		+	+					-	Widespread	-	-	-	4
Roemeria hybrida subsp. hybrida	Pıtpıtotu	Violet Horned-Poppy		+	+					-	Widespread	-	-	-	4
PLANTAGINACEAE															
Linaria corifolia	Tarla nevruzotu	-		+	+					Ir.-Tur.	Inner Anatolia (Endemic)	-	-	LC	4
Veronica multifida	Devesabunu	narrow-leaved speedwell.			+					Ir.-Tur.	Widespread	-	-	-	4
PLUMBAGINACEAE															
Acantholimon venustum var. *venustum*	Kınalı kirpiotu	Agrimony, Churchsteeples		+						-	S and Inner Anatolia	-	-	-	4
Limonium meyeri	Deve kulağı	Sea-Lavender	+	+						Ir.-Tur.	E Anatolia	-	-	-	5
POLYGONACEAE															
Polygonum cognatum	Madımak	Indian knotgrass		+	+					-	W, E, S, SE and Central Anatolia	-	-	-	3
Polygonum arenastrum	Bezmece otu	Oval-leaf knotweed		+	+					-	Widespread	-	-	-	4
Rumex crispus	Labada	Curly dock		+	+					-		-	-	-	4

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
RANUNCULACEAE															
Adonis flammea	Cin lalesi	Pheasant's Eye	+	+	+					-	Widespread	-	-	-	5
Ceratocephala falcata	Yelotu	Sword fruited buttercup		+	+					-	Widespread	-	-	-	4
Consolida orientalis	Morçiçek	Oriental knight's-spur		+	+					-	Thrace, W, E and Central Anatolia	-	-	-	4
RESEDACEAE															
Reseda lutea var. *lutea*	Muhabbet çiçeği	Yellow mignonette	+	+						-	Widespread	-	-	-	3
SCROPHULARIACEAE															
Verbascum cheiranthifolium var. *cheiranthifolium*	Bozkulak	Mullein		+	+					-	Anatolia	-	-	-	4
TAMARICACEAE															
Tamarix parviflora	Deli ılgın	Smallflower tamarisk		+						Med.	N, W and Central Anatolia	-	-	-	1
ZYGOPHYLLACEAE															
Tribulus terrestris	Çobançökerten	Common caltrop		+	+					-	W, N, S, SE and Central Anatolia	-	-	-	4
Zygophyllum fabago	It üzerliği	Syrian bean caper		+						-	E, S and Central Anatolia	-	-	-	4
MONOCOTYLEDONES															

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
ASPARAGACEAE															
Ornithogalum umbellatum	Sunbala	Star ofbethlehem		+						-	Widespread	-	-	-	4
POACEAE															
Aegilops biuncialis	İki kılçık	Mediterranean Aegilops		+	+					-	W, S and SE Anatolia	-	-	-	5
Aegilops cylindrica	Kirpikli ot	Jointed goatgrass	+	+	+					Ir.-Tur.	Inner Anatolia	-	-	-	5
Aegilops triuncialis ssp. *triuncialis*	Üçkılçık	Barb goatgrass		+	+					-	Widespread	-	-	-	5
Aeluropus littoralis	Sahil ayrığı	Mediterranean saltgrass	+	+						-	W, S and Inner Anatolia	-	-	-	4
Bromus japonicus subsp. *japonicus*	Iyeotu	Japanese brome		+	+					-	Widespread	-	-	-	4
Bromus squarrosus	Kirpikli damiye	Rough brome		+	+					-	Widespread	-	-	-	5
Bromus sterilis	Sağır ilcan	Poverty brome	+	+	+					-	Widespread	-	-	-	4
Bromus tomentellus subsp. *tomentellus*	Bozkır bromu	Wooly brome	+	+	+					Ir.-Tur.	Outer Anatolia	-	-	-	5
Bromus tectorum	Kır bromu	Downy brome		+	+					-	Widespread	-	-	-	5
Cynodon dactylon var. *dactylon*	Köpekdişi	Bahama grass		+	+					-	W, NE and S Anatolia	-	-	-	5
Dactylis glomerata subsp. *hispanica*	Kıllı domuzayrığı	Orchardgrass		+	+					-	Widespread	-	-	-	5
Hordeum murinum subsp. *murinum*	Pisipisiotu	Mouse barley		+	+					-	S. Anatolia	-	-	-	3

Scientific Name (Latin Name)	Turkish Name	English Name	Habitats							Flora Region*	Distribution in Turkey*	CITES	BERN	End./IUCN Category	Relative Abundance*
			Salty step	Dry Meadow, Roadsides and	Agricultural	Bushes (Maquis and frigana)	Coastal Sand	Rocky Areas	Wetlands						
Phleum exaratum subsp. *exaratum*	Meşe itkuyruğu	Timothy		+						-	Widespread	-	-	-	3
Poa bulbosa	Yumrulu salkım	Bulbous bluegrass		+	+					-	Widespread	-	-	-	5
Poa sterilis	Köse salkımotu	-	+	+						-	NW, S and Inner Anatolia	-	-	-	5
Stipa holosericea	Dirgen kılaç	-	+	+						Ir.-Tur.	W, S and Inner Anatolia	-	-	-	5

LEGEND for FLORA LIST

Flora Regions

Med. : Mediterranean

E. Med. : East Mediterranean Eur.-Sib. : Euro – Siberian

Ir.-Tur. : Irano-Turanien End. : Endemic

End. St. : Endemism status

Moun. : Element found in mountainous areas

Distribution in Turkey

N : North

S : South

E : East W : West

C : Central Anatolia Widespread: Found almost everywhere in Turkey

Relative Abundance

1. : Very rare
2. : Rare
3. : Relatively abundant
4. : Abundant
5. : Establishing pure population

Anthemis fumarifolia

Astragalus lycius

Petrosimonia nigdeensis -

Cousinia birandiana

Cousinia iconica

Linaria corifolia

Figure 5-29: Photos of Some Endemic Plants found in the project site and its surroundings

5.6.3.4 Fauna (Mammals (excl. Chiroptera) and Herpetofauna)

Desktop based literature survey was conducted to support the field studies carried out for the Project.

There are one mammal *Lutra lurta* and one reptile *Testudo graeca* species listed under Karapınar Plain KBA that meet the KBA Criteria (Please see Table 5-54 for KBA-listed species).

Akköz et al. (2011) pointed out that 6 amphibians and reptiles, 8 mammalians, and 142 bird species were likely to occur in and around the Project Site in their Biodiversity Report which was mainly based on the literature review without any site surveys.

Erdoğan et al. (2018) also prepared a report on Biodiversity of the Project Site. They reported 24 amphibians and reptiles were likely to occur in and around the Project Site according to the literature but only one species was directly observed at the Project Site during the field study (dwarf lizard - *Parvilacerta parva*).

Lists of animals provided in **Table 5-56** and **Table 5-57** do not only include the species directly observed within the AOI. Rather, with a more conservative approach and given with fauna only taking into account direct observations can undermine the actual composition in a given area, species that are also presumed present based on habitat suitability, previous records and expert judgment are included. This way, it was aimed to ensure that the ecological impact assessment is not only confined to the findings of field surveys conducted for the Project, which were limited to summer 2018 and spring 2020, but to a wider range of all available data.

5.6.3.4.1 *Amphibians and Reptiles*

According to the contemporary literature, 2 amphibians, 2 turtles, 1 gekkonid, 2 agamids, 2 sicincids, 3 lacertids and 11 snake species are considered likely to be present near settlements and Wetlands in the Biodiversity Study Area see (Table 5-56, Figure 5-30).

One Least Concern reptile species (Dwarf Lizard of *Parvilacerta parva*) was directly observed within the Project Site. Only few individuals were observed in the eastern part of the Project Site see Figure 5-30). Likely occurrence of the rest of the listed species is based on literature.

Among these species, only Common Tortoise (*Testudo graeca*) which is also KBA-listed species is vulnerable and European Pond Turtle (*Emys orbicularis*) is Near Threatened according to the IUCN Red List.

Although this species was not detected within the AoI during the field surveys conducted in 2018 and 2020 it is likely to occur in Karapınar region according to the literature.

Table 5-56: Amphibians and Reptiles of the Biodiversity Study Area

Species	Common Name	IUCN Red List	BERN	CITES	Habitats Directive	Source (O: Observed on Site; L: Literature)
Bufotes) variabilis	Variable Green Toad	LC	Annex II	-	Annex IV	O
Pelophylax ridibundus	Eurasian Marsh Frog	LC	Annex III	-	-	O
Emys orbicularis	European Pond Turtle	NT	Annex III	-	Annex II, IV	L
Testudo graeca	Common Tortoise	VU	Annex II	-	Annex II	L
Stellagama stellio	Starred Agama	LC	Annex II	-	-	L
Trapelus lessonae	Steppe Agama	DD	Annex II	-	-	L
Mediodactylus kotschyi	Kotschy's Gecko	LC	Annex II	-	-	L
Lacerta media	Three-lined Lizard	LC		-	-	L
Ophisops elegans	Snake-eyed Lizard	DD	Annex III	-	Annex IV	L
Parvilacerta parva	Dwarf Lizard	LC	Annex II	-	-	O
Eumeces schneiderii	Schneider's Skink	-	-	-	-	L
Heremites auratus	Levant Skink	LC	Annex III	-	-	L
Eryx jaculus	Sand Boa	LC	Annex III		Annex IV	L
Eirenis modestus	Ring-Headed Dwarf Snake	LC	Annex III	-	-	L
Elaphe sauromates	Eastern Four-Lined Ratsnake	LC	Annex III		-	L
Malpolon insignitus	Eastern Montpellier Snake	LC	Annex III	-	-	L
Platyceps najadum	Dahl's Whip Snake	LC	Annex II		-	L
Telescopus fallax	Soosan Snake	LC	Annex II	-	-	L
Natrix natrix	Grass Snake	LC	Annex III	-	Annex IV	L
Natrix tessellata	Tessellated Water Snake	LC	Annex II	-	Annex IV	L
Xerotyphlops vermicularis	Eurasian Blind Snake	LC	Annex II	-	-	L
Montivipera xanthina	Ottoman Viper	LC	Annex II	-	-	L

Figure 5-30: Reptile Species *Parvilacerta parva* (Dwarf Lizard) Observed within the Project Site

5.6.3.4.2 *Mammals*

Mammals of the AOI, which were identified based on direct observation or literature data, are listed in Table 5-57.

Possible occurrence of 16 mammal species were determined in the AoI (1 *Eulipotyphla*, 1 *Lagomorpha*, *8 Rodentia*, 6 *Carnivora*). Five of these species were detected by direct observations, tracks or faeces: Anatolian Ground Squirrel - *Spermophilus xanthoprymnus*, Red fox - *Vulpes vulpes*, European hare - *Lepus europaeus*, Southern white-breasted hedgehog - *Erinaceus concolor*, and beech marten - *Martes foina*. Likely presence of the remaining 11 species was presumed based on previous literature findings.

Although Eurasian Otter - *Lutra lutra*, which is listed as Near Threatened Species in IUCN Red List, is KBA-listed species, no evidence of its occurrence was found within the AoI during the field surveys conducted in 2018 and 2020. The Eurasian Otter lives in a wide variety of aquatic habitats, including highland and lowland lakes, rivers, streams, marshes, swamp forests and coastal areas independent of their size, origin or latitude (Mason and Macdonald 1986). In most parts of its range, its occurrence is correlated with bank side vegetation showing importance of vegetation to otters (Mason and Macdonald 1986). Otters in different regions may depend upon differing features of the habitat, but to breed, they need holes in the riverbank, cavities among tree roots, piles of rock, wood or debris. The Eurasian Otters are closely connected to a linear living space. Most portion of their activity is concentrated to a narrow strip on either side of the interface between water and land (Kruuk 1995). Otter distribution in coastal areas especially the location of holts, is strongly correlated with the presence of freshwater (Kruuk et al. 1989, Beja 1992). According to the Uluturk and Yutumez, (2017), *Lutra lutra* has a wide distrubiton in Turkey; however, there is no record of its occurrence in Karapınar Region in literature. Given its habitat and ecological characteristics are compared to the AoI's habitats, it is considered unlikely to occur within the Project AoI.

Anatolian ground squirrel (*Spermophilus xanthoprymnus*, Bennett, 1835), is a group-living, diurnal, obligately hibernating marmotine squirrel. It inhabits the steppes and alpine meadows throughout central lowland and eastern highland Anatolia and adjacent Armenia and north-western Iran. It is presently listed as "Near Threatened" on the 2009 IUCN meeting Red List of Threatened Species because of large-scale agricultural activities that result in habitat destruction and fragmentation (Gündüz et al. 2007, Temple and Cuttelod 2009, Mutlu Kart and Gür 2009, Gür and Mutlu Kart Gür 2010).

Anatolian ground squirrel was observed to be very abundant and spread in the AoI, and it was observed more densely on the north-northeast part of the Project Site and on the roadsides where more dense vegetation exists. Number of carcasses were identified at the roadside. A few galleries of the species were observed within the Project Site. Furthermore, ground squirrels were identified to be the primary target of predatory birds in the region.

Table 5-57: Mammals of the Biodiversity Study Area

Scientific Name	Common name	IUCN	Bern	Habitats directive	Source (O: Observed on Site; L: Literature)
Spermophilus xanthoprymnus	Anatolian Ground Squirrel	NT		-	O
Allactaga williamsi	Williams's Jerboa	LC		-	L
Microtus guentheri	Günther's Vole	LC	-	-	L
Microtus anatolicus	Anatolian Vole	DD		-	L
Microtus dogramacii	Microtus dogramacii	LC		-	L
Nannospalax xanthodon	Nehring's Blind Mole Rat	DD	-	-	L
Rattus rattus	House Rat	LC	-	-	L
Mus domesticus	House Mouse	LC	-	-	L
Canis lupus	Grey Wolf	LC	Annex II	Annex II, IV, V	L
Canis aureus	Golden Jackal	LC	-	Annex V	L
Vulpes vulpes	Red Fox	LC	-		O
Martes foina	Beech Marten	LC	Annex III	-	O
Meles meles	Eurasian Badger	LC	Annex III	--	L
Mustela nivalis	Least Weasel	LC	Annex III		L
Erinaceus concolor	Southern White-breasted Hedgehog	LC	Annex III	-	O
Lepus europaeus	European Hare	LC	Annex III	-	O

DD: Data deficient, LC: Least concern, NT: Near threatened
Source: O: Observation; L: Literature

Figure 5-31: Feces of Beech marten (*Martes foina*) found in the Project site

Figure 5-32: Anatolian ground squirrel observed at the Project Site

5.6.3.5 Avifauna

Avifauna studies for the Project have been designed to cover migration and breeding season between March and May 2020. The studies have been led by ornithologist, Prof. Ali Erdoğan, and his team.

Kılıç (1999) studied the birds of Karapınar district between 1994 and 1995. He detected 158 bird species in the Karapınar district and 58 of them were breeding in the region. He pointed out Ereğli Plain and Hotamış Marshes as the most important bird areas. Great White Pelican (*Pelecanus onocrotalus*) was observed but no breeding was detected at Meke Maar during the study.

Study of Erdoğan et al. (2018) recorded 81 bird species and 32 of these species were directly observed within the Project Site. Among these species, Long-legged Buzzard, Eastern Imperial Eagle and Egyptian Vulture were spotted feeding on animal carcasses in the Project Site.

256 species of birds have been recorded within 50 km of the project site according to the data returned on the IBAT report. Of these ten are listed by the IUCN as being Vulnerable or Endangered and these are, Vulnerable; Eastern Imperial Eagle, Greater Spotted Eagle, Great Bustard, European Turtle Dove, Common Pochard and Marbled Teal, Endangered: Saker Falcon, Steppe Eagle Egyptian Vulture and White-headed Duck.

5.6.3.5.1 *Scoping*

Firstly, species-specific information was gathered with the primary goal of defining target species to be surveyed. Then, habitat structure in the area was assessed in collaboration with the botanist, to identify potential ranges for species at the Project Site prior to field surveys. Lastly, designated sites in the region were assessed to further analyse specific bird interest of these sites and in what capacity they would be incorporated into the impact analysis.

The avifauna of Turkey is represented by 400 regular species, including 39 species of birds of prey, 4 species of vultures, and 2 species of storks (Kirwan et al., 2008). Moreover, Turkey lies on two main migration routes of the soaring birds (Newton, 2010).

Although, raptors are especially vulnerable to collisions due to their flight behaviours, and their populations are under higher risk of decline, other species, especially those that are potential breeders at the Project footprint have also been given special consideration. The energy transmission lines (ETLs), on the other hand, pose a threat for large bodied flying birds, particularly storks and waterfowls. Certainly, the impact of the ETL is anticipated to be higher than the impact of plant components.

In line with the guidelines and best international practices, as referred to by PS6, breeding bird surveys were conducted to record distribution of breeding birds that use the AoI. Vantage point surveys were also completed during spring 2020 to record soaring birds, including raptors, storks and their allies, migrating over the Project site and wider AoI.

Although the main emphasis of the Project avifauna studies is the target species, it is important to understand distribution, abundance and potential displacement effects on populations of secondary species that are breeding residents and/or species of regional conservation significance.

The need for wintering bird surveys was scoped out following a review of on-site habitats as well as based on the knowledge of the Project's Ecologist. The site does not support habitats suitable for large aggregations of geese, other wildfowl or wading birds. In addition the populations of certain wintering bird species, including Greater White-fronted Goose (an IBA trigger species) are known to have suffered significant declines over recent years as a result of over-hunting and changes in migration patterns due to global climate change. In addition the extent of open water habitat within the wider IBA has also significantly reduced over time due to over-abstraction, thus removing large areas of suitable habitat.

5.6.3.5.2 *Findings*

A total of 55 bird species from 11 ordos and 22 families were recorded during avifauna surveys. Of 11 ordos, *Passeriformes* ordo had the richest bird diversity with 29 species (53%), and richest family was *Accipitridae* among the others with 11 species (20%) in AoI (Figure 5-33 and Figure 5-34). On the other hand, *Ciconiiformes*, *Accipitriformes*, *Falconiformes, Gruiformes* and *(Pelecaniformes*) ordos containing migratory soaring bird species had 18 species, representing 33%of all observed bird species in study area (Figure 27-28). According to the survey findings, 27 of these species were residents, 14 were summer visitors and 14 were transit migrants. Most the species spotted in the area were widespread species with high population density. All these species were directly

observed within the AOI. Photos of the birds observed during the surveys are provided in Figure 5-37 to Figure 5-44.

Taxonomy and status of the bird species observed during avifauna surveys are presented in Table 5-58 while their conservation status is presented in Table 5-59.

The AoI is dominated by salty steppe vegetation with roadside vegetation and wetland vegetation in a very limited area. These areas are foraging ranges for passerine birds like crested lark (*Galerida cristata*), greater short-toed lark (*Calandrella brachydactyla*), hooded crow (*Corvux corax*), house sparrow (*Passer domesticus*), ortolan bunting (*Emberiza hortulana*), white wagtail (*Motacilla alba*), black-billed Magpie (*Pica pica*), raven (*Corvus corax*), barn swallow (*Hirundo rustica*), isabelline wheatear (*Oenanthe isabellina*), spotted flycatcher (*Muscicapa striata*) and eurasian hoopoe (*Upupa epeps*). Common buzzard (*Buteo buteo*) and long-legged buzzard (*Buteo rufinus*) are resident raptors in the region. Moreover, egyptian vulture (*Neophron percnopterus*), eastern imperial eagle (*Aquilla heliaca*) and golden eagle (*Aquila chrysaetos*) were observed in the study area while foraging and steppe eagle (Aquila nipalensis), short-toed snake eagle (Circaetus gallicus) and booted eagle (Hieraaetus pennatus) were also observed during transit passing. Also transit migrant white storks (*Ciconia ciconia*) were detected. Furthermore, nests of common kestrel (*Falco tinnunculus*) were detected on an existing ETL tower near the project site

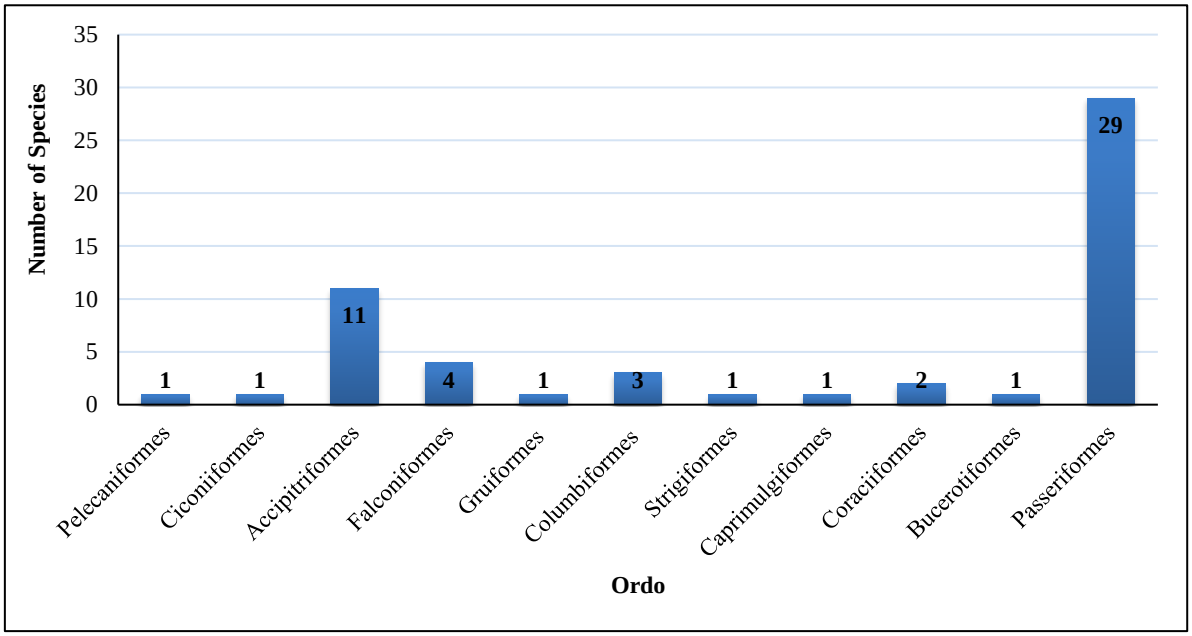


Figure 5-33: Number of Birds by Ordos

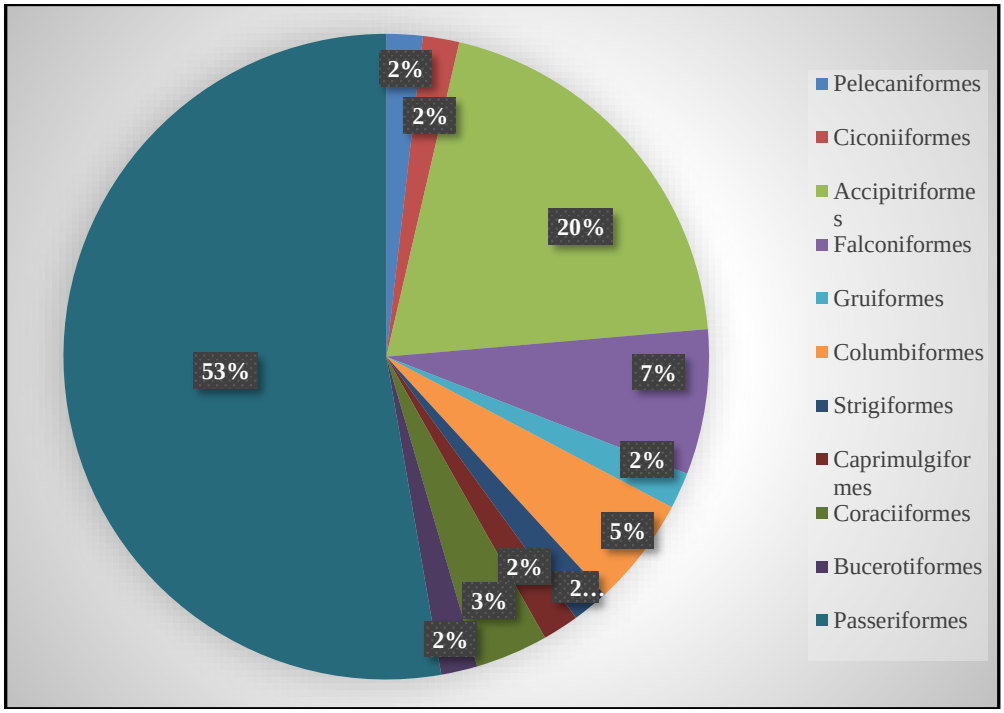


Figure 5-34: Percentage of Birds by Ordos

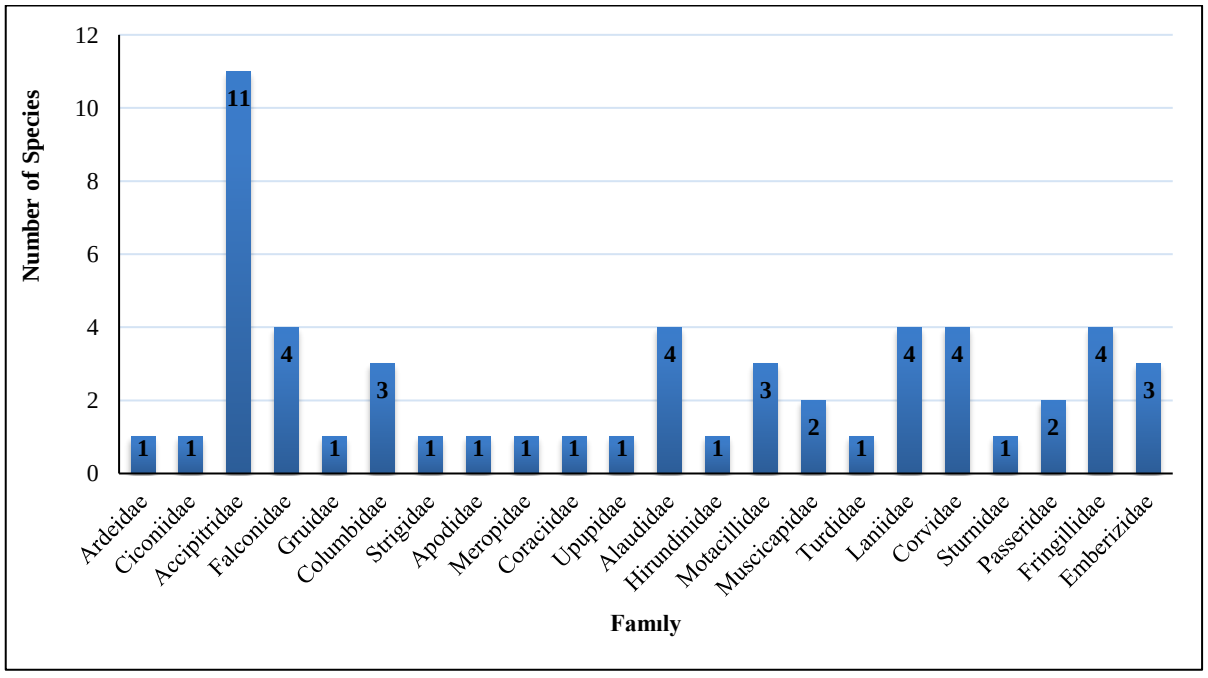


Figure 5-35: Number of Birds by Families

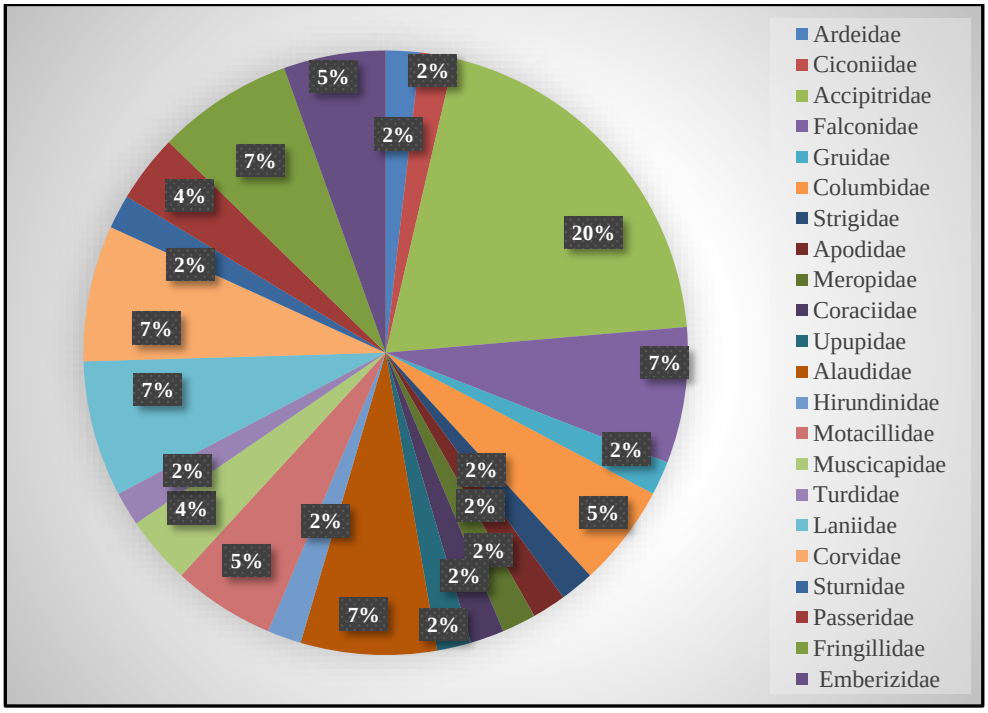


Figure 5-36: Percentage of Birds by Families

Table 5-58: Taxonomy and status of observed bird species in the 2020 Spring Survey Period

Scientific Name	Common Name	RDB	IUCN	BERN	NGC	CITES	Regional Status
Pelecaniformes							
Ardeidae							
Ardea cinerea	Grey Heron	A.3.1	LC	Annex III	Annex I	Not in scope	R
Ciconiiformes							
Ciconiidae							
Ciconia ciconia	White Stork	A.3.1	LC	Annex II	Not in scope	Not in scope	T
Accipitriformes							
Accipitridae							
Milvus migrans	Black Kite	A.3	LC	Annex II	Not in scope	Annex II	T
Neophron percnopterus	Egyptian Vulture	A.3	EN	Annex II	Not in scope	Annex II	S
Circaetus gallicus	Short-toed Snake-eagle	A.4	LC	Annex II	Not in scope	Annex II	S

Scientific Name	Common Name	RDB	IUCN	BERN	NGC	CITES	Regional Status
Buteo buteo	Common Buzzard	A.3	LC	Annex II	Not in scope	Annex II	R
Buteo rufinus	Long-legged Buzzard	A.3	LC	Annex II	Not in scope	Annex II	R
Clanga pomarina	Lesser Spotted Eagle	A.3	LC	Annex II	Not in scope	Annex II	T
Aquila heliaca	Eastern Imperial Eagle	A.1.2	VU	Annex II	Not in scope	Annex II	R
Aquila chrysaetos	Golden Eagle	A.1.2	LC	Annex II	Not in scope	Annex II	R
Hieraaetus pennatus	Booted Eagle	A.3	LC	Annex II	Not in scope	Annex II	T
Pandion haliaetus	Osprey	A.1.2	LC	Annex II	Not in scope	Annex II	T
Aquila nipalensis	Steppe Eagle	A.1.2	EN	Annex II	Not in scope	Annex II	T
Falconiformes							
Falconidae							
Falco naumanni	Lesser Kestrel	A.2	LC	Annex II	Not in scope	Annex II	T
Falco tinnunculus	Common Kestrel	A.2	LC	Annex II	Not in scope	Annex II	R
Falco subbuteo	Eurasian Hobby	A.3.1	LC	Annex II	Not in scope	Annex II	S
Falco peregrinus	Peregrine Falcon	A.1.2	LC	Annex II	Not in scope	Annex II	R
Gruiformes							
Gruidae							
Grus grus	Common Crane	A.3	LC	Annex II	Not in scope	Annex II	T
Columbiformes							
Columbidae							
Streptopelia decaocto	Eurasian Collared-dove	A.5	LC	Annex III	Annex I	Not in scope	R
Streptopelia turtur	European Turtle-dove	A.3.1	VU	Annex III	Annex II	Not in scope	S
Columba livia	Rock Pigeon	A.5	LC	Annex III	Annex II	Not in scope	S
Strigiformes							
Strigidae							
Athene noctua	Little Owl	A.2	LC	Annex II	Not in scope	Annex II	R
Caprimulgiformes							
Apodidae							
Apus apus	Common Swift	A.3.1	LC	Annex III	Not in scope	Not in scope	S

Scientific Name	Common Name	RDB	IUCN	BERN	NGC	CITES	Regional Status
Coraciiformes							
Meropidae							
Merops apiaster	European Bee-eater	A.3.1	LC	Annex II	Not in scope	Not in scope	T
Coraciidae							
Coracias garrulus	European Roller	A.2	LC	Annex II	Not in scope	Not in scope	T
Bucerotiformes							
Upupidae							
Upupa epops	Eurasian Hoopoe	A.2	LC	Annex II	Not in scope	Not in scope	S
Passeriformes							
Alaudidae							
Melanocorypha calandra	Calandra Lark	A.5	LC	Annex II	Not in scope	Not in scope	R
Calandrella brachydactyla	Greater Short-toed Lark	A.3	LC	Annex II	Not in scope	Not in scope	S
Galerida cristata	Crested Lark	A.3	LC	Annex III	Annex I	Not in scope	R
Alauda arvensis	Eurasian Skylark	A.4	LC	Annex III	Annex I	Not in scope	R
Hirundinidae							
Hirundo rustica	Barn Swallow	A.5	LC	Annex II	Not in scope	Not in scope	S
Motacillidae							
Motacilla flava	Yellow Wagtail	A.3.1	LC	Annex II	Not in scope	Not in scope	T
Motacilla cinerea	Grey Wagtail	A.2	LC	Annex II	Not in scope	Not in scope	R
Motacilla alba	White Wagtail	A.3.1	LC	Annex II	Not in scope	Not in scope	R
Muscicapidae							
Muscicapa striata	Spotted Flycatcher	A.3	LC	Annex II	Not in scope	Not in scope	T
Oenanthe isabellina	Isabelline Wheatear	A.3	LC	Annex II	Annex I	Not in scope	S
Turdidae							
Turdus merula	Eurasian Blackbird	A.3	LC	Annex III	Annex II	Not in scope	R
Laniidae							
Lanius collurio	Red-backed Shrike	A.3	LC	Annex II	Annex I	Not in scope	S
Lanius minor	Lesser Grey Shrike	A.3	LC	Annex II	Not in scope	Not in scope	T

Scientific Name	Common Name	RDB	IUCN	BERN	NGC	CITES	Regional Status
Lanius senator	Woodchat Shrike	A.2	LC	Annex II	Not in scope	Not in scope	T
Lanius nubicus	Masked Shrike	A.2	LC	Annex II	Not in scope	Not in scope	S
Corvidae							
Pica pica	Black-billed Magpie	A.5	LC	Not in scope	Annex II	Not in scope	R
Corvus frugilegus	Rook	A.5	LC	Not in scope	Annex II	Not in scope	R
Corvus cornix	Carrion Crow	A.5	Not in scope	Not in scope	Annex II	Not in scope	R
Corvus corax	Common Raven	A.5	LC	Annex III	Annex I	Not in scope	R
Sturnidae							
Sturnus vulgaris	Common Starling	A.5	LC	Not in scope	Annex I	Not in scope	R
Passeridae							
Passer domesticus	House Sparrow	A.5	LC	Not in scope	Annex II	Not in scope	R
Passer hispaniolensis	Spanish Sparrow	A.3	LC	Annex III	Annex I	Not in scope	R
Fringillidae							
Fringilla coelebs	Eurasian Chaffinch	A.4	LC	Annex III	Annex I	Not in scope	R
Chloris chloris	European Greenfinch	A.3	LC	Annex II	Not in scope	Not in scope	R
Carduelis carduelis	European Goldfinch	A.3.1	LC	Annex II	Not in scope	Not in scope	R
Linaria cannabina	Eurasian Linnet	A.3	LC	Annex II	Not in scope	Not in scope	R
Emberizidae							
Emberiza hortulana	Ortolan Bunting	A.3	LC	Annex III	Annex I	Not in scope	S
Emberiza calandra	Corn Bunting	A.4	LC	Annex III	Annex I	Not in scope	R
Emberiza melanocephala	Black-headed Bunting	A.4	LC	Annex II	Not in scope	Not in scope	S

Table 5-59: Conservation criteria and regional status of birds of the Project site

Conservation Criteria		Number of species	% of species
RDB	A.1.2	5	9
	A.2	8	15
	A.3	18	33

Conservation Criteria		Number of species	% of species
	A.3.1	9	16
	A.4	5	9
	A.5	10	18
IUCN	EN	2	3
	VU	2	4
	LC	50	91
	Not in scope	1	2
BERN	App II	37	67
	App III	13	24
	Not in scope	5	9
NGC	App I	12	22
	App II	7	13
	Not in scope	36	65
CITES	App II	17	31
	Not in scope	38	69
Regional Status	Resident (R)	27	49
	Summer visitor (S)	14	26
	Transit migrant (T)	14	25

ABBREVIATIONS USED in Table 5-58 and Table 5-59 RDB: Red data book for birds of Turkey (Kiziroğlu, 2008)

A.1.2: Populations of these species are severely low as 1-10 pairs in a survey area. The species are also under protection in Turkey of the imminent danger of extinction. During this survey, 5 species (Eastern Imperial Eagle - *Aquila heliaca,* Golden Eagle - *Aquila chrysaetos,* Osprey - *Pandion haliaetus,* Steppe Eagle - *Aquila nipalensis,* Peregrine Falcon - *Falco peregrinus*) were recorded in this section.

A.2: Populations of these species are significantly low as 11-25 pairs in a survey area. The species are not in imminent danger of extinction but may face the danger anytime soon. During this survey,8 species were recorded in this section.

- **A.3 and B.3:** Populations of these species have 26-250 pairs in a survey area. The species are tending to face extinction in the wild. During this survey, 18 species were recorded in this section.
- **A.3.1:** Populations of these species constantly change between 251-500 pairs and tend to decline to compare to previous records in a survey area. During this survey, 9 species were recorded in this section.

A.4: Populations of these species are notably stable with local declines and no imminent dangers. During this survey, 5 species were recorded in this section.

A.5 and B.5: Populations of these species are significantly stable with no declines as well as no danger of decline or extinction. During this survey, 10 species were recorded in this section.

IUCN The IUCN Red List of Threatened Species. Version 2020.1. www.iucnredlist.org

EN (endangered): A taxon is endangered when the best available evidence indicates that it is facing a very high risk of extinction in the wild. Two of the species (Egyptian vulture – *Neophron percnopterus* and Steppe eagle - *Aquila nipalensis*) was recorded is in this criterion.

VU (vulnerable): A taxon is Vulnerable when the best available evidence indicates that it is considered to be facing a high risk of extinction in the wild. One species (Eastern Imperial Eagle - *Aquila heliacal* and European Turtle-dove - *Streptopelia turtur)*) was recorded is in this criterion.

NT (near threatened): A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future. No species was recorded is in this criterion.

LC (least concern): A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category. Thus 50 of the species encountered in this survey fall into this criterion.

Not in scope: 1 species (Hooded Crow - *Corvus cornix*) are not covered by the scope of this convention

BERN Convention: Convention on the Conservation of European wildlife and natural habitats,

Appendix II (Strictly Protected Fauna Species) 37 species in this survey would fall into this criterion.

Appendix III (Protected Fauna Species) 13 species in this survey would belong to this criterion.

Not in scope: 5 species are not covered by the scope of this convention

CITES: Convention on the International Trade in Endangered Species of Wild Flora and Fauna

Appendix I: None of the species encountered in this survey would fall into this criterion.

Appendix II: 17 of the species encountered in this survey would belong to this criterion.

Not in scope: 38 species are not covered by the scope of this convention

NGC: National Game Commission (2019-2020 Game Period)

Appendix I: Includes species under conservation of National Game Commission, 12 of the species encountered in this survey would fall into this criterion

Appendix II: Includes species allowed to be hunted by the National Game Commission, 7 of the species encountered in this survey would fall into this criterion

Not in scope: 36 species are not covered by the scope of the commission's decisions

Regional Status:

Residents: 27 of the species encountered in this survey would fall into this criterion.

Summer Visitors: 14 of the species encountered in this survey would belong to this criterion.

Winter Visitors: None of the species encountered in this survey would belong to this criterion.

Transit Migrants: 14 of the species encountered in this survey would belong to this criterion.

Figure 5-37: Isabelline wheatears (*Oenanthe isabellina*) which were observed different parts of the Project site

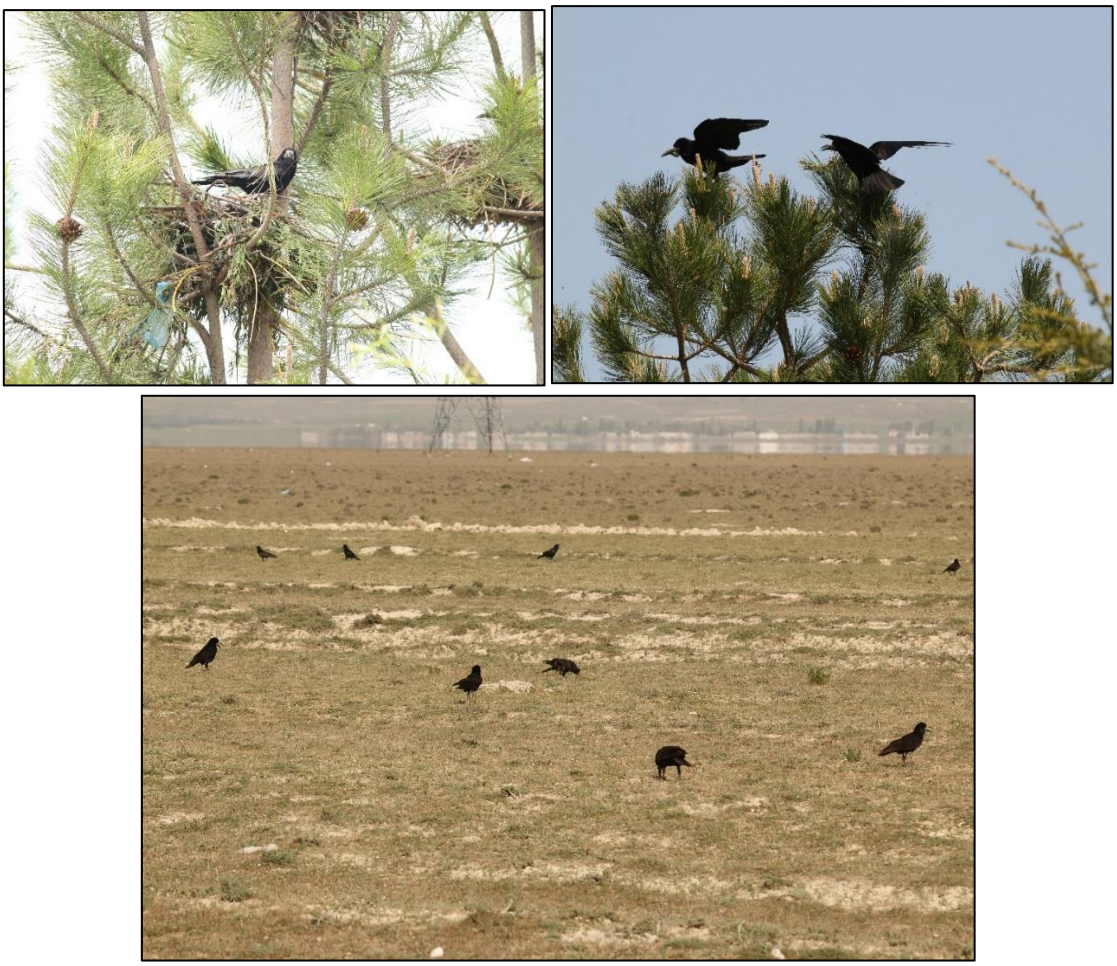


Figure 5-38: Rooks (*Corvus frugilegus*) observed at different parts of the Project site and breeding near the settlements

Figure 5-39: Common starlings (*Sturnus vulgaris*) observed within the Project Site and its surroundings

Figure 5-40: Eurasian Collared doves (*Streptopelia decaocto*) observed near the settlements

Figure 5-41: A corn bunting (*Emberiza calandra*)

Figure 5-42: A lesser grey shrike (*Lanius minor*) (above) and a Black-headed Wagtail (Motacilla flava) (below)

Figure 5-43: Black-billed magpies (Pica pica) which were observed in the Project site (above) and near the settlements (below)

Figure 5-44: A little owl (*Athene noctua*) (above), Eurasian hoopoes (*Upupa epops*) and common starlings (*Sturnus vulgaris*) observed near the surrounding settlements

5.6.3.5.3 *Gathering Points (Thermals) of Soaring Birds within the Area*

During avifauna surveys, two different thermals and gathering points were identified (Figure 5-45); Thermal 1 where eastern imperial eagle, buzzards, lesser-spotted eagle and booted eagle were observed is located near the Tilkili Village Road. Thermal 2 where lesser Kestrel, buzzards and storks were observed is located to the east of the Project Site.

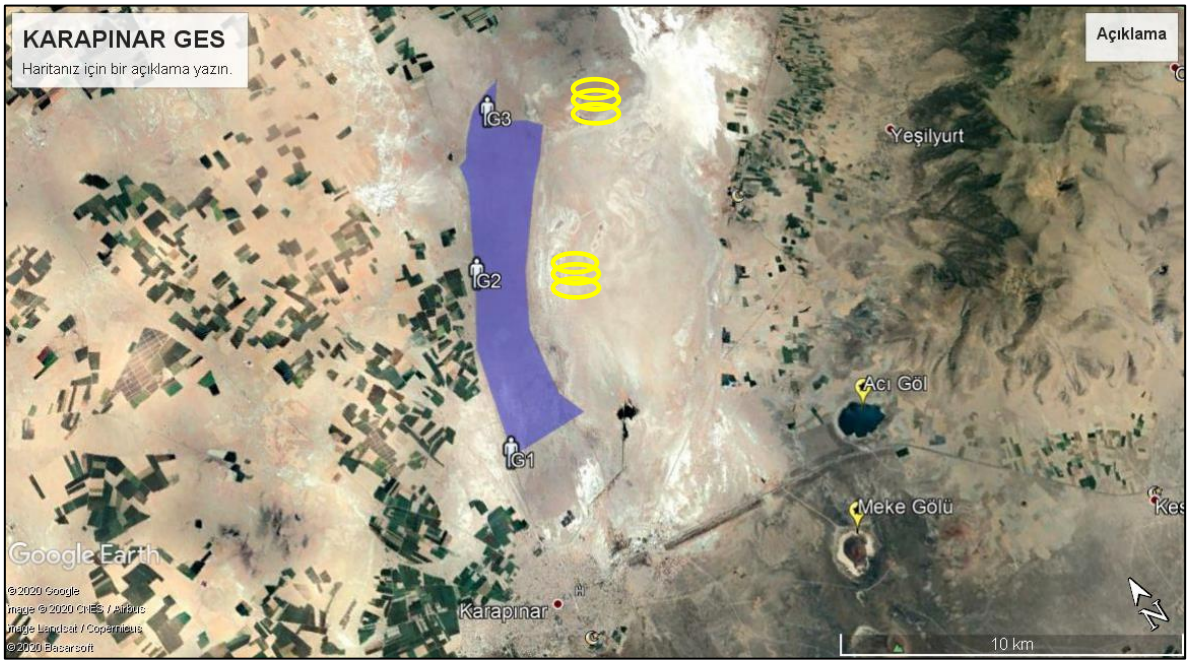


Figure 5-45: Thermals which were detected in the monitoring period.

5.6.3.5.4 *Migratory soaring birds and migration routes within the area*

In the Western Palearctic, each year millions of birds migrate from wintering areas in Africa to breeding areas in Eurasia in spring and after breeding in Eurasia to Africa in autumn using Eurasian-African flyway. Eight migration bottlenecks were described in the Western Palearctic and three of them (Bosporus in Istanbul, Artvin-Borçka in Artvin Province and Belen in Hatay Province) are located in Turkey. See Figure 5-47 for migration routes and bottlenecks of Western Palearctic.

The primary routes of the north-south migratory bird movements in Turkey occur between the Eastern Black Sea (Borçka) and Thrace region (Bosporus) in the north and the Mediterranean region in the south (Belen) (Cameron et al. 1967, Shirihai and Christie 1992, Shirihai 2000, Panuccio et al. 2017). These migratory movements occur mainly on a north-south axis in relation to weather conditions, geography, topography and species and individual level differences (Michev et al. 2012 Tøttrup et al. 2008, Agostini et al. 2015).

Soaring birds tend to follow the narrow traditional routes where thermals and other updrafts develop and minimize the large barriers such as sea crossings (Panuccio et al. 2013, Trierweiler et al. 2014). These traditional routes are often called primary or major migration routes. On these routes or flyways, soaring birds must pass narrow corridors which are considered as bottlenecks where most of the migration activity occur between these bottlenecks along the flyways (Newton 2010). Figure 5-49 through Figure 5-52 present primary and secondary migration routes and bottlenecks of soaring birds in Turkey.

The Project site is not located on the primary migration routes or bottlenecks; however, it's close to the primary and secondary migration routes and presence of soaring birds was observed in close proximity to the site.

As presented in Figure 5-46, migration path of soaring birds was observed to be in south-east - north-west direction during the ornithological surveys. Three different flight routes (orange arrows in the Figure) were identified over and

around the project site. Green Zone indicates the construction laydown area and the areas where current land preparation activities are ongoing within the Project Site. Bird activities were observed to be very low in this zone. Red zones indicate foraging and resting area of white stork, long-legged buzzard, eastern imperial eagle, and golden eagle.

No large-scale migration was observed during the ornithological surveys. Furthermore, the Project Site is not located on the primary migration routes of soaring migrant birds; however, transit passing of white stork, common crane, lesser-spotted eagle, steppe eagle, booted eagle, osprey, eastern imperial eagle, and Egyptian vulture through the Project Site was observed. Migration routes of white storks and black storks are shown in Figure 5-49 and Figure 5-50. Resting sites and migration routes of common cranes are shown in Figure 5-51 Migratory routes of lesser-spotted eagles are shown in Figure 5-52. Also, European Turtle-dove which is summer visitor in the region was observed usually near the villages and agricultural areas. However, several individuals were also observed within the Project Site during the field surveys carried out in Spring 2020.

Moreover, intensive migration of swallows, and swifts through the project site was observed. These species usually use wider areas during migration period. Furthermore, migratory species such as storks and cranes migrate in large groups (groups of 1000 individuals or more) using wider areas on a specific route.

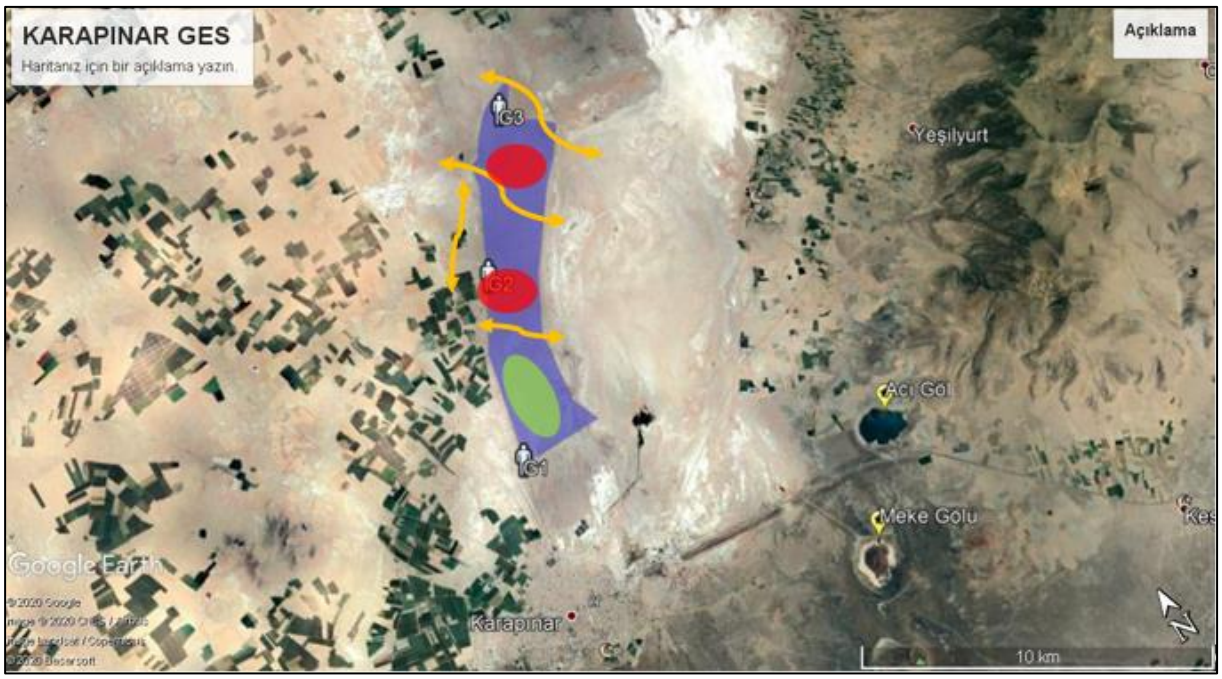


Figure 5-46: Migration routes identified in the study area (orange arrows) Green zone: Construction laydown where the bird activity was very low. Red zones: Foraging and resting area of white stork, long-legged buzzard, eastern imperial eagle, and golden eagle.

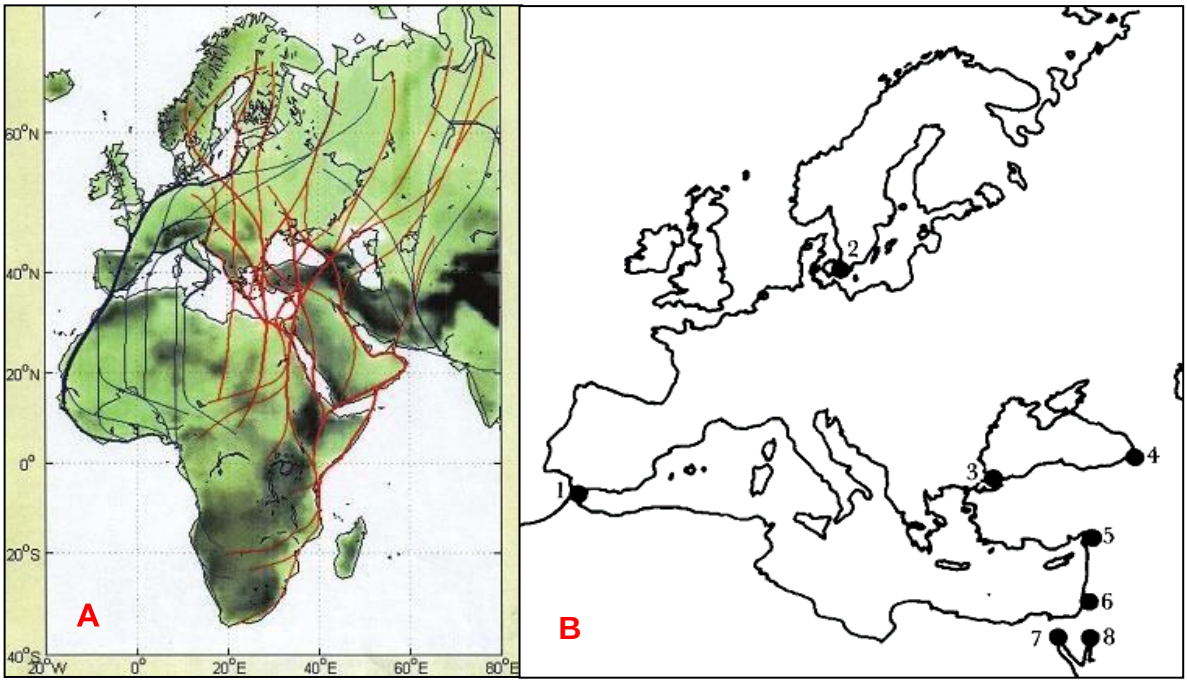


Figure 5-47: A: Migration routes of birds in West paleartic zoogeographical region (Busse vd. 2015). B: Major migration bottlenecks for birds in West paleartic region (1 = Gibraltar, 2 Falsterbo, 3 = Bosporus, 4 = Borgka, 5 = Iskenderun-Belen, 6 = Kfar Kasem, 7 = Suez, 8 = Eilat) (Shirihai & Christie, 1992)

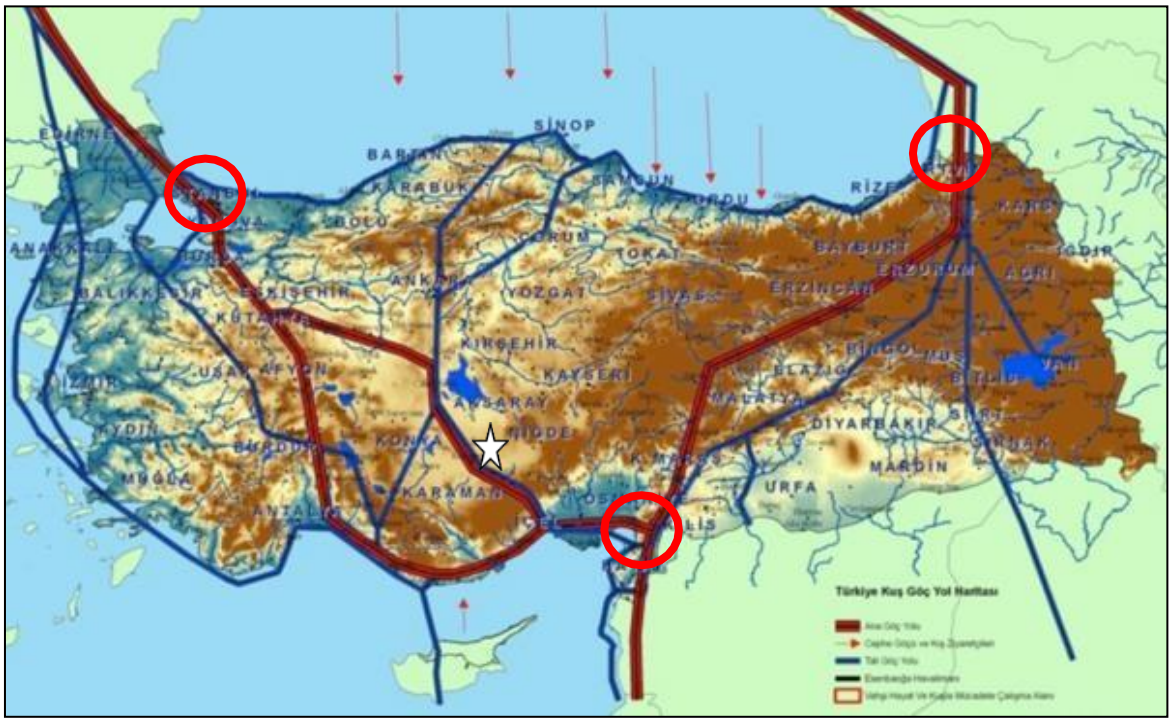


Figure 5-48: Bottlenecks for migratory birds (red circles), primary (red) and secondary (blue) migration routes of soaring birds in Turkey and the project site (star marking) (Kiziroğlu et al. 2011).

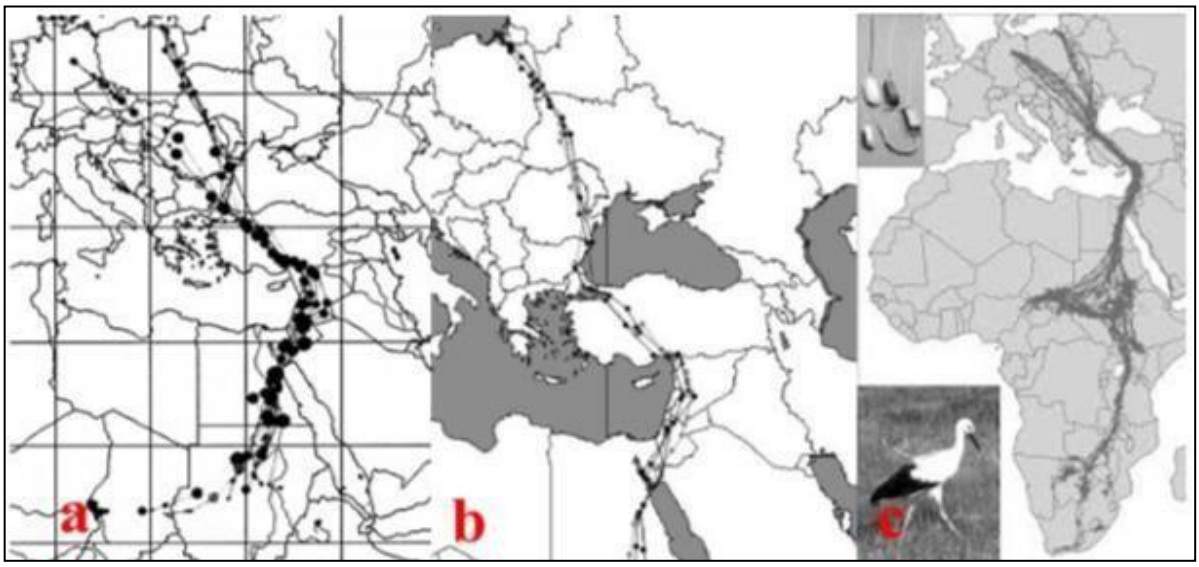


Figure 5-49: The migration routes of white storks (a: Shamoun-Baranes et al. 2003, b: Chernetsov et al. 2004, Berthold et al. 2006)

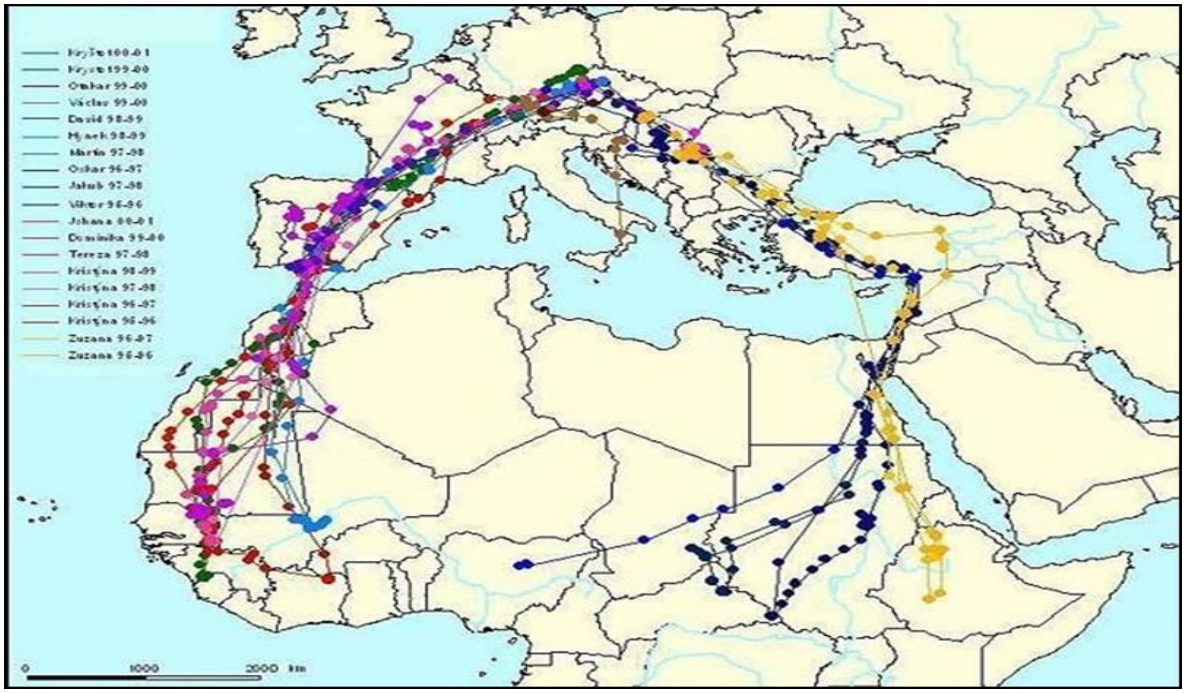


Figure 5-50: The migration routes of black storks which were GPS tagged in the Czech Republic (Bobek et al. 2008)

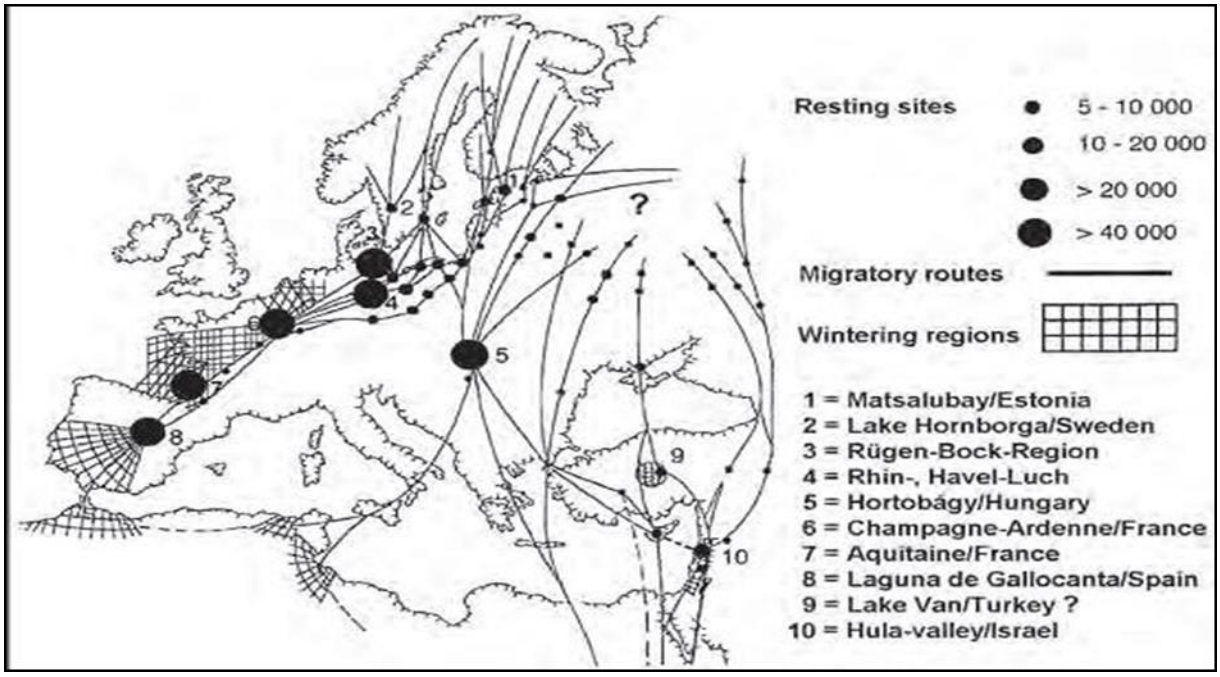


Figure 5-51: The resting sites, migratory routes and wintering regions of common crane (*Grus grus*) (Prange 2005)

Figure 5-52: The migration routes of 3 lesser spotted eagles which were marked in Germany in 2017 (World Working Group on Birds of Prey and Owls, Germany, http://www.satellite-telemetry.de) Note: Star symbol indicates the Project Site.

5.6.3.6 The abundance, commonness and the breeding status of the animal species

This section summarises the abundance, commonness and breeding status of the animal species that were detected within the AoI.

Only one reptile species (dwarf lizard - *Parvilacerta parva*) was observed in the Project Site. Only couple of individuals were seen in the eastern part of the Project Site. Most individuals are likely to live near the water resources in Konya region while only a few are present in the Project Site.

Mammal species Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*) was identified to be abundant, specifically near the highway and very abundant in the area but very low within the Project Site.

Fifty-five bird species were directly observed in the project site and its surroundings. Greater Short-toed lark (*Calandrella brachydactyla*) and Isabelline wheatear (*Oenanthe isabellina*) were the most abundant and the most common bird species in the Project site among the others. Both of species' pairs and juvenile individuals were observed in the Project site. On the other hand, Eurasian hoopoe (*Upupa epops*) was identified to be abundant and very common whose pairs were also observed in the Project site (Table 5-60).

Table 5-60: The abundance, commonness and the breeding status of the fauna and avifauna recorded during surveys completed in 2020 in the Study Area

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Reptile	*Parvilacerta parva*	Dwarf Lizard	LC	Rare	Uncommon	This species was observed only eastern part of project site.	Only couple individuals were observed. Probably few individuals live in the project site. Most individuals probably live near the water sources close to the city Centre.
Mammal	*Spermophilus xanthoprymnus*	Anatolian Ground Squirrel	NT	Abundant	Very common	Observed near the settlements and project site and its surroundings	This species is very abundant, specifically near the highway but more abundant project site's surroundings. Many Ground Squirrel's galleries observed in the region.
Bird	*Ardea cinerea*	Grey Heron	LC	Relatively Abundant	Uncommon	Observed near the Wetlands	This species only observed near the Wetlands. Daily movements of species was observed between the Wetlands
Bird	*Ciconia ciconia*	White Stork	LC	Relatively Abundant	Uncommon	This species in the middle of the project site and agricultural areas near settlements	This species in the middle of the project site and agricultural while resting and passing. During transit migration 430 individuals of the species were counted.
Bird	*Milvus migrans*	Black Kite	LC	Rare	Uncommon	This species was observed only northern part of project site.	Probably transit migrant and using project site for feeding with animal carcasses.

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Neophron percnopterus*	Egyptian Vulture	EN	Rare	Uncommon	This species was observed northern part of project site and on the electric transmission lines.	Transit migrant and using project site for foraging and feeding with animal carcasses. Sub-adult and juvenile individuals were observed near the electric transmission lines. This species may be breeding in the region.
Bird	*Circaetus gallicus*	Short-toed Snake-eagle	LC	Rare	Uncommon	This species was observed only northern part of project site.	Transit migrant and using project site for transit migration and sometimes for foraging.
Bird	*Buteo buteo*	Common Buzzard	LC	Rare	Uncommon	This species was observed northern part of project site and possible to see other parts of the project site and near Wetlands.	Observed during foraging in the northern part of the project site and near Wetlands.
Bird	*Buteo rufinus*	Long-legged Buzzard	LC	Abundant	Common	Observed in project site and its surroundings	Observed during foraging in the project site and also while carrying the nest material. This species may breed near the project site.
Bird	*Clanga pomarina*	Lesser Spotted Eagle	LC	Rare	Uncommon	This species was observed only northern part of project site.	Transit migrant and using project site for transit migration and sometimes for foraging.

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Aquila heliaca*	Eastern Imperial Eagle	VU	Rare	Uncommon	This species was observed only northern part of project site.	Transit migrant and using project site for transit migration and sometimes for foraging
Bird	*Aquila chrysaetos*	Golden Eagle	LC	Rare	Uncommon	This species was observed only northern part of project site.	This species is using project site for foraging and feeding with animal carcasses
Bird	*Hieraaetus pennatus*	Booted Eagle	LC	Rare	Uncommon	This species was observed only northern part of project site.	Observed during its transit passing over the project site
Bird	*Pandion haliaetus*	Osprey	LC	Rare	Uncommon	This species was observed only northern part of project site.	Observed during its transit passing over the project site
Bird	*Aquila nipalensis*	Steppe Eagle	EN	Rare	Uncommon	This species was observed only northern part of project site.	Observed during its transit passing over the project site
Bird	*Falco naumanni*	Lesser Kestrel	LC	Rare	Uncommon	This species was observed only northern part of project site.	Observed during its transit passing over the project site

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Falco tinnunculus*	Common Kestrel	LC	Rare	Uncommon	This species was observed only on the electric transmission lines.	This species is resident in the project site and surroundings. The nest of the species was found on the electric transmission lines. It was using project site for foraging and feeding with animal carcasses
Bird	*Falco subbuteo*	Eurasian Hobby	LC	Rare	Uncommon	This species was observed only northern part of project site.	Observed during its transit passing over the project site
Bird	*Falco peregrinus*	Peregrine Falcon	LC	Rare	Uncommon	This species was observed only northern part of project site.	Observed during its transit passing over the project site
Bird	*Grus grus*	Common Crane	LC	Rare	Uncommon	This species was observed only northern part of project site.	Observed during its transit passing over the project site
Bird	*Streptopelia turtur*	European Turtle-dove	VU	Abundant	Uncommon	This species was observed near the settlements, and agricultural areas.	This species using the project site's surroundings for foraging and resting and breeding near the settelements..
Bird	*Columba livia*	Rock Pigeon	LC	Abundant	Common	Observed near the settlements and project site surroundings and possible see in project site	Breeding near the settlements

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Streptopelia decaocto*	Eurasian Collared-dove	LC	Abundant	Common	Observed near the settlements and project site surroundings and possible see in project site	Breeding near the settlements
Bird	*Athene noctua*	Little Owl	LC	Abundant	Common	Observed near the settlements and project site surroundings and possible see in project site	Observed near the settlements
Bird	*Apus apus*	Common Swift	LC	Abundant	Common	Observed near the settlements and project site surroundings and possible see in project site	Transit migrant in the region
Bird	*Merops apiaster*	European Bee-eater	LC	Abundant	Common	Observed near the settlements and project site surroundings and possible see in project site	Transit migrant in the region

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Coracias garrulus*	European Roller	LC	Abundant	Common	Observed near the settlements and project site surroundings and possible see in project site	Transit migrant in the region
Bird	*Upupa epops*	Eurasian Hoopoe	LC	Abundant	Very common	Observed near the settlements and project site and its surroundings	Probably breeding in project site and its surroundings
Bird	*Melanocorypha calandra*	Calandra Lark	LC	Abundant	Very common	Observed near the settlements and project site and its surroundings	Probably breeds in the project site and its surroundings
Bird	*Calandrella brachydactyla*	Greater Short-toed Lark	LC	Abundant	Very common	Observed near the settlements and project site and its surroundings	Foraging in the project site. Pairs and juveniles were observed in the project site. Breeding in project site and its surroundings.

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Alaudala rufescens*	Lesser Short-toed Lark	LC	Relatively Abundant	Common	Observed in the project site and its surroundings.	Probably breeding in project site and its surroundings
Bird	*Galerida cristata*	Crested Lark	LC	Relatively Abundant	Very common	Observed near the settlements and project site and its surroundings	Probably breeding in project's surroundings
Bird	*Hirundo rustica*	Barn Swallow	LC	Abundant	Very common	Observed near the settlements and project site and its surroundings	Breeding near the settlements and agricultural areas
Bird	*Motacilla alba*	White Wagtail	LC	Relatively Abundant	Common	Observed near the settlements and project site and its surroundings	Probably breeding near the settlements
Bird	*Motacilla flava*	Yellow Wagtail	LC	Abundant	Common	Observed near the settlements and project site and its surroundings	Foraging near the settlements and agricultural areas
Bird	*Motacilla cinerea*	Grey Wagtail	LC	Abundant	Common	Observed near the settlements and project site and its surroundings	Foraging near the settlements and agricultural areas

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Muscicapa striata*	Spotted Flycatcher	LC	Relatively Abundant	Common	Observed near the settlements and project site and its surroundings	Transit migrant in the region
Bird	*Oenanthe isabellina*	Isabelline Wheatear	LC	Abundant	Very common	Observed near the settlements and project site and its surroundings	Foraging in the project site. Pairs and juveniles were observed in the project site. Breeding in project site and its surroundings.
Bird	*Turdus merula*	Eurasian Blackbird	LC	Abundant	Common	Observed near the settlements and project site and its surroundings	Breeding near the settlements and agricultural areas
Bird	*Lanius collurio*	Red-backed Shrike	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Lanius minor*	Lesser Grey Shrike	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Lanius senator*	Woodchat Shrike	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Lanius nubicus*	Masked Shrike	LC	Abundant	Common	Observed near the settlements and project site and its surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Pica pica*	Black-billed Magpie	LC	Relatively Abundant	Very common	Observed near the settlements and project site and its surroundings	Breeding near the settlements and agricultural areas
Bird	*Corvus frugilegus*	Rook	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Breeding near the settlements and agricultural areas
Bird	*Corvus cornix*	Hooded crow	LC	Abundant	Common	Observed near the settlements and project site and its surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Corvus corax*	Common Raven	LC	Rare	Common	Observed in the project site and its surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Sturnus vulgaris*	Common Starling	LC	Abundant	Common	Observed near the settlements and project site's surroundings	Breeding near the settlements

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Passer domesticus*	House Sparrow	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Breeding near the settlements
Bird	*Passer hispaniolensis*	Spanish Sparrow	LC	Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Fringilla coelebs*	Eurasian Chaffinch	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Chloris chloris*	European Greenfinch	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Carduelis carduelis*	European Goldfinch	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Linaria cannabina*	Eurasian Linnet	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas

Taxa	Scientific Name	Common Name	IUCN	Abundance	Commonness	Occurrence	Observation Note (Breeding, feeding etc.)
Bird	*Emberiza melanocephala*	Black-headed Bunting	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Emberiza calandra*	Corn Bunting	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas
Bird	*Emberiza hortulana*	Ortolan Bunting	LC	Relatively Abundant	Common	Observed near the settlements and project site's surroundings	Probably breeding near the settlements and agricultural areas

5.6.3.7 Target Species

As result of 15 day long Spring 2020 Surveys, 18 target species were detected. These species were mainly soaring migrant and resident birds, and species that could be adversely affected by project activities. Taxonomy and status of these species are provided in Table 5-58, detailed observation data is presented in Table 5-61 and information on abundance and commonness is provided in Table 5-60.

Transit migrant white storks (*Ciconia Ciconia*) were observed while resting in the Project Site and nearby agricultural areas. Common buzzard (*Buteo buteo*) and long-legged buzzard (*Buteo rufinus*) are resident raptors and likely breeding in the region. Nests of common kestrel (*Falco tinnunculus*) were detected on an ETL tower near the Project Site. Egyptian vulture (*Neophron percnopterus*), eastern imperial eagle *(Aquilla heliaca*) and golden eagle (*Aquila chrysaetos*) were observed in the region while foraging and steppe eagle (*Aquila nipalensis*), short-toed snake eagle (*Circaetus gallicus*) and booted eagle (*Hieraaetus pennatus*) were also observed during transit passing. Photographs taken during the survey are presented in Figure 5-53 to Figure 5-60.

KBA / IBA listed bird species (please refer to Section 5.6.3.1.2 for the IBA and KBA species) were not detected within the AoI during the field surveys; therefore, none of them were designated as target species.

Table 5-61: Observation Data informing the Target Specie Determination

Target Species	Number of birds recorded and observation dates														
	22.03.2020	23.03.2020	24.03.2020	25.03.2020	26.03.2020	11.05.2020	12.05.2020	13.05.2020	14.05.2020	15.05.2020	27.05.2020	28.05.2020	29.05.2020	30.05.2020	31.05.2020
Ardea cinerea	3	2	1		5	2	3	2		2		1		1	2
Ciconia ciconia	25	10				15	30	50	40	70	100	20	30	20	20
Milvus migrans	1	2	1				1			1			1		1
Neophron percnopterus			1		1	2	1		2		3		2	2	1
Circaetus gallicus						3	2		4		2	5		3	2
Buteo buteo	2	2	4	3	2	1	1	5	2	7	8	6	3	7	3
Buteo rufinus			1			3		2		5	3	2	4	3	2
Clanga pomarina			1						1				1		
Aquila heliaca		1				2		1			2	1		2	1
Aquila chrysaetos						1		1		1		1		1	
Hieraaetus pennatus					2		1		2		1		2		2
Pandion haliaetus			1					1					1		
Aquila nipalensis							1			1				1	
Falco naumanni	1	1	2		1	1	1		2	1	1	1		3	1
Falco tinnunculus	1	1	2		2		3	2	2	2	3		3		2
Falco subbuteo				1				1					1		1
Falco peregrinus			1			1			1			1		1	
Grus grus				5				7			3				

Figure 5-53: Transit migrant white storks (*Ciconia ciconia*) observed near the ETLs in the Study Area

Figure 5-54: Foraging eastern imperial eagles (*Aquila heliaca*) observed in the Project Site

Figure 5-55: Foraging golden eagles (*Aquila chrysaetos*) observed in the Project Site

Figure 5-56: Foraging Egyptian vultures (Neophron percnopterus) observed in the Project Site

Figure 5-57: Transit migrant booted eagles (*Hieraaetus pennatus*)

Figure 5-58: Resident long-legged buzzards (*Bute rufinus*) which were carriying nest material

Figure 5-59: Common kestrel which had a nest on the electric transmission line tower

Figure 5-60: Common buzzards (*Buteo buteo*) which were observed near the Meke Lake

5.6.3.8 Fauna Species of Concern

Of the fauna species detected within the AoI, Near Threatened and Vulnerable species were further assessed as species of concern for the ecological impact assessment study.

Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*)

Anatolian ground squirrel l (*Spermophilus xanthoprymnus*, Bennett, 1835), is a group-living, diurnal, obligately hibernating marmotine squirrel. It inhabits the steppes and alpine meadows throughout central lowland and eastern highland Anatolia and adjacent Armenia and northwestern Iran. Its preferred elevation appears to range from about 800 to 2,900 m. The species displays sexual dimorphism in size, with adult males being considerably larger than adult females and exhibits geographic variation in body size. It is presently listed as "Near Threatened" on the 2009 IUCN meeting Red List of Threatened Species because of large-scale agricultural activities that result in habitat destruction and fragmentation (Gündüz et al. 2007, Temple and Cuttelod 2009, Mutlu Kart and Gür 2009, Gür and Mutlu Kart Gür 2010).

The species was very abundant and spread all over the region, and it was observed more densely on the north-northeast part of the area and on the highway edges and more abundant project site's surroundings. The reason for this is more dense vegetation in these parts and the grain of wheat spilling into the roadsides. Even during the survey, three individuals who died while collecting the grain of wheat spilled on the sides of the road were also identified. The species was the main prey of predatory bird species and carnivorous mammals. This species should be monitored during construction and first year of operation.

Common Tortoise (*Testudo graeca*)

Different subspecies of Common Tortoise have widespread distribution in Turkey. It is a typical Mediterranean species living in humid and damp steppes, semi-steppe and forested habitats, including agriculturally used areas. However, its population has been declining due to habitat loss and fragmentation (Türkozan et al. 2003, 2005) and presently listed as "Near Threatened" by IUCN (Tortoise & Freshwater Turtle Specialist Group 1996). Tortoise is diurnal active, terrestrial and relatively slow-moving specie. Breeding takes place in the spring, usually in late March, April and May.

Common Tortoise (*Testudo graeca*) is also Karapınar Plain KBA-listed species. Although it wasn't observed in the AoI during the field studies, it is likely to occur in the region. Therefore, it is selected as one of the indicator species of this study.

Egyptian vulture (*Neophron percnopterus*)

Egyptian vulture breeds in Continental Europe and Middle to East Asia, then it migrates to West and Northeast Africa to spend winters. This species is widely distributed except some parts of North, South and West Anatolia Figure 5-61. However, breeding sites for this species are located in the Easter and Central Anatolia. Egyptian Vultures prefer to nest on very steep and high cliffs close to water supplies. Nestlings reach maturity in 3 to 5 years. Nestlings and sub-adults have black-brown feathers unlike most white coloured adults. They feed on carcasses of small mammals, birds, and reptiles, it is also spotted around dump sites.

According to the contemporary literature, global population of this species consists of approximately 30,000 individuals. While 3,500 pairs breed in Continental Europe, 1,500 pairs are thought to breed in Turkey. Human activities' pressure on this species between 1970-1990 resulted in population reduction by 50%, thus qualifying the species as endangered (EN) in the scope of IUCN studies (Cabellos and Donazar 1989, Erdoğan 1995, Sarà and Di Vittorio 2003, Hidalgo et al. 2004, Birdlife International 2004, Meyburg et al. 2004, Garcia-Ripolles and Lopez-Lopez 2006, Cortes-Avizanda et al. 2009, Turkish Avian Activity Maps, 2012, Angelov et al. 2012, ICUN, 2015).

Species' Western European population migrate over the Strait of Gibraltar, while Turkish population migrates over Bosphorus (from Eastern Europe) and Hatay-Belen Pass, through Arabian Peninsula and the Levant to reach Africa (Meyburg et al. 2004, Arslangündoğdu 2011, Fülöp et al. 2014, Kuzeydoğa 2015, Bougain 2016).

During the field studies, fifteen individuals of this species were observed in 9 flights in AoI while transit passing over the region.

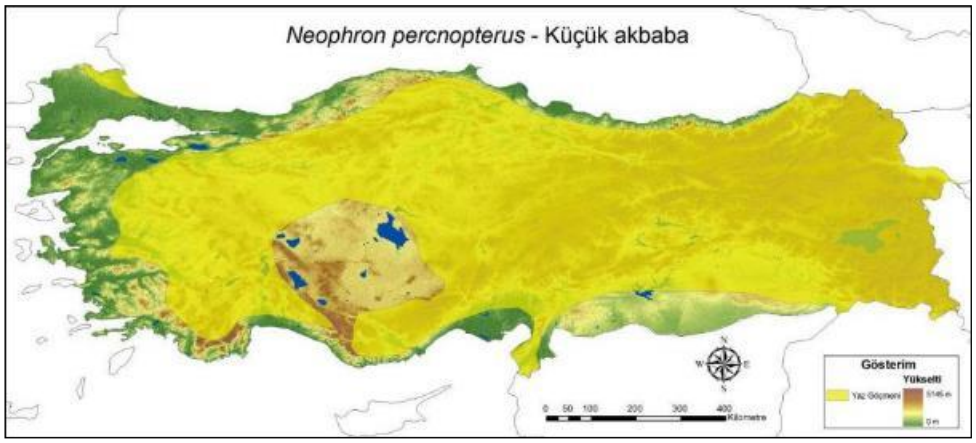


Figure 5-61: Distribution of Egyptian Vulture in Turkey (Turkish Avian Activity Maps, 2012)

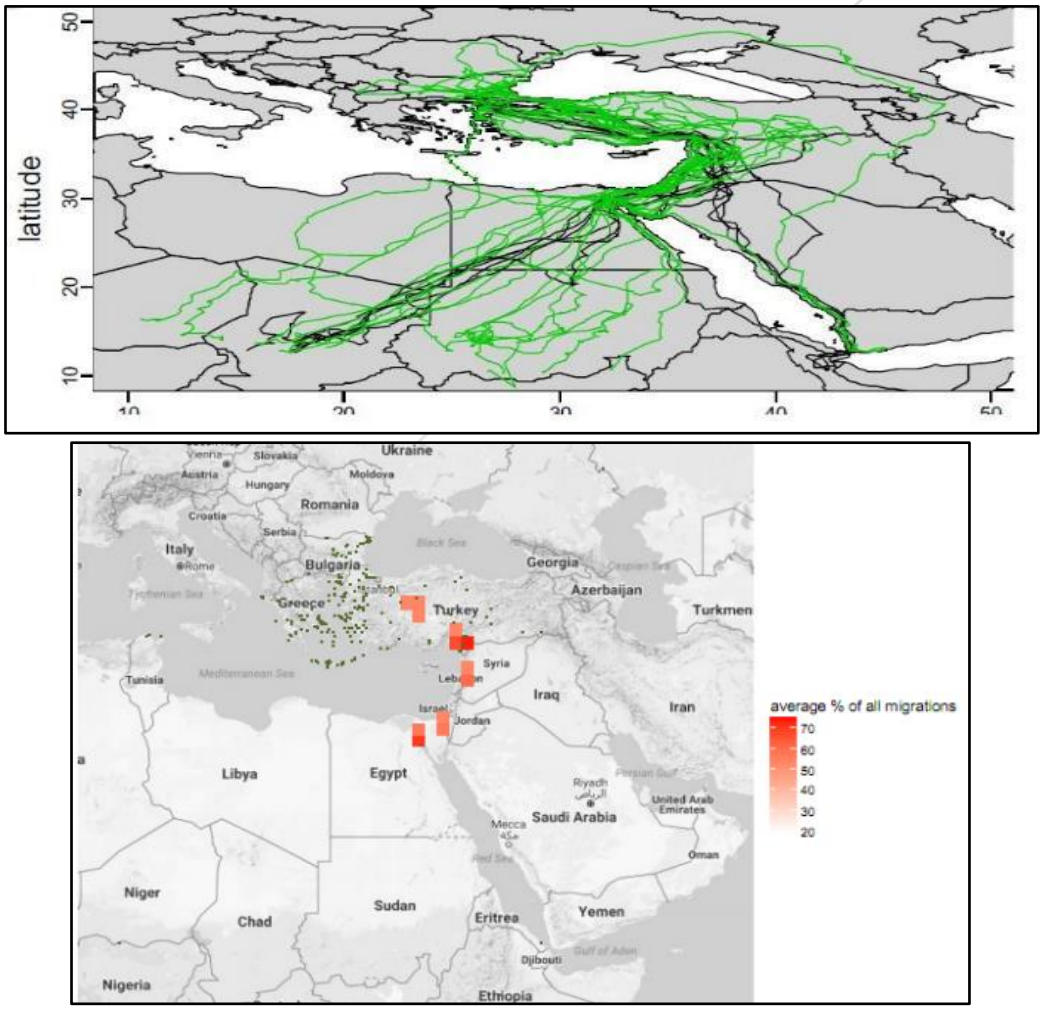


Figure 5-62: Adult (black markings) and young (green markings) vultures that were marked in Bulgaria and Greece in 2010-2016 (above) and average % of all migration (below) (Bougain, 2016).

Eastern Imperial Eagle (*Aquila heliaca*)

Eastern Imperial Eagle (*Aquila heliaca*) nests in Central and Eastern Europe including Turkey (southern part of Blacks Sea Region and Trace Region and partially in Eastern Anatolia of Turkey) and as well as Central Asia. (Figure 5-63). The species winters on the Balkan Peninsula, the Arabian Peninsula, in North-Eastern Africa, as far as Tanzania to the south, in South and East Asia, in India, as far as Korea to the east, Japan, Taiwan and, to the south-east, Singapore (Heredia 1996, BirdLife International, 2017).

The Eastern imperial eagle exists at rolling terrains and plains where forested areas or groups of trees alternate with open spaces such as pastures, agricultural lands and fallow lands. The Imperial eagles nest on single or in groups of tall trees growing alongside rivers, frequently in the immediate proximity to settlements, roads and arable lands. The minimal distance between the nests of various pairs is around 4,700 m. The mating displays begin in February and are most intensive in March. The nests are usually 7 to 26 m above the ground.

The Imperial eagle hunts in open areas such as pastures, meadows, and bare hills. The main food of the Imperial eagle includes northern white-breasted hedgehog (*Erinaceus roumanicus*), souslik (*Spermophilus citellus*), hare (*Lepus europaeus*), shrews (*Microtus* sp.), tortoise (*Testudo graeca*), yellow-legged gull (*Larus michahellis*), white stork (*Ciconia ciconia*) and rarely domestic chicken (*Gallus gallus f. domestica*) (Haraszthy et al. 1996, Heredia 1996, Chavko et al. 2007, Demerdzhiev et al. 2011a,b, 2014, Horváth et al. 2011, Horal 2011, Kovács et al. 2008, Mullarney et al. 2009, Stoychev et al. 2014, www.saveraptors.org).

The European population of the species was estimated to be between 850-1.400 or 1,768 – 2,229 pairs and the global population is 2500-9999 pairs (Demerdzhiev et al., 2011, BirdLife International, 2017). The Turkish population of the species has been estimated as 42-180 pairs. The Eastern imperial eagle is classified as globally vulnerable (BirdLife International, 2017) and endangered at the European level (Tucker, Heath, 1994). It is included in Annex 1 of the Birds Directive, Annex 1 of CITES and Annex 2 of the Bonn and Bern Conventions. At the national level, the species is included in A.1.2[13] category of the Red Data Book of Birds of Turkey, (Kiziroğlu 2008).

Ten transit migrant individuals of this species were observed in 7 flights in the AoI during the field surveys.

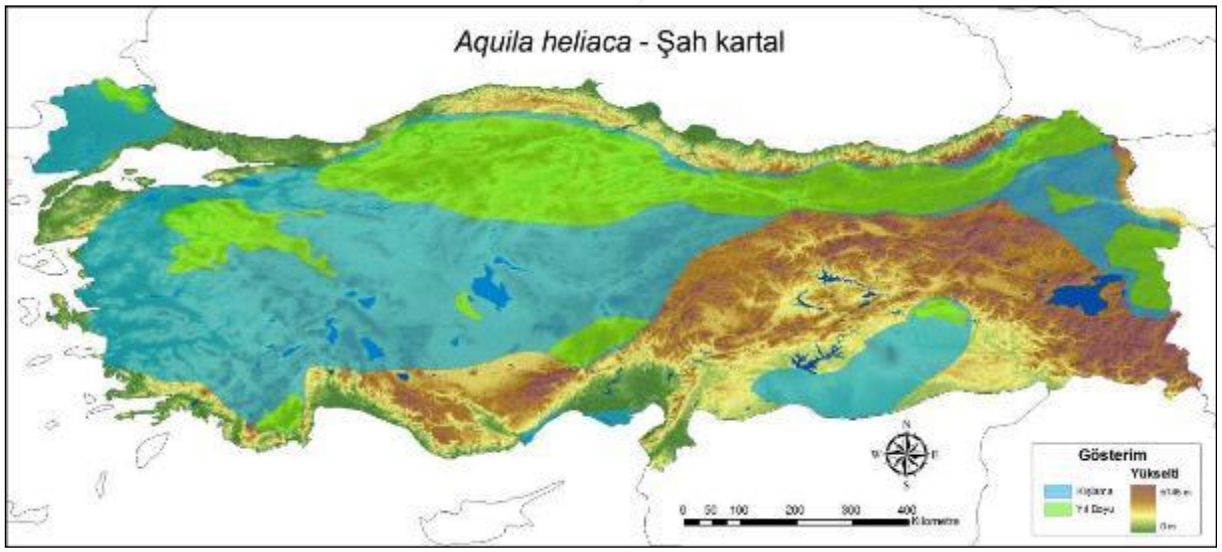


Figure 5-63: Distribution of eastern imperial eagle in (Turkish Avian Activity Maps. 2012).

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[13] A.1.2: Populations of these species are severely low as 1-10 pairs in a survey area. The species are also under protection in Turkey of the imminent danger of extinction. Please refer the notes below Table 5-59 for detailed explanation on the conservation criteria and spotted species within the AOI under each category.

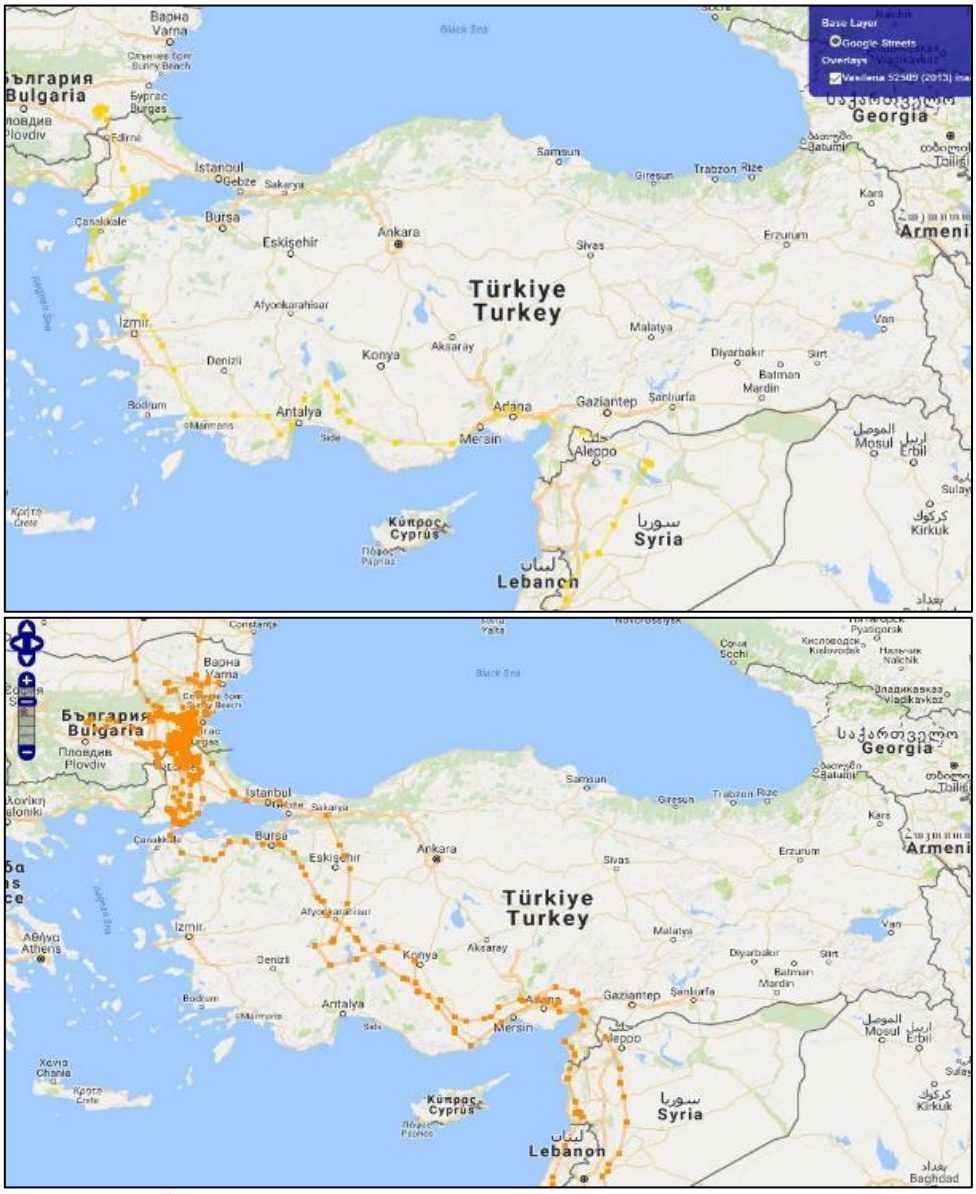

Figure 5-64: Migration of Young Eastern imperial eagles Vasilena (above) and Alexander (below) which were marked with GPS transmitter in Bulgaria (www.saveraptors.org)

Steppe Eagle (*Aquila nipalensis*)

Steppe Eagle (*Aquila heliaca*) nests in Southern Russia and Central Asia and as far as Central Asia (Cramp 1998, Gombobaatar et al. 2012). It is known that the species nests in Central Anatolia near Tuz Lake in Turkey (Turkish Avian Activity Maps. 2012) (Figure 5-65). The species winters Africa and eastern India, as far as Tanzania to the south, in South and East Asia, in India (Den Besten 2004). Recent studies showed that total of 17,800 and 73,500 mature individuals of the species likely to be occur. European population estimated as 800–1200 pairs, which equates to 1600–2400 mature individuals (Meyburg et al 2013). Steppe Eagles are under threat of habitat loss, persecution, predation of chicks, and electrocution or injury from power lines (Global Raptor Information Network 2020).

During 2020 spring monitoring period 3 individuals were seen in 3 flights. This species should be monitored in the next periods.

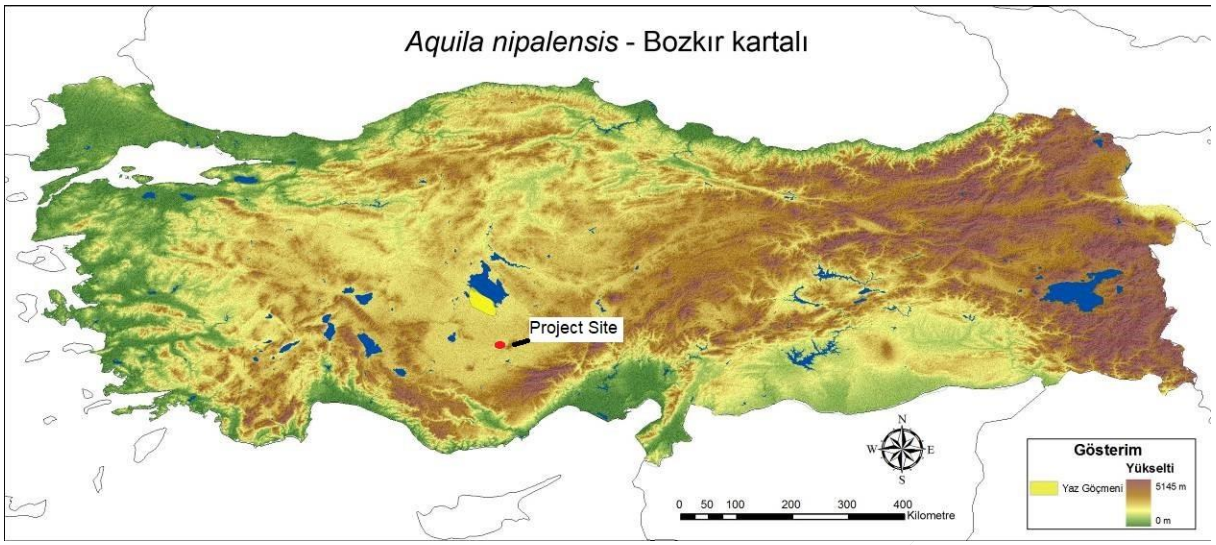

Figure 5-65: Distribution of eastern steppe eagle in (Turkish Avian Activity Maps. 2012)

European Turtle-dove (*Streptopelia turtur*)

European Turtle-dove is a migratory species with a western Palearctic range covering most of Europe and the Middle East and including Turkey and north Africa, although it is rare in northern Scandinavia and Russia. It winters in south of the Sahara. The species is considered as Vulnerable because it has undergone rapid declines in Europe while, in Russia and Central Asia, it is thought it's believed to have experienced more severe declines due to loss of foraging and nesting sites as well as disease and hunting along its migration routes. Estimated global population size is 19,300,000-71,400,000 individuals. This roughly equates to 12,800,000-47,600,000 mature individuals. Further validation of this estimate is needed. (BirdLife International 2020c). Species is a summer visitor, usually arriving in April and leaving September. It prefers nesting in bushes in landscapes with a rich, patchy habitat mosaic of open cultivated land for feeding adjacent to wooded areas with trees and bushes in clumps (woods, copses, groves) or lines (riparian woodlands, hedges).

European Turtle-dove is summer visitor in the AoI and it was usually observed near the villages and agricultural areas during the field studies. Several individuals were also observed within the Project Site.

As summarised in Table 5-62, conservation values of these species are:

A.1.2: Populations of these species are severely low as 1-10 pairs in a survey area. The species are also under protection in Turkey of the imminent danger of extinction. During this survey, 5 species (Eastern Imperial Eagle - *Aquila heliaca*, Golden Eagle - *Aquila chrysaetos*, Osprey - *Pandion haliaetus*, Steppe Eagle - *Aquila nipalensis*, Peregrine Falcon - *Falco peregrinus*) were recorded transit passing the AoI.
A.3: Populations of these species have 26-250 pairs in a survey area. The species are tending to face extinction in the wild. During this survey, 18 species were recorded transit passing the AoI.
A.3.1: Populations of these species constantly change between 251-500 pairs and tend to decline to compare to previous records in a survey area. During this survey, 9 species were recorded in the AoI.

Locations where these species were observed in the AoI are presented in Figure 5-66.

Table 5-62: Conservation Values of Target Bird Species

Scientific Name	Common Name	RDB	IUCN	BERN	NGC	CITES	Regional Status	
Neophron percnopterus	Egyptian Vulture	A.3	EN	Annex II	Not in scope	Annex II	S	High Sensitive
Aquila heliaca	Eastern Imperial Eagle	A.1.2	VU	Annex II	Not in scope	Annex II	R	High Sensitive
Aquila nipalensis	Steppe Eagle	A.1.2	EN	Annex II	Not in scope	Annex II	T	High Sensitive
Streptopelia turtur	European Turtle-dove	A.3.1	VU	Annex III	Annex II	Not in scope	S	

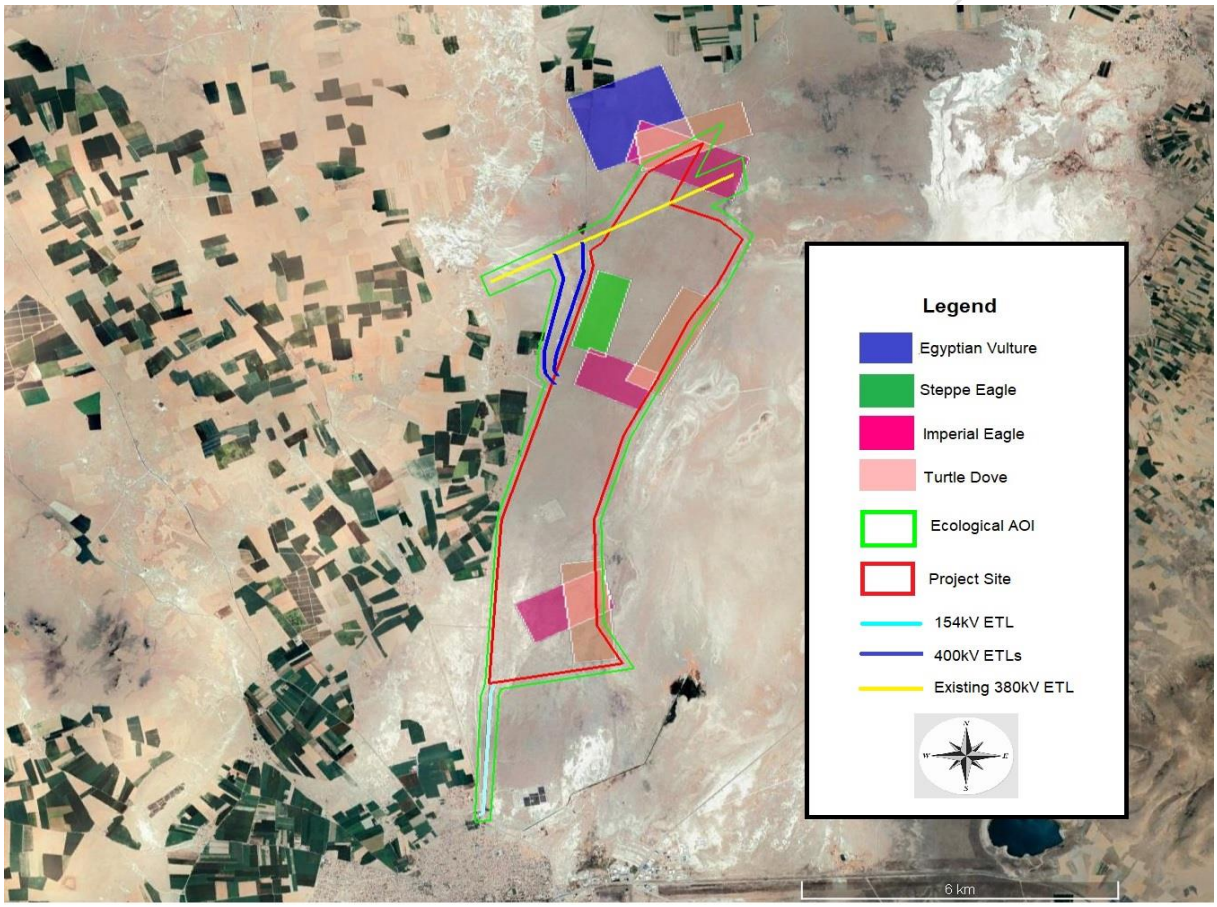

Figure 5-66: Locations where Bird Species of Concern Spotted

5.6.3.9 Invasive Alien Species

According to IFC PS 6 GN99, an alien or non-native plant or animal species is one that is introduced beyond its original range of distribution. Invasive alien species are non-native species that may become invasive or spread rapidly by outcompeting other native plants and animals when they are introduced into a new habitat that lacks controlling factors as determined by natural evolution. Invasive alien species are recognized to be a major global threat to biodiversity and ecosystem services.

15 IAS (one of them *Phragmites australis* was observed out of the AOI in the small wetland area near the Project Site) listed under IUCN's Database and three species listed under Invasive Species Database of Turkey (Önen, 2015) were identified during the fiend studies. List of the IAS observed in the Study Area is presented in Table 5-63.

Table 5-63 Invasive Alien Species Observed at the Study Area

IUCN Global IAS Database	IAS Database of Turkey (Önen H, 2015)
Cardus nutans	*Convolvulus arvensis*
Centaurea solstitialis	*Tribulus terrestris*
Cirsium arvense	*Chondrillea juncea*
Xanthium spinosum	
Elaeagnus angustifolia	
Lotus corniculatus	
Robinia pseudoacacia	
Erodium cicutarium	
Rumex crispus	
Tamarix parviflora	
Aegilops triuncialis	
Bromus tectorum	
Cynodon dactylon	
Dactylis glomerata	
Phragmites australis	

Given the number of IAS identified at the Study Area, necessary measures will be taken in line with IFC PS6 requirements and best practices to avoid intentional or accidental introduction of alien or non-native species of flora and fauna. GISP has a detailed document on implementation of a global strategy to address IAS; Global Strategy on Invasive Alien Species and Invasive Alien Species: A Toolkit of Best Prevention and Management Practices, while IUCN (2016) recommends a series of actions to be taken to avoid IAS-related risks to biodiversity. Detailed measures to be taken to avoid and if necessary, eradicate IAS are further provided in Chapter 5.6.5.

5.6.3.10 Ecosystem Services Review

In line with IFC PS 6 requirements and based on the socio-economic features of the Project Site detailed in Section 6 of this ESIA Report, a qualitative assessment has been undertaken of the loss of provisioning ecosystem services used by local people. The assessment methodology used is based on World Resources Institute's (WRI), October 2013 guidance (WRI guidance, 2013) according to three key criteria:

- Whether the Project will change the quality or quantity of the service?
- If yes, whether the change has an adverse effect on users, for example by tipping it over a threshold, or making demand outstrip supply, or changing perceptions about availability?
- If yes, whether the service is important for livelihoods?

Accordingly, grazing activities as potential priority ecosystem services of concern. Socio-economic assessment consisting evaluation of potential impacts and necessary mitigations in relation to grazing activities is presented in Section 6.

5.6.4 Impact Assessment

This section presents the identification and assessment of the following potential biodiversity impacts of the Project during the construction, operation and decommissioning phases.

The following *Sections 5.6.4.1 and 5.6.4.2* assess these impacts in relation to the identified protected areas and biodiversity receptors. Relevant mitigation measures are provided in Section 5.6.5.

5.6.4.1 *Land Preparation and Construction Phase*

Potential impacts from Construction activities may include:

- Habitat loss and degradation (permanent and temporary)
- Disturbance (e.g. noise, artificial light, dust)
- Injury or mortality
- Indirect impacts(e.g. Accidental introduction and dispersal of invasive species from construction activities)

5.6.4.1.1 *Protected Areas and Internationally Recognised Areas*

As explained in Section 5.6.3.1, the Project Site is not located within or overlaps with any of Turkey's legally Protected Areas. The closest protected area is the Meke Maar Lake Nature Protection Area located at 8km south-east away from the Project Site. No direct or indirect impacts of Project activities are anticipated on Meke Maar due to its distance.

The Project Site is within the boundaries of Karapınar Plain KBA. Potential construction phase impacts on KBA features (i.e. habitats and KBA-listed species) are evaluated in following sections.

5.6.4.1.2 *Terrestrial and Wetland Habitats and Flora*

Habitat loss and Degradation

The most significant impacts of the land preparation and construction phase of the Project would be **habitat loss** and **degradation** for terrestrial flora and fauna species, which would result in loss of species' populations for flora, and for fauna it would be losing areas important for their ecological functions. Given the construction activities will be limited to the footprint of the internal roads and buildings, the extent of the impact would be restricted.

Field surveys identified three habitat types in the AOI of the Project. The habitats within the AOI are mainly formed of scrub and/or herbaceous vegetation associations and open spaces with little or no vegetation. The modified habitats of negligible conservation value (buildings/hardstanding, roads, roadsides, barren land, bare rocks and agricultural crops) are not discussed further in this ESIA.

The most valuable natural habitat in the AOI is Salt Steppes (E6.2 Continental Inland salt steppes according to EUNIS Habitat Directive) while the wetland and roadside vegetation are not of special characteristic to be under EUNIS classification scheme. Even though this habitat is currently degraded status due to over-grazing, its conservation value is considered to be Medium, not higher because of its widespread existence in the Region.

There are not Critically Endangered (CR) or Endangered (EN) plant species identified through flora surveys. Although some endemic plant species were detected in the AOI, these species are widespread in the region and Least Concern according to the IUCN Red List. None of these species are listed under Karapınar Plain KBA or IPA Species. Therefore, their conservation values are determined as Low while the impact magnitude is considered as Low to Moderate.

Construction activities will be limited to the Project Site and ETL route, where a minimum clearing of natural vegetation will be ensured (limited to the roads and building footprints where not possible to avoid). The ETL route vegetation can be rehabilitated using suitable natural shrub species. Areas of salt steppes that will be affected permanently and temporarily will be limited, and therefore the magnitude of the impact is considered to be minor to moderate. For the overall habitat structure, again due to the main impacts being restricted to roads and building footprints, the overall integrity of the habitats is anticipated to remain.

Based on the estimated excavation amount, an area of 100ha will be stripped throughout the Project Site. Considering 1,899ha of the Project Site is covered with vegetation (1,404.55ha Scrub and/or herbaceous vegetation

and 494.43ha Open spaces with little or no vegetation) according to the Corine Database. Loss of vegetation is estimated to be approximately 5% without any mitigations.

Disturbance

Disturbance to the terrestrial and wetland habitats and flora could be due to dust generation and settlement on these features during dry periods. However, this impact is anticipated to be limited as the mitigation measures such as dust suppression is in place during dry periods. Furthermore, small wetland habitat is located more than 1km away from the Project Site therefore no disturbance on the wetland habitat is expected.

The small wetland located at approximately 1.5km south-east away from the Project Site is known to show seasonal changes and fed by direct discharge of the Municipality's Sewerage Network. No impacts are anticipated on this habitat due to Project Activities.

Indirect Impacts

Introduction or spread of non-native invasive species accidently is also an indirect impact that can occur during construction activities which may cause impact with minor to moderate magnitude on the terrestrial fauna. The field studies identified 18 invasive alien species within the AOI, 15 of which are listed under the IUCN Global IAS Database while three are listed under IAS Database of Turkey. Considering the medium sensitivity of E.6.2. Continental Inland Salt Steppes and low sensitivity of the endemic species, potential impact will be at minor to moderate significance. Monitoring of the IAS will be required during construction. Details of monitoring is provided in Section 5.6.7.

Injury or mortality

Not applicable

5.6.4.1.3 *Terrestrial and Wetland Habitats and Fauna*

Mammals

Mammals are likely to be affected by construction through habitat loss/degradation, disturbance (presence of people, artificial lighting, dust and noise), injury or mortality due to construction work and increased traffic and temporary habitat fragmentation.

Construction activities will be limited to the Project Site and ETL route and 500m corridor (the AoI); therefore, associated impacts will be confined to the AoI.

Habitat loss and Degradation

The habitats affected by the construction are common at the national and local level and the areas affected directly are relatively small.

Loss of breeding sites and nests is another significant impact related to habitat loss, especially for those that are ground-nesting. Fauna species identified at the Biodiversity Study Area, are those that are found in the larger area, with alternative habitats outside the AoI.

Possible occurrence of 16 mammal species (five based on direct observation, 11 based on literature) were determined in the AoI. Amongst these, Anatolian Ground Squirrel - *Spermophilus xanthoprymnus*, was considered as species of concern due to its IUCN Red List status (NT) and its conservation value was determined as Medium.

Project impacts on this species during construction are considered to be of Low to Moderate magnitude.

Although *Lutra lutra* is KBA-listed species, no individuals were identified within the AoI during the field surveys conducted in 2018 and 2020 as the habitat type is not suitable for the species (please see Section 5.6.3.4.2 for details). Therefore, no impact on this species is anticipated as a result of construction activities.

All other mammal species recorded in the AoI are of low conservation value. The construction impacts described above are considered to be of low magnitude and the resulting effect is negligible.

Disturbance

Disturbance due to presence of people, artificial lights, generation of noise and dust is likely to affect mammal species within the AoI. Similar to the habitat loss, impacts associated with disturbance due to project activities are considered to be of Low of magnitude while the impact significance will be negligible for mammals with low conservation value and moderate for Anatolian Ground Squirrel that has Medium conservation value without any mitigations.

Injury and Mortality

Fauna species that are present or likely to be present in the AoI will face injury and mortality risks due to the Project activities. Impact magnitude is considered to be High which will lead to moderate significance impact for mammals with low conservation value and major significance impact for Anatolian Ground Squirrel that has Medium conservation value while there are no mitigations in place.

Indirect Impacts

Indirect impacts (such as project-induced access by third parties, in-migration and associated impacts on resource use, including land conversion, hunting and wildlife trade, and spread of invasive alien species) can affect mammal species in the AoI. However, given the nature of the Project Site and Project activities, magnitude of indirect impacts will be negligible leading to an impact with negligible significance.

Amphibians and reptiles

Amphibians and reptiles in the Project AoI are likely to be affected by construction through habitat loss/degradation, disturbance (presence of people, artificial lighting, dust and noise), injury or mortality due to construction works and increased traffic, and temporary habitat fragmentation.

Habitat loss and Degradation

Only a few individuals of one Least Concern reptile species (Lizard of Anatolian - *Parvilacerta parva*) was directly observed in eastern section of the Project Site. Among the species that are likely to occur in the AoI according to the literature, Common Tortoise (*Testudo graeca*) a KBA-listed species and it is listed as Vulnerable under IUCN Red List; and European Pond Turtle (*Emys orbicularis*) is Near Threatened while the rest is Least Concern. Different subspecies of Common Tortoise have widespread distribution in Turkey. However, no individuals were observed within the AoI during the field studies. Although European Pond Turtle is a KBA species however it is scoped out of the ESIA due to no habitat being present with the site or AoI suitable for this species (small wetland in the south-east is also considered unsuitable because the area is known to dry out over summer.

Construction impacts on the species that exist in the AoI are considered to be of Low magnitude and the impact significance is considered to have Moderate for Common Tortoise and Negligible for other species including Lizard of Anatolian.

Disturbance

Disturbance due to presence of people, artificial lights, generation of noise and dust is likely to affect amphibians and reptiles within the AoI. Similar to the habitat loss, impacts associated with disturbance due to project activities are considered to be of Low of magnitude while the impact significance will be negligible for species with low conservation value and Moderate for Common Tortoise that has High conservation value without any mitigations.

Injury and Mortality

Amphibians and reptiles will face injury and mortality risks due to the Project activities within the AoI. Impact magnitude is considered to be High which will lead to moderate significance impact for species with low conservation value and major significance impact for Common Tortoise that has High conservation value while there are no mitigations in place.

Indirect Impacts

Indirect impacts (such as project-induced access by third parties, in-migration and associated impacts on resource use, including land conversion, hunting and wildlife trade, and spread of invasive alien species) can affect amphibian and reptile species in the AoI. However, given the nature of the Project Site and Project activities, magnitude of indirect impacts will be negligible leading to an impact with negligible significance.

Avifauna

Bird species are likely to be affected by loss/degradation of breeding/feeding habitat and disturbance (presence of people, artificial lighting, dust and noise) during construction. Construction impacts will be confined to Project Site and ETL routes with 500m corridor. The habitats affected by the construction are common at the national and local level and the areas affected directly are relatively small.

Among the bird species that are present or likely to occur within the AoI, four are either threatened or near threatened as per IUCN Red List: European turtle-dove (*Streptopelia turtur*), and eastern imperial eagle (*Aquilla heliaca*) are Vulnerable; Egyptian vulture (*Neophron percnopterus*) and steppe eagle (*Aquila nipalensis*) are Endangered species according to IUCN.

These species are considered to have high sensitivity/conservation value due to their conservation values as per IUCN Red List and Red data book for birds of Turkey (Kiziroğlu, 2008). See Table 5-59 for conservation values of these species.

During Spring 2020 field studies:

- 15 individuals of Egyptian vulture were observed in 9 flights north of the AoI while transit passing over the region.
- 10 transit migrant individuals of Eastern Imperial Eagle were observed in 7 flights through the Project Site
- 3 transit individuals of Steppe Eagle were observed in 3 flights
- European Turtle-dove is summer visitor in the AoI and it was usually observed near the villages and agricultural areas during the field studies. Several individuals were also observed within the Project Site (Locations where these species were observed in the AoI are presented in Figure 5-66).

According to the field study findings, the AoI is neither a suitable nesting habitat nor a critical nesting/breeding ground for a Critically Endangered or Endangered avifauna species. Therefore, the Project activities are not expected to lead to a net loss or reduction in the global or national/regional population of any species, including those of conservation concern. It is likely that any potential impact due to habitat loss on these species would be tolerated by the local population. Therefore, the potential impacts due to habitat loss would be minor in magnitude.

The impacts of habitat loss as a result of construction will not impact on habitats that would be important for congregatory species of birds including Greater White-fronted Goose which is included on the IBA citation. The project will not impact wetland habitat which could support this species neither will it impact habitat that could support breeding Ruddy Shelduck which is also listed on the IBA citation. It is possible that up to one or two pairs of Greater Sandplover, also listed on the IBA citation, could breed within the Project area and pre-construction surveys are recommended for this species to take account of any changes in the use of site since previous breeding bird surveys.

Significance of potential impacts on biodiversity during land preparation and construction as per sensitivity of the receptors and nature of each impact is summarized in Table 5-64.

5.6.4.2 *Operation Phase*

5.6.4.2.1 *Protected Areas and Internationally Recognised Areas*

As explained in Section 5.6.3.1, the Project Site is not located within any of Turkey's legally Protected Areas. The closest protected area is the Meke Maar Lake Nature Protection Area located at 8km south-east away from the Project Site. No direct or indirect impacts of plant operations are anticipated on Meke Maar due to its distance.

Potential operation phase impacts on KBA features (i.e. habitats and KBA-listed species are evaluated in following sections.

5.6.4.2.2 *Terrestrial and Wetland Habitats and Flora*

The vegetation will be cleared at an area of 100ha only for the footprint of internal roads and buildings as well as for the frames of the PV panels. This will be a permanent impact and will involve the loss of vegetation throughout the Project Site. Considering that E6.2 Continental Inland salt steppes habitat is listed under Annex 1 of EUNIS Habitat Directive their value of concern is assigned as Medium while the value of concern for other habitats is assigned as Low.

Although, these habitats are suitable for terrestrial species, the habitats are widespread nationally and locally. Therefore, their value of concern is assigned as Low (other habitats) to Medium (Annex 1 habitat).

Of the taxa identified with the Project AOI, six (6) were endemic and Least Concern species, distributions of which are regional: *Anthemis fumarifolia, Astragalus lycius, Petrosimonia nigdeensis, Cousinia birandiana, Cousinia iconica* and *Linaria corifoli.* Four of these species were identified to be abundant within the AOI while *Petrosiminio nigdeensis* was identified to be more dominant . None of them were rare or listed under Karapınar Plain KBA or IPA Species. Therefore, their value of concern was assigned as Low.

The magnitude of the impact is considered as Moderate. Based on these, significance of impacts on E6.2 Continental Inland salt steppes habitat is Moderate while the impact significance is Minor for terrestrial flora species on the Site.

5.6.4.2.3 *Terrestrial and Wetland Habitats and Fauna*

There will be no additional habitat loss during the operational phase of the Project. Impacts on ecological receptors within the AoI will therefore be limited to

- Disturbance
- Injury/mortality through accidents, collisions through ETLs
- Displacement of some fauna
- Indirect Impacts

Mammals

Mammals are likely to be affected during the operational phase of the Project as a result of increased disturbance, noise, dust and injury or mortality because of collision with site vehicles or electrocution with buried cables. Increases in disturbance due to presence of people, artificial lighting, noise and dust will be relatively insignificant during operation compared the construction phase. Similarly, vehicle movements will be reduced when compared to the construction phase therefore injury /mortality risks will be lower.

Unmitigated these impacts are likely to be Low on Asian Ground Squirrel which is of Medium conservation value. The overall impact significance is therefore considered to be Moderate.

<u>Amphibians and reptiles</u>

Amphibians and reptiles are likely to be affected by habitat loss within the Project Site. Considering the impact magnitude will be low and receptor sensitivity of Least Concern Lizard of Anatolian - *Parvilacerta parva (Low Sensitive);* KBA-listed Vulnerable Common Tortoise - *Testudo graeca* (High); Near Threatened European Pond Turtle - Emys orbicularis (Medium), impact significance is anticipated to be negligible for Lizard of Anatolian, Moderate for Common Tortoise and Minor for European Pond Turtle.

Disturbance and injury/mortality impacts will be insignificant when compared to construction phase similar to mammals.

Avifauna

Once the PV Panels are installed, the site appearance from the air will be altered significantly which may cause potential disorientation of birds from dense arrays of panels resembling water bodies and therefore potential for collision mortality.

Limited number of scientific papers in the peer-reviewed literature present fatality information from fatality monitoring studies at a photovoltaic utility-scale solar energy facility; however, more data exists in unpublished reports. A study made a comprehensive overview of bird mortality patterns by synthesising results from fatality monitoring studies at 10 photovoltaic solar facilities across 13 site-years in California and Nevada. Study identified variability in the distribution of avian orders and species among and within Bird Conservation Regions and concluded that a cause of mortality could not be determined for approximately 61% of intact carcasses introducing uncertainty into the interpretation of the fatality estimates. The study estimated an average annual fatality rate of 2.49 birds per megawatt per year for a PV Plants.

A recent study in the UK[14] found no peer-reviewed papers to support claims that PV panels were causing mortality in birds, although it should be noted that no UK or European studies could be found. PV panels inevitably present some risk of collision mortality to birds as likely as collision with any fixed object or man-made structure, such as fences, towers or buildings (Drewitt and Langston, 2008). There is no firm evidence of large numbers of bird strikes associated with PV panels. Although, there is some concern that waterfowls might be attracted to PV panels, mistaking them for water surfaces, there is little evidence for this (http://ww2.rspb.org.uk/Images/Renewable_energy_report_tcm9-297887.pdf).

The Karapinar IBA is designated due to its support function for overwintering Greater White-fronted Goose however data included on the IBA citation is historical and over 20 years old . The function and habitat value of the IBA for this species has significantly changed since the cited population count. Wetlands associated with the IBA and Ramsar site are much diminished through over abstraction of water for agriculture. In addition populations of Greater White-fronted Goose within Turkey are considered to have reduced from c150,000 to c10,000 over recent years as a result of hunting pressures. This population decline within Turkey is also likely as a result of global climate change which have altered migration patterns of overwintering wildfowl as warmer winter temperatures reduces southerly and westerly migration movements[15].

In the light of above, the potential negative impacts on avifauna species associated with PV panels glare and resembling water bodies are considered to be minor, both in terms of likelihood of impact as well as the significance of the Project site and wider IBA for wintering wildfowl. However, it is recommended to monitor bird fatalities and panel appearance at the Project Site during operations. Applying hedgerows between sections may reduce collision risks to waterfowl.

No impact in terms of population decrease is expected as a result of collision, displacement or barrier effect.

ETLs are expected to have considerable impact on birds as they are important mortality factor for soaring birds. In most cases, accidents on over-ground powerlines lead to severe injuries or immediate death. Electrocution harms mostly birds sitting on the ground rail or having ground contact. Current passage through the body causes primary damages to tissues and impaired functions: muscles and nerves abruptly stop functioning. The bird will fall from the pole and crash onto the ground, where the bird suffers further serious injuries. In case of collision accidents, birds crash at high flight speed into cables or wires. The resulting injuries vary widely and are comparable to traumata caused by collisions with cars.

Most of the target species, some of which are endangered such as Egyptian vulture, were spotted near the existing ETLs. Also, when the identified migration routes in the Project Site are assessed in relation of the planned ETL routes it is anticipated that the 400kV ETL lines and towers will partially coincide with the migration routes of soaring birds. Soaring birds such as storks, eagles, vultures and other raptors are reported to be commonly affected by power lines with considerable risk on birds flying at heights between 20m and 50m.

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[14] Taylor, R., Conway, J., Gabb, O. & Gillespie J. (2019). Potential ecological impacts of ground-mounted photovoltaic solar panels.

[15] Pavon-Jordan et al (2020) Positive impacts of important bird and biodiversity areas on wintering waterbirds under changing temperatures throughout Europe and North Africa Biological Conservation Volume 246, June 2020

Because of their long-suspended insulators, the risk of electrocution by High Voltage powerlines are reported to be low while death by collision with the cables poses much higher risk. On the other hand, powerlines where the conductor cables are arranged at different heights (multi-level arrangements) and with neutral cables high above the conductor cables are known to pose more threat while the powerlines with conductor cables arranged at one height (single-level arrangement) pose less risk of collision.

5.6.4.3 *Decommissioning Phase*

The project is not expected to be decommissioned at least for 30 years. Impacts during decommissioning are expected to be temporary and the magnitude of the impact will depend on how much of the infrastructure is removed. Decommissioning is expected to have a moderate adverse impact significance on the ecological features within the Project AOI, given similar factors highlighted during construction in section 5.6.4.1 for both. Once fully decommissioned and the habitats recovered from disturbance, the long-term impact significance is likely to be moderate positive following the reinstatement of native vegetation and colonisation by animal species.

Table 5-64: Significance of Land Preparation and Construction-Phase Impacts on Biodiversity

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Habitat loss / degradation, disturbance, increased injury and mortality							
Priority habitats: E6.2 Continental Inland salt steppes	Medium	Long-term	Local	One-off	Low	Moderate	Moderate
Widespread endemic flora	Low	Long-term	Local	One-off	Low	Moderate	Minor
Other Habitats (Modified / degraded)	Low	Long-term	Local	One-off	Low	Low	Negligible
Anatolian Ground Squirrel - *Spermophilus xanthoprymnus*	Medium	Long-term	Local	One-off	Medium	Low	Moderate
Common Tortoise - *Testudo graeca*	High	Long-term	Local	One-off	Low	Low	Moderate
Lizard of Anatolian - *Parvilacerta parva*	Low	Long-term	Local	One-off	Low	Low	Negligible
Other Fauna species in the AOI with less conservation value	Low	Long-term	Local	One-off	Low	Low	Negligible
Target bird species: Eastern imperial eagle - *Aquilla heliacal* Egyptian vulture - *Neophron percnopterus* Steppe eagle - *Aquila nipalensis* Eurepean turtle dove - *Streptopelia turtur*	High	Long-term	Local	One-off	Low	Low	Minor

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Breeding bird species using the AOI (not observed during the field surveys)	Medium	Long-term	Local	One-off	Low	Low	Minor
Destruction of Breeding/Roosting Sites							
Fauna	Medium to High	Medium-term	Local	One-off	Low	Low	Moderate
Target bird species	High	Medium-term	Local	One-off	Low	Low	Moderate
Breeding bird species	High	Medium-term	Local	One-off	Low	Low	Moderate
Indirect Environnemental Impacts (dust, noise, waste, etc.)							
Priority habitats	High	Short-term	Local	Intermittent	Low	Low	Moderate
Widespread endemic flora	Low	Short-term	Local	Intermittent	Low	Low	Negligible
Fauna	Low to High	Short-term	Local	Intermittent	Low	Low	Negligible to Moderate
Target bird species	High	Short-term	Local	Intermittent	Low	Low	Moderate
Breeding bird species	Medium	Short-term	Local	Intermittent	Low	Low	Minor

Table 5-65: Significance of Operation-Phase Impacts on Biodiversity

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Intensity		
Disturbance, injury / mortality associated with collision impacts / road casualties							
Collision with PV Panels							
Waterfowls	Low to Medium	Long-term	Local	Intermittent	Medium	Moderate	Minor
Target bird species	High	Long-term	Local	Intermittent	High	Low	Moderate
Breeding bird species	Medium	Long-term	Local	Intermittent	High	Low	Minor

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
Collision with ETLs and ETL towers							
Target bird species	High	Long-term	Local	Intermittent	High	High	Major
Breeding bird species	Medium	Long-term	Local	Intermittent	High	High	Major
Collision with Vehicles							
Anatolian Ground Squirrel - *Spermophilus xanthoprymnus*	Medium	Long-term	Local	One-off	Low	Low	Moderate
Displacement							
Fauna	Low to Medium	Medium-term	Local	One-off	Low	Moderate	Moderate
Target bird species	High	Medium-term	Local	One-off	Low	Negligible	Negligible
Breeding bird species	Medium	Medium-term	Local	One-off	Low	Moderate	Moderate
Indirect Environmental Impacts							
Priority habitats	High	Short-term	Local	Intermittent	Low	Negligible to Low	Moderate
Widespread endemic flora	Low	Short-term	Local	Intermittent	Low	Negligible to Low	Negligible
Fauna	Low to High	Short-term	Local	Intermittent	Low	Negligible to Low	Negligible to Moderate
Target bird species	High	Short-term	Local	Intermittent	Low	Negligible to Low	Moderate
Breeding bird species	Medium	Short-term	Local	Intermittent	Low	Negligible to Low	Minor

5.6.5 Mitigation Measures

Project Specific Biodiversity Management Plan (BMP) will be developed and implemented throughout the Project lifetime with the main objective of achieving “no-net-loss” of biodiversity, including the Annex I Salt Steppe habitat, in accordance with IFC PS 6 and associated guidance notes. The Project will not affect features for which the KBA, IBA or IPA are considered to be important. A conceptual framework for the mitigation hierarchy (avoid, reduce, remedy and offset) is presented in Figure 5-67. BMP will include the mitigation pan set out in the sections below, along with details of monitoring which will be completed at the pre-construction, construction, operation and decommissioning of the Project..

In order to reach habitat and species conservation targets, the mitigation hierarchy approach has been adopted to be implemented throughout the Project life-cycle in managing impacts on biodiversity to achieve no-net-loss.

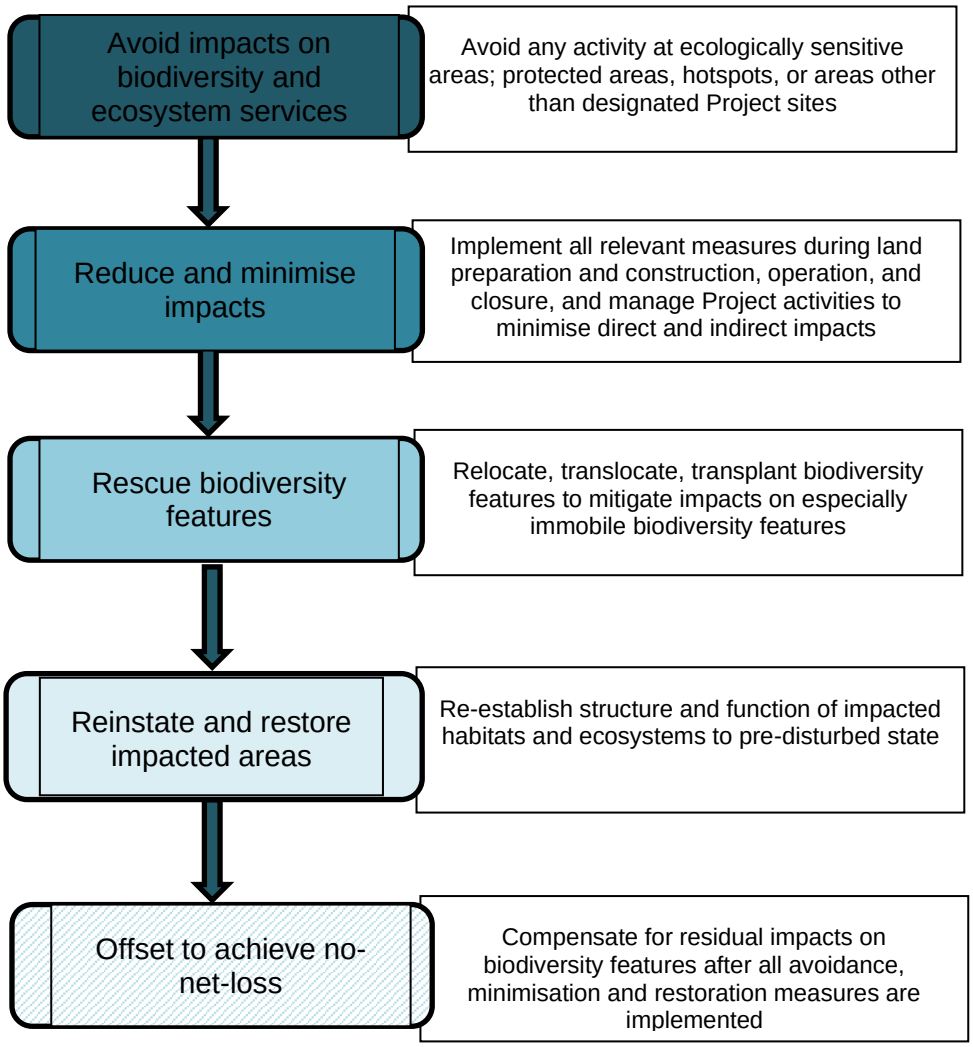

Figure 5-67: Mitigation Hierarchy

For each group of biodiversity features that has been subject to impact assessment, the mitigation hierarchy presented in Figure 5-67 has been considered.

5.6.5.1 *Generic Mitigation Measures*

The following generic mitigation measures will be applied throughout the Project:

- All construction and operational working areas will be kept to a minimum to reduce habitat loss.
- All type of impact on natural habitats outside the Project footprint will be avoided during land clearance and topsoil removal;
- Boundaries of the construction areas, including traffic routes, will be limited only to designated sites.
- On-site vehicle speed limits will be implemented to avoid potential road-kills;
- Dust suppression measures, such as water sprays, will be implemented for reduction of dust during the working period.
- All construction and operational activities will comply with the international guidelines on the prevention and management of alien plant and animal species across the Project.
- During vegetation clearance or felling, any animals found should be removed and released to a safe refugia.
- All workers involved in Project activities will be made aware of the environmental and ecological sensitivities (natural habitats and threatened and protected species) of the region, the Project site and project activities. Staff will be provided with relevant information through staff induction, toolbox talks, leaflets and office posters.
- The lighting of the project site will be kept to a minimum, and sensory lighting systems will be considered instead of night-long active lighting. Lights will be directed downwards;
- A ban will be enforced on workers killing or trapping wild animals, for food or trade. Signage will be installed to reinforce the hunting ban throughout the project areas.

5.6.5.2 *Mitigation Measures for Terrestrial and Aquatic Habitats and Flora*

All construction and operational working areas will be kept to a minimum to reduce habitat loss and degradation. Off-road access will be prohibited. Plans will be implemented to minimise all construction traffic activities. Dust suppression measures will be implemented during the working periods.

The BMP will provide further guidance however the mitigations will include the following practices at minimum:

- Soil removed from construction sites will be stored and used in the restoration.
- Select the location of the stockpiles with consideration of environmental safeguards
- Habitats affected temporarily during construction will be restored/reinstated on a ‘like-for-like or better principle’, using the species recorded during the pre-construction and baseline surveys (native species only).
- Areas of Salt Steppe habitat within the project site will, where reasonably practicable, be avoided and if this cannot be achieved habitat will be reinstated after during the operations phase of the project. The predicted impact of the Project is considered to be minor and the majority of terrestrial habitat within the Project area will remain unaffected as habitats and floral species will persist under and between the PV panels.
- The Project will not impact on any flora species that are included on the IPA citation as none of these species were recorded during the baseline surveys. If any of these species are recorded during the pre-construction surveys the BMP will be updated accordingly and additional mitigation will be completed.
- All species used in the habitat restoration will be native and if possible, seeds will be collected from within the wider KBA / IPA as part of the habitat restoration plan. Species to be developed on the site should be suitable for Salt Steppe habitat but should include those species listed on the KBA / IBA citation in order to achieve a net-gain in these species. The site will be fenced and it is therefore considered that establishment of these plants and habitat units will be very successful due to removing grazing pressures from the site during construction and operation of the Project . No introduction of non-native plant species will be allowed. Where restoration is not possible on site (eg under the footprint of the permanent structures), similar habitat will be created off-site and again these habitat reinstatement work will include the development of plant species for which the KPA / IPA are important.

- Limit the Project activities with the boundaries of the construction area, including traffic routes to avoid impact on the adjacent vegetation;
- Preserve vegetation as much as feasible
- Keep land clearance of natural vegetation at minimum and restricted to designated sites
- Avoid dumping excavated soils on natural habitats including the small wetland located to the south-east of the Project Site;
- Stabilise all destructed habitats and rehabilitate as early as possible
- Clear vegetation before nesting seasons of animals identified in the area
- Prior to clearing the extent of clearing areas will be clearly marked out with appropriate flagging material
- Clearing is to be to be carried out in a sequential manner and in a way that directs escaping wildlife away from clearing and into adjacent native vegetation or natural areas of their own volition
- If non-mobile fauna are found prior to or during clearing activities, it shall be relocated from the clearing area to a safe and suitable location containing the microhabitat features, preferably within 200 m of the capture location;
- Train on-site employees to be aware of significance of habitats and species, nests of fauna species, to avoid any destruction or displacement without an expert opinion on the status of the nests. Collaborate with biodiversity experts to implement a training and awareness program.
- Develop and implement Biodiversity Management Plan
- Ensure proper waste disposal avoiding natural habitats
- Avoid any destruction to habitats other than those at designated construction sites
- Allow for adaptive management and take additional measures if needed
- There will be no direct discharges of any pollutants to the aquatic habitats (i.e. small wetland located to the south-east of the Project Site.

5.6.5.3 *Mitigation Measures for Terrestrial Fauna*

Ban on Hunting

A ban on hunting by construction and operation staff will be implemented to reduce pressure on species protected species in the Project areas and surroundings. All construction and operation staff living at the Project site will be required to follow company rules and code of conduct. Signage will be installed illustrating the hunting ban on any species throughout the Project areas.

Collision

It is recommended to consider single level arrangement of powerline cables where applicable through the 400kV ETL and to fit ETL towers and powerlines with bird flight diverters / deterrents and/or static wire-marking to minimise potential risks on soaring birds in the area. Ensure the diverters are visible to birds at night. The pylon design should be appropriate to avoid electrocutions A programme of operational monitoring will be developed and included in a Biodiversity Management Plan and this will include searches along the ETL to check for victims of collision. Additional mitigation works will be completed if the 400kV ETL line is shown to be having a significant impact on birds. Collision monitoring will also include surveys within the Project area to ascertain the level, if any, of mortality caused by the PV panels.

Displacement and Loss of Breeding/Rooting Sites

Management strategies and mitigation measures addressing appropriate removal of topsoil and vegetation will be implemented to ensure no individuals are killed or no galleries are destructed and populations of the species continue to survive in the area. Mitigation Measures described in 5.6.4.4 will be applied for minimising potential negative impacts on fauna species.

Breeding, Foraging and Wintering Birds

To minimise the potential impact to all breeding bird species, vegetation clearance will be undertaken outside of the main bird breeding period if possible. Where this is not possible, the areas to be cleared will be checked for breeding birds prior to the clearance and if nesting birds are found, appropriate mitigation measures will be implemented. This may involve avoiding construction within 50m of the active nest until the chicks have fledged.

5.6.5.4 *Mitigation Measures to prevent intrusion and spread of invasive species*

Number of Invasive plant Species were identified with the AOI. 15 of these were listed under IUCN's IAS Database and three species were listed under Turkey's IAS Database.

IFC PS6 (IFC, 2012a) includes the following best practice measures with regard to IAS:

- Must not intentionally introduce alien species unless this is in accordance with existing regulatory framework
- Must not deliberately introduce IAS irrespective of regulatory framework
- Introduction of alien species (eg in planting) must be subject to a risk assessment
- Implement measures to avoid accidental introduction or spreading of alien species (see below)
- Consider the implementation of measures to eradicate IAS from natural habitats over which Kalyon has management control

In the absence of industry specific guidance, construction and operational activities on this Project will comply with international guidelines on the prevention and management of IAS (IPIECA & OGP, 2010). Preventative, control and monitoring measures will need to be implemented with regard to the following aspects of the Project:

Packaging and movement of materials:

- Minimise traffic and the distance it has travelled
- Source goods/materials locally where possible
- Contain any IAS and report their presence

Vehicles and plant:

- As-new' wash-down is essential before entering non-infested areas and after working in infested areas
- Train and raise awareness regarding IAS
- Pressure wash vehicle tyres in a contained area
- Contain and destroy residue
- Record and report the presence of any IAS

Soil and vegetation:

- Minimise disturbance to, or movement of, soil and vegetation
- Prevent soil damage and erosion
- Ensure imported soil/other materials are safe and free of IAS (source from a reputable supplier, request information on the soil's origin and certification of IAS free status if possible)
- Prevent IAS establishment on exposed stored soil (do not store bare soil near known sources of IAS, consider using matting to cover exposed soil)
- Ensure infested material is disposed of safely
- Retain as much natural vegetation as possible

Landscaping and Reclamation:

- Use native plants for reinstatement and landscaping
- Assess any non-native species (to be used in landscaping) for IAS potential
- Consider that some IAS may be soil-based
- Avoid altering soil and water body properties

It has to be mentioned that not all the above measures will need to be implemented; risk screening will need to be undertaken by the contractor for each construction site and this will inform the implementation of the most appropriate prevention and control measures.

5.6.5.5 *Mitigation Measures to prevent Indirect Impacts*

There will be Project specific Dust and Air Quality Management Plan, Noise Management Plan, Waste Management Plan and Pollution Prevention Plan in place and implemented during the Construction Phase. Similarly, Operation Environmental and Social Management Plan and sub-plans will be implemented during operations to comply with international standards and GIIP to minimize dust and noise emissions, and implement all necessary measures in line with the Project management plans which will minimise indirect impacts on biodiversity features.

Noise

The following measures will be implemented to reduce noise levels and disturbance to wildlife:

- Avoidance of unnecessary revving of engines and switch off equipment when not in use
- Vehicles and equipment will be properly maintained to meet the manufacturers' noise rating levels. Any silencers or bearings which become defective would be replaced as soon as possible
- Using reverse warning systems incorporating broadband noise where practicable
- Using enclosures for noisy plant such as pumps or generators
- Minimising drop height of materials
- Limiting the use of particularly noisy plant or vehicles where practicable
- Plant and vehicles will be operated with noise control hoods closed

Control of Artificial Lighting

Artificial lighting used on construction sites and camps at night will be shaded and directed downwards to avoid light spillage and disturbance to birds or other wildlife.

Dust

Dust suppression measures will be employed as necessary during the construction, operation and decommissioning phases of the Project. These measures will include the use of water to supress the spread of dust and or modifying site wide speed limits.

5.6.6 Residual Impact

Implementation of the mitigation hierarchy and mitigation measures addressing each potential impact on biodiversity, residual impacts that might incur when avoidance, minimization and restoration measures are taken are summarized in Table 5-66, with the assumption that all recommended mitigation measures are in place.

Table 5-66: Residual Impact Significance on Biodiversity Receptors

Receptor	Impact Significance
Habitat loss / degradation, disturbance, increased injury and mortality	
Priority habitats: E6.2 Continental Inland salt steppes	Minor
Widespread endemic flora	Negligible
Other Habitats (Modified / degraded)	Negligible
Anatolian Ground Squirrel - *Spermophilus xanthoprymnus*	Minor
Common Tortoise - *Testudo graeca*	Minor
Lizard of Anatolian - Parvilacerta parva	Negligible
European Pond Turtle - Emys orbicularis	Negligible
Other Fauna species in the AOI with less conservation value	Negligible
Target bird species: Eastern imperial eagle - *Aquilla heliacal* Egyptian vulture - *Neophron percnopterus* Steppe eagle - *Aquila nipalensis* European turtle dove - *Streptopelia turtur*	Negligible
Breeding bird species using the AOI (not observed during the field surveys)	Negligible

Receptor	Impact Significance
Destruction of Breeding/Roosting Sites	
Fauna	Minor
Target bird species	Minor
Breeding bird species	Minor
Indirect Environnemental Impacts (dust, noise, waste, etc.)	
Priority habitats	Minor
Widespread endemic flora	Negligible
Fauna	Negligible to Minor
Target bird species	Minor
Breeding bird species	Negligible

Table 5-67: Significance of Operation-Phase Impacts on Biodiversity

Receptor	Impact Significance
Permanent Habitat Loss, disturbance, increased injury and mortality	
Priority habitats: E6.2 Continental Inland salt steppes	Minor
Widespread endemic flora	Negligible
Other Habitats	Negligible
Anatolian Ground Squirrel - *Spermophilus xanthoprymnus*	Minor
Common Tortoise - *Testudo graeca*	Minor
Lizard of Anatolian - Parvilacerta parva	Negligible
Target bird species: Eastern imperial eagle - *Aquilla heliacal* Egyptian vulture - *Neophron percnopterus* Steppe eagle - *Aquila nipalensis*	Negligible
Breeding bird species	Negligible
Collision with PV Panels	
Waterfowls	Negligible
Target bird species	Minor
Breeding bird species	Negligible
Collision with ETLs and ETL towers	
Target bird species	Moderate
Breeding bird species	Moderate
Displacement	
Fauna	Negligible
Target bird species	Negligible
Breeding bird species	Negligible
Indirect Environmental Impacts (dust, noise, waste, etc.)	
Priority habitats	Negligible

Receptor	Impact Significance
Widespread endemic flora	Negligible
Fauna	Negligible to Moderate
Target bird species	Minor
Breeding bird species	Negligible

5.6.7 Monitoring Requirements

Project specific Biodiversity Monitoring will be detailed in a separate Biodiversity Management Plan (BMP) in order to validate the accuracy of predicted impacts and risks to biodiversity values posed by the project, and the predicted effectiveness of biodiversity management actions so that the project achieves a net gain. The monitoring and evaluation program will include the following: (i) baseline, measures of the status of biodiversity values prior to the project's impacts; (ii) process, monitoring of the implementation of mitigation measures and management controls; and (iii) outcomes, monitoring of the status of biodiversity values during the life of the project, compared to the baseline during construction and operation. Specific thresholds will be set for monitoring results that will trigger a need to adapt the management plan(s) to address any deficiencies in performance. The programme will cover methods in line with IFC PS 6 and accompanying Guidance Note (GN6) as well as PS 1.

5.6.7.1 Habitat and Flora Species

Vegetation surveys will be completed as part of the operational monitoring which will be undertaken across the Project site, including along the ETL. Surveys will be completed to ascertain the level of plant cover across the site as well as its species composition and abundance. The results of the surveys will be compared to studies completed to inform the EIA. Corrective actions will be taken as necessary to ensure that the project results in a net gain of the Annex 1 habitat within the Project area, including the ETL. Additional works will be completed based on the results of the survey.

Habitat surveys will also be completed once the project has been decommissioned (Year 1 and Year 5) to demonstrate the overall impact of the Project on flora. Additional works including habitat reinstatement or additional seeding will be completed based on the results of these surveys.

5.6.7.2 Mammals, Amphibians and Reptiles

Operational impacts are not predicted to be significant however site staff will be asked to record mammal, amphibian or reptile fatalities on the site roads and this information will be passed on to the Project Ecologist. Corrective actions including signage, decreasing of site wide speed limits or if necessary, construction of animal tunnels will be considered.

Surveys will be completed across the site to record the presence and distribution of ecological receptors including Anatolian Ground Squirrel, Common Tortoise and other species of mammal, reptile and amphibians. Surveys will be completed in Years 1 and 5 of operation and the results compared to the surveys completed to inform the ESIA.

5.6.7.3 Avifauna

Bird surveys will be completed at the Project site as well as the wetland area 1.5km south-east. These surveys were commenced in March 2021 with the aim of recording Greater Sandplover within the Project area and adjacent wetland. Initially, two surveys have been carried out in March and April.

During construction, construction areas will be checked for breeding bird activity and if recorded breeding activity will be allowed to finish prior to the area being cleared.

Winter bird surveys will be completed in 2021 within the Project area as well as the adjacent wetland and the wetlands within the wider IBA. One survey will be completed in each month from October 2021 to March 2022.

Once the Project is fully operational, operational bird surveys will be completed in Year 1 and Year 5. Operational bird surveys will consist of breeding bird surveys and timings and frequency will be determined on the results of the pre-construction survey but are likely to consist of three or four visits between February / March and June. In addition to the breeding bird surveys, winter bird surveys will also be completed in Years 1 and 5. A single visit per month will be completed across the Project site and wider IBA in each month from October to March.

Operational carcass searching surveys will be completed across the Project area including the ETL. Carcass surveys will be completed for at least the first year of operation. The frequency of these surveys will be determined based on the results of scavenger removal and searcher efficiency trials. Additional measures to protect birds may need to be implemented based on the result of the operational surveys, including the carcass searches.

Survey methods will be included in a Biodiversity Management Plan (BMP).

5.6.7.4 Introduction and Spread of IAS

During construction, visual checks will be undertaken for the accidental introduction or spread of alien, invasive species, especially plant species which may be brought into the areas from construction activities (on vehicles, in any imported materials). Checks by a qualified ecologist will be undertaken around all major working areas in the Project Site and under the ETLs monthly. Measures to remove/eradicate any species introduced, if found, will be put in place.

Especially during any restoration/rehabilitation work to be conducted, the approach would be to give preference to native species and those that have higher adaptive capacity. Necessary screening will be conducted to avoid any accidental introduction.

6 SOCIO-ECONOMIC IMPACTS AND MITIGATION MEASURES

This section identifies the social impact of Karapınar SPP Project on the surrounding communities. This social impact assessment (SIA) intends to determine whether the proposed Project has the positive and adverse effects on individuals, households and institutions.

The key objectives of the study are to:

- Identify potential project-related social impacts across the whole operational life cycle, from exploration through to decommissioning phases,
- Evaluate the social-economic impact of the proposed interventions on the households and investigate whether certain social groups would be adversely affected,
- Avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on affected communities,
- Provide support in the planning and management of community initiatives,
- Identify key stakeholders and propose an appropriate plan for their participation in project design and implementation.

6.1 METHODOLOGY

The social impact assessment study requires the interpretation of both primary and secondary data gathered to address past and present conditions of the project-affected communities. Household and settlement questionnaires were planned to be conducted in the settlements for gathering information about the existing socio-economic conditions of the affected households and attitudes toward the Project. However, it was not possible to conduct these questionnaires because of the coronavirus disease (COVID-19). COVID-19 has been characterized as a pandemic by the World Health Organization. Given the recent developments in COVID-19, changes were made in the interview program to ensure the health and safety of the staff/surveyors and the local community. Thus, conducting of households and settlements questionnaires were cancelled. Observations and key informant interviews were carried out on the project sites on 16-18 June 2020, with informants identified and selected based on their proximity to and relevance for the Project, including district headmen and local community members. At this stage, vulnerable populations were not directly contacted to minimise risk of COVID-19 transmission.

Files and records were also reviewed as part of this visit, including the following:

- Kalyon Organization Chart
- Construction Camp Management Plan
- Recruitment Procedure
- Construction Safety Management Plan
- Quality Management System certificates
- EIA Report and its annexes
- Project introduction presentation
- Institutional opinion letters about the project (Refer Appendix A for opinion letters)
- Construction Environmental and Social Management Plans

The interviews concerned people's experiences about the project, their income sources, agricultural activities, livestock farming, infrastructure in the project area etc. and were carried out qualitatively, starting with open-ended questions on topics.

Data for the social impact assessment are obtained from the following sources:

- Secondary data;
- Depth interview with key informants;
- Participant observation.

For the baseline socioeconomic assessment studies, the general data/information on Konya Province is gathered from the institutional and research reports of Turkish Statistical Institute where necessary. In addition, numerical data specifically related to Karapınar District was obtained, where possible, to reflect the characteristics within the project influence area. However, district-based information is limitedly available in official resources, therefore face to face interview approach is frequently applied during the site visits.

6.1.1 SIA Revision

An additional site visit was conducted from 28 October to 1 November 2020 with the aim of addressing gaps previously identified within the SIA, as shown in the below table.

Table 6-1: Methodology for SIA revision

#	Topic	Gaps identified in October 2020	How the gaps were addressed
1	Economic displacement impact	Initial ESIA studies conducted found that the project site, comprised primarily of pasture lands, is regularly used by an undetermined number of households in local communities for livestock grazing (sheep and goats) during the summer season. Currently, there is no detailed information available on the precise number of households that may be affected, demographics of these households, level of dependency on livestock grazing as a source of income, and the nature and extent of economic displacement that they may experience from the project. Given the lack of such information, appropriate mitigation measures to minimise any potential economic displacement impacts have not been identified to date.	The following consultations were conducted to confirm whether economic displacement impact would take place, and obtain more demographic data on the applicable households: • Private meetings conducted with the 60 livestock owners and herders, to identify all herders that make use of pasture lands for sheep and goat grazing activities, verify their understanding of potential project impacts and mitigation measures, identify their key concerns and expectations from the project, and conduct household questionnaire on herding activities • Private meetings with Kalyon to verify the nature of the displacement impact, such as access and usage restrictions on the project site for herders Refer to baseline section 6.2.5 and impact assessment section 6.3.1 for further details.
2	Additional economic displacement	There is currently lack of clarity regarding the current ownership and usage status of the barns, and number of barns present on the project site.	Consultations were conducted with the barn users to verify the current status of the barns with regards to their ownership and usage status and purpose, as well as any previous engagement activities and compensation and/or support provided to the barn owners users by the Project. Refer to section 6.3.1.1 for details.
3	Stakeholder engagement and consultations	The ESIA lacks information on the consultation methodology used, including: • List of relevant stakeholders and stakeholder groups at the local, regional and national levels • The criteria used to determine the key informant stakeholders • Details on the consultations conducted including the exact number and types of stakeholders interviewed, location, key issues discussed and the Project's responses and/or how the issues would be addressed in the final ESIA • All documentation reviewed as part of the consultation process	The stakeholder engagement and consultation chapter (section 8.5 of this document) and the Stakeholder Engagement Plan (SEP) have been updated with the missing details identified, as well as information gathered from the additional consultations conducted.
4	Social baseline data	There is conflicting information available about the seasonality of the residential settlements located to the west of the project area, within the boundaries of	Consultations with the households residing in the five local settlements within Reşadiye Neighbourhood clarified the number of permanent and temporary

		Reşadiye Neighbourhood, with some sources indicating that some of the residents are permanently based there, while others indicate that the settlements are only used for animal husbandry activities rather than as residential households.	settlers. The baseline section 6.2.3 has been updated accordingly.
5	Cumulative impact	A road widening project is planned by the Municipality and Highway Directorate for the road connecting the project site to the five nearby settlements. The nature and scale of potential impacts of this on local communities on aspects including traffic, health, safety and security and pollution have not yet been identified. While this road project is not considered associated infrastructure of the project, the pedestrian passages created may have implications for the internal project roads to be set up.	Consultations have been conducted with the Municipality and Highways Directorate regarding the Project Planning of the Road Widening Project. According to the information gathered from these agencies, the road rehabilitation project would not commence before March 2021. The Highways Directorate has indicated that they may consider constructing mitigation measures such as underground passages or pedestrian bridges as part of their project, only if requested by the local community members. The Project Company will relay this information to the local herder households as part of its stakeholder engagement process. Refer to section 6.3.1.2.1.

This additional site visit in October-November 2020 comprised meetings with the Project Company, headmen of Reşadiye District and Fatih District, 60 households within the five local settlements[16] who carry out livestock herding activities, and the household who previously occupied the Project area for economic activities. Documentation, including the questionnaire forms conducted with the 60 households and list of meetings held as part of this visit, have been produced.

As stated in the SEP, the consultations conducted were Covid-19 secured in line with the IFC/EBRD briefing note on stakeholder engagement during the Covid-19 crisis (April 2020)[17]. The findings of these meetings are reflected in the respective baseline and impacts chapters below.

6.1.2 Assessment Approach

Social impacts may be defined as “impacts on the lives of individual people or groups or categories of people, or forms of social organization” (Adams, 2000). In the Guidelines and Principles for Social Impact Assessment (2003) prepared by the Interorganizational Committee in 2003 the notion of social impacts is defined as follows: “The consequences to human populations of any public or private actions-that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society”. The term also embodies all human impacts including cultural impacts, community impacts, infrastructural impacts, gender impacts, resource issues, political impacts etc.

According to Vanclay (2002) social impacts may cause one or more of the following changes:

- People’s way of life;
- Their culture;
- Their community;
- Their natural environment;
- Their health and wellbeing; and
- Their fears and aspirations.

Many researchers define project affected/impacted people in different ways. When the affected communities are examined, the range of possible affected groups or categories is very wide. As Adams (2000) points out, ‘interested and Affected Parties’ as a better way refers to the whole range of winners and losers from the project construction. These groups are heterogeneous and gendered.

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[16] Büyükkarakuyu, Kucukkarakuyu, Kirkitoğlu, Ekmekçi and Seyithacı

[17] https://www.ebrd.com/covid19-consultation.pdf

Positive and negative social and economic impacts/costs of any projects are rarely distributed evenly. As the impacted communities are themselves heterogeneous, there can be significant disparities in impacts, particularly among different socio-economic groups/categories.

All potential impacts; negative/positive, long term/short term, planned/unplanned, expected/unexpected should be taken into consideration together in a social impact assessment. Interdependency and mutual interaction among all sorts of impact complicates impacts to be separately assessed.

Relevant standards for social impacts are outlined in the following sections.

6.1.3 Project Standards

Project related national and international standards are outlined in Section 3 of the ESIA Report. SIA has been prepared in compatibility with the following legislation and standards:

- Turkish national regulations (Environmental Assessment Regulation, Official Gazette, 2014).
- Standards set by international financial institutions: European Bank for Reconstruction and Development (EBRD) (2019) Environmental and Social Policy and Performance Standards (2012) on the Environmental and Social Sustainability of the International Finance Corporation (IFC).

6.2 BASELINE CONDITIONS

This section provides social and demographic characteristics of the settlements located around the proposed Project site. Baseline information presented in this section is based on secondary data sources such as census data, geographical data (including maps), and national and local government statistics, documentation from community-based organizations. Many of the data included in this report are from the Turkish Statistical Institute (TÜİK). Also, depth-interviews with the Reşadiye, Fatih and Karapınar mukhtars, residences of affected settlements, representatives of government institutions and company officials were conducted to obtain baseline information. Further information on the stakeholders engaged as part of the SIA process are shown in section 8.5.4.

6.2.1 Administrative Structure

The affected settlements are within the administrative borders of Konya Province Karapınar District. The distance of Konya Province Karapınar District to the province centre is 102 km. The average height of the district from sea level is 1,026 metres. In the neighbourhood of Karapınar District, there is Aksaray Province to the north, Karaman Province Ayrancı District to the south, Karatay and Çumra Districts to the west and Ereğli District to the east. The surface area of Karapınar District is 2,939.17 km^2.

The administrative chiefdom of Karapınar District is the District Governorship subordinate to the Ministry of Interior. The district governor has been appointed to the district in October 2019. The local administration is being managed by the Municipality of Karapınar, and they took office by being elected in the local elections made in March 2019. The smallest local administration of Karapınar District central Neighbourhoods are the Neighbourhood mukhtars, who were elected in the local elections.

6.2.2 Project Affected Settlements

The project site is located 2 km north of Karapınar District centre and 93 km to Konya Province centre. The project site is within the borders of Fatih Neighbourhood, which is one of the central neighbourhoods.

Six settlements are likely to be affected by the Project. These are Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu, Küçük Karakuyu plateau settlements within Reşadiye Neighbourhood located to the west and Karapınar District located to the south of the project site. The map in Figure 6-1 shows the settlements likely to be affected by the Project.

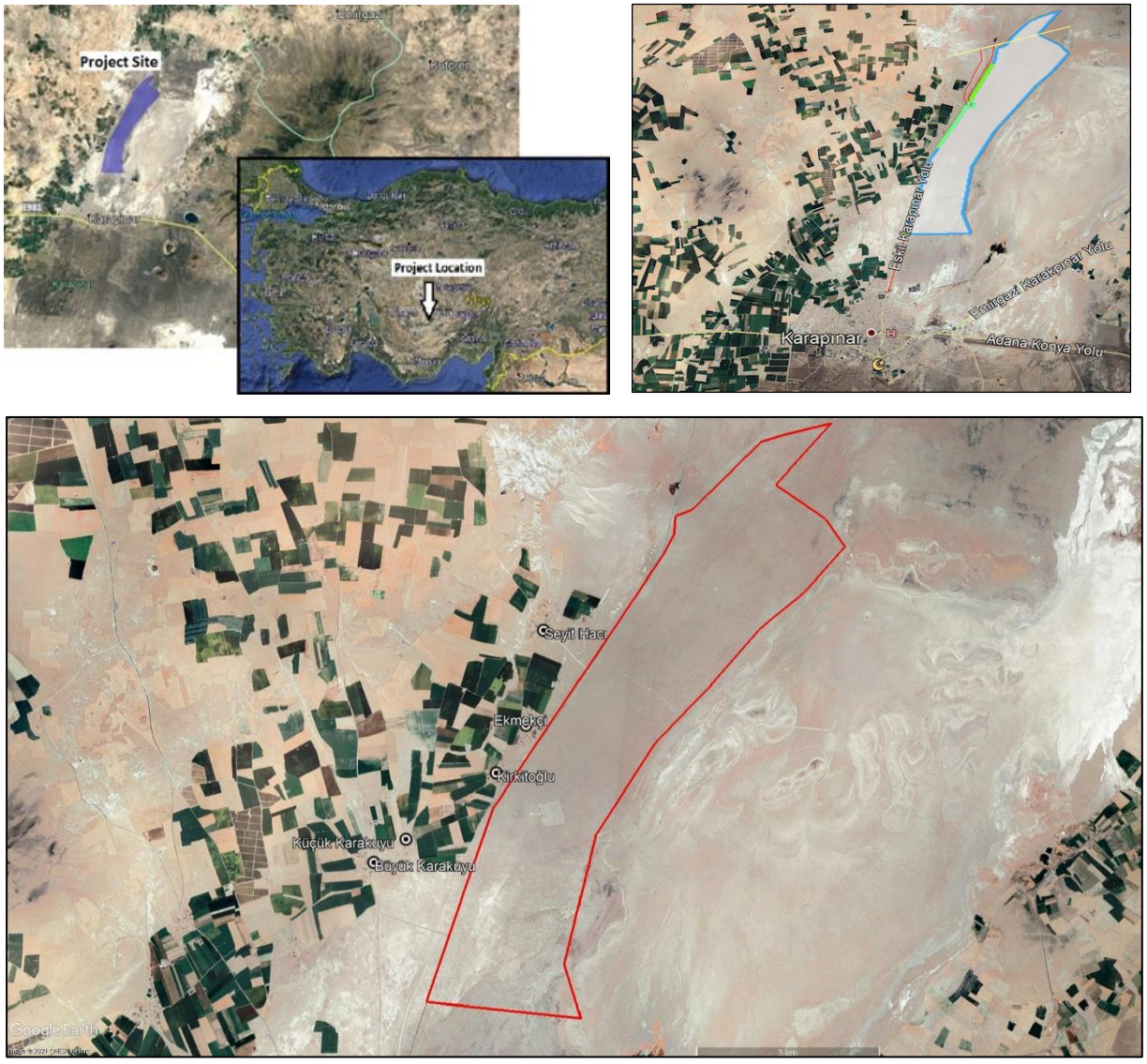

Figure 6-1: Project Affected Settlements

6.2.3 Demographic Characteristics and Ethnic Groups

According to the Address-Based Population Census of Turkish Statistical Institute, the population of the district is 49,766 as of 2018. Due to the reason that the legal statuses of villages in Konya have been abolished along with the new metropolitan law, the district's village population has been absent since 2013.

In consideration of the main population indicators, the population increase rate of Konya Province is over the average of Turkey. In addition, the net migration rate being 2.6‰ across the province shows that there is a tendency of migration outwards the province.

The majority of the population in Karapınar consists of the age range of 0-19, and there is a majority of young-middle aged population throughout the district. The fertility rate of the district is similar to the province average. As of age of 20, the young population decreases in the district. The main reason of this can be employment. In consideration of the distribution of the population in the district by gender, the female population is less than the male population. In all of the 60+ age groups, the number of females is higher than males (See Figure 6-2).

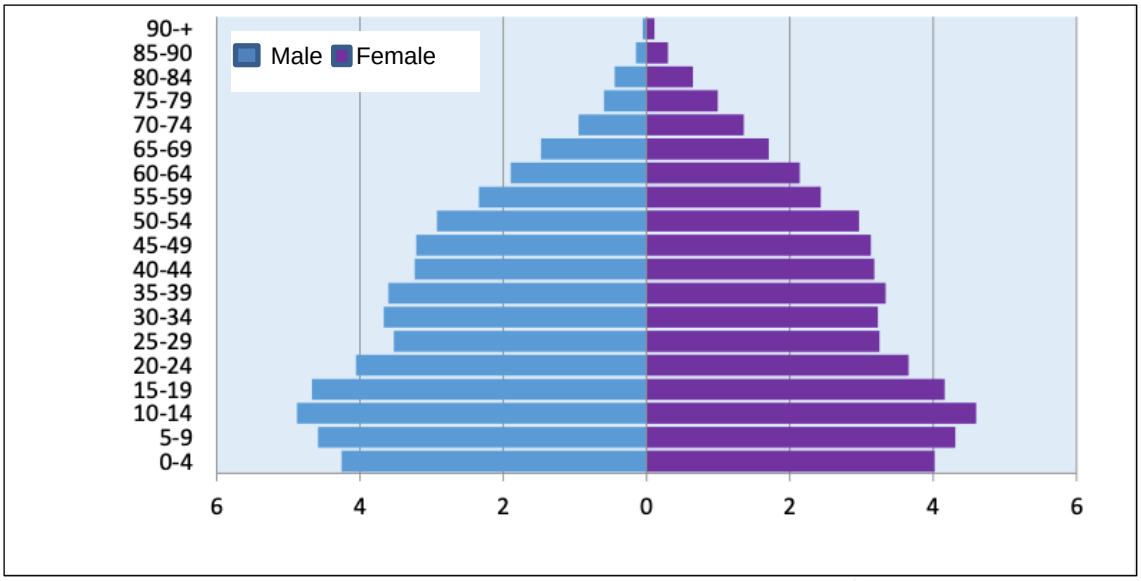

Figure 6-2: Population of Karapınar District

In examination of the distribution of the population in the district by age ranges, it is seen that the largest population is between the ages of 15 and 64 with a rate of 64.59% as of 2018. The population within the rage of 0-14 constitutes the 26.64% of the total population as of 2018. The population over the age of 65 is the 8.77% of the total population in the district. It is observed that the young population has not changed much in the recent years, and the age group of 65+ has been in a tendency to increase. In the graphic, the distribution of population in the district by age ranges can be seen over years (See Figure 6-3).

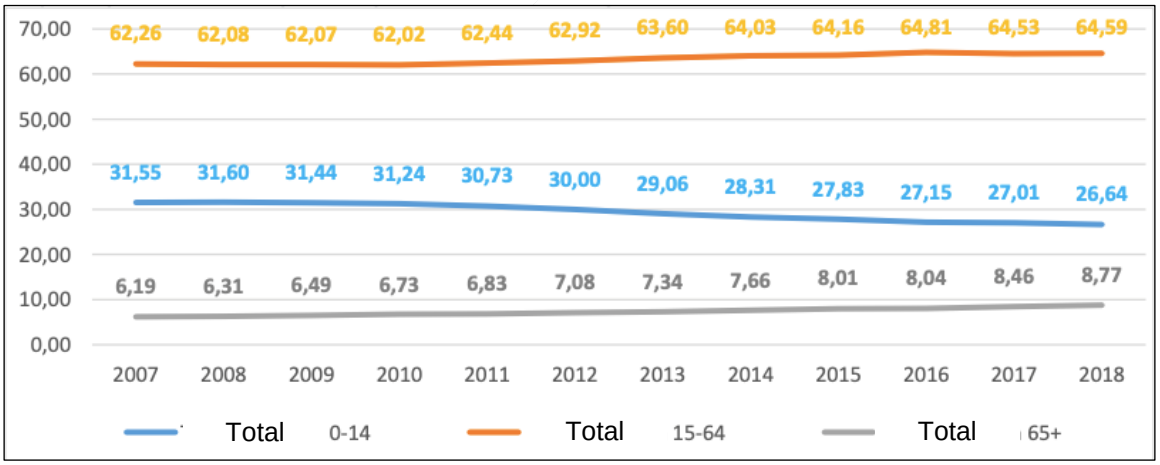

Figure 6-3: Age Distribution

In examination of the age dependency rates in the district between 2007 and 2018, it can be said that the young age dependency rate tends to decrease, even slightly, in the last 3 years. As of 2018, the total age dependency rate in the district is 54.82%, the young age dependency rate is 41.24% and the elderly age dependency rate is 13.58% (See Figure 6-4).

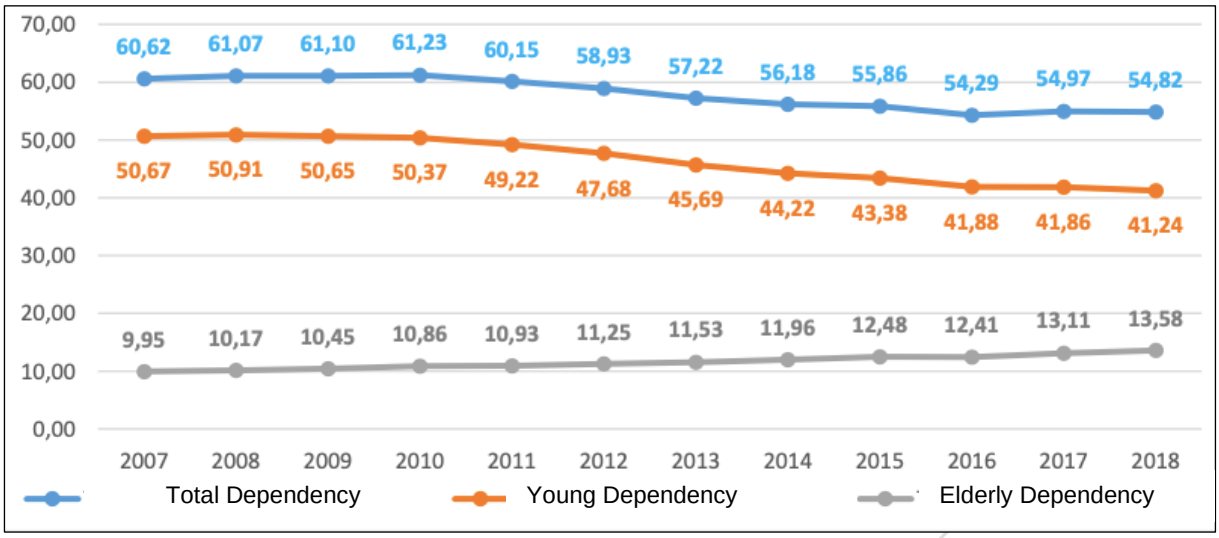

Figure 6-4: Age Dependency

The religious belief throughout Karapınar District is Islam. It has a homogeneous social structure, the mother tongue of which is Turkish. There is no minority, immigrant population or ethnical structure.

According to the information obtained in the interviews, there is no significant difference between the winter and summer population of the district.

The population of Reşadiye Neighbourhood is noted as 2,120, however only limited part of this population is based in the plateau settlements located to the west of the project site. A part of the settlements are resided seasonally for animal husbandry. Within the five local settlements of Büyükkarakuyu, Kucukkarakuyu, Kirkitoğlu, Ekmekçi and Seyithacı, 60 households raise either bovine (cow), ovine (sheep goats), or both types of cattle. Out of these 60 households, 57 of them have their main dwellings in the district center of Karapınar and only use these buildings on a temporary basis for animal husbandry activities. These activities generally take place each year between late March until the June-July period, with additional time spent in the pastures between October and November if there is autumn rainfall. Three households live here permanently.

6.2.4 Economy, Income and Employment

According to the TUIK information, 72% of the total population of Karapınar is involved in agriculture-based sectors, 4.5% in industry-based sectors, and the remaining part in service sector. As understood at this point, the district has agriculture and animal husbandry oriented socioeconomic structure. The affected communities largely rely on agriculture and the animal husbandry for their livelihood and had little or no access to formal sector work. Animal husbandry is primary livelihoods of the people of the district. Both sheep and goat and cattle husbandry are commonly carried out. It is seen that the number of sheep and goats in the district has dropped in the recent years, and sheep husbandry, which is one of the major livelihoods of the people in the district, has been replaced by ovine husbandry. On the other hand, in farming, which is one of the major livelihoods, along with initiation of irrigated agriculture in large fields besides wheat and barley, products such as corn, beet, sunflower, potato and clover has been added.

In consideration of Karapınar's contribution to the agricultural production throughout the country, it is seen that it is on the 236th place out of 872 districts in Turkey showing that its agricultural contributions are incontrovertible. Considering the industrial enterprises, it is seen that trade is mostly based on agriculture. Especially along with introduction of irrigated agriculture, there have been significant increase in agricultural production. Trading of agricultural products, in particular, wheat, barley, corn, clover, sunflower, rye, oats, lentil, cumin and beets, which have wide cultivation areas in the region, constitute the livelihood of the tradesmen.

In the district, there are Kar-Yem forage factory with a capacity of 20 ton/day, Meke-Süt milk factory with a capacity of 7 ton/day, Rensan-Süt milk factory with a capacity of 15 ton/day, Volkan Tuğla brick factory with a capacity of 3,000 pcs/day, Kamer Yatırım Beydere flour factory with a capacity of 120 ton/day, Pınar flour factory with a capacity of 45 ton/day, Adana-Yem forage factory with a capacity of 20 ton/day, Anıl Çamaşırları underwear factory with a capacity of 2,500 pcs/day and Meat Integrated factory with a capacity of 800 pcs/day. In these facilities, 29 persons

are employed in Kar-Yem forage factory, 80 persons in Anıl Çamaşır underwear factory, 37 persons in Beydere flour factory, 3 persons in Volkan Tuğla brick factory, 14 persons in Adana-Yem forage factory, 18 persons in Meat Integrated factory, 4 persons in Meke-Süt milk factory and 12 persons in Rensen-Süt milk factory. The rate of industrial workers in Karapınar is quite below the average in Turkey.

There is an Organized Industrial Zone established in 2005 in the district. As of June 2020, approximately 2,000 people are working at 24 factories located in the Zone.

As of 2018, there are 4402 registered insured employees in the district. When examined the total number of insured employees by sectors, it is seen that the most employment in the district is in education sector. In the second place comes retail trade (excluding motor vehicles and motorcycles), and in the third place, crops and animal production, hunting and related service activities.

As of 2018, there are 998 registered enterprises in the district. When examined the total numbers of enterprises by sectors, it is seen that the retail trade (excluding motor vehicles and motorcycles) sector has the highest number of enterprises in the district. In the second place comes highway transport and pipeline transport activities, and in the third place, crops and animal production, hunting and related service activities.

In the recent years, it is seen that tourism activities have increased in the district; especially there is an increase in the number of domestic tourists visiting to see natural beauties such as Lake Meke. Karapınar District has historical values as well as significant natural beauties. In 2017, Karapınar District drew 7,825 tourists, all of which are domestic, to the accommodation facilities certified by the municipality. The total number of nights stayed by these tourists was 10,231. The average duration of stay is 1.31 day. The occupancy rate of the accommodation facilities certified by the municipality in the district is 33.93% in 2017.

In the district, there is a hotel with a room capacity of 150 under construction, which is planned to be put in service in 2020.

6.2.5 Agriculture and Animal Husbandry

Livestock Rearing in Local Settlements

Within the five local settlements of Büyükkarakuyu, Kucukkarakuyu, Kirkitoğlu, Ekmekçi and Seyithacı specifically, 60 households raise either bovine (cow), ovine (sheep goats), or both types of cattle. Out of these 60 households, 57 of them have their main dwellings in the district centre of Karapınar and only use these buildings on a temporary basis for animal husbandry activities. Three households live here permanently.

Among the 34 households who manage sheep and goat livestock, one household lives in the local settlements permanently. Depending on the seasonal conditions, the grazing activities in the project site last from the second half of March to June-July, as well as in the October-November period if there is autumn rainfall. On average, the animals graze outside for approximately five to six months of the year.

The below table provides details on the livestock owners in these settlements who own ovine cattle, which shows that three households rely on the livestock rearing as their main source of income. All households listed in Table 6-2 own their livestock, and 12 of them employ shepherds for grazing activities.

Table 6-2: Current status of households with ovine cattle

Settlement	# of ovine cattle owners (out of total # of households)	# of ovine cattle owned	Livestock as main source of income
Büyükkarakuyu	10 (of 12)	3,380	1
Kucukkarakuyu	9 (of 9)	2,140	0
Kirkitoğlu	4 (of 10)	256	0
Ekmekçi	1 (of 9)	200	0
Seyithacı	10 (of 20)	1,340	2
Total	**34 (of 60)**	**7,316**	**3**

19 out of the 34 ovine cattle owners use their own fields for grazing, while the remaining 15 use the project area.

The households indicated that there has been a general decrease in the number of sheep and goats kept in recent years, due to several factors including difficulties in maintaining animal care conditions and costs, lack of available shepherds and personnel, the labour-intensive nature of sheep-rearing, lack of natural grass in the pastures due to droughts, and uncompetitive meat and milk prices. As a result, many of them are attempting to increase the number of cow cattle kept instead, as they are easier and more affordable to maintain.

Figure 6-5 below shows the sheep and goat grazing activities at the Project site.

Figure 6-5: Animal grazing activities within the Project Site (First picture was taken within the Project Site, Second picture shows a flock about to enter the Project Site)

Livestock Rearing in Karapinar District

As of 2018, the highest population of livestock in Karapınar District is sheep (Merinos) (Table 6-3). The number of sheep (Merinos) is 102,470. The second animal population is of sheep (domestic and others, aged 2 and older). The number of domestic sheep (aged 2 and older) is 101,600.

Table 6-3: Number of Livestock Quantity, 2018

	Karapınar	Konya	Province/District (%)
Sheep (Merino)	102,470	190,255	53.86
Sheep (Local or Other) - at Age 2 or more	101,600	1,200,922	8.46
Sheep (Merino) 12 - 24 Months (Female Male)	40,300	66,424	60.67
Dairy Cattles (Pure Culture)	31,000	388,755	7.97
Sheep (Local or Other) 12 -24 Months (Female Male)	30,245	246,729	12.26

In consideration of the animal production in the district, it is seen that cattle milk has the highest production rate. In 2018, 101,983 tons of cattle milk production took place. This was followed by sheep milk with a production quantity of 9,564 tons. This was followed by goat milk (hair goat and others). The production quantity of goat milk (hair goat and others) is 493.92 tons.

In years 2017-2018, the number of enterprises operating in apiculture in the district was 8. This is the highest number recorded between 2004 and 2018.

In consideration of the number of chickens in the district, there is no broiler hen between 2004 and 2018. The number of laying hens increased between 2010 and 2018, and it was recorded as 15,100 in 2018.

In consideration of the number of animals fleeced in Karapınar District, the highest number is of sheep (Merinos) with 154,650 as of 2018. Following sheep (Merinos), the highest number of fleece is of sheep (domestic and others) with 148,075. The most milked animal in the district is sheep. The number of sheep milked was 159,283 in 2018. In 2018, 28,186 dairy cattle were milked. The number of sheep milked shows a tendency of increase as of 2017, whereas there is no significant change in the number of other animals milked.

Agricultural Land Use

Karapınar District is located on a land with a surface area of 293,916.85 hectares. 51.03% of the total surface area of the district is allocated for agriculture, which is a proportion close to the average of Konya, whereas quite above the average of Turkey. A large portion of the total surface area (44.38%) is allocated for grass lands/pasture lands. The forestlands have a rate of 0.68% of the total surface area. Land use allocations of Karapınar are given in Table 6-4.

Table 6-4: Land Use Distribution of Karapınar District

Land type	Karapınar Land Use Type	
	(Ha)	%
Agricultural Land	150,000	51.03
Pasture-Meadow	130,444	44.38
Forest	2,013	0.68
Other	11,460	3.90
Total	**293,917**	**100**

As of 2018, the largest amount of the agricultural lands in Karapınar District belongs is used for cultivating cereals and other crops with a surface area of 101,633 ha. It is seen that this number has not changed much in the recent 3 years. The second largest amount of the agricultural lands belongs to the fallow lands, although it has been gradually decreasing in the recent 3 years. In 2018, the surface area of the fallow lands is 17,651ha.

In consideration of the most cultivated products in the group of Cereals and other Crops in 2018, corn is in the first place. The total surface area of corn cultivation is 24,297ha. Wheat (except of durum wheat) has the second place. In 2018, wheat (except of durum wheat) was cultivated on a surface area of 17,856ha in the district. Other than these, the mostly cultivated crop is barley with a surface area of 17,806ha.

In consideration of other fields of highest production rates in the group of Cereals and Other Crops corn comes in the first place with a production of 446,659 tons. Sugar beet follows corn with a quantity of 312,946 tons. In comparison of productivity in the group of Cereals and Other Crops, corn is the crop with the highest productivity. Sugar beet and sorghum follow corn.

The vegetable which has the highest cultivation rate in Karapınar District is carrot with a surface area of 1,650ha. Carrot is followed by tomato for paste cultivated on a surface area of 560ha and melon cultivated on a surface area of 280ha. Carrot is the most produced vegetable with 82,500 tons in the district. Carrot followed by tomato for paste with a quantity of 34,045 tons and melon with 8,400 tons.

As of 2018, the biggest share in total fruit production area is for other apples with a surface area of 250ha in Karapınar District. Other apples are followed by sour cherry with a surface area of 110ha. The fruit with the most production quantity in the district is other apples with 2,181 tons. They are followed by sour cherry with a production

quantity of 302 tons and starking apple with a production quantity of 116 tons. In consideration of productivity, the most productive fruit in the district is seeded table grape with 69 kg/decare. The productivities of the fruit types are very low; therefore, productivity studies on fruit production must be increased.

Since the project has no utilisation and impact on the lands of agricultural production, the detailed tables regarding vegetative production has not been included to the report.

6.2.6 Housing Conditions

Almost all the houses in the district centre are built of reinforced concrete material, and they are mostly 2 to 50-year-old buildings. Despite that there are high-rise buildings, there are majorly lower and 2 to 5 floor buildings. There are 603 apartments in the modern settlement built by the Mass Housing Administration in 2015. Similarly, one more housing project is planned. With the new project, it is expected that the housing stock in the district will increase by 317 more apartments. It is considered that there is sufficient housing stock to meet the demand for housing that will occur along with the project.

6.2.7 Education and Culture

As of 2019, there are 670 classrooms, 634 teachers and 10,722 students in the district (see Table 6-5). While the number of students per classroom is 16, the number of students per teacher is 16.9 in the district. Karapınar district is a district with high number of students per classroom and number of students per teacher compared to the districts with similar development levels.

As of 2017, the rate of illiterate people in the district was 2.9%, while 40.04% were graduated from primary school, 14% primary education, 10.3% secondary school, 13.1% secondary education and 7.1% higher education. In addition, the population of literate but ungraduated people is 11.3% of the total population. The rate of illiterate people in the district is decreasing gradually.

Table 6-5: Schools, Teachers and Classrooms

	Number of Classrooms	Number of Teachers	Number of Students	Number of Schools / Institutions	Number of Students per Classroom	Number of Students per Teacher
Primary School	266	222	4005	26	15.1	18.0
Preschool	24	16	369	11	15.4	23.1
Secondary School	181	225	3932	20	21.7	17.5
Secondary Education	157	159	2416	9	15.4	15.2
Total	**670**	**634**	**10722**	**75**	**16.0**	**16.9**

6.2.8 Health

As of 2019, in consideration of the statistics of institutions providing 1st level healthcare services in the district, there are 6 Family Healthcare Centres, and 16 physicians and 16 other healthcare personnel providing service in these centres. As of 2019, there is 1 institution providing 2nd level healthcare services in the district (Karapınar State Hospital). There are 25 physicians, 45 other healthcare personnel and 50 beds in this institution. There are 2 ambulances that provide ambulance service in the district and are directed by the 112 Emergency Stations in the province.

6.2.9 Infrastructure and Community Services

Electricity, water network and fixed-line telephones are available in all small settlements subordinate to Reşadiye District, where animal husbandry is carried on, and which is located near Karapınar District centre and the project site. Well water/utility water provided by drilling is also available in the plateaus and pastures near the project site. Since the province has the status of metropolitan municipality, Konya Metropolitan Municipality is responsible for the water and sewerage infrastructure services of all neighbourhoods.

The waste collected by Karapınar Municipality is transferred and temporarily stored in an open dumping area until they are transferred to a landfill in Ereğli. It is understood that the Municipality's temporary dumping area is not in line with the requirements of local legislation. .

The Karapınar Municipality WWTP is currently under planning / development stage while the sewerage network is directly discharged to the receiving environment.

Although there are parks and playgrounds available to the public in the district centre, the mukhtars and the local people think that there is an insufficiency of green areas, parks and gardens according to the discussions held during the June 2020 site visit conducted by Rina's Social expert.

Furthermore, these interviewees raised following concerns regarding infrastructure and social services:

- There is a lack of social facility where youngsters and children can spend time in many neighbourhoods. Especially there are neighbourhoods in need of playgrounds. There is no cinema or theatre hall in the district.
- There are neighbourhoods with low quality of services such as infrastructure and internet.
- Since agriculture is one of the important sources of income in the district, irrigation infrastructure must be improved, and ponds must be formed.
- The young population is gradually decreasing in the district.

No further concerns in terms of infrastructure and community services were received during the additional social field study held between 28 October to 1 November 2020.

6.2.10 Vulnerable People

According to the environmental and social policy of IFC, vulnerable groups are the individuals and groups who can be directly, differently, very little or highly affected by the project. The race, colour, gender, language, religion, and political or other view of a disadvantaged or vulnerable individual or group may result from their national or social origin, property, birth or other status. Customer is determined by considering factors such as gender, ethnicity, culture, literacy, illness, physical or mental disability, poverty, economic disadvantage and dependence on unique natural resources.

According to the environmental and social policy of EBRD, vulnerable groups, as disadvantaged individuals and groups, are defined according to their situation largely negatively affected by the impacts of the project due to their gender, sexual orientation, ethnic and religious identity, native/minority community status, age and disability status. According to this, vulnerable individuals and/or groups are not limited to the issues mentioned here, but are the people below the limit of poverty, stateless, elderly, households led by women and children, refugees, immigrant groups, ethnic minorities, nationals and/or those displaced by laws, or communities dependent on natural resources.

According to the information gathered via interviews held with local administrations, mukhtars and institutions, there are elderly people, people with disabilities and people receiving social allowances from public institutions in Fatih Neighbourhood and Reşadiye Neighbourhood, which are the closest settlements to the project site. Vulnerable groups that may be disproportionately affected by the project due to their disadvantage are taken into consideration in terms of factors such as gender, age, disability, poverty and economic disadvantage, and it is considered that such disadvantaged people will not be subject to significant impacts due to the project activities. Therefore, a detailed socioeconomic study has not been performed.

In addition, there are no ethnic and religious minorities, stateless people, refugees, groups subject to forced migration, unprotected nature-dependent communities and soilless households in the settlements nearby the project site.

As the national census does not collect information on ethnic, religious or other origins, the exact populations of such minority groups in Karapinar District is unknown. However, a small number of Syrian refugees appear to be present based on news reports from the past five years concerning tension and small-scale conflicts between Turkish host communities and Syrian refugees in the area.

It has been determined that the seasonal workers staying in tents (a photo is presented in Figure 6-6) that were erroneously identified in the June 2020 SIA site survey as being situated near the project site are in fact located 4.5km away from the project boundaries (in the north of the district centre). Given the distance of the tents from the project boundaries, no Project impacts are anticipated for the occupants.

Figure 6-6: Seasonal Workers' Tents (June 2020)

6.3 SOCIAL IMPACTS OF THE PROJECT

When evaluating social and environmental impacts, directly-indirectly, short-long term, planned-unplanned, known-unknown impacts, intentional-unintentional, visible-invisible all impacts should be considered. At some situation, entire parts of the society or in some cases society may be affected partially. Some impacts may stay invisible for a long time. This section of the report outlines the list of key impacts that has been identified in relation to the Project.

6.3.1 Land Acquisition and Economic Displacement

The entire project area is public land, therefore temporary or permanent expropriation/purchase/renting activity was not required. A major part of the land, on which the project facilities are being established, consists of pasture lands and have been utilized for grazing sheep and goat seasonally by the nearby settlements during summers. Status of these pasture lands was subsequently changed in accordance with the Pasture Law during the YEKA Project development and designated as Energy Specialty Industrial Zone by the Ministry of Science, Industry and Technology.

Likewise, land acquisition is not required for the ETLs. The entire line along the ETL route is passing through the public lands.

No house/settlement or physical asset has been required to be moved, replaced or displaced due to the project. The Project will result in two types of economic displacement impacts, as described in the below subsections.

6.3.1.1 Construction Phase

Barn structures

In 2014, three members of a household established barn and associated infrastructure on the Project site (see Figure 6-7), which were demolished in 2020. A timeline of the relevant events as obtained through the discussions with the household in question and local authorities and review of relevant documents[18] is detailed below:

- **July 2012**: The project area was declared an Energy Specialized Industrial Zone (ESIZ) by the Council of Ministers.

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[18] Including photos of the barn structures, official correspondence from the District Governorship to the household serving notice to evacuate the site, and memorandum of understanding signed by attendees including the household, the Project Company's site manager and witnesses, confirming that the household accepts the compensation as a donation and agrees not to demand additional compensation or support from the Project

- **September 2012**: This decision was published in the Official Gazette No. 28405 and entered into force.
- **Early 2014**: Three members of a single household constructed a barn and associated infrastructure including warehouses, huts and shelters within the project area, for the use of livestock-rearing activities.
- **April 2014**: The Karapinar District Governorship sent a letter to the household, stating their lack of legal right to occupy the land and requesting them to evacuate from the project area. The household continued to occupy the area following this request.
- **January 2020**: The Governorship sent an additional letter to the household, reaffirming their illegal occupation and demand to evacuate within 15 days.
- **June 2020**: The Governorship proceeded with the eviction process, giving prior written notice to the occupants on 20 June. The demolition and evacuation were carried out on June 22.
- **August 2020**: A memorandum of understanding confirming the household members' understanding of and satisfaction with how the eviction process was undertaken was signed by the three household members, a representative of the Project Company, and three independent witnesses.

The household members reside in a village 25km from the Project area, where they own existing land parcels and barn structures. They allegedly decided to occupy the Project land as their village becomes too hot in the summers, and they wanted to take advantage of the cooler temperatures in the Project area during this season.

Kalyon provided the following support for the demolition and evacuation process that occurred in June 2020:

- Personnel and vehicles to facilitate the relocation of the equipment and personal belongings to the household's residential dwelling, situated 25km away
- Construction machinery and equipment needed for demolition of structure
- Donation of 53,000 Turkish Lira to the household for the structures built, based on the household members' declaration of value of the goods
- Coordination of alternative lands options in collaboration with the District Governorship and the Municipality. The municipality offered to sell a land parcel to the household to be paid in instalments, which they decided not to take up as they were unable to pay for the instalments required and had existing land parcels within their village

In interviews conducted with the household members in October 2020, they expressed satisfaction with their interactions with the Project Company, and appreciation for the ongoing communication and support provided to them throughout the eviction process.

Various documents have been produced throughout this process, including the official correspondence from the District Governorship to the household serving notice to evacuate the site, and the memorandum of understanding signed by attendees including the household, the Project Company's site manager and witnesses, confirming that the household accepts the compensation provided as a donation and agrees not to demand additional compensation or support from the Project.

As sufficient prior notice and communication were provided to the household throughout the six years in which they occupied the land, and the Project Company took reasonable additional steps to support the household as a goodwill gesture, through provision of in-kind support for relocation of the goods and financial payment for the value of the structures built, no additional mitigation measures will be proposed regarding this household.

Figure 6-7: The only barn that was observed to be in use during the site visit (June 2020)

Figure 6-8: Abandoned Barn within the Project Area (June 2020)

Herding activities

The Project will result in a change of land use type from pastureland to primarily industrial use.

Among the 34 households with ovine livestock as detailed in baseline section 6.2.5, 15 households use the project area for grazing purposes while 19 of them use their own fields for grazing. The below table describes the impacts of the Project activities on herding activities experienced by the 15 livestock owners who make use of the Project

area, in terms of the increase in distance and time that it takes to reach the pasture area. Among these 15 households, three households rely on the livestock as their main source of income (1 in Büyükkarakuyu and 2 in Seyithaci).

Table 6-6: Changes to accessibility of grazing lands due to Project

Settlement	# of households using the Project site for grazing	Increase in distance	Increase in time
Büyükkarakuyu	4	1 km	10 minutes
Kucukkarakuyu	4	1 km	10 minutes
Kirkitoğlu	1	1.7 km	15 minutes
Ekmekçi	-	1.7 km	15 minutes
Seyithacı	6	1.7 km	15 minutes

The herders' journeys to reach the grazing areas have increased by between 10 to 15 minutes. Given that two daily trips are made during the grazing season, this results in a total increase of up to one hour per day. The herders have indicated that while this increase in journey time is an inconvenience, it will not impact their livestock activities, costs, or incomes in a significant manner, and the herds can walk this additional path without difficulties or having to stop. Among the total of 34 households, 24 (80%) were previously not aware of the passageways facilitated by the Project for animal crossings, and were informed accordingly by the surveyor during the November 2020 visit. The municipality has indicated that alternative pasture lands are also available directly adjacent to or near the villages. These available pasture areas are shown in Figure 6-9 below in green, in relation to the villages (numbered 1 to 5 on the map). The herders interviewed indicated that the pastureland is of similar quality across the area.

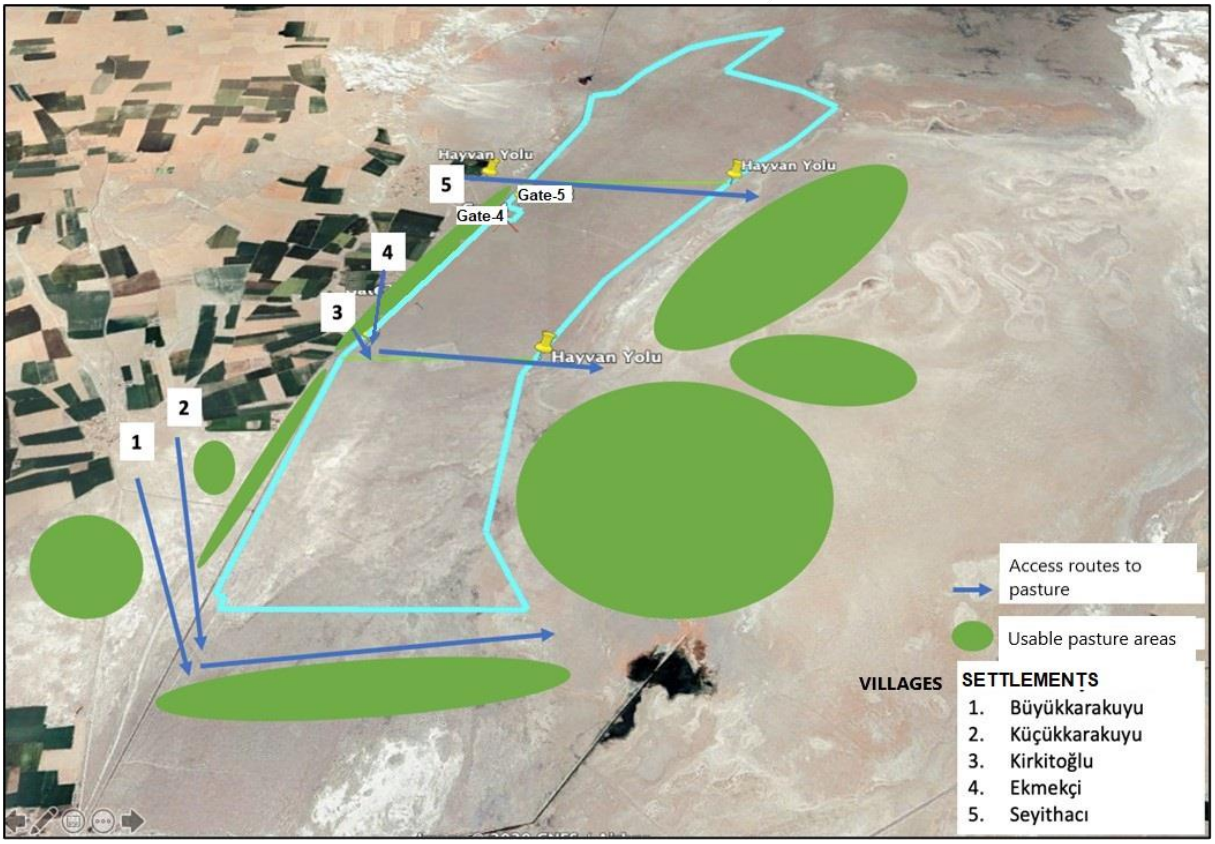

Figure 6-9: Animal crossing ramp in the project site and livestock herd passing through project site

It is expected that this will be a long-term impact given the land use restrictions required for the Project.

The degree of significance is considered to be minor given that 15 households are affected in total, among whom three households (one in Büyükkarakuyu and two in Seyithacı villages) rely on livestock as their main source of income based on responses provided in the October 2020 survey. Additionally, grazing areas remain accessible, albeit with an increased travel time.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Land users (i.e. herders)	Medium	Long-term	Local	Continuous	Likely	Low	Minor to Moderate (negative)

6.3.1.1.1 *Mitigations, Management and Monitoring*

The following mitigation measures have been / are being implemented concerning the impacts on herders' livelihoods:

- The Project Company has established two animal passageways and four transition ramps within the construction site, with a width of approximately 8m and a length of 1.7 km, as shown in Figure 6-10 below (completed on 20 December 2021). These are suitable for the livestock herders in Kirkitoğlu, Ekmekçi and Seyithacı settlements to access the pasture area in the east of the project area without encountering any obstacles. The herders in the other two settlements of Büyükkarakuyu and Küçükkarakuyu continue to be able to reach the project area through existing paths, without needing to use these new passageways;
- CLO communicate with the stakeholders including all herders present in the five local settlements;
- Ongoing communication has been established and will be maintained with the land users (i.e. herders) as per SEP, including through additional signage throughout the Project site and in neighbouring villages and roads about the location of these passageways, posting of the Project's contact details in accessible locations to facilitate submission of grievances, and regular contact with herder representatives via phone or face-to-face meetings;
- As part of the draft ESIA disclosure process, maps detailing the animal passageways were distributed to the affected herders, project leaflets were distributed to the headmen offices and focus group discussions have been conducted with the herders to confirm that these measures mitigate the impacts to a sufficient degree;
- A grievance mechanism is in place to receive and address specific concerns of stakeholders, particularly the land users within a defined period of time in line with the SEP; and
- Additional consultations have been conducted with the livestock owners and herders to identify their main priorities, needs and feedback on proposed initiatives as part of the draft ESIA disclosure process.

Figure 6-10: Animal crossing ramp in the project site and livestock herd passing through project site

6.3.1.1.2 *Residual Impact*

With implementation of above-mentioned measures, the residual impact significance is expected to be reduced to minor (negative).

Receptor	Construction Phase Residual Impact
Land users (i.e. herders)	Minor

6.3.1.2 Operation Phase

Access to parts of the Project site will continue to be restricted during the operations phase, while passageways will remain open as corridors for livestock movements. The project impacts would be limited through implementation of the measures identified for the construction period. It is expected that the scale of this impact will be local, long-term and the nature negative. The degree of significance is minor.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Land users (i.e. herders)	High	Long-term	Local	Continuous	Likely	Low	Minor (negative)

6.3.1.2.1 *Mitigations, Management and Monitoring*

Through implementation of the mitigation measures to be implemented in the construction and operations phases, potential impacts to herding livelihood activities will be sufficiently managed. The SEP is in place to manage the grievances and problems that may arise for the herders. Grievance logs are kept and evaluated periodically, and the need for additional mitigation measures are identified as necessary through consultation with the herders. The Project will implement the following mitigation measures throughout the operation phase.

- The Project will relay information regarding the Highways Directorate's Road Widening Project and options available to the local communities, as the Directorate will consider mitigation measures such as underground passages or pedestrian bridges only if requested by the local community members;

  A community development plan (CDP) will be developed with ongoing provisions for support for local communities during the operations phase with initiatives to support economic, social and environmental development relating to livestock owners, unemployment, low employment capacity, technical and vocational training, local procurement, nature protection etc. As relevant, this will include partnerships with parties such as local NGOs, agricultural/livestock organisations, veterinarians, financial institutions and others, to be identified based on the livestock owners' needs that will be discussed through the additional consultations conducted in the construction and/or operations phases.

- Updates on consultations conducted and initiatives developed as part of the CDP will be reflected within the Project's stakeholder engagement monitoring program through revisions made by the CLO, and ongoing E&S reports issued.

6.3.1.2.2 *Residual Impact*

If the above-mentioned measures are implemented, the residual impact would be minor to moderate.

Receptor	Construction Phase Residual Impact
Animal owners and land users	Minor

6.3.1.3 Decommissioning Phase

Following the decommissioning, land will be returned to the land users for animal husbandry and owners, and the environment will return to their baseline conditions and livelihoods will continue as before. The impact is minor positive.

6.3.2 Procurement of Goods and Services

In terms of business opportunities, the project will provide business opportunities for companies at the national and regional level, and to some extent for companies in the project region. The project will bring positive economic impacts temporarily (3 years) by means of the procurement of goods and services to be needed from the region during the construction phase.

6.3.2.1 Construction Phase

The project will create business opportunities for local and regional economy. Especially in the field of food and beverage, general accommodation needs (cleaning, etc.), transportation (personnel shuttle, etc.), machine-equipment rental, construction materials (concrete, etc.), accommodation (hotel, rental house), there will be a more intense need during the construction phase. The potential opportunities for local services sector would be linked to accommodation, catering, cleaning, transport and security.

A detailed assessment of existing local capabilities has been conducted at the early phases of construction activities. The active engagement of local businesses within the Company's supply chain could provide the following benefits:

- ✓ increase in business profits for local suppliers;
- ✓ increase in sales volume;
- ✓ potential improvement in quality of goods and services and local business practices;
- ✓ potential growth of small businesses and improved employment opportunities;
- ✓ decrease in unemployment; and
- ✓ growth of welfare.

These economic benefits (including increased number of businesses and sales volume) may trigger higher prices on the local consumer market, and also the prices of some services such as house rents and hotel fees. This could negatively affect the local people and the people working in public institutions and temporary officers, etc. However, despite of some potential risks, the benefits of economic stimulus are expected to outweigh any adverse effects and result in overall positive impact.

It is expected that the scale of this impact will be local, short-term and the nature positive. The degree of impact significance is moderate.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Local companies and tradesmen	High	Short-term	Local and regional	Continuous	Likely	Medium	Minor (positive)

6.3.2.1.1 *Mitigations, Management and Monitoring*

It will be beneficial to develop some mechanisms to create positive impact on the local economy (including directly affected communities and Konya Province to some extend) by ensuring the procurement from local sources. This has been formalised through a Local Content Policy, which identifies measures to be taken to identify local suppliers and prioritise procurement from such parties. Commitments included in the Policy include:

- ✓ Prioritisation of suppliers from local areas (defined as those from Karapınar District and neighbourhoods within its administrative borders), including seeking opportunities to work with small to medium-sized suppliers where feasible;
- ✓ Focus on use of raw materials and products sourced or manufactured in Turkey, to the extent possible;
- ✓ Establishment of a transparent and ethical procurement process that will ensure equal access opportunities to all local supplies and communities.

Kalyon has a transparent process and announcement mechanism in place in order for the businesses to be aware of, participate in and benefit from such procurement processes. The company shows maximum effort on

procurement from the region and district. This circumstance is also appreciated by the stakeholders interviewed in Karapınar.

6.3.2.1.2 *Residual Impact*

The positive impact on the local businesses developing due to the supply of goods and services will continue throughout the construction phase. Residual impact is moderate (positive).

Receptor	Construction Phase Residual Impact
Local companies and tradesmen	Minor (positive)

6.3.2.2 Operation Phase

Some positive impacts in the construction phase (supply of food and beverage, consumables, etc.) will continue. Even though the procurement potential will decrease, the operation phase that will extend over 30 years will enable the positive economic impact to last long and be sustainable. However, some businesses growing in terms of scale (restaurant, etc.) may incur loss of income.

The project might create limited business opportunities for local and regional economy in this phase.

Project's positive impact on the local businesses developing due to the supply of goods and services will continue throughout the operation phase in a smaller magnitude.

It is expected that the scale of this impact will be local, long-term and the nature positive. The degree of impact significance is Minor.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Local companies and tradesmen	High	Long-term	Local and regional		Likely	Low	Minor (positive)

6.3.2.2.1 *Mitigations, Management and Monitoring*

The impact mitigating measures listed under the construction phase are also valid for the operation phase.

In order for the businesses that have lost income or had to downsize due to the magnitude of supply decreasing in comparison to the construction phase to prepare for this situation, information related to the Project schedule and phases will be provided by the Project Company. In addition, in order for such businesses to prepare for possible downsizing scenarios training and communication activities can be provided.

6.3.2.2.2 *Residual Impact*

The residual impact will be minor (positive).

6.3.2.3 Decommissioning Phase

Business opportunities related to the operation phase activities will be over at the time of decommissioning while different business opportunities related to decommissioning activities will appear in short-term.

Considering the nature of the project activities any impacts on local tradesmen will be negligible / minor during this phase.

6.3.2.4 Cumulative Impact

The solar energy investments in the region may increase. A potential exists in this field. The increasing number of projects would increase the supply and job opportunities as well. Moreover, the increasing capacity of local suppliers may also facilitate cooperation opportunities in the new projects. There is no project development study in this direction yet.

6.3.3 Employment Opportunities

As described in the Project description, there will be opportunities for employment during the lifecycle of the Project. The maximum number of personnel during peak construction time is estimated to be 1200.

After the construction period, the Project is likely to require 121 skilled, semi-skilled and unskilled workers. Although local workforce will be utilized as much as possible, a considerable amount of worker will come out of Karapınar District.

As of February 2021, there are 619 employees at Site. 170 of these are local workforce while 449 are from out of Karapınar. Of the currently employed local workforce,143 people are blue collar and 17 people are white collar.

Indirect employment to be created in the area of influence as a result of the Project is estimated to be 384.[19]

6.3.3.1 Construction Phase

Providing employment opportunity to community members creates positive impact in terms of increased employment (for example as of February 2021, 170 local people including men and women are employed for the Project) and increased local income level. For further information regarding local skill base see Section 6.2.4.

On the other hand, local people will gain new competency skills, certificates (i.e. welding, etc.). These certificates can be obtained from institutions such as Public Training Centre, KOMEK (Konya Vocational Course Institution), etc. in general.

It is expected that the scale of this impact will be local and the nature positive. This impact is short-term.

The degree of significance is moderate.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Eligible and able people in the local communities	High	Short-term	Local	Occasional	Possible	Moderate	Moderate (positive)

6.3.3.1.1 *Mitigations, Management and Monitoring*

Kalyon has developed a Local Content Policy to manage local hire in order to bring some project benefits to the affected communities, in line with IFC PS and ILO. This Policy applies to the Project Company and the Contractors (including sub-contractors and third-party consultants). The Policy acts as a consistent set of guidelines and principles to be applied by Kalyon and the Contractor in the selection, employment, training, and management of the work force throughout the life of the Project.

Kalyon's Local Content Policy aims at increasing the use of local workforce (i.e. workforce coming from the affected communities).

The Local Content Policy is based on the following specific measures:

- Advertising jobs locally
- Encouraging and attracting local workforce to apply for jobs through regular communications with mukhtars
- Prioritising the hire of local workforce where reasonable and practical
- Monitoring recruited local workforce
- Transparency of recruitment / hiring procedure

Furthermore, a Labour Management Plan in line with IFC PS2 requirements is in place aiming:

- to establish, maintain and improve the worker-management relationship;

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[19] Using the UK Homes & Communities Agency formula for the rate of direct jobs to induced jobs (rate of 1.32) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/378177/additionality_guide_2014_full.pdf

- to promote the fair treatment, non-discrimination and equal opportunity of workers, and compliance with national labour and employment laws;
- to protect the workforce by addressing child labor and forced labor,
- to promote safe and healthy working conditions, and to protect and promote the health of workers.

The following measures will be conducted to support Project employment and training opportunities for refugees, if their presence in local neighbourhoods is confirmed:

- Conduct meetings with local authorities and NGOs to determine the current status of Syrian refugee settlements in Karapinar District.
- If significant numbers of Syrian refugees are identified as residing in the District, discuss with the local authorities and NGOs potential campaign to promote employment and training opportunities for refugees on the Project site.
    - Promotion of employment and training opportunities targeting minority groups such as Syrian refugees
    - Liaison with workers belonging to minority groups to identify specific concerns
    - Permission for workers to observe diverse religious holidays.
    - Translate the Project's Labour Commitment Policy into other languages as applicable if migrant or refugee workers are present on site

Except for the employees that are residents in Karapınar, Kalyon provides temporary accommodation on Site. Currently (as of February 2021) there are 165 employees utilising the accommodation provided on Site while 170 local workers are using their own residents in Karapinar.

Kalyon has developed a Camp Site Management Plan (CSMP) in line with IFC's 'Workers' Accommodation Processes and Standards Guidance Note' and will be implemented during the construction phase. The CSMP sets out the standards that applicable to workers' accommodation as good practice. The CSMP provides benchmarks that the project (The Project Company and all Contractors) will align with and perform regular monitoring, and the standards include provisions such as guidance on worker and community interactions as well as:

- ✓ Minimum space allocated per person;
    - Not more than eight workers accommodated in the same room, with separate beds for each worker, partitions to ensure privacy and a minimum distance of one metre between beds;
    - Not more than one worker per $4m^2$ (surface) and one worker per $10m^3$ (volume);
- ✓ Supply of safe water in the workers' dwelling in such quantities as to provide for all personal and household uses;
    - 100 litres of water per worker per day on average should be available personal hygiene purposes.
- ✓ Adequate sewage and garbage disposal systems;
- ✓ Appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, and, in particular, insects;
- ✓ Adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting;
    - One hand wash sink per six to fifteen persons;
    - One toilet per six to fifteen persons / One urinal per six to fifteen persons / One shower per six to fifteen persons;
    - Regular cleaning of soil and sanitary facilities and regular washing of bed linen; and
    - Separate storage provided for boots and PPE.
- ✓ A minimum degree of privacy both between individual persons within the household and for the members of the household against undue disturbance by external factors;
- ✓ The suitable separation of rooms devoted to living purposes from Neighbourhoods for animals;
- ✓ A separate bed for each worker;
- ✓ Appropriate heating, ventilation and/or air conditioning provided at the accommodation so that the inside temperature is kept around 20°C ; and
- ✓ Common dining rooms, canteens, rest and recreation rooms and health facilities.

6.3.3.1.2 *Residual Impact*

Following implementation of mitigation measures described above, the residual impact is considered to be moderate (positive).

Receptor	Construction Phase Residual Impact
Eligible and able people in the local communities	Moderate (positive)

6.3.3.2 Operation Phase

The number of workers during the operation phase is estimated to be around 121. This will be decreasing the expenditures on goods and service from the district. However, the long-lasting operation phase necessities will diversify.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Eligible and able people in the local communities	Medium	Long-term	Local	Continuous	Likely	Medium	Minor(positive)

6.3.3.2.1 *Mitigations, Management and Monitoring*

The mitigation measures listed in the construction phase also apply to the operation phase.

6.3.3.2.2 *Residual Impact*

Following implementation of mitigation measures described above, the residual impact is considered to minor (positive).

Receptor	Construction Phase Residual Impact
Eligible and able people in the local communities	Minor (positive)

6.3.3.3 Decommissioning Phase

The major social impacts associated with the decommissioning phase are the loss of permanent jobs related with solar power operation. However, temporary work will be needed. Overall during decommissioning, the impact will be similar to the construction phase.

The impact will be moderate positive for temporary workers and negative to workers in the project operation.

6.3.4 Community Health and Safety

Related with the reasons of dust, noise, environmental pollution, traffic etc. during the operation and construction phase of the Project, it may have adverse impacts for the community members that live in the area.

The primary potential impacts on community health, safety and security may occur on the fields given below:

- Traffic, Transport and Road Safety
- Dust
- Noise
- Visual Impacts
- Aviation
- Potential Increase in Population Communicable Disease Incidence Rate:

- Security Management
- Worker's Interaction with Local Communities

The project related impacts such as noise and dust emissions, extra load on community infrastructures and visual impacts which have potential to affect communities, are assessed separately in Section 5 of this report, together with related mitigation measures.

6.3.4.1 Traffic, Transportation and Road Safety

6.3.4.1.1 *Construction Phase*

Transportation to the project site is provided through Karapınar-Besci-Aksaray Highway (formally Karapınar – Eskil Road), passing through Konya Province - Karapınar District centre. There are two entrances to the project site located to the south-west of the Project Site. Access and transportation between these entrances is provided through the internal roads of the project site.

The mentioned road is an undivided narrow road consisting of one lane per each direction, with intensive traffic especially in the summer, used by large vehicles such as agricultural machines.

Figure 6-11: Karapınar-.Eskil Road Project Site Exit Point

Due to the increasing traffic load caused by the road being narrow and having a distorted surface and being used by a part of the project vehicles, the road poses increased risk of road accidents. Especially the heavy tonnage vehicles coming to the project site not complying with the weight and speed rules pose significant risks. The road becomes riskier in the cases that the construction machines operating at the project site use the highway when necessary.

The vehicles that deliver materials to/from the project site pose increased traffic risk on different routes that are used for site access as explained in 2.2.1.

A large number of long vehicles will be used for transporting solar panels and other components during the construction phase. This will significantly increase the traffic risk with the combination of factors such as the insufficient width on the existing roads, intensity, restricted view and failure to comply with the speed limits.

According to the information gathered from Project Team on Site, there have been communications with the Municipality, Governorship of Karapınar and local security forces for enlargement of the Karapınar-Eskil road partially to reduce potential accident risks on the road and planning studies have been started.

Kalyon has conducted a Traffic Risk Assessment study focussing on potential risks related to in-site vehicle movements and Karapınar -Eskil Road. The study has identified that risks such as material damage, injury, or death that can be posed by the following:

- Site entrance by unauthorised personnel,
- Lack of training of certification of drivers,
- Operation of defective vehicles,
- Lack of enough parking space and parking at restricted areas such as emergency exits,
- Unclear distinction between vehicle roads and pedestrian pathways,
- No warning and warning signs,
- Material fall from machinery and trucks on the roads,
- Transportation of personnel, equipment or material in bad weather conditions (fogy, rain, and snow),
- Not following the road and site speed limits,
- Accidents due to incorrect overtaking,
- Excavation works near the road,
- Vehicles without reflector, wedge, drawing rope, fire extinguisher, first aid kit and environmental spill kit,
- Uncontrolled entrance to / exit from the Site,
- Closure of transport roads and crossing roads,
- Lack of security measures around crashed or broken vehicles,
- Accidents caused by drivers under the impact of alcohol or drugs or sleepless,
- Lack of seasonal tires on the vehicles,
- Fuel supply on roads,
- Missing daily maintenance and failure records,
- Truck movements without lowering the dumpers.

The risk assessment study also presents the mitigations that are in place and will be taken to avoid or minimise traffic related risks.

It is expected that the scale of traffic related impacts listed previously will be local to regional (may be and the nature negative. This impact is considered as short-term. The degree of significance will be Minor to Moderate.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Local community and road users	Low to High	Short-term	Local, regional national	Intermittent	Likely	Low to Moderate	Minor to Moderate

6.3.4.1.1.1 Mitigations, Management and Monitoring

- Traffic Management Plan has been developed for the Project.
- The caution signs are set at the vicinities of the entry points from the highway to the project site.
- Flagmen are available at the entry-exit points of the Project Site.
- Two Flagmen are available at the Road Side.
- All light and heavy vehicle drivers and machine operators are trained in safe driving.
- The speeds and tonnages of all vehicles (including the subcontractor and supplier vehicles) are monitored through vehicle tracking system.

- If required, Traffic Risk Assessment will be updated to cover other main transportation roads to be used for transportation of PV Panels, inverters, ETL Towers and other materials to the project.
- Mitigations set out by the Traffic Risk Assessment are implemented by the Project Company and the Contractors. These mitigations include but not limited to:
    - Personnel entry and vehicle entry-exit registers are filled.
    - Regular field inspections for warning signs, potential risks and vehicle approvals are carried out.
    - Training is provided to drivers, administrative personnel and security officers on traffic safety.
    - Training on warning lights, fog lights and headlights is provided to the traffic responsible(s) upon appointment.
    - Traffic mirrors are placed at necessary points.
    - Legal carrying capacity is visible on vehicles cards.
    - Regular checks of scale plugs are carried out.
    - Traffic safety instructions are posted at necessary and easily accessible locations.
    - The work permit system is in place for potentially risky activities. Excavation areas are covered to prevent unauthorised access.
    - Emergency team is assigned and drills are conducted.
    - Flammable materials are not allowed to be kept on vehicles.
    - Suitable fire-extinguishers are available on vehicles.
    - Daily fault registration is filled regularly.
    - Access roads and crossings are kept open over the Project Site.

6.3.4.1.1.2 Residual Impact

Providing that the measures identified for the construction phase (via the Traffic Management Plan and Traffic Risk Assessment) are implemented, traffic related risks will be minimised. However, in spite of this, occurrence of stakeholder grievances can be expected until the road enlargement is completed.

Residual impact is anticipated to be Minor.

Receptor	Impact Significance
Local community and road users	Minor

6.3.4.1.2 *Operation Phase*

During the operation phase, the traffic risk will decrease as a result of decreased traffic load, heavy vehicle traffic will be almost ended, and the number of employees and vehicles will be decreased.

However, still the traffic load and risks to be caused by especially the vehicles in operation between Karapınar and the project site will continue.

Furthermore, there will be additional traffic load if water required for PV Panel cleaning is transferred from an offsite resource via tankers or wastewater generated at Site is collected via vacuum tankers and transferred to the discharge point. Daily PV Panel Cleaning water demand is estimated to be 86.7m^3 during dry periods (April – September) which will require journey of 4-6 tankers per day and cause additional load on the route.

Tanker movements due to wastewater transfer is anticipated to be insignificant as number of personnel will be around 121.

The impact is considered to be minor (negative) as summarised in below table.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Local community and road users	Low to High	Long-term	Local, regional	intermittent	Likely	Negligible to Low	Minor

6.3.4.1.2.1 *Mitigations, Management and Monitoring*

The measures listed under the construction phase are also valid for the operation phase.

6.3.4.1.2.2 *Residual Impact*

If the measures determined for the construction phase are implemented, it is thought that the risks will be manageable, and the accident risks will be minimised. However, in spite of this, due to reasons such as inadequate carrying capacity of highway and risky transportation road in terms of road safety and the vehicles in operation continuing to use the same road unless it is enlarged, risks associated with accidents can be expected.

The impact is minor.

Receptor	Residual Impact
Local community and road users	Minor

6.3.4.1.3 *Decommissioning Phase*

Following the completion of the operation phase, all of the employees are estimated to leave from the region. At this stage, there will be a significant heavy vehicle, construction equipment and lightweight vehicle traffic due to the dismantling and transportation of the solar panels. In addition, there is a similar situation during the works of restoration of the land.

It is expected that the scale of this impact will be local, short-term (0-6 months) and the nature negative.

The degree of significance is moderate.

Receptor	Sensitivity	Nature of Impact				Impact Magnitude	Impact Significance
		Duration	Extent	Frequency	Likelihood		
Local community and road users	High	Short-term	Local, regional and national	Intermittent	Likely	Moderate	Moderate

6.3.4.1.3.1 *Mitigations, Management and Monitoring*

The measures applied during the construction and operation phases must be applied identically in this phase.

6.3.4.1.3.2 *Residual Impact*

Considering the nature of the project activities any impacts on local community and road users will be negligible or minor during this phase.

Receptor	Impact Significance
Local community and road users	Moderate

6.3.4.2 Glint and Glare

6.3.4.2.1 *Aviation*

Although solar panels are designed to absorb, not reflect, irradiation glint and glare are still a concern in terms of aviation since they can cause a distraction or lead to an after-image being experienced by an observer. This can present a nuisance and, under some circumstances, a safety hazard.

The visual flight rules chart is provided in the following figure. According to this figure the project area is not located within a flight route. The nearest airport to the Project Site is Konya Airport 92km to the west.

Also, there is potential of glare from solar modules affecting some military activities, the Project Company has requested an Opinion Letter on Military Forbidden Zones and Safety Zones from the Presidency of General Staff on 14 April 2020. Opinion Letter of the Presidency was received on 29 May 2020 indicating that the Presidency has no objection against the Project while suggesting entering Project information to the vertical obstacle database to ensure flight safety since the effects of SPPs on aircraft and radar systems are unknown.

Furthermore, the Project Company assessed the albedo data (reflection from the ground surface) obtained from an existing measurement station located in the Project site to consider potential impacts to adjacent settlements and road users. Annual average albedo ratio was reported as 29% whereas the albedo ratio is between 5-8% for PV modules itself. This assessment concluded that reflection ratio of the surface ground is higher than the PV modules.

Based on above, no impacts in terms of aviation, military zones, road safety or nearby settlements is expected due to the Project.

Figure 6-12: Flight Routes around the Project Area (source: https://skyvector.com/)

6.3.4.3 Potential Increase in Population Communicable Disease Incidence Rates

The risk of disease outbreaks is typically associated with demographic changes and labour migration. This risk is may be relatively higher during construction because of the higher number of workers, the presence of a workers' accommodation camp and the possible higher rate of foreign workers. The efficient implementation of all required mitigation measures and the implementation of a Construction Camp Management Plan will, in any case, reduce the impact significance to a negligible level.

The project staff will be provided with on-site sanitary and first aid/medical facilities in line with the IFC Guidance Note on Worker's Accommodation Processes and Standards. Kalyon will ensure that by implementing Construction Camp Management Plan developed for the Project.

Furthermore, Kalyon has developed and been implementing Project specific Covid-19 Emergency Plan that outlines the necessary actions and mitigations to be taken during Covid-19 pandemic. This is a detailed Plan explaining risk groups, potential and confirmed cases and instructions to the Project Personnel for different scenarios. Also, brochures, notice boards and tool-box-talks have been used to raise awareness of the Project Personnel in terms of measures to be taken, personal care, mask and disinfectant use etc.

To mitigate the potential introduction and spread of communicable diseases related with the Project, the following mitigation measures are being implemented:

- The medical check-ups during the recruitment process.

- The infectious diseases seen among the employees throughout the construction phase are being closely monitored, and the periodic medical check-ups must not be disrupted.
- The areas such as the rooms, sanitary areas, infirmary and first-aid facilities in the project site are in compliance with the requirements of IFC/EBRD Workers' Accommodation: Processes and Standards (2009) Guideline. For group meetings, they are conducted in line with the IFC/EBRD briefing note on stakeholder engagement during the Covid-19 crisis (April 2020) as further detailed in section 8.5.3
- In particular, the health and hygiene conditions of the employees working in common spaces such as cafeteria, cleaning, etc. are continuously monitored.
- The workers are provided with training on health, hygiene and infectious diseases to raise awareness.
- Project Community Health and Safety Management Plan and Emergency Preparedness and Response Plan has been developed in accordance with the IFC and EBRD standards and being implemented.
- Identify opportunities to support local public health campaigns that focus on prevention of communicable diseases.

6.3.4.4 Security Management

Private security personnel has been appointed to provide security against potential security risks and threats to Kalyon's personnel, property and assets, to contractors / sub-contractors and their equipment and materials, both on the Project Site and at offsite operations and activities (i.e. within the wider community in the area of influence) such as;

- ✓ Corrupt or unethical behaviour, especially involving community relations or grievance resolution, by Kalyon, its representatives or business partners, resulting in a loss of affected stakeholder trust;
- ✓ Vandalism or theft of Project equipment, materials or personal items (e.g. theft from contractor's/ secure compound);
- ✓ Conflicts between workers of different nationalities or different employers, including any harassment of females, workers from different ethnic groups, or on other grounds;
- ✓ Illicit/proscribed activities undertaken by workers or others (e.g. drugs / alcohol trading, etc.); and
- ✓ Road traffic accidents and various medical or other emergencies.

Kalyon has developed a Security Management Plan (SMP) to protect life and property while ensuring that the Project's security measures are deployed in a way that complies with the law, respects and protects human dignity and human rights, avoids creating conflict and addresses security threats in a peaceful way as possible.

In addition, Code of Conduct for Workers and a Code of Conduct for Security Personnel has been developed for the Project. Code of Conduct for Security outlines appropriate conduct, engagement and appropriate use of force. All security personnel is made aware of the code of conduct as part of their induction program.

All potentially affected stakeholders can contact the company and file grievances about the security arrangements and acts of security personnel through Community Grievance Mechanism.

With implementation of the SMP and Code of Conduct for Security Personnel, the residual impact is considered to be minor.

6.3.4.5 Workers' Interaction with the Local Community

Skilled and unskilled employees are provided accommodation at the Campsite during construction. Workers use the dining halls and canteens within the Campsite for dining. Workers are anticipated to have interaction with the Project affected settlements (described in Section 6.2.2) only on their off days when they use recreational and shopping facilities in Karapınar and Konya. Based on the interviews made with the local people and governmental agencies as part of the stakeholder engagement activities undertaken in June 2020, it is understood that the local community is tolerant and welcoming to the outsiders. Given the limited time of interaction potential impact is considered to be minor during construction. This impact will be even negligible during operations due to the significantly reduced number of workers.

6.3.4.5.1 *Mitigations, Management and Monitoring*

A Project Introductory Leaflet/Brochure (which includes the number of workers, schedule etc.) was developed and disclosed to the community in the vicinity of the Project site .

Labour Commitment Policy, Code of Conduct for Workers and Code of Conduct for Security Personnel have been developed for the Project. Project Workers are provided with trainings on these policies as well as potential interactions, conflicts, the community's sensitivities, culture, local traditions, communication and behaviours to prevent any potential conflicts.

6.3.5 Cultural Heritage

The ESIA studies has been carried out for the identification and assessment of the potential Project impacts on the tangible and intangible cultural heritage assets within and in the surroundings of the Karapinar SPP Project Area. The studies consisted desktop studies, field research and consultations with the related local cultural heritage authorities (Konya Regional Directorate of Ministry of Culture and Tourism, Konya Cultural and National Heritage Conservation Board).

Desktop studies consisted review of the following sources:

- Academic publications
- Historical maps
- Cultural Heritage Assessment Reports prepared for other construction and infrastructure projects conducted in the region
- Inventory records of the Ministry of Culture and Tourism
- Documentaries related to the intangible cultural heritage of the region.

Based on the opinion letters of Konya Governorship Provincial Directorate of Environment and Urbanisation and Provincial Directorate of Culture and Tourism – Cultural and Natural Heritage Conservation Board and interviews made with executives, there are no cultural or natural assets within the Project Site registered under the Law on Conservation of Cultural and Natural Assets No. 2863. In addition, the Provincial Directorate of Culture and Tourism states that there are no culture and tourism conservation development areas and tourism centres and tourism potential.

Lake Meke and Lake Acıgöl 1st degree natural protection sites are approximately 8 kilometres away from the Project Site.

In Karapınar District, there are registered historical buildings such as mosques, fountains and Ottoman hammams, registered examples of civilian architecture from 19th-20th Centuries, and an underground city dated back to 8th-10th Centuries.

The project activities are not expected to cause an impact on cultural heritage since there is no known or registered cultural asset in the Project Site or its impact area according to the desktop studies' findings. However, in accordance with GIIP, the Contractor is required to put in place provisions for identification of unidentified or unexpected finds during below ground works commensurate with the nature and scale of the risk.

Since the Project's land preparation and construction phase involves earthworks and excavation activities, a chance find procedure has been developed and implemented in order to prevent potential harm to any other undiscovered archaeological finds that might be present at the Project Area. The Project will comply with the requirements of Turkish Law with regard to management of any probable chance finds that may be discovered during the Project works.

Chance Find Procedure aims to avoid / and or reduce project risks that may result due to chance finds in accordance with Good International Industry Practice (GIIP). This sub-plan applies to the Project Company and the Contractor (including sub-contractors and third-party consultants). The sub-plan is applicable to the construction phase only and applies to activities connected with the Project construction.

The following mitigation measures has been set in order to ensure that potential chance finds that may be encountered during earthworks and construction activities are managed properly:

- The Chance Finds Procedure will be implemented by the Project Company and the contractor's environmental and social teams in case of a chance find.

- All the Project Company and the contractors' personnel have been informed about the implementation of the Chance Finds Procedure and related trainings have been provided.
- In case of a chance find, all activities that may potentially harm the archaeological find will be ceased, the area will be secured, and the chance find will be recorded. The Museum Directorate of Konya will be notified immediately for further actions.
- The Project Company will collaborate with the Museum Directorate of Konya, Provincial Directorate of Culture and Tourism and Ministry of Culture and Tourism for the investigation of the site and will take relevant measures to avoid any further disturbance.
- Within the scope of stakeholder engagement to be conducted, ongoing information disclosure to communities will include any chance finds. If deemed necessary, consultations with local communities will also be done.
- If any cultural site is present, the Project Company will also take necessary measures to ensure that the availability/accessibility of this resource is not impacted by the Project during also the operation phase.
- In case of any grievance regarding intangible cultural heritage, the grievance will be responded to appropriately in compliance with the grievance procedure.
- All employees should be trained on the Chance Find Procedure and refreshing trainings should be carried out.

6.3.6 Human Rights Impact Assessment

A Human Rights Impact Assessment (HRIA) scoping study was carried out in January 2021 in line with EP-IV requirements. The scoping study concluded that the Project does not pose any High Risks in terms of human rights and the medium or low risks can be adequately mitigated and addressed through existing E&S management plans and procedures as identified within the ESIA, and additional mitigation measures identified within the study. Therefore, no further HRIA study is deemed necessary based on the Scoping Report findings. The HRIA Scoping Report is provided in **Appendix G**.

The following table shows the medium risks identified and the applicable mitigation measures that will either be implemented going forward, or are existing mitigation measures implemented as part of the Project's ESMS.

Table 6-7: Human rights medium risks ad mitigation measures

Human rights	Project context	Mitigation measures identified
Right to equality before the law, equal protection of the law and non-discrimination	Impacts for potential victims include limited or lack of access to employment opportunities and enjoyment of a safe workplace within the Project site, in particular for women and people with disabilities.	**Future actions to be implemented:** Provide awareness training on principles of gender equality and prohibition of harassment to workers. Develop a procedure detailing how the Project Company will aim to meet the 3% target for recruitment of persons with disabilities, and conduct ongoing monitoring of this target. **Existing mitigation measures:** Provide training to security on religious tolerance and sensitivity.
Right not to be subjected to slavery, servitude or forced labour	The risk particularly affects vulnerable populations such as refugees and migrants.	**Future actions to be implemented within existing labour monitoring procedures:** Conduct regular control and monitoring of workers and working conditions, including for any migrant workers present on site.
Right of protection for the child	The risk particularly affects vulnerable children.	**Future actions to be implemented within existing labour monitoring procedures:** Conduct regular monitoring and verification of workers' ages on the Project site, including for subcontractor workforces.
Right to health, food, water and sanitation	The rates of occupational incidents in Turkey have been decreasing in recent	***Workers*** **Existing mitigation measures:**

Human rights	Project context	Mitigation measures identified
	years. Potential risks to local residents' health include temporary noise impacts during the construction phase, traffic incidents, air pollution, contamination of water sources and risks associated with influx of the workforce.	Refer to section 8.1 of the ESIA for organisational responsibilities for OHS oversight, and section 8.4 for details on the OHS policies and procedures required of all contractors, sub-contractors and suppliers. Sections 5.1.4, 5.3.4, 5.4.4 and 5.5.3 identify mitigation measures to protect workers' health and safety in relation to management of air pollution, land contamination, water and wastewater, and waste, respectively. ***Community*** **Existing mitigation measures:** See the ESIA's section 5.1.4 and 5.2 for air pollution and noise control measures to minimise adverse impacts on local communities respectively, section 6.3.5.1 for traffic management and mitigation measures and section 6.3.5.3 for mitigation of potential transmission of communicable diseases
Rights of members of ethnic, religious and linguistic minorities	As the national census does not collect information on ethnic, religious or other origins, the exact populations of minority groups in Karapinar District is unknown. However, a small number of Kurdish residents and Syrian refugees appear to be present.	**Future actions to be implemented:** Implement additional measures to incorporate rights of minorities to non-discrimination and equal opportunity within the ESMS, including: ● Conduct meetings with local authorities and NGOs to determine the current status of Syrian refugee settlements in Karapinar District. If significant numbers of Syrian refugees are identified as residing in the District, discuss with the local authorities and NGOs potential campaign to promote employment and training opportunities for refugees on the Project site. ● Promotion of employment and training opportunities targeting minority groups such as Syrian refugees ● Liaison with workers belonging to minority groups to identify specific concerns ● Permission for workers to observe diverse religious holidays. ● Translate the Project's Labour Commitment Policy into other languages as applicable if migrant or refugee workers are present on site

7 CUMULATIVE IMPACT ASSESSMENT (CIA)

Cumulative impacts occur when the effects of developments (action, project or activity) overlap with the effects of other existing, planned or anticipated future developments by affecting the same VECs.

This chapter aims to assess the potential cumulative environmental and social impacts of the Project on the Valued Environmental and Social Components (VECs), together with other existing and future solar power developments.

CIA process is defined by IFC as (i) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social drivers on the chosen VESCs over time, and (ii) proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

7.1 CIA METHODOLOGY

The CIA study for Karapınar YEKA SPP Project has been conducted following the six-step process specified by the IFC's Good Practice Handbook on the Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets. Figure 7-1 illustrates the Rapid Cumulative Impact Assessment (RCIA) logical framework which is suggested to be conducted by the IFC. Steps of the RCIA process is as follows:

- Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries: Determine spatial and temporal boundaries and identify VECs.
- Step 2: Scoping Phase II – Other Activities and Environmental Drivers: Identify all developments and external natural and social stressors affecting the VECs.
- Step 3: Establish Information on Baseline Status of VECs: Determine present conditions of VECs.
- Step 4: Assess Cumulative Impacts on VECs
- Step 5: Assess Significance of Predicted Cumulative Impacts
- Step 6: Management of Cumulative Impacts

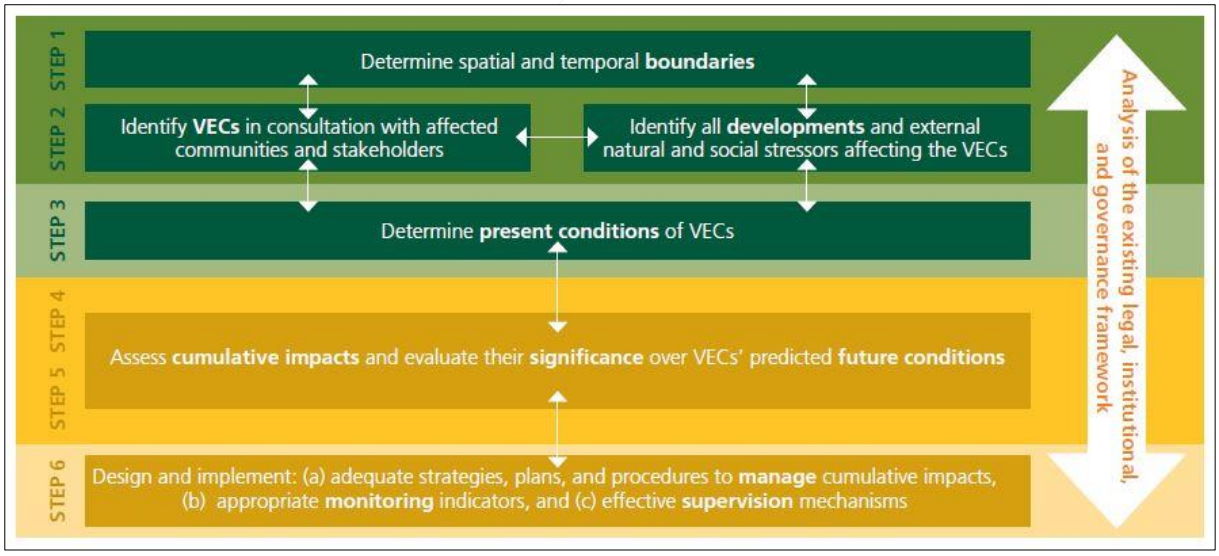

Figure 7-1: RCIA Logical Framework

7.2 CUMULATIVE IMPACT ASSESSMENT STUDY

7.2.1 Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries

The CIA studies mainly focus on the valued environmental and social components (VECs) such as:

- Physical features (e.g. biodiversity);
- Ecosystem services;
- Natural processes;
- Socio-economic conditions;
- Cultural aspects

Table 7-1: Identified Specific VECs

Environmental/Social Aspects	VECs	Specific VECs
Air Emissions	Air quality in local settlements	Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu, Küçük Karakuyu and Karapınar
Noise	Background noise levels at local settlements	Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu, Küçük Karakuyu and Karapınar
Land, Soils and Visual Environment	Visual Environment of local settlements	Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu, Küçük Karakuyu and Karapınar
Water	Water Resources	Groundwater Level of the subject Aquifer
		Groundwater Quality Level of the subject Aquifer
		Surface Water Quality of Acıgöl and Meke Lakes
Biodiversity	Key Biodiversity Area	Karapınar Plain KBA
	Priority Habitats	E6 Inland salt steppes
	Other Habitats	Small wetland located at 1.5km away from the Project Site.
	Important Flora Species	Anthemis fumarifolia Astragalus lycius, Petrosimonia nigdeensis Cousinia birandiana Cousinia iconica Linaria corifolia
	Important Fauna Species	Asia Minor Ground Squirrel Emys orbicularis Testudo graeca
	Migratory and Breeding Bird Species	Neophron percnopterus Aquila heliaca Aquila nipalensis

Environmental/Social Aspects	VECs	Specific VECs
		Streptopelia turtur Falco tinnunculus
Socio-economic Conditions	Land Use	Local people using the Project Site for grazing
	Socio-economic activities	Local people using the Project Site for grazing
	Regional socio-economy	Residents of Karapınar
	Community Health, Safety and Security	Residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu, Küçük Karakuyu and Karapınar

The **spatial boundary** of the CIA study is determined as to cover Karapınar YEKA SPP Project's direct impact area (Project Site and the nearby settlements affected by the project activities/components and the borders of the selected VECs. The Project Site is within the Karapınar Plain KBA. Therefore, considering habitat integrity; the spatial boundary of the CIA Study has been determined to cover the Project Site, project access roads, ETLs and Karapınar Plain KBA (See Figure 7-2).

The **temporal boundary** of the CIA study is determined as the timeframe from the beginning of land preparation activities until the end of the Energy Generation Licence duration (49 years from the licensing date). The Plant is planned to be fully operational in 2023 and the construction period will be significantly shorter than the operation phase. Therefore, the operation phase of Karapınar YEKA SPP is determined as the focus of this CIA study as the most conservative timeframe.

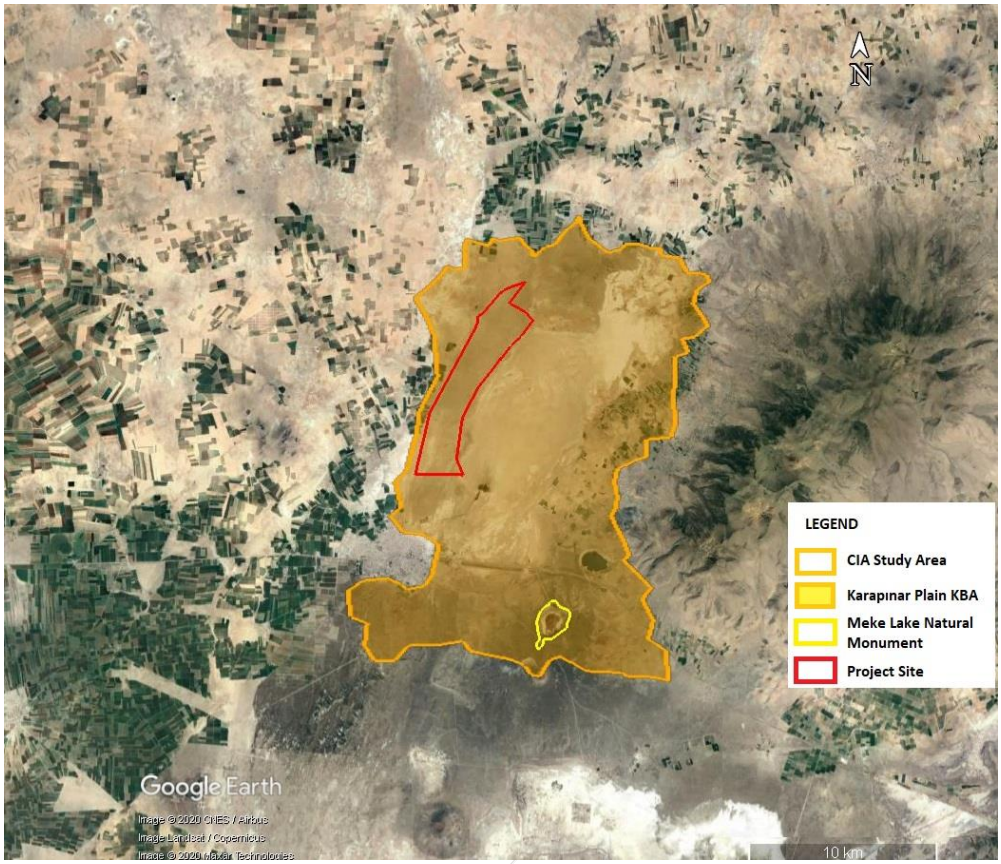

Figure 7-2: CIA Study Area

7.2.2 Step 2: Scoping Phase II – Other Activities and Environmental Drivers

Other past developments whose impacts persist, existing and foreseeable developments and environmental drivers within the spatial and temporal boundaries of the CIA Study, which would have potential impacts on the VECs, have been identified through:

- Desk-based review of Electricity General Licenses issued by the EMRA for solar power plants;
- Site Visit Findings; and
- Interviews with Local authorities.

Available information on the existing and foreseeable developments identified within the CIA boundary are provided in Table 7-2. There are operational 9.8MW Afta SPP and 2.24MW Solona Konya SPP on 2.1km south of Karapınar YEKA SPP Plant. In addition to these operational SPP's, 8MW Gitaş-1 SPP has valid energy production unit but it's predicted that this Project is still at planning stage since neither its location nor its construction status couldn't be confirmed either via desktop studies and site visit or interviews with the Local Authorities.

According to the information obtained from EMRA, no other existing or planned power developments have been identified within the CIA Study Area.

Table 7-2: Solar Power Developments Identified within the CIA Study Area

License No	Development Name	Installed Capacity (MWm)	Installed Capacity (MWe)	Capacity under Construction (MWe)	Capacity under Operation (MWe)	Project Location	Distance to Karapınar YEKA SPP (km)
EÜ/8504-16/04208	Solana Konya SPP	2.24	2.24	0	2.24	Karapınar	2.1
EÜ/8519-5/04213	Afta SPP	13.7	9.8	0	9.8	Karapınar	2.1
EÜ/8541-14/04223	Gitaş - 1 SPP	8	8	8	0	Karapınar	NA

7.2.3 Step 3: Establish Information on Baseline Status of VECs

Information on the baseline status of the VECs is mainly based on the environmental and social baseline information presented in Chapter 5 and Chapter 6 of this ESIA.

7.2.4 Step 4: Assessment of Cumulative Impacts on VECs

Analysis of cumulative impacts on VECs involves estimating the future state of the VECs that may result from the impacts they experience because of past, existing or foreseeable developments. The concern is not just estimation of the development's impact, but estimation of the future condition of VECs in the context of all stresses—which is the cumulative impact—and can be evaluated in reference to an established threshold level of acceptable condition, if known, or in reference to a past baseline.

The cumulative impact potential on the VECs has been evaluated considering the projects affecting the VECs along with the Karapınar YEKA SPP Project. If a VEC is found likely to be affected by one or more Projects in addition to Karapınar YEKA SPP, there is cumulative impact potential on that VEC (See Table 7-3 for the CIA findings).

It should be noted that this CIA study is restricted to the level of readily available information through public information sources. However, considering the short distances between Karapınar YEKA, Afta and Solana Konya Projects a cumulative impact is anticipated on biodiversity, visual aspects, groundwater quality and socio-economic features.

Table 7-3: Cumulative Impact Potential of the Identified Existing and Future Developments on the VECs

Environmental/Social Aspect	Specific VECs	Project Under Assessment	Existing / Operational Projects		Foreseeable Projects (under construction, Generation License Exists)	Cumulative Impact Predicted
		Karapınar YEKA SPP	Solona Konya SPP	Afta SPP	Gitaş-1 SPP	(Yes/No)
Impacts on Air Quality and Noise	Seyit Haci	✓				No
	Büyük Karakuyu	✓				No
	Ekmekçi	✓				No
	Kirkitoğlu	✓				No
	Küçük Karakuyu	✓				No
	Karapınar		✓	✓		No
Visual Impact	Seyit Haci	✓				No
	Büyük Karakuyu	✓				No
	Ekmekçi	✓				No
	Kirkitoğlu	✓				No
	Küçük Karakuyu	✓				No
	Karapınar	✓	✓	✓	✓	**Yes**
Biodiversity	Key Biodiversity Area					No
	Priority Habitats	✓				No
	Small wetland located at 1.5km away from the Project Site.	✓	✓	✓		No
	Important Flora Species					No
	Important Fauna Species	✓	✓	✓	✓	**Yes**
	Migratory and Breeding Bird Species	✓	✓	✓	✓	**Yes**
Land Use		✓				No
Water	Groundwater Level of the subject Aquifer					No
	Groundwater Quality of the subject Aquifer due to accidental spills	✓	✓	✓	✓	**Yes**
	Surface Water Quality of Acıgöl and Meke Lakes due to accidental spills					No
	KOSKI Water Supply Network	✓	✓	✓	✓	**Yes**
Socio-economic Conditions	Socio economic conditions of local people using the Project Site for grazing	✓				No
	Socio-economic Conditions in the Region	✓	✓	✓	✓	**Yes**
Community Health and Safety	Seyit Haci	✓				No
	Büyük Karakuyu	✓				No
	Ekmekçi	✓				No
	Kirkitoğlu	✓				No
	Küçük Karakuyu	✓				No
	Karapınar				✓	No

7.2.5 Step 5: Assessment of Significance of Predicted Cumulative Impacts

According to the IFC's Good Practice Handbook, the significance of a cumulative impact is evaluated not in terms of the amount of change, but in terms of the potential resulting impact to the vulnerability and/or risk to the sustainability of the VECs assessed. This means evaluating cumulative impacts in the context of ecological thresholds. Determining ecological thresholds for biological and social VECs has proven to be difficult. In many cases, such thresholds may not be clearly identified until they are actually crossed, at which point recovery may take a long time with considerable cost or may simply not be possible. Consequently, a precautionary approach that explicitly considers uncertainty in ecological and sociological relationships is essential when thresholds of acceptable VEC condition are being established.

Determination of thresholds is an essential component not only for the assessment of significance of cumulative impacts but also for the design of management strategies. To be able to determine the significance of cumulative impacts, some limits of acceptable change in VEC condition are needed to which incremental effects can be compared. In practice, if the cumulative impacts of all combined developments on a VEC do not exceed a limit or threshold, the development would be considered acceptable. Thresholds are limits beyond which changes resulting from cumulative impacts become of concern; they are typically expressed in terms of carrying capacity, goals, targets, and/or limits of acceptable change. In reality, however, since such thresholds are not widely defined or available, the CIA is often hindered.

Good practice implies making attempts to estimate thresholds for VECs studied, and applying the mitigation hierarchy to manage those impacts that may result in exceeding predicted thresholds.

An alternative is to identify the limits of acceptable change, in consultation with the scientific community and the affected community. This approach focuses on the identification of VEC conditions that are deemed acceptable to stakeholders. The advantage of this approach is that once acceptable VEC conditions have been agreed upon, the appropriate combination of levels of use and management strategies required to sustain those conditions can be determined.

Finally, in the absence of defined thresholds or in the face of an inability to determine limits of acceptable change, practitioners should first acknowledge this lack or inability as part of the CIA process, and use their best efforts to suggest appropriate thresholds or limits, based on available scientific evidence and in consultation with stakeholders, government agencies, and technical experts.

Based on the approaches suggested by IFC and the CIA limitations, the significance of cumulative impacts is evaluated not in terms of the amount of change, but in terms of the potential resulting impact to the vulnerability and/or risk to the sustainability of the VECs assessed.

Among the specific VECs that will potentially experience cumulative impacts as identified in Step 4, the significance of potential cumulative impacts on specific biodiversity VECs are considered as moderate while the cumulative impacts on the other VECs are considered negligible to minor based on the information discussed in the Biodiversity Section of the ESIA. According to the information gathered from the facility representative of Afta and Solona SEP, total of 40tonnes of water is used for PV panel cleaning and the water is supplied from the Municipality's Water Supply Network. Although it is not secured yet, Kalyon is planning to supply panel cleaning water from the KOSKI Water Supply Network too which is subject to mutual agreement with the Municipality when fully operational (it should be noted that effluent of package type WWTP to be installed on site will be utilised for dust suppression and PV panel cleaning during construction in dry periods). Utilising water from the KOSKI Water Supply Network will cause additional load on the Network and its water resource.

Direct impacts on biodiversity will be mitigated through implementation of necessary measures to limit the amount of vegetation removed during the land preparation and construction phase of the Project. Any habitat destruction outside the Project site will be prohibited and natural habitats of flora and fauna species outside the Project footprint will be conserved. New ETL towers and powerlines may be fitted with bird flight diverters and/or static wire-marking to minimise potential risks on soaring birds in the area.

Table 7-4: Cumulative Impact Significance: Summary Table

		Project Under Assessment	Existing / Operational Projects		Foreseeable Projects (under construction, Generation License Exists)	Cumulative Impact Significance
		Karapınar YEKA SPP	Solona Konya SPP	Afta SPP	Gitaş-1 SPP	
Visual Impact	Karapınar	✓	✓	✓	✓	Minor
Water	Groundwater quality of the subject aquifer	✓	✓	✓	✓	Minor
	KOSKI Water Supply Network	✓	✓	✓	✓	Moderate
Biodiversity	Important Fauna Species	✓	✓	✓	✓	Minor
	Migratory and Breeding Bird Species	✓	✓	✓	✓	Moderate
Socio-economic Conditions	Socio-economic Conditions in the Region	✓	✓	✓	✓	Moderate
Community Health and Safety	Karapınar	✓	✓	✓	✓	Minor

7.2.6 Step 6: Management of Cumulative Impacts – Design and Implementation

The management measures needed to prevent cumulative impacts will depend on both the context in which the development impacts occur (i.e. the impacts from other projects and natural drivers affect the VECs) and the characteristics of the development's impacts. Since cumulative impacts typically result from the actions of multiple stakeholders, the responsibility for their management is collective, requiring individual actions to eliminate or minimise individual development's contributions. It should be noted that there is limited information on other developments at the time of conducting this CIA.

As described in Chapter 5 and Chapter 6 of the ESIA, project specific on-site mitigations and monitoring programmes will be implemented in order to minimise potential impacts of the Karapınar YEKA SPP Project on the environmental and social receptors including the specific VECs identified by the CIA study.

Should a future CIA study carried out for the region the Project is located, Kalyon will promote exchange of information with other the governmental agencies, Lenders or other developers to ensure the potential cumulative impacts are well understood and managed.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT SYSTEM

An environmental and social management system (ESMS) has been developed to oversee the Project activities. The ESMS is composed of Kalyon's policies, project assessment documentation, project specific management plans, supporting thematic sub-plans and reporting templates for monitoring progress. The ESMS will be supported by the management plans to be prepared by the Contractor outlining procedures for implementing the requirements of Kalyon. The ESMS framework is aligned with the requirements of ISO14001:2015 Environmental management, ISO 26000:2010 Social Responsibility and ISO 45001:2018 Occupational Health and Safety management. Underpinning the project plans are a number of project polices that set out the core values and principles of the Project:

- HSE Policy;
- Project Specific Labour Commitment Policy;
- Project Specific Code of Conduct – Workers;
- Project Specific Code of Conduct – Security Personnel; and
  Project Specific Local Content Policy.

8.1 ORGANISATIONAL RESPONSIBILITY

Kalyon has developed a project EHS organisational structure to oversee and manage all EHS issues during the construction phase in line with the requirements defined in this document. Project Organogram showing project organisation is presented in Figure 8-1 and preliminary EHS organogram is presented in Figure 8-2. A preliminary O&M organisation chart was recently developed for the Operation Phase which will be detailed and responsibilities will be assigned in the Operation Environmental and Social Management Plan of the Project (See Figure 8-4). According to the O&M organisation chart an HSE Chief, HR Chief and Security Chief will be assigned when the Plant is fully operational. Until that time, Kalyon's EHS Team and JHSU will be the responsible for management of EHS issues. HR issues will be under the responsibility of Kalyon. Site's existing security team is responsible for the whole site including construction and operational areas.

Organisation charts are live elements and will be subject to revisions during Project lifetime.

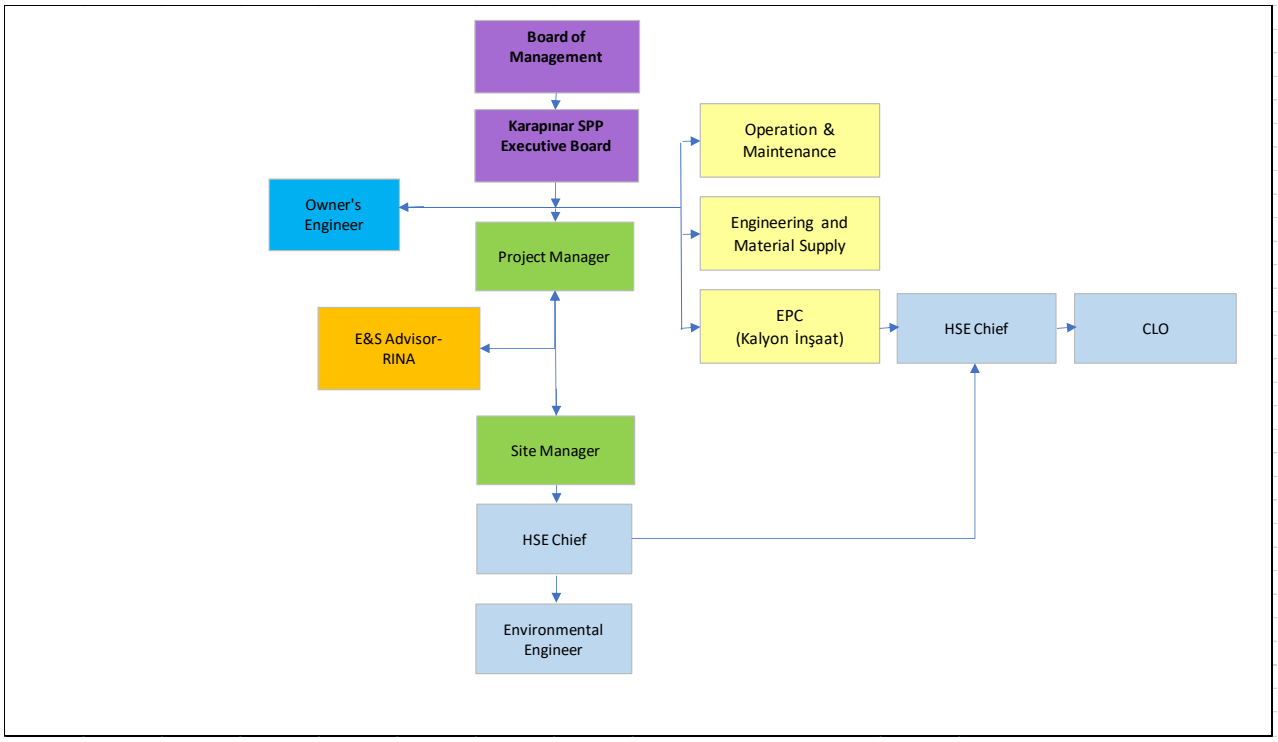

Figure 8-1: Project Management General Organogram

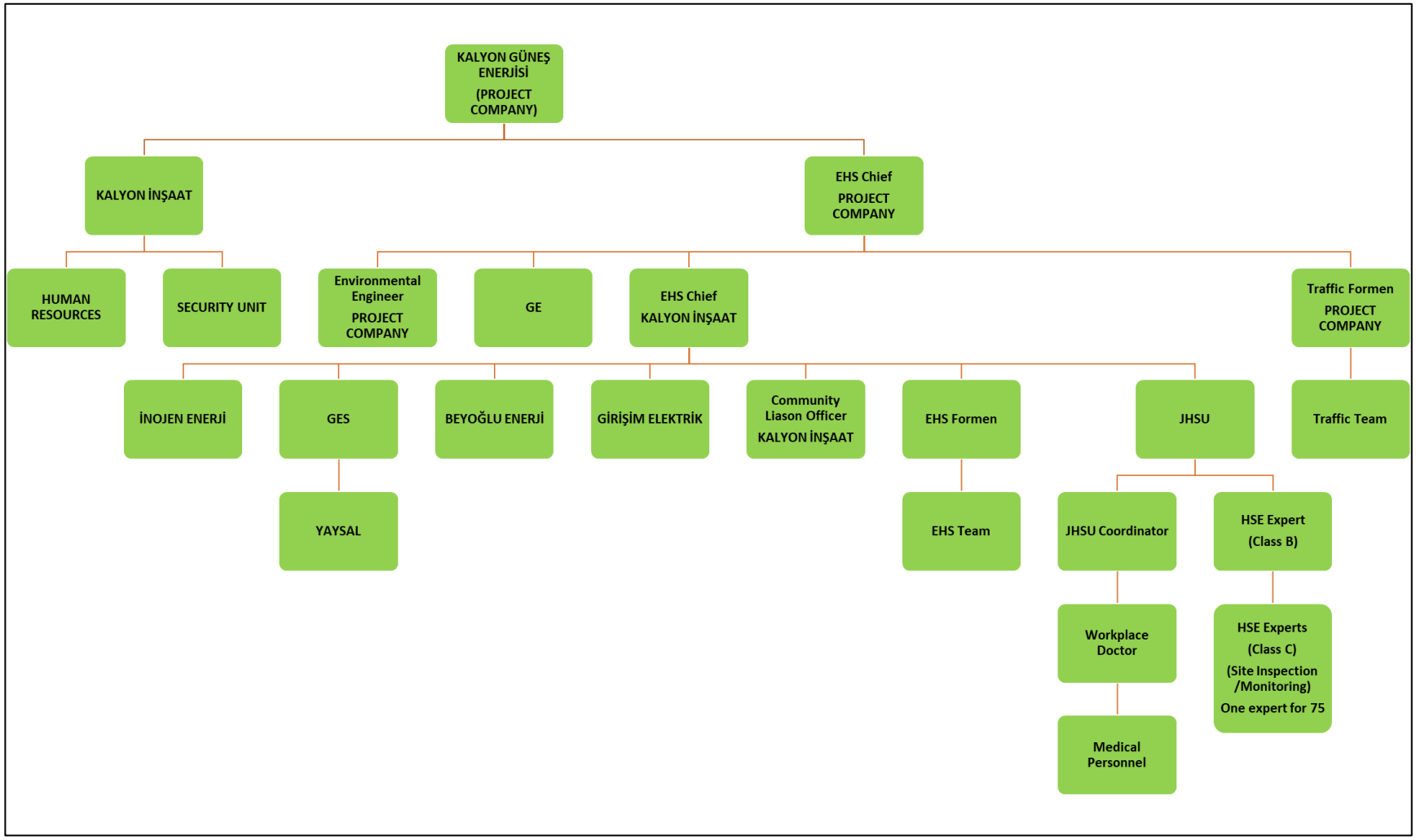

Figure 8-2: Construction EHS Organogram

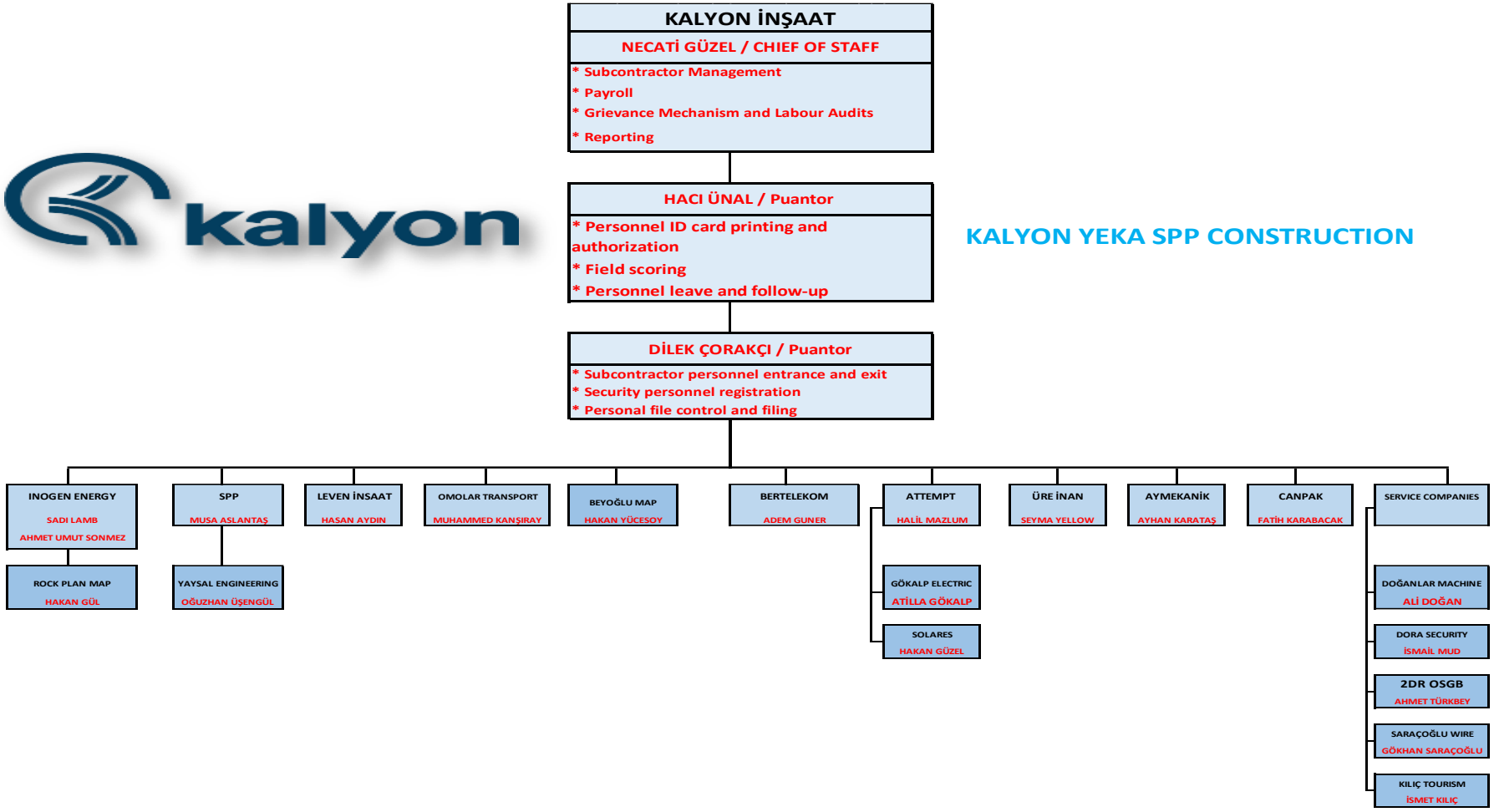

Figure 8-3: Construction Human Resources Organogram

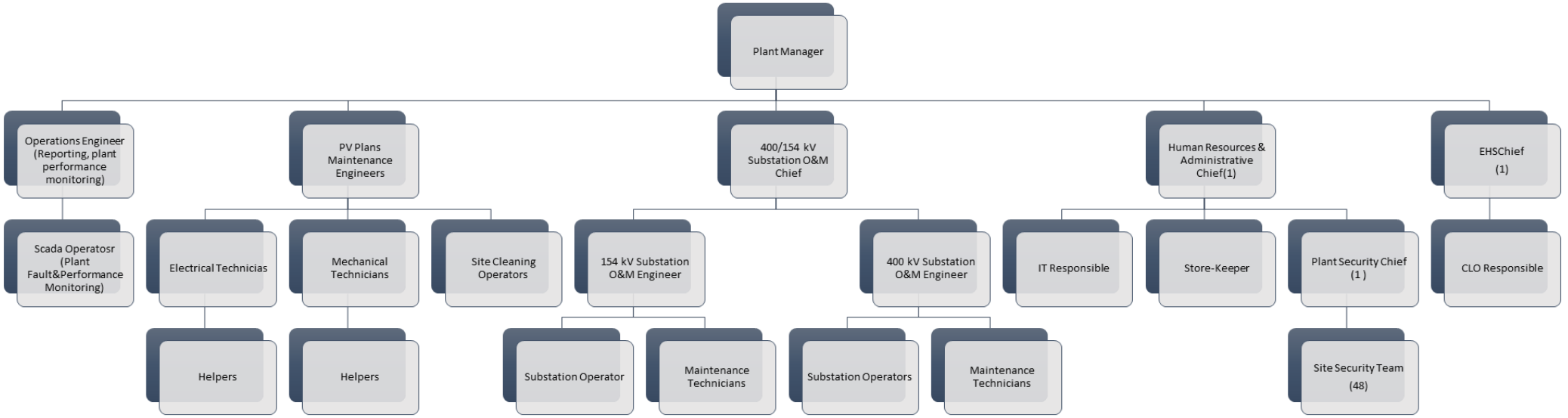

Figure 8-4: Preliminary Operation Phase General Organisation Chart

Table 8-8-1: Project Key Roles and Responsibilities

Role	E&S Responsibility	Name (TBC)
Project Manager(Home/site based)	• Overall responsibility for ensuring the implementation of Kalyon's CESMP; • Secure financial and human resources required to implement the CESMP; and • Nominate personnel to assist the Site Manager and CLO as required.	Gürler Duman
Site Manager (Site based)	• Oversee and ensure the implementation of CESMP by the Contractors (including all subcontractors); • Oversee and report Contractor's E&S performance to the Project Manager; • Attend regular EHS meetings with Contractor; • Provide support to CLO to manage community issues and any grievances; • Coordinate regular audits and inspections to check that committed impact mitigation measures are being implemented; and • Compile monthly reports in accordance with requirements of the CESMP.	Davut Deniz Gürcü
Kalyon EHS Chief (Site based)	• Responsible for implementing national permit requirements under the responsibility of Kalyon; • Oversee and ensure the implementation of CESMP by the Contractors (including all subcontractors); • Oversee and report Contractor's EHS and social performance to the Site Manager / Project Manager; • Attend regular EHS meetings with Contractors; • Provide support to CLO to manage community issues and any grievances; • Coordinate regular audits and inspections to check that committed impact mitigation measures are being implemented by the Contractors; • Compile monthly reports in accordance with requirements of the CESMP; • Liaise with MoEU and prepare statutory reports and H&S reporting; • Monitor close out of actions in the Corrective Action Plan (CAP); • Provide training to Kalyon's personnel on E&S matters (and maintain Kalyon's training records); • Review E&S reporting and communication with Lenders; and • Oversee Contractors and subcontractors training (and record keeping).	Zülfikar Güler
Kalyon Community Liaison Officer (Site based)	• Manage all communication with community and local stakeholders; • Implement requirements of the Stakeholder Engagement Plan; • Maintain and implement the community grievance mechanism; • As secretary of the Project Stakeholder Committee, convene and arrange regular meetings to maintain regular communication with wider community; • Liaise with community leaders on project activities; • Support Contractors to engage local labour and verify implementation of Labour Management Plan; • Maintain socio-economic statistics with regard to recruitment of local workers; and	Hande Yükseler

Role	E&S Responsibility	Name (TBC)
	• Produce monthly summaries that provide details related to community investment activities and the implementation of the community grievance mechanism.	
Kalyon Environmental Engineer	• Obtain and follow legal environmental permits and communicate with the institutions; • Provide environmental trainings to employees; • Plan, organize and conduct environmental drills; • Ensure compliance with Project Standards including local environmental regulatory requirements and IFC Performance Standards; • Ensure waste and wastewater management practices are in line with Project CESMP and Waste Management Plan (adequate waste segregation, keeping waste transfer logs, ensuring disposal / recycling in accordance with local regulations; • Coordinate environmental measurement and monitoring activities (noise, air quality, water quality) and report to the EHS Chief regularly to meet monthly reporting requirements.	TBC
JHSU Team	• Fulfill the duties specified in the Regulation on Duties, Authorities, Responsibilities and Training of Occupational Safety Specialists, • Fulfill the duties specified in the Regulation on Duties, Authorities, Responsibilities and Training of Workplace Physicians, • Participate in the EHS Meetings, • Conduct and monitor risk assessment studies, which is a must for all workplaces under the Occupational Safety Law, • Identify and define occupational risks, • Notify Kalyon Enerji HSE Chief about required fire protection and safety measures in line with the related legislation. • Identify and define the factors that arise from environmental workplaces and that may pose a risk to the workplace, • Review occupational health and safety and fire safety procedures in force at the Project Site, • Examine the documentation kept and / or to be kept by the workplace in line with the legislation for occupational health and safety, fire and emergency situations, and reveal what needs to be done in matters that do not comply with legal requirements, • Support Kalyon's EHS Chief for evaluation, recording and report of occupational accidents, near-misses and disease statistics; • Provide middle and upper level managers with trainings on occupational health and safety, fire and emergency issues as per the most up-to-date legislative requirements, employer's obligations and employees' responsibilities; • Revise and / or re-preparing the Project EPRP in accordance with the local legislation and IFI requirements; • Prepare of periodic reports on the work carried out from the beginning and the final situation regarding the stage reached and presenting it to the EHS Chief and Project Manager.	(TBC)

Role	E&S Responsibility	Name (TBC)
Kalyon HR Manager and Team (Personnel Affairs)	• Ensure Project labour management practices adhere to the Project standards; • Maintain and implement the worker grievance mechanism as per LMP; • Ensure contractors implement the Project worker grievance mechanisms, through review of grievance records reports; • Keep the records regarding the personnel of the Project Company and the contractors; • Conduct labour audits for all new contractors on site as well as periodic labour audits; • Produce monthly summaries that provide details related to worker grievance mechanism and HR related issues.	Chief of Staff – Necati Güzel
Traffic Team	• Ensure management and movement of the vehicles in accordance with the Traffic Management Plan and Traffic Routing Scheme within the project area; • Control traffic movements in the cut-fill sites; • Provide guidance to the vehicles that enter the Site in compliance with the Traffic Management Plan and Traffic Routing Scheme; • Arrange, locate and regularly inspect traffic and warning signs; • Conduct on-site inspections of traffic applications together with the Security Team; • Ensure controlled entrance and exit of the vehicles during busy hours (i.e. during transportation of Project Personnel and materials.	TBC
Security Team	• Act in accordance with Security Management Plan, Code of Conduct – Workers and Code of Conduct – Security Personnel as well as Law on Special Security Services(No. 5188) to ensure project standards are met; • Ensure a healthy working environment for employees; • Prevent unauthorized persons from entering the restricted areas; • Take necessary measures against all kinds of theft and actions that may arise from inside and outside of the buildings; • Prevent/manage events that may cause material and moral losses through regular patrols within the Project Site and take necessary measures to prevent re-occurrence; • Take necessary actions in terms of first response in the event of disasters and extraordinary situations (fire, flood, earthquake, etc.), • Warn those who violate the order and discipline with the Project Site and inform EHS Chief / Site Manager accordingly; • Prevent all kinds of activities that are not authorized by the administration, prevent the harm to buildings and belongings, to prevent all kinds of activities that create visual and sound pollution. • Prepare necessary and detailed minutes and reports by conveying information to the relevant authorities on the security issues; • Produce reports and minutes summarising security issues and provide to EHS Chief and Site Manager.	Security Team Manager – İsmail Çamur

Whilst some staff and responsibilities are expected to change as the Project moves through construction into operation, the overall structure and roles and responsibilities will be defined during its inception and modifications implemented as required.

8.2 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The Project has developed a Construction Environmental and Social Management Plan (CESMP) and committed to develop an operational one (OESMP) before the operations commence. The objective of CESMP is to provide a description of all proposed activities and planned facilities and to outline the actions to be taken by the Contractor to enable the Project to:

- Conform to all applicable laws, implementing regulations, financing institution obligations, permit obligations and good international industry practice (GIIP);
- Not cause undue harm or damage to natural resources, life (including human and wildlife); property, or sites, structure or objects of historical or archaeological significance;
- Be constructed in a safe manner;
- Formalise the overall programme for environmental and social management throughout the Project's life cycle;
- To be considerate of nearby community and to honour commitments made in community disclosure and consultation activities; and
- To set a framework for Contractors to implement E&S, H&S, labour and security measures on site during construction and operation.

The CESMP presents the framework for implementation, management and monitoring of the environmental, social, health & safety, labour and security requirements for Karapınar YEKA SPP Project and consists of the following sub-plans:

- Pollution Prevention and Control Plan
- Noise Management Plan
- Dust and Air Emissions Control Plan
- Camp Site Management Plan
- Construction Traffic and Traffic Management Plan
- Security Management Plan
- Training Plan
- Waste and Wastewater Management Plan
- Community Health, Safety and Security Management Plan
- Emergency Preparedness and Response Plan
- Occupational Health and Safety Management Plan
- Labour Management Plan
- Local Content Policy
- Chance Find Procedure
- Stakeholder Engagement Plan

The OESMP presents the framework for implementation, management and monitoring of the environmental, social, health & safety, labour and security requirements of the operation phase and consists of the following sub-plans:

- Pollution Prevention and Control Plan
- Security Management Plan
- Training Plan
- Water Management Plan
- Waste Management Plan
- Community Health and Safety Management Plan
- Emergency Preparedness and Response Plan
- Occupational Health and Safety Management Plan
- Labour Management Plan (Construction phase plan will be updated to reflect operation phase requirements)
- Stakeholder Engagement Plan (Construction SEP should be updated to cover any changes during Project Lifetime)

8.3 MONITORING E&S PERFORMANCE

Project commits to develop an internal monitoring program that covers the following topics as a minimum:

- Status of the project.
- Status of permits and compliance with national legislation and IFC requirements.
- Status of environmental management, social and health and safety.
- Status of compliance of the ESAP (when available).
- Submission of an environmental and social compliance report to Lenders on an annual basis or as agreed.

In addition to the internal monitoring programme there will be Lender's regular monitoring to confirm the Project compliance in terms of above-mentioned topics.

8.4 MANAGEMENT OF CONTRACTORS AND SUPPLIERS

The Contractor will review in detail Project CESMP and sub-plans and supporting documents. The Contractor should then prepare, implement, and regularly update a Contractor Construction Environmental & Social Management Plan (CCESMP).

The Contractor Contractor's site plan should include:

- Key activity areas including waste management, hazardous material control, maintenance, workshops, refuelling, temporary storage, welfare facilities, concrete batching, etc.;
- Highlight on site plan the position of all sensitive receptors (e.g. nearby residential properties);
- Permitted routes to the site and traffic management requirements;
- Clearly identify laydown area;
- Location of storage facilities and type of storage (fuel, materials, waste, chemicals); and
- Site vehicle access and delivery points.

The Contractors, through their Procurement Team, should review and evaluate of all sub-contractors and third-party suppliers, prior to contracting, to verify their eligibility to meet the E&S obligations as set out in this document. This shall include:

- Check credentials of supply chain before contracting in relation to provision for managing forced labour, child labour, health and safety, environmental impacts in the supply chain;
- Confirm willingness to adhere to environmental, social, health and safety and labour policies of Kalyon;
- Documentation to evidence practices that align with IFC PS2 including their entitlement to wages and benefits, hours of work, overtime arrangements and overtime compensation, and leave for illness, maternity, vacation or holiday, that at a minimum comply with national law. This includes respecting a collective bargaining agreement with a workers' organisation if there is such an agreement to working conditions, terms of employment (worker contracts);
- Confirm no serious EHS incidents or fatalities in the last three years; and
- Willingness to provide appropriate personal protective equipment (PPE) in conjunction with training, use and maintenance of the PPE. PPE provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems and ability to implement OHS procedures in line with the CESMP.

8.5 STAKEHOLDER ENGAGEMENT AND CONSULTATION

The Project Company is responsible for all external communications to the community. The Project Company's Community Liaison Officer (CLO) will manage interactions with the wider community. The Contractor is responsible for adhering to and supporting the Project Company to implement the requirements of the SEP. The Contractor is responsible for providing the CLO with detailed schedule and sufficient notice of project activities that are likely to have impact on local communities, to allow for transparent and effective communication regarding the Project. The below sections describe the relevant roles and responsibilities, stakeholder identification, analysis, and engagement processes developed to date, which are further detailed in the SEP.

8.5.1 Roles and Responsibilities

The Project Company is responsible for the implementation of the SEP throughout the Project lifecycle. Stakeholder engagement processes will be carried out within the limits of responsibilities as set out in the table below which will be updated accordingly in line with any organizational changes throughout the various phases of the Project.

Table 8-2: Stakeholder Engagement Roles & Responsibilities

Unit / title / location	Duties and responsibilities
CLO (site)	• Recording grievances and requests, submission to the relevant unit / Site Chief, coordination and follow-up of the necessary action • Meeting, informing and reporting with complainant and requesters • Implementation of Stakeholder Engagement Plan requirements and inter-unit coordination • Reporting of stakeholder engagement activities • Updating and preparing the website, brochures and other communication tools and ensuring accessibility for all stakeholders
Site Supervisor (site)	• Regular local and regional stakeholder visits • Organizing information meetings • Complaints and requests are evaluated and directed to the relevant unit / necessary action is taken • Representation and spokesperson for project stakeholders (local)
Project Manager / Director / Mid-Level Management (field and center) Unit Managers: Corporate Communication, Human Resources, Purchasing, Administrative Affairs, Health Safety Environment and others as applicable	• Providing technical, administrative, financial and human resources support to stakeholder engagement activities • Management and tracking of resources dedicated to stakeholder engagement activities • Representation and spokesperson for project stakeholders (local and regional) • Undertaking necessary actions identified as a result of consultations/engagement activities
Assistant General Manager / General Manager / Senior Management (headquarters)	• Providing the necessary resources for effective stakeholder engagement activities • Representation and spokesperson for project stakeholders (national and international)

8.5.2 Stakeholder Identification and Analysis

Table 8-3 below presents identified stakeholders based the on-desktop studies and consultations conducted throughout the ESIA process. Disclosure and recommended routine of communication for the future stakeholder engagement activities are presented separately in section 8.5.5.

Table 8-3: List of Project Stakeholders

Stakeholder group	Description

Karapinar District	• Livestock owners grazing in the project area
	• People living in the plateau settlements (Küçükkarakuyu, Kirkitoğlu, Ekmekçi, Büyükkarakuyu, Seyithacı etc.) in the Reşadiye District and animal owners
	• People living in Fatih and Reşadiye neighborhoods
	• People living in Karapınar district center
	• Mukhtars
	• Karapınar public institutions, including:
	  ○ District Governorship and its affiliated directorates (Population, Finance, Title Deed, Courthouse, National Education, Health etc.)
	  ○ Regional Highways Directorate
	  ○ Municipality and Council members
	  ○ Gendarmerie and police service
	  ○ Karapınar District Directorate of Agriculture and Forestry
	  ○ TEİAŞ
	• Semi-Public / Non-governmental organizations, including:
	  ○ Agricultural Exchange
	  ○ Chamber of Commerce and Industry
	  ○ Commodity Exchange

Stakeholder group	Description
	○ Chamber of Arts and Craftsman ○ Chamber of Agriculture ○ Organized Industrial Zone ○ Agricultural Credit Cooperative • Political party representatives • Local media (Anadolu Agency, Yeşilpınar Newspaper etc.)
Local – Konya Province	• Konya Governorship and affiliated institutions • Konya Metropolitan Municipality • City Council • Provincial Directorates of Ministries: Agriculture and Forest; Culture and Tourism; Environment and Urbanism • Social Security Institution • NGOs ○ TEMA Foundation – Konya Provincial Representation ○ Konya Civil Society Organizations Platform • Subcontractors and suppliers
National	• Ministry of Energy and Natural Resources • Energy Market Regulatory Board • Ministry of Agriculture and Forestry • Ministry of Culture and Tourism • Ministry of Environment and Urbanization • Ministry of Family Labour and Social Services • Ministry of Transport and Infrastructure • Ministry of Education • Non-governmental organizations (TEMA Foundation, Greenpeace)
International	• International financial institutions

8.5.2.1 Vulnerable Groups

Vulnerable groups that have been identified in Fatih and Reşadiye Neighbourhoods include people with disabilities, elderly people and people receiving governmental social support, according to the information obtained from the headmen and the district governorship.

Communication tools that require face-to-face interactions have been minimised during the pandemic period in order to reduce transmission risks. As a result, meetings specifically targeting vulnerable people have not been conducted to date. Instead, alternative consultation and disclosure methods such as communication with local district headmen have been carried out, with ongoing engagement expected throughout the remainder of the project lifecycle through municipality or mosque announcements, text messages, website announcements, short films promoting the project from the municipality's social media account, and advertisements or news in local newspapers.

8.5.3 COVID-19 Measures for Stakeholder Engagement Activities

All stakeholder engagement activities conducted in June 2020 and October to November 2020, including household surveys and meetings, were Covid-19 secured in line with the IFC/EBRD briefing note on stakeholder engagement during the Covid-19 crisis (April 2020)[20]. The following requirements were established and implemented:

- Prior to the meetings, the most up-to-date information on the incidence and spread of COVID-19 will be verified with instructions from local authorities (including any local restrictions on travel and movement) from local authorities in areas where fieldwork / field visits are planned;
- Contact will be minimized during any exchange of physical copies of documents.
- Project staff carrying out the participation activities, Personal Protective Equipment (PPE)) will be trained on how to put on and take off and how to keep it clean. Employees participating in participation activities will maintain physical distance and use the correct PPE during interviews. No one showing COVID-19 symptoms will attend the meetings and will not be admitted to the Project Site. Kalyon will ensure that staff receive medical assistance and follow the recommendations of healthcare professionals.
- During stakeholder consultations, staff will maintain physical distance, frequently disinfect equipment and supplies, comply with respiratory rules and cover coughs and sneezes, avoid touching their own faces;
- For travels to / from the Project Site, the seating arrangement in the vehicles will focus on maximizing the distance between individuals, windows will remain open as long as weather permits and is safe. All drivers and passengers will wear masks throughout the journey. Staff will plan the route and any stops, such as refuelling, to reduce additional exposure to risks;
- Prior to any special meeting, all participants will be asked to confirm the occurrence of symptoms and contact information as they know their current COVID-19 status. If any person is confirmed to be COVID-19 positive or showing symptoms, telephone meetings will be held instead of face-to-face meetings.
- All meetings will be held in well-ventilated open areas with sufficient space for all participants to maintain a minimum physical distance of 2m. Participants will be asked to wear a face mask during the meeting;

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[20] https://www.ebrd.com/covid19-consultation.pdf

- Given that current national Covid-19 measures do not allow public meetings to be held, all meetings will be private, one-on-one activities; and
- If staff attending any meeting are diagnosed with COVID-19 immediately after the visit, all participants with whom the individual has interacted will be informed via the contact information provided.

8.5.4 ESIA Consultations

Pursuant to Articles 14 and 24 of the Environmental Impact Assessment Regulation, a public participation/consultation meeting was not held in the EIA process. Instead, Konya Governorship Provincial Directorate of Environment and Urbanisation made a public announcement about the project and asked for public opinion in 2016, during which no opinions or objections were submitted.

As part of the ESIA process, consultations were conducted with stakeholders including local community members and governmental authorities in June 2020 as part of the ESIA process. The below table provides further information on the main concerns raised by in these consultations, and how they have been addressed within this ESIA.

Table 8-4: Stakeholder concerns raised

Topic	Issues raised by stakeholders	Addressed in the ESIA
Traffic safety	• Risk of accidents on the Karapınar-Besci highway given that it is narrow and has heavy traffic, especially in summer and autumn seasons.	• Traffic management measures detailed in section 6.3.4.1 including caution signs, flagmen and vehicle tracking systems
Livelihood impacts	• Impacts of the Project on the herding livelihoods of the households in the five local settlements	• Individual meetings with the 60 households in the five local settlements were conducted to obtain further information on the potential impacts. • Mitigation measures proposed accordingly in section 6.3.1.1.1 and 6.3.1.2.1, including increased communication of Project passageways and ramps available for livestock and additional support for herding livelihoods
Stakeholder engagement	• Several public institutions and local community members have a low level of knowledge about the Project	• Various communication and disclosure measures have been identified in the SEP, including through the Project website, information brochures, municipality or mosque announcements, and notice boards in the relevant municipalities
Community grievances	• While requests and grievances from stakeholders are verbally responded to and addressed, these are not being recorded. A CLO should be employed for this purpose	• A CLO has been appointed with their role and responsibilities detailed in the SEP. Grievances and requests will also be systematically recorded.as part of the community grievance mechanism included in the SEP.
Worker accommodation	• Worker accommodation camps should be managed in line with the IFC and EBRD standards, such as size of rooms, air conditioning, and conditions of bathrooms	• Worker accommodation standards to be implemented are detailed in section 6.3.3.1.1.
Local recruitment	• A public announcement mechanism should be established and disclosed to inform local community members about job opportunities in a transparent manner	• Local content policy ahs been developed to manage local recruitment, as detailed in section 6.3.3
Local procurement	• A mechanism should be developed to inform potential suppliers of Kalyon's aim to use local goods and services and to increase local purchasing	• A local procurement plan has been developed to manage use of local suppliers and goods, as detailed in section 6.3.2
Social responsibility	• Social responsibility projects should be developed during construction and operations phases including regarding local employment opportunities, traffic education in schools, protection of flora and fauna in the area, and support local development	• A community development plan (CDP) will be developed to provide additional support to local communities. Traffic awareness measures are included in section 6.3.4.1. Flora and fauna protection. • Local recruitment procedures are detailed in the local content policy as per section 6.3.3

8.5.5 Stakeholder Engagement Programme

Various information methods will be used to reach out to different stakeholder groups throughout the Project lifecycle, as shown in Table 8-5 below.

Table 8-5: Stakeholder engagement programme

Stakeholders	Information to be disclosed	Methods	Timeframe
Project affected settlements	• Final draft ESIA documents • Information about the project • Project activities	• Regular visit • Notice boards • Brochures • Project website and social media accounts • During the pandemic period, telephone calls, announcements from the municipality or mosque, sending short messages, screening short films promoting the project from the municipality's social media account, announcements or news to local newspapers	• Pre-construction phase: Monthly • Construction phase: Quarterly • Operations phase: Monthly
Local people using the Project Area for grazing	• Final draft ESIA documents • Information about the project • Project activities • The locations of animal passageways opened within the project area • Community development initiatives to support herding livelihoods • Information on the Highways Directorate's Road Widening Project and options available to the local communities	• Regular visits • Focus group discussions to discuss livelihood needs, priorities and opportunities • Meetings with external stakeholders for implementation of CDP • Signage and maps indicating locations of animal passageways • Notice boards • Brochures • Project website and social media accounts • Telephone calls and text messages during the pandemic	• Pre-construction phase: Monthly • Construction phase: Monthly • Operations phase: Monthly
Karapınar public institutions	• EIA • Project activities • ESIA documents	• Visit when necessary • Project website • Telephone conversations	• As needed
Karapınar civil society and non-governmental organizations Local press representatives Karapınar tradesmen and community	• EIA • Final draft ESIA documents • Project activities •	• Regular visit • Notice boards • Brochures • Project website and social media accounts • Telephone conversations	• Construction phase: Quarterly and as needed • Operations phase: Quarterly
Stakeholders in Konya city center	• Final draft ESIA documents • Information about the project • Project activities	• Project website and social media accounts	• As needed
Vulnerable groups located near the project site (women, elderly, disabled etc.)	• Final draft ESIA documents • Information about the project • Project activities • Grievance mechanism	• Regular visit (by phone or in person) • Notice boards • Brochures • Project website and social media accounts • During the pandemic period, telephone calls, announcements from the municipality or mosque, sending short messages, screening short films promoting the project from the municipality's social media account,	• During the construction phase: Biannual • During the operation phase: Monthly

		announcements or news to local newspapers	
Project Workers (including workers of sub-contractors and suppliers)	• Workers Grievance Mechanism • HR Policies and Procedures • Working Conditions and Employment Requirements • Labor rights and trade union rights • COVID-19 Pandemic Measures in the Workplace • Trainings (Induction, recruitment, HR Plan and procedures, employee complaint mechanism and OHS issues)	• Regular meetings • Notice boards • Brochures	• Construction phase: Quarterly • Operations phase: Biannual

8.5.6 Community Grievance Mechanism

Within the scope of stakeholder engagement activities of the project, a formal grievance mechanism has been established in line with IFC principles regarding the management of complaints and requests from stakeholders.

The objectives of the grievance mechanism is:

- Provide stakeholders with a mechanism to express their comments, dissatisfaction and grievances;
- Creating a mechanism to respond to stakeholder complaints;
- Creating a mechanism to solve problems related to the project;
- Making sure that complaints are handled fairly and transparently;
- To allow the monitoring of the efficiency of the mechanism.

The Project Company aims to record and evaluate the complaints and requests from stakeholders, to resolve those that are possible as soon as possible, and to meticulously manage the processes of feedback to the stakeholder.

All stakeholders are able to submit their complaints and requests regarding the project through the following methods:

- By submitting the Complaint and Request Form to the construction site office
- By putting the Complaint and Request Form in boxes placed/to be placed in the Fatih and Reşadiye mukhtars and the construction site
- By sending the Complaint and Request Form to the construction site or company headquarters address
- Via the Contact Form on the project website
- By calling the project field office phone

All grievances can be submitted anonymously.

Grievance management of the project is carried out as explained below:

- Regardless of the way in which the complaint or request is received, the form number is registered by the CLO. The period determined for registration is 3 working days.
- During registration, complaints will be divided into high, medium, low level priority categories. Categories will be represented by color codes. For example; Issues that may have significant impacts on the health, safety, well-being or property of an individual or group of people will be categorized as High Level. Time
- Complaint boxes at the construction site are checked every day at 16.00, and the complaint boxes in the mukhtar offices at 14.00 on Mondays and Thursdays.
- After registration, the form is sent to the relevant manager or unit within 1 business day.
- In the event of a verbal complaint from external stakeholders, a record is created by the CLO via the form (the complainant is not required to provide a name).
- The resolution of the complaint or request is carried out within 15 working days, if possible.
- After a solution or situations where a solution is not possible, together with valid reasons, the complainant / request owner is notified by the responsible personnel within 1 business day after the evaluation.
- All complaints are added to the Complaint and Request Tracking Table every Friday.

The resolution time of complaints is maximum 15 business days, and the maximum time for feedback is 17 business days.

During the construction and operation process, Kalyon is available at the following coordinates:

Project Website	https://kalyonpv.com/
Project Field Office	Address: Karapınar-Besci highway 3.km Telephone: 0 536 271 8113 CLO: Hande Yukseler
Karapınar Announcement Boards **Complaint / Request Forwarding Boxes**	Karapinar Municipality Building Fatih Neighborhood Mukhtar Reşadiye Neighborhood Mukhtar Kalyon Güneş Enerjisi Üretim A.Ş. Site Entry
Project Head Office	Address: Malıköy Başkent OSB Mahallesi Şadi Türk Bulvarı No:23 Sincan/Ankara

(Kalyon Solar Energy Production Inc.)	Phone: 444 6 559 mail: info@kalyonpv.com

9 CONCLUSIONS

9.1 ESIA BACKGROUND

RINA Consulting has been assigned to conduct an ESIA study for the Karapınar YEKA SPP Project as Kalyon is seeking financing from International Finance Institutions' (IFIs).

This ESIA has been prepared in line with Turkish Legal Framework and IFIs requirements, mainly World Band and IFC Performance Standards (2012), including general and sector specific EHS Guidelines and EBRD Performance Requirements.

The ESIA predicts that residual environmental impacts of minor to moderate significance may occur as a result of the Project. The ESIA study has established that potential impacts associated with the Project activities are not detrimental in nature and anticipated to be successfully managed through effective implementation of specific management measures.

In terms of biodiversity features, construction activities will have impacts on terrestrial habitats and flora due to removal of vegetation as well as disturbance and displacement of fauna. Operation phase will likely cause increased avifauna injury and mortality by means of collisions with the ETLs and ETL towers.

An environmental and social management system (ESMS) and Environmental and Social Management Plan (ESMP), appropriate to the nature and scale of the project and commensurate with the level of its environmental and social risks and impacts, has been established to provide guidance to the Project Company and Contractors for effective implementation of necessary mitigation measures during Project activities. The ESMP comprises number of Project specific management plans to be implemented by the Project Company and Contractors.

9.2 SUMMARY OF IMPACTS

The main environmental and social impacts (positive and negative) identified and the mitigation measures which will be implemented to remove or reduce the level of impact is presented in Table 9-1.

Table 9-1: Potential Environmental and Social Impacts and Mitigation Measures

Ambient Air Quality
Dust generation comprises the major source of air pollution caused by construction activities especially earthworks. Project earthworks will comprise land levelling and excavation, construction of access roads, excavations for underground cable trenches, ETL towers and substations. Particulate matter is present in the atmosphere for only a short period after release, as particles are heavy enough to settle relatively quickly. Therefore, impacts of dust emission will be localised and will not cause long-term or widespread changes to local air quality. However, deposition of particulate matter will cause short-term impacts on the settlements and agricultural areas in close proximity to the Project area. Necessary mitigation measures are implemented by the Project Company to minimise dust generation during construction activities and periodic dust measurements at pre-defined locations have been commenced during dry periods. In addition to the mitigations in place, if any grievance related to dust is received at settlements, the grievance will be evaluated and where found necessary/applicable, one-off PM_{10} measurements will be conducted at these locations and necessary corrective actions will be implemented. Therefore, the residual impact on the various groups of receptors is anticipated to be short-term and negligible to moderate. Noting that annual energy production of Karapinar SPP will be about 2.3 TWh for the first year of operation once fully operating, energy production by the Project will annually displace 1.14 million tCO_2e emission on the national grid during operation. Therefore, the Project will have positive long-term impact on the local ambient air quality during the operational phase.
Noise Impacts
Operation of construction machinery and equipment will generate noise during land preparation and construction activities. Consequently, noise impacts on receptors will occur. The receptors that are likely to be affected by noise impacts are residents of Seyit Hacı, Büyük Karakuyu, Ekmekçi, Kirkitoğlu and Küçük Karakuyu. Cumulative noise levels at the closest receptors are calculated by taking the background noise levels at these receptors into account. Calculations are based on the worst-case scenario in which maximum amount of construction machinery and equipment will operate at the same time, at one location, with maximum sound levels. Furthermore, Noise Monitoring studies were carried out in September 2020 and December 2020 in Seyt Hacı and Ekmekçi settlements. Based on monitoring results and calculations, it is anticipated that exceedance of standards at the sensitive receptors might occur from time to time for short periods of time unless mitigations are not in place. A Noise Management Plan has been developed and mitigation and monitoring activities are in place to ensure noise impacts are minimised, including limits to daily construction hours and the amount of machinery operating simultaneously, the use of portable noise barriers and implementation periodic five-day noise monitoring programme at pre-defined measurement locations.

Any grievance received from the local people related to the construction noise will be taken into consideration and corrective measures will be implemented where necessary (i.e. where regulatory noise limits are exceeded).

Residual impacts after the implementation of mitigation measures during construction at potential receptors will therefore be negligible to moderate.

Noise sources during the operation of solar farms are very limited; transformers and inverters will be enclosed and there will be minimal noise emissions from traffic caused by employee transportation. Noise emissions will therefore be negligible.

Land use, Soil and Visual Impacts

The major Project impacts and/or risks on soils and geology during the land preparation and construction phase include loss, disturbance and erosion of topsoil due to site clearance and earthworks, soil contamination risk from accidents and improper management of waste / hazardous materials and sinkhole formation due to over-extraction of groundwater and changes in local drainage patterns.

Mitigation measures to minimise soil loss and erosion will be implemented, including restriction of topsoil removal to areas of strict need only, appropriate storage and post-construction reinstatement of top-soil, and re-vegetation of disturbed areas. Soil contamination will be avoided / minimised through the implementation of a Waste Management Plan, and ensuring the appropriate management of wastes and hazardous materials, including a training programme for Project workers

The risk of sinkhole formation will be mitigated by the avoidance of the use of groundwater for construction activities and appropriate selection of project foundation elements.

Following implementation of these mitigation measures, residual impact during land preparation and construction will be negligible (for soil contamination) to moderate (for soil erosion and sinkhole formation).

Further impacts on soils as a result of the Project during its operational phase will be minimal, provided proposed revegetation and standard pollution prevention measures are implemented. It is noted that the region is already vulnerable to sinkhole formations due to geological characteristics, sudden changes in groundwater levels and precipitation patterns during wet season; therefore, there will be still potential for sinkhole formation at the Project site which may pose risk to the plant components.

Visual effects of PV plants arise from changes in the composition and character of views available to receptors affected by the proposed development (e.g. residents, recreational users, tourists etc.). Receptors of visual impacts as a result of the Karipinar SPP are identified as transient users of Karapınar – Eskil Road and residents of the settlements on the other side of this road. As the Project site will be fenced, its visibility from the road and the nearby settlements will be minimal. Thus, the visual effect of the project is identified as negligible.

Water and Wastewater

Water demand during construction phase of the Project consist of drinking and utility water consumption by Project personnel and water use for construction activities such as dust suppression). Drinking water is purchased as bottled water from the local market and utility water and dust suppression water was supplied via tankers from the Karapınar Municipality facilities during early construction stage. During the rest of the construction phase, effluent from the on-site package type wastewater treatment plant (WWTP) is planned to be used for green-field irrigation and dust suppression for operation of which permit application process is anticipated to be completed in the first half of 2021. Potable water and wate required for panel cleaning is planned to be supplied from KOSKI Potable Water Supply Network.

Generated wastewater has been stored in leak-proof septic tanks and treated in package type wastewater treatment plant installed on the construction laydown area and finally discharged to the Municipality's sewage system through vacuum trucks to date. Once the package WWTP is operational, generated wastewater will be treated on-site and treated effluent will be used for dust suppression and for cleaning of operational PV panels during dry periods while it will be used for green-field irrigation when there is no other demand during wet seasons. Permit processes for operating WWTP and using KOSKI Potable Water are still on-going.

Accidental spill/leakage of hazardous materials such as fuel, oils, lubricants, cement, etc. has the potential to contaminate the groundwater within the Project site considering the shallow groundwater depths especially in its south-eastern section. A Pollution Prevention and Control Plan is in place and management of hazardous materials is carried out in accordance with this plan, with designated storage areas available in the laydown area and appropriate training provided for personnel on site.

Once fully operational, 15,600 m^3/year water will be required to clean the panels. Panel cleaning will be required during dry season (April September) and water will be supplied from KOSKI Potable Water Supply Network capacity of which is considered adequate.

No groundwater extraction is planned for the Project in any project phase.

There is very limited need for the use of hazardous materials during the routine operation of a solar PV project and with appropriate storage and management of fuels, oils, cement etc. impacts on surface / groundwater during Project operations will be negligible.

Waste Management

Main waste types that generated during the land preparation and construction phase include domestic waste, packaging waste, excavation and construction waste, hazardous waste, and other special hazardous wastes

such as medical waste, waste electric/electronic equipment, waste batteries and accumulators, waste oils, waste vegetable oils, end-of-life tires and vehicles, and broken PV panels.

The Project Company and the contractors are dedicated to avoiding and minimize impacts due to waste generation by complying with the requirements of Project Waste Management Plan and national legislation as well as applying international standards on waste management. Generated domestic waste is stored at dedicated containers on site and regularly collected by the Karapınar Municipality's trucks and transferred and temporarily stored in open dumping area located at 5.1km east of the Project Site until they are transferred to a landfill in Ereğli on daily basis.

Recyclable waste bins are available in common areas of the Site. According to the available waste registers, scrap metal, paper and cardboards are being segregated at Site. The Project Company will make necessary arrangements to segregate waste plastic and glass and send off-site at the earliest.

The firm KONATIK was appointed as waste management service provider on February 09, 2021.

Based on above, no significant impact is anticipated during construction.

During the operational phase, the number of Project personnel and associated generation of domestic waste, will be reduced significantly. Limited quantities of hazardous wastes will also be produced (waste oils, tyres, batteries etc.). Domestic waste will be temporarily stored near the substations and administrative buildings and regularly collected by Karapınar Municipality. All waste management practices will be carried out in compliance with the Project Waste Management Plan and national regulations and potential impact from waste management will be negligible.

The Project Company has liaised with the PV panel Manufacturer (who is another Kalyon Holding Group Entity) to secure an appropriate and effective recycling/re-use mechanism for end-of-life and broken or damaged solar panels. Accordingly, broken/damaged panels are stored at a dedicated storage area with adequate bunding and sent to the Manufacturer for evaluation when a reasonable amount that is easy to transfer is reached. Upon evaluation, if there is a fault that can be fixed at the factory the manufacturer takes necessary action and sends the fixed panel(s) to the Project Site If the panels need recycling, then the manufacturer sends these panels to their own certified waste management company for recycling of broken / damaged panels as electronic wastes. According to the information received from the Project Company, rate of wastage from the beginning of installation of panels is approximately 0.17% (500 broken or damaged panels / 300,000 panels installed).

At Project decommissioning phase, end-of-life PV panels will be the main concern, if not managed/recycled appropriately As with panels broken / damaged during the operational phase, an appropriate recycling/re-use mechanism will be developed for end-of-life solar panels in cooperation with the PV panel manufacturer. If this option is found inapplicable, other recycling facilities will be engaged for this purpose.

Biodiversity

The Project Site is not located within or overlaps with any of Turkey's legally Protected Areas. The closest protected area is the Meke Maar Lake Nature Protection Area located at 8km south-east away from the Project Site. No direct or indirect impacts of Project activities are anticipated on Meke Maar due to its distance. The Project Site is within the boundaries of Karapınar Plain KBA.

Construction Phase Impacts

The most valuable natural habitat in the AOI is Salt Steppes (E6.2 Continental Inland salt steppes according to EUNIS Habitat Directive) while the wetland and roadside vegetation are not of special characteristic to be under EUNIS classification scheme. Even though this habitat is currently degraded status due to over-grazing, its conservation value is considered to be Medium, not higher because of its widespread existence in the Region.

There are not Critically Endangered (CR) or Endangered (EN) plant species identified through flora surveys. Although some endemic plant species were detected in the AOI, these species are widespread in the region and Least Concern according to the IUCN Red List. None of these species are listed under Karapınar Plain KBA or IPA Species. Therefore, their conservation values are determined as Low while the impact magnitude is considered as Low to Moderate.

Construction activities will be limited to the Project Site and ETL route, where a minimum clearing of natural vegetation will be ensured (limited to the roads and building footprints where not possible to avoid). The ETL route vegetation can be rehabilitated using suitable natural shrub species. Areas of salt steppes that will be affected permanently and temporarily will be limited, and therefore the magnitude of the impact is considered to be minor to moderate. For the overall habitat structure, again due to the main impacts being restricted to roads and building footprints, the overall integrity of the habitats is anticipated to remain.

Disturbance to the terrestrial and wetland habitats and flora could be due to dust generation and settlement on these features during dry periods. However, this impact is anticipated to be limited as the mitigation measures such as dust suppression is in place during dry periods. Furthermore, small wetland habitat is located more than 1km away from the Project Site therefore no disturbance on the wetland habitat is expected.

Introduction or spread of non-native invasive species accidently is also an indirect impact that can occur during construction activities which may cause impact with minor to moderate magnitude on the terrestrial fauna. The

field studies identified 18 invasive alien species within the AOI, 15 of which are listed under the IUCN Global IAS Database while three are listed under IAS Database of Turkey. Considering the medium sensitivity of E.6.2. Continental Inland Salt Steppes and low sensitivity of the endemic species, potential impact will be at minor to moderate significance. Monitoring of the IAS will be required during construction.

Possible occurrence of 16 mammal species (five based on direct observation, 11 based on literature) were determined in the AoI. Amongst these, Anatolian Ground Squirrel - *Spermophilus xanthoprymnus*, was considered as species of concern due to its IUCN Red List status (NT) and its conservation value was determined as Medium. project impacts on this species during construction are considered to be of Low to Moderate magnitude.

The construction impacts described above are considered to be of low magnitude and the resulting effect is negligible.

Disturbance due to presence of people, artificial lights, generation of noise and dust is likely to affect mammal species within the AoI. Similar to the habitat loss, impacts associated with disturbance due to project activities are considered to be of Low of magnitude while the impact significance will be negligible for mammals with low conservation value and moderate for Anatolian Ground Squirrel and Common Tortoise that have Medium conservation value without any mitigations.

Fauna species that are present or likely to be present in the AoI will face injury and mortality risks due to the Project activities. Impact magnitude is considered to be High which will lead to moderate significance impact for mammals with low conservation value and major significance impact for Anatolian Ground Squirrel and Common Tortoise that have Medium conservation value while there are no mitigations in place.

Although European Pond Turtle is a KBA species however it is scoped out of the ESIA due to no habitat being present with the site or AoI suitable for this species (small wetland in the south-east is also considered unsuitable because the area is known to dry out over summer.

Construction impacts on the species that exist in the AoI are considered to be of Low magnitude and the impact significance is considered to have Moderate for Common Tortoise and Negligible for other species including Lizard of Anatolian.

Indirect impacts (such as project-induced access by third parties, in-migration and associated impacts on resource use, including land conversion, hunting and wildlife trade, and spread of invasive alien species) can affect fauna species in the AoI. However, given the nature of the Project Site and Project activities, magnitude of indirect impacts will be negligible leading to an impact with negligible significance.

According to the field study findings, the AoI is neither a suitable nesting habitat nor a critical nesting/breeding ground for a CriticallyEndangered or Endangered avifauna species. Therefore, the Project activities are not expected to lead to a net loss or reduction in the global or national/regional population of any species, including those of conservation concern. It is likely that any potential impact due to habitat loss on these species would be tolerated by the local population. Therefore, the potential impacts due to habitat loss would be minor in magnitude.

The impacts of habitat loss as a result of construction will not impact on habitats that would be important for congregatory species of birds including Greater White-fronted Goose which is included on the IBA citation. The project will not impact wetland habitat which could support this species neither will it impact habitat that could support breeding Ruddy Shelduck which is also listed on the IBA citation. It is possible that up to one or two pairs of Greater Sandplover, also listed on the IBA citation, could breed within the Project area and pre-construction surveys are recommended for this species to take account of any changes in the use of site since previous breeding bird surveys.

Operation Phase Impacts

The vegetation will be cleared at an area of 100ha only for the footprint of internal roads and buildings as well as for the frames of the PV panels. This will be a permanent impact and will involve the loss of vegetation throughout the Project Site. The magnitude of the impact is considered as Moderate. Based on these, significance of impacts on E6.2 Continental Inland salt steppes habitat is Moderate while the impact significance is Minor for terrestrial flora species on the Site.

Mammals are likely to be affected during the operational phase of the Project as a result of increased disturbance, noise, dust and injury or mortality because of collision with site vehicles or electrocution with buried cables. Increases in disturbance due to presence of people, artificial lighting, noise and dust will be relatively insignificant during operation compared the construction phase. Similarly, vehicle movements will be reduced when compared to the construction phase therefore injury /mortality risks will be lower.
Unmitigated these impacts are likely to be Low on Asian Ground Squirrel which is of Medium conservation value.

Amphibians and reptiles are likely to be affected by habitat loss within the Project Site. Considering the impact magnitude will be low and receptor sensitivity of Least Concern Lizard of Anatolian - *Parvilacerta parva (Low Sensitive);* KBA-listed Vulnerable Common Tortoise - *Testudo graeca* (High); Near Threatened European Pond

Turtle - Emys orbicularis (Medium), impact significance is anticipated to be negligible for Lizard of Anatolian, Moderate for Common Tortoise and Minor for European Pond Turtle.

Disturbance and injury/mortality impacts will be insignificant when compared to construction phase similar to mammals.

The potential negative impacts on avifauna species associated with PV panels glare and resembling water bodies are considered to be minor, both in terms of likelihood of impact as well as the significance of the Project site and wider IBA for wintering wildfowl. However, it is recommended to monitor bird fatalities and panel appearance at the Project Site during operations. Applying hedgerows between sections may reduce collision risks to waterfowl. No impact in terms of population decrease is expected as a result of collision, displacement or barrier effect.

Most of the target species, some of which are endangered such as Egyptian vulture, were spotted near the existing ETLs. Also, when the identified migration routes in the Project Site are assessed in relation of the planned ETL routes it is anticipated that the 400kV ETL lines and towers will partially coincide with the migration routes of soaring birds.

Project Specific Biodiversity Management Plan (BMP) will be developed and implemented throughout the Project lifetime with the main objective of achieving “no-net-loss” of biodiversity, including the Annex I Salt Steppe habitat, in accordance with IFC PS 6 and associated guidance notes. The Project will not affect features for which the KBA, IBA or IPA are considered to be important. BMP will include the mitigation pan set out in the sections below, along with details of monitoring which will be completed at the pre-construction, construction, operation and decommissioning of the Project..
Project specific Biodiversity Monitoring will be detailed in a separate Biodiversity Management Plan (BMP) in order to validate the accuracy of predicted impacts and risks to biodiversity values posed by the project, and the predicted effectiveness of biodiversity management actions so that the project achieves a net gain.

The programme will cover methods in line with IFC PS 6 and accompanying Guidance Note (GN6) as well as PS 1.

Land Acquisition and Economic Displacement

The entire project area is public land, therefore temporary or permanent expropriation/purchase/renting activity was not required. A major part of the land, on which the project facilities are being established, consists of pasture lands and have been utilized for grazing sheep and goat seasonally by the nearby settlements during summers. Status of these pasture lands was subsequently changed in accordance with the Pasture Law during the YEKA Project development and designated as Energy Specialty Industrial Zone by the Ministry of Science, Industry and Technology in 2012.

Likewise, land acquisition is not required for the ETLs. The entire line along the ETL route is passing through the public lands.

No house/settlement or physical asset has been required to be moved, replaced or displaced due to the project. The Project will result in two types of economic displacement impacts, as described below:

1) In 2014, three members of a household established barn and associated infrastructure on the Project site, which were demolished by Karapinar District Governorship giving prior written notice to the occupants in 2020.

2) The Project will result in a change of land use type from pastureland to primarily industrial use. Among the 34 households with ovine livestock, 15 households use the project area for grazing purposes while 19 of them use their own fields for grazing. The Project will impact activities on herding activities experienced by the 15 livestock owners who make use of the Project area, in terms of the increase in distance and time that it takes to reach the pasture area. Among these 15 households, three households rely on the livestock as their main source of income (1 in Büyükkarakuyu and 2 in Seyithaci).

The herders’ journeys to reach the grazing areas have increased by between 10 to 15 minutes. The herders have indicated that while this increase in journey time is an inconvenience, it will not impact their livestock activities, costs, or incomes in a significant manner, and the herds can walk this additional path without difficulties or having to stop. The municipality has indicated that alternative pasture lands are also available directly adjacent to or near the villages. The herders interviewed indicated that the pastureland is of similar quality across the area.

The degree of impact significance is considered to be minor given that 15 households are affected in total, among whom three households (one in Büyükkarakuyu and two in Seyithacı villages) rely on livestock as their main source of income based on responses provided in the October 2020 survey. Additionally, grazing areas remain accessible, albeit with an increased travel time.

Employment

There will be opportunities for employment during the lifecycle of the Project. The maximum number of personnel during peak construction time is estimated to be 1200.

As of February 2021, there are 619 employees at Site. 170 of these are local workforce while 449 are from out of Karapınar. Of the currently employed local workforce,143 people are blue collar and 17 people are white collar. Indirect employment to be created in the area of influence as a result of the Project is estimated to be 384.

After the construction period, the Project is likely to require 100 skilled, semi-skilled and unskilled workers. Although local workforce will be utilized as much as possible, a considerable number of workers will come from out of Karapınar District.

Kalyon has developed a Local Content Policy to manage local hire in order to bring some project benefits to the affected communities. This Policy applies to the Project Company and the Contractors (including sub-contractors and third-party consultants). The Policy acts as a consistent set of guidelines and principles to be applied by Kalyon and the Contractor in the selection, employment, training, and management of the work force throughout the life of the Project. Furthermore, a Labour Management Plan in line with IFC PS2 requirements is in place.

Kalyon provides temporary accommodation for the workers on site.

Kalyon has developed a Camp Site Management Plan (CSMP) in line with IFC's 'Workers' Accommodation Processes and Standards Guidance Note', to be implemented during the construction phase. The CSMP sets out the standards that need to be applied to workers' accommodation for projects funded by IFC. The CSMP provides benchmarks that the project will need to align with, and the standards include provisions such as guidance on worker and community interactions.

During the operation phase there will be no temporary worker camps. The personnel hired for the operation and maintenance of the SPP will be able to reside in their own homes, or where necessary in local accommodation in Karapınar District.

Business Opportunities

In terms of business opportunities over the longer term, the project will provide business opportunities for companies at the national and regional level, and to some extent for companies in the project region.

During the construction phase, the project will bring positive economic impacts temporarily (3 years) by means of the procurement of goods and services needed from the region, especially in the field of catering, accommodation / hotel rental and associated needs (cleaning, etc.), transport (personnel shuttle, etc.), machine-equipment rental and construction materials (concrete etc.).

Community Health, Safety and Security

Potential impacts on community health, safety and security may arise during construction, operation and decommissioning phases of the Project. Primary potential impacts on community health and safety mainly include the following: traffic and road safety, aviation, dust, noise, visual impacts, increase in communicable diseases, security and workers' interaction with local community.

Impacts such as noise emissions, dust and visual impacts, which have potential to affect communities, are described separately under the various headings above.

To mitigate the potential traffic related impacts from the Project, Kalyon has undertaken a Traffic Risk Assessment and developed a Traffic Management Plan. With implementation and compliance with the Traffic Management Plan, the residual impact will be moderate during Project construction and decommissioning and minor during the operational phase.

Although solar panels are designed to absorb, not reflect, irradiation glint and glare are still a concern in terms of aviation since they can cause a distraction or lead to an after-image being experienced by an observer. This can present a nuisance and, under some circumstances, a safety hazard. The nearest airport to the Project site is Konya Airport 92km to the west and the site is not on a flight route. The Presidency of General Staff issued an opinion letter on 29 May 2020 indicating no objection in terms of Military Forbidden Zones and Safety Zones and stated that the Project information will be entered into the vertical obstacle database to ensure flight safety. Therefore, no impacts in terms of aviation and military zones is expected due to the Project.

The Project Company has assessed the albedo data (reflection from the ground surface) obtained from an existing measurement station located in the Project site to consider potential impacts to adjacent settlements and road users. Annual average albedo ratio was reported as 29% whereas the albedo ratio is between 5-8% for PV modules itself. It was concluded in the assessment that reflection ratio of the surface ground is higher than the PV modules. Therefore, no impact on road safety or nearby settlements is expected.

To mitigate the potential introduction and spread of communicable diseases related to the Project, Kalyon implements the Campsite Management Plan developed for the Project, the full and efficient implementation of which will reduce potential impact to a negligible level. The project staff is provided with on-site sanitary and first aid/medical facilities in line with the IFC Guidance Note on Worker's Accommodation Processes and Standards as well as training on health, hygiene and infectious diseases to raise awareness. Kalyon has also developed and been implementing Project specific Covid-19 Emergency Plan that outlines the necessary actions and mitigations to be taken during Covi-19 pandemic. This is a detailed Plan explaining risk groups, potential and confirmed cases and instructions to the Project personnel for different scenarios.

To mitigate potential safety and security related impacts, Kalyon implements Security Management Plan (SMP) developed for the Project. The SMP sets out mitigation measures to protect life and property while ensuring that the Project's security measures are deployed in a way that complies with the law, respects and protects human dignity and human rights, avoids creating conflict and addresses security threats in a peaceful way as possible.

Labour Commitment Policy, Code of Conduct for Workers and Security has been developed for the Project. Project workers and provided with appropriate training on these policies as well as potential interactions, conflicts, the community's sensitivities, culture, local traditions, communication and behaviours to prevent any potential conflicts.

Cultural Heritage

The project activities are not expected to cause an impact on cultural heritage since there is no known or registered cultural asset in the Project site or its impact area. However, in accordance with Good International Industry Practice (GIIP)., the Contractor is required to put in place provisions for identification of unidentified or unexpected finds during below ground works commensurate with the nature and scale of the risk.

A Chance Find Procedure has been developed that aims to avoid / and or reduce project risks that may result due to chance finds in accordance with GIIP.

9.3 PROJECT ENVIRONMENTAL AND SOCIAL CATEGORIZATION

As part of the review of environmental and social risks and impacts of a proposed investment, IFC uses a process of environmental and social categorisation to reflect the magnitude of risks and impacts. The resulting category also specifies IFC's institutional requirements for disclosure in accordance with IFC's Access to Information Policy. These categories, which are also adopted by Equator Principles IV, are as follows:

1. Category A: Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.
2. Category B: Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
3. Category C: Business activities with minimal or no adverse environmental or social risks and/or impacts.
4. Category FI: Business activities involving investments in financial institutions (FIs) or through delivery mechanisms involving financial intermediation (This category is further divided in 3 as FI-1, FI-2, and FI-3).

In IFC's Guidance Note 1 on the Assessment and Management of Environmental and Social Risks and Impacts, it is further stated that "For certain projects, and particularly for greenfield investments and projects (including, but not limited to, major expansion or transformation-conversion activities) involving specifically identified physical elements, aspects and facilities that are likely to generate potentially significant adverse environmental and social risks and impacts, the client should conduct a comprehensive full-scale ESIA".

The EBRD also categorizes each project to determine the nature and level of environmental and social investigations, information disclosure and stakeholder required. EBRD's description of each category is as follows:

- Category A: Projects that could result in potentially significant adverse future environmental and/or social impacts which, at the time of categorization, cannot readily be identified or assessed, and which, therefore, require a formalized and participatory environmental and social impact assessment process.
- Category B: Projects with potential adverse future environmental and/or social impacts that are typically site-specific, and/or readily identified and addressed through mitigation measures.
- Category C: Projects that are likely to have minimal or no potential adverse future environmental and/or social impacts and can readily be addressed through limited environmental and social appraisal.

The EBRD also provides an indicative list for Category A projects in the scope of its Environmental and Social Policy (2019) where Solar Power Projects are not included. Category A listing also includes:

- "Projects which are likely to have a perceptible impact on sensitive locations of international, national or regional importance. Such sensitive locations include, inter alia, nature protected areas designated by national or international law, critical habitat or other ecosystems which support priority biodiversity features, areas of archaeological or cultural significance, and areas of importance for indigenous peoples or other vulnerable groups."
- "Projects which may result in significant adverse social impacts to local communities or other project affected parties" and
- "Projects which may involve significant involuntary resettlement or economic displacement".

This ESIA study is based on full scope and provides a full understanding of the project's potential impacts. Based on the discussions held with the Lenders and Lenders' Advisor, the Project is considered likely Category A due to its scale and location within a Key Biodiversity Area.

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