DRAFT REPORT

Project ANKA - G4-Bor-3 Solar Power Plant, Niğde

Environmental and Social Impact Assessment

Submitted to:

KALYON YEKA GES 3 ve 4 GÜNEŞ ENERJİSİ YATIRIMLARI A.Ş.

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Abbreviations

Abbreviation	Definition
AC	Alternating Current
AFAD	Disaster and Emergency Management Authority
AoI	Area of Influence
APL	Allocation in Return for Domestic Production
AZE	Alliance for Zero Extinction
CCTV	Closed-circuit television
CDP	Community Development Plan
CH	Critical Habitat
CHA	Critical Habitat Assessment
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Client	Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş., subsidiary of Kalyon Enerji
CLO	Community Liasion Officer
CLS	Community Level Survey
CMC	Continuous Monitoring Center
CO	Carbon Monoxide
CSP	Concentrating solar-thermal power
CVD	Chemical Vapour Deposition
dBA	Decibels A
DC	Direct Current
DD	Data Deficient
EAAA	Ecologically Appropriate Area of Analysis
EBRD	European Bank for Reconstruction and Developmen
EHSS	Environment, Health and Safety, Social
E&S	Environmental and Social

Abbreviation	Definition
EIA	Environmental Impact Assessment
EMRA	Energy Market Regulatory Authority
EN	Endangered
EOO	Extent of Occurrence
EP	Equator Principles
EPC	Engineering, procurement, and construction
EPA	Environmental Protection Agency
EPFI	Equator Principles Financial Institution
EPRP	Emergency Preparedness and Response Plan
ESGA	E&S Gap Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
EUNIS	European Nature Information System
FGD	Focus Group Discussion
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GN	Guidance Note
ha	hectare
HC	Hydrocarbon
HH	Household Survey
HR	Human Resources
hPA	Hectopascal
HR	Human Resources
HSE	Health and Safety and Environment

Abbreviation	Definition
IBA	Important Bird Area
ICOMOS	The International Council on Monuments and Sites
ICP	Informed Consultation and Participation
IFC	International Finance Corporation
IFI	International Financial Institutions
IPA	Important Plant Area
IUCN	International Union for Conservation of Nature
Kalyon Enerji	Kalyon Enerji Yatırımları A.Ş. (the Project Owner)
KBA	Key Biodiversity Area
KM	Kilometer
KPI	Key Performance Indicator
L	Liter
LC	Least Concern
LNG	Liquefied Natural Gas
LRP	Livelihood Restoration Plan
M	Meter
m^3	Cubic meter
MEDAŞ	MERAM Electricity Distribution Inc. Co.
mm	Milimeter
MoAF	Ministry of Agriculture and Forestry
MoC	Management of Change
MoEUCC	Ministry of Environment, Urbanisation and Climate Change
MWe	Megawatt Electric
MWp	Megawatt Power
N/A	Not Applicable
N-CP	Non-Compliance

Abbreviation	Definition
NGO	Non-governmental Organization
NO_x	Nitrogen Oxide
NT	Near Threatened
NTS	Non-Technical Summary
OBS	Observation
OECD	The Organization for Economic Cooperation and Development
OHS	Occupational Health and Safety
OHTL	Overhead Transmission Line
PA/CA	Preventative Actions/Corrective Actions
PAP	Project Affected Person
PCB	Polychlorinated Biphenyls
PDoEUCC	Provincial Directorate of Environment, Urbanization and Climate Change
PGA	Peak Ground Acceleration
PM	Particulate Matter
PPM	Public Participation Meeting
PS	Performance Standard
PV	Photovoltaic
RAP	Resettlement Action Plan
RCIA	Rapid Cumulative Impact Assessment
R&D	Research and Development
RIV	Residual Impact Value
RLE	Red List of Ecosystems
RMU	Disconnector -Breaker Unit
RSA	Regional Study Area
RWIHC	Regulation of Water Intended for Human Consumption
SCADA	Supervisory Control and Data Acquisition

Abbreviation	Definition
Sec	second
SEA	Strategic Environmental Assessment
SEP	Stakeholder Engagement Plan
SF	Safety Factor
SHW	State Hydraulic Works
SIA	Social Impact Assessment
SO_2	Sulphur dioxide
SP	Sampling Point
SPA	Special Provincial Administration
SPP	Solar Power Plant
sqm	Square Meter
SYDV	Social Assistance and Solidarity Foundation
TCFD	Task Force on Climate-related Financial Disclosures
TEDAŞ	Turkey Electricity Distribution Inc.
TEİAŞ	Turkish Electricity Transmission Corporation
TGFZ	Tuz Gölü Fault Zone
TOE	Tonne of oil equivalent
TRY	Turkish New Lira
TS	Turkish Standard
TURKSTAT	Turkish Statistical Institute
TÜBİVES	Turkish Plants Data Service
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNGP	United Nations Guiding Principles on Business and Human Rights
VEC	Valued Environmental and Social Component
VU	Vulnerable
WB	World Bank

Abbreviation	Definition
WB ESF	World Bank Environmental and Social Framework
WHO	World Health Organisation
WSP Türkiye	Golder Associates Türkiye Ltd.
WWF	World Wildlife Fund
WWTP	Wastewater Treatment Plant
YADES	Ministry of Family and Social Services Elderly Support Program
YEKA	Renewable Energy Source Area

Assumptions and Limitations

This report has been prepared based on the documentation provided to WSP Türkiye by the Client. WSP Türkiye cannot confirm the accuracy of the information provided by third parties during the ESIA process.

IMPORTANT: This section should be read before reliance is placed on any of the opinions, advice, recommendations, or conclusions herein set out.

a) The purpose of this Environmental and Social Impact Assessment ("ESIA") report was to undertake ESIA pursuant to the appointment of WSP Türkiye to act as consultant.

b) Except for Kalyon Enerji Yatırımları A.Ş. ("Kalyon Enerji") and Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş. ("Client"), a subsidiary of Kalyon Enerji, any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of the third parties. Should additional parties require reliance on this report, written authorization from WSP Türkiye will be required. WSP Türkiye disclaims responsibility of consequential financial effects on transactions or property values, or requirements for follow-up actions and costs. No duty is undertaken, nor warranty nor representation made to any party in respect of the opinions, advice, recommendations, or conclusions herein set out.

c) The report is based on data and information provided to WSP Türkiye by the Client and data and information collected up to issue date. It is based solely on a review of information and data obtained by the Client as described in this report, and discussion with representatives of the Client, as reported herein. Except as otherwise may be requested, WSP Türkiye disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to WSP Türkiye after the time during which WSP Türkiye developed the ESIA report.

d) It should be noted that not all the associated facilities were determined before physical, biological, and social field studies. Additional field studies and additional social and biological component baseline data collection studies might be necessary to cover the associated facilities not previously investigated during the baseline collection.

e) In evaluating the Project, WSP Türkiye has relied in good faith on information provided by other individuals noted in this report. WSP Türkiye has assumed that the information provided is factual and accurate. In addition, the findings in this report are based, to a large degree, upon information provided by the Client. WSP Türkiye accepts no responsibility for any deficiency, misstatement or inaccuracy contained in this report as a result of omissions, misinterpretations or fraudulent acts of persons interviewed or contacted.

f) WSP Türkiye makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation. These interpretations may change over time; thus, the client should review these issues with appropriate legal counsel.

g) This Report is prepared by WSP Türkiye for the benefit of the Kalyon Enerji Yatırımları A.Ş. and Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş.The provision of this Report to any party other than the Client is on a strictly non-reliance basis and cannot be construed as establishing a duty of care, or any form of contractual relationship, between the Consultant and the non-reliant recipient. Any party receiving this Report other than the Client must independently, and without reliance upon this Report or upon WSP Türkiye, make its own analysis and decision in relation to the subject matter of this Report.

1.0 INTRODUCTION

1.1 Project Background

G4 Bor-3 Solar Power Plant Project ("the Project") having a capacity of 130 MWp /100 MWe, is planned by Kalyon Enerji Yatırımları A.Ş. ("Kalyon Enerji") and Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş. ("Client"), a subsidiary of Kalyon Enerji. The Project will be located in Niğde Province, in the Bor District, Seslikaya and Badak neighbourhoods in Türkiye.

An Environmental Impact Assessment (EIA) report has been prepared for the Project per the requirements of national EIA Regulation and the "EIA Positive" decision has been acquired on October 27,2022 (Decision no: 6891). EIA Positive decision has been taken over by Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş from Kalyon Enerji Yatırımları A.Ş. referring to letter no: E-71595204-220.99-6343245 and dated May 2023 in which subsidiary shall have the full responsibility to comply with EIA commitments.

A Gap Analysis Study, previously prepared by WSP Danışmanlık ve Mühendislik Ltd. Şti. ("WSP Türkiye") in April 2023, has identified gaps of the existing national EIA Report and available documentation obtained from Kalyon Enerji and suggest actions to close these gaps to reach a full bankable ESIA in line with the International Conventions, IFIs Performance Standards (Equator Principles IV (EP), International Finance Corporation (IFC) Performance Standards (PS), Organisation for Economic Co-operation and Development (OECD)'s Common Approaches and Guidelines, and the best practices in the industry along with the national legislation).

Kalyon Enerji retained WSP Türkiye to prepare the Environmental and Social Impact Assessment ("ESIA") for the Project in compliance with the national and international requirements detailed above.

The main components of the plant consist of solar panels, a panel carrier system, an inverter station (inverter, transformer, ring main unit and the substation. Associated infrastructure and utilities can be listed as the administrative building, Supervisory Control and Data Acquisition (SCADA) System and the overhead transmission line (OHTL). Once the Solar Power Plant is put into operation, it is planned to produce 100 MWe of electricity annually, and the electricity produced will be connected to the Bor Substation via ~13 km 154 kV OHTL. Details of the Project components are provided in Chapter 3 of this report.

The Project pre-construction activities, namely, mobilization of temporary site facilities, site preparation, grading and levelling, material delivery and storage and certain early trenching activities for cable laying has started in March 2023. The construction period of the Project is estimated to be 8 months and the total operation period will be 30 years.

The Project will be established on a pastureland / treasury land of 201.6 hectares. The Project area has been classified as an "Industrial Zone" in the 1/100.000 Scale Environmental Plan. The area lays within the borders of the "Niğde-Bor Energy Specialized Industrial Zone".

Background on the Project

It is of great importance to create a balanced portfolio in electricity generation by increasing the share of renewable energy resources and resource diversity in total electricity generation. With the Renewable Energy Resource Area (YEKA) model realized in this context, the cost of electricity purchased from renewable energy generation facilities will be reduced while developing domestic production in renewable energy technologies and increasing the capacity of qualified human resources.

The Regulation on Renewable Energy Resource Areas was published in the Official Gazette dated 09/10/2016 and numbered 29852. With this Regulation, a new investment model for the utilization of renewable energy resources was introduced.

YEKAs are determined within the scope of administrative and technical studies conducted by the Ministry of Energy and Resources and announced in the Official Gazette. In this case, those who will participate in YEKA competitions know for which area they will apply.

In addition to this method, after the contract is signed by the winner of the "Competition for Connection Capacity Allocation for YEKA Purposes", candidate YEKAs (project sites) are proposed to be located in the connection region where the connection right is acquired, and these areas can be announced as YEKA and allocated to the investor if deemed appropriate by the Ministry.[1]

The Project is part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor district of Niğde province on 29.09.2023. The legal status of the plot was formerly pastureland, and it was declared an industrial zone suitable for the development of a solar project: a YEKA. Consequently, it was launched the "Competition Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy"; YEKA SPP-4 (Bor-1, Bor-2 and Bor-3) competitions were held on 08.04.2022. YEKA Right of Use Agreements were signed on 16.05.2022 with Kalyon Enerji Yatırımları A.Ş., which won the competition held by the Ministry of Energy and Natural Resources for the G4 Bor-3 region. The contract for the YEKA area was taken from Kalyon Enerji Yatırımları A.Ş. to its subsidiary, Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş., as of March 7, 2023.

Pre-construction activities namely, mobilization of temporary site facilities is nearing completion, site preparation is in progress, grading and levelling is in progress, material delivery and storage and certain early trenching activities for cable laying are ongoing, PV panel support pillar driving has started, trench closing activities have been completed at some area as of June 2023.

Background on the Project Owner, Kalyon Enerji

Kalyon Enerji is a renewable energy investment company established in 2016. As of August 2022, 50%facilities. Enerji belongs to International Energy Holding, which is affiliated with International Holding Company, one of the largest investment companies of the United Arab Emirates and the Gulf Region, and the remaining 50% belongs to Kalyon İnşaat, which is one of the leading construction companies of Türkiye and has signed many essential construction works.

Kalyon Enerji’s top priority is to make energy accessible to everyone, including disadvantaged groups, by using clean and renewable energy sources. In this respect, Kalyon Enerji focuses on solar and wind power plant investments considering Turkey's and the world's ever-increasing energy needs with a sustainability vision and playing a leading role in the fight against climate change. Making Kalyon Enerji’s impact investments in clean energy considers both the country's goals and the world's needs.

1.2 Purpose of the ESIA Report

1.2.1 Objectives

A bankable ESIA needs to comply with both the national legislation and international standards. IFC Performance Standard 1 (IFC, 2012) lists the overall objectives for an ESIA, including:

- to identify and assess social and environmental impacts, both adverse and beneficial, in the project’s area of influence;
- to follow the mitigation hierarchy of avoidance, minimization and mitigation of impacts and if needed compensation, with respect to adverse impacts to workers, other affected people, and the environment;

[1] https://enerji.gov.tr/eigm-yenilenebilir-enerji-uretim-faaliyetleri-yeka-modeli

- to conduct meaningful consultation; and
- to promote improved social and environmental performance of companies through the effective use of management systems.

As described in IFC Performance Standard 1, the main components of the assessment will include:

- the potential environmental and social impacts of the Project throughout the full development cycle – preconstruction, construction, operation, decommissioning;
- a public consultation and disclosure plan to ensure that local communities and other key stakeholders are informed of the Project and have an opportunity to express their opinions concerning the Project;
- proposed mitigation activities to minimize adverse environmental impacts;
- the nature and significance of residual impacts (those adverse impacts that occur after mitigation has been applied) and ongoing monitoring and management plans to address them;
- the nature and significance of cumulative impacts;
- a social management plan to maximize benefits to the local community and promote a sustainable economy.

This ESIA Report has been prepared by WSP Türkiye for the following objectives:

- Identification and assessment of social and environmental impacts, both adverse and beneficial, in the Project's area of influence;
- Evaluation of the main environmental and social risks and potential impacts of the Project;
- Presentation of Environmental and Social Management Plan ("ESMP"), Stakeholder Engagement documentation, and grievance mechanism in line with the Equator Principles ("EP") IV, and International Finance Corporation ("IFC") Performance Standards ("PSs");
- Description of the management, mitigation, monitoring and compensation measures, including the ESMS, the ESMP, and the thematic action or management plans;
- Cumulative impact assessment (as required by the EP IV and IFC PSs); and
- Assessment of associated facilities.

1.2.2 Categorization of the Project

According to the IFC's Policy on E&S Sustainability (January 2012), as part of the review of environmental and social risks and impacts of a proposed investment, IFC 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 the IFC's Access to Information Policy. Accordingly, all projects are divided in four categories:

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

- Category FI: business activities involving investments in financial intermediaries or through delivery mechanisms involving financial intermediation. This category is further divided into three risk categories (FI-1, FI-2, FI-3).

As per the environmental and social categorization criteria of the applicable standards given above, based on the discussions held with the Lenders and Lenders' Advisor, available data, the National EIA, Project area being located inside Key Biodiversity Area (KBA), the Project is categorised as "Category A".

Table 1-1: Project Categorisation According to Applicable Standards

Applicable Standard	Category Explanation
IFC PSs (2012)	Category A: Business activities with potential significant adverse environmental or social risks and/or impacts that are diverse, irreversible, or unprecedented.
EPIV (2020)	Category A: Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible, or unprecedented.

1.2.3 Key Steps in the ESIA Process

1.2.3.1 Gap Analysis

Several documents have been prepared to support the National EIA approval and the international ESIA process. The first stage of the ESIA process has been preparing the gap analysis to identify deficiencies of the national EIA Report and available documentation provided by the Client in relation to the relevant international standards, and to suggest actions to close these gaps. The overall role of the study was to review, existing technical documents, reports, studies to evaluate the possibility of using the data already available in the preparation of the international ESIA.

1.2.3.2 Review of Additional Documentation

An additional step of the ESIA preparation has been the review of supplementary documentation that has become available with the progress of the Project design. The review of the documentation has allowed the ESIA team to complete the gap analysis of the existing data and information as well as defining the methodology and structure of the ESIA and associated documents.

1.2.3.3 Baseline Data Collection

Baseline information for the ESIA is obtained from the Project specific social and environmental baseline studies that have been initiated during Gap Analysis process and carried out as part of this ESIA, utilising both desktop study and field-based approaches. These studies have been compiled through specifically commissioned surveys, collated from a range of sources including publicly available information and through consultation. Relevant information used to support the assessment process is referenced in the relevant sections of the ESIA.

Baseline field studies conducted in the scope of the Project are given below:

- 10th-12th of May 2023 by a team of social experts led by a WSP Türkiye Senior Social Specialist Elçin Kaya for the social baseline and social components of the impact assessment study.

- 1st of June 2023 by the expert botanist Prof. Dr. Hayri Duman from Gazi University (Faculty of Science, Dpt. Biology), fauna expert Şafak Bulut drom Hitit University (Faculty of Science, Dpt. Biology), and Çağrı Tekatlı biodiversity specialist of WSP Türkiye

Physical baseline studies namely, air quality, soil quality, groundwater quality and background noise were carried out by the Client. EHSS pre-construction survey including biodiversity was carried out by the Client on January 5, 2023 and survey report was provided to WSP Türkiye.

1.2.3.4 Stakeholder Engagement

IFC require that the Project sponsor consults with the relevant stakeholders;

a) During scoping and before the terms of reference for the ESIA are finalized, and

b) Once a draft ESIA report is prepared. The ESIA report must be made accessible to the public once completed, however it is recommended to consult and inform local stakeholders in earlier phases of the process.

Stakeholder mapping and consultation activities have been initiated during Gap Analysis process and carried out as part of this ESIA resulting in a Stakeholder Engagement Plan (SEP) and grievance mechanisms that are presented in the chapters and sections of this report.

1.2.3.5 Impact Assessment

The general methodology adapted by WSP Türkiye for the ESIA has been designed to be highly transparent and to allow an analysis of the impacts on the various environmental and social components. The steps in WSP Türkiye's Impact Assessment Methodology are the following:

Identification and description of the project components

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Identification and description of the impact sources and impact factors

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Characterization of the impact factors

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Definition of the spatial and temporal boundaries of the assessment

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Identification of the environmental and social components and receptors

↓

Definition of the state and sensitivity of the receptors

↓

Definition of the interactions between impact factors and components

↓

Identification and description of the mitigation, management and monitoring measures

↓

Final assessment

Figure 1-1: Steps of WSP Türkiye's Impact Assessment Methodology

WSP Türkiye's impact assessment methodology is described in detail in Chapter 5 of this report.

1.2.3.5.1 Environmental and Social Components

The impact assessment on individual valued environmental and social components affected in the different Project phases is completed through the use of specific environmental and social impact matrices which compare the component state, expressed in terms of sensitivity, with the relevant impact factors, quantified on the basis of a series of parameters which include:

- Duration (very short, short, medium, long, very long)
- Frequency (single event, infrequent, recurrent, frequent, continuous)
- Geographic extent (Project site, local, regional, national, international); and
- Intensity (negligible, low, medium, high, very high).

The quantification of impacts resulting from each factor acting on the environmental component is obtained by assigning a score to each feature.

Each of the parameters listed above can have a value between 1 and 5. The severity of the impact is determined through an Impact Factor Score which sums the score of each of the 4 parameters, hence it can assume a value between 5 and 20. An Impact Value is then calculated by multiplying the Impact Factor Score and Sensitivity of the component. A final Residual Impact Value is calculated after reversibility and predicted effectiveness of mitigation is also considered.

The semi-quantitative methodology described above allows for an analytical assessment of impacts caused by individual impact factors on individual components. The process therefore ends with a table presenting several residual impacts from different impact factors for each component. It is a synthesis of the impacts on a component from all the impact factors generated by the Project actions.

The impact assessment is expressed based on the assessor's experience, assigning higher weight to the values less favorable to the component's protection, in order to guide the assessment in a conservative manner.

Impacts are presented in separate tables for negative and positive impacts to avoid automatic trade-offs.

The impact assessments for both components are presented in Chapter 7.

1.2.3.5.2 Identification of Mitigation Measures

Mitigation measures were identified through the application of the mitigation hierarchy of avoid, minimize, or, where residual impacts remain, compensate/offset providing the framework for developing a checklist of mitigation measures for risks and adverse environmental and social impacts. This approach implies that priority have been given to preventive actions mainly related to Project design, location, and implementation rather than curative interventions that handle adverse outcomes after the emergence of the anticipated problems.

Realistic and affordable (cost-effective) mitigating measures have been proposed to prevent, reduce, or minimise the impacts to acceptable levels and address other issues such as the need for e.g., worker health and safety improvements, community engagement, institutional involvement.

Given the fact that changes would be possible in the course of the development of the Project, mitigation measures have been designed to adapt to the changes readily through an adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the Project's lifecycle. With this flexibility of the proposed mitigation measures sufficiently considered, it would prevent any unnecessary delay due to further assessment.

1.2.4 Environmental and Social Management System

The applicable Project standards require that an Environmental and Social Management System (ESMS) for the Project is prepared and implemented through the Project lifecycle. The general framework for the environmental and social management system to be developed and implemented by the Project through the Project lifecycle has been described in Chapter 10.

1.3 Uncertainties

Like most ESIAs, the current ESIA faced a number of challenges in terms of retrieving baseline information, the level of accuracy of predicting impacts, and developing appropriate mitigation. Furthermore, even with a firm Project design and an unchanging environment, predictions are by definition uncertain.

This ESIA is prepared based on the Project information provided by the Client and the information collected during the site visits. The Project is progressing in parallel with the ESIA studies. Assessments made within the scope of this ESIA Report are based on the most current design. On the other hand, the design and/or optimization of possible associated facilities are still ongoing.

1.4 Structure of the ESIA Report

This document is the ESIA Report for the Project prepared in compliance with the national and international requirements. This document presents the following Chapters:

- Introduction (Chapter 1)
- Regulatory and Policy Framework (Chapter 2)
- Project Description (Chapter 3)
- Alternatives Analysis (Chapter 4)
- ESIA Methodology (Chapter 5)
- Environmental and Social Baseline (Chapter 6)
- Environmental and Social Impact Assessment (Chapter 7)
- Climate Change Risk Assessment (Chapter 8)
- Cumulative Impact Assessment (Chapter 9)
- Environmental and Social Management Plan (Chapter 10)
- Conclusions (Chapter 11)
- References
- Appendices

2.0 REGULATORY AND POLICY FRAMEWORK

This chapter describes the legal framework to be considered in the ESIA Report, management plans and other related documents while describing the management of environmental and social impacts and risks related to the Project. Applicable Environmental and Social Requirements of the Project are defined based on the IFC Performance Standards, Guidance Documents, IFC General EHS Guidelines, Equator Principles, Organisation for Economic Co-operation and Development's Common Approaches and the National Turkish legislation.

Türkiye is on the accession path to EU membership and is in the process of aligning its national environmental legislation and standards to meet EU requirements. For the management of certain environmental media, such as air quality, noise management, Turkish standards are already converging with those of the EU.

The Project will be in compliance with the most stringent requirement between national legal requirements and international requirements.

This chapter details the following in particular:

- The relevant institutional framework in Türkiye involved in the regulation of the Project;
- Relevant Turkish environmental and social laws and regulations that are applicable to the Project;
- International treaties, conventions, and protocols relevant to the Project and to which Türkiye is a signatory;
- Environmental and social guidelines and standards developed by international organizations; the EP and IFC PSs;
- Other international guidelines and standards, directly applicable to construction sites, powerlines, associated facilities, etc. which are considered international best practice.

2.1 National Legal and Regulatory Framework

2.1.1 Environmental Legal and Regulatory Framework

The Turkish legal framework for environmental protection was developed in line with national and international initiatives and standards, and some of them have been revised recently to be harmonized with the EU Directives in the scope of pre-accession efforts of Türkiye to the EU. In the following sections, related institutions, legislation, processes, and procedures that are related to the environmental and social aspects of the proposed Project are described.

The Ministry of Agriculture and Forestry ("MoAF") is the responsible organization for the issuing and implementation of policies and legislation adopted for the agricultural areas, forestry areas and protected areas.

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

The Environment Law of 1983 has a comprehensive structure that has a holistic and integrated vision for the environment. "Polluter pays" and "user pays" principles and carrying capacity concepts form the basis of regulatory tools in the Environmental Law. The Law is supported by numerous Regulations and decrees prepared or updated in the process of alignment with EU legislation, thus contributing significantly to compensating the gaps within the former legislative system of Türkiye.

The EIA Regulation, which dates originally from 1998, has had several revisions and was most recently amended on July 29th, 2022. Although the EIA Regulation has been derived from the European Union EIA Directive, the integration of various Turkish conventions, sub-laws and governmental decrees makes the EIA Regulation distinctive in certain respects.

The lead government agency, responsible for environmental protection in Türkiye is the Ministry of Environment, Urbanization and Climate Change (“MoEUCC”). MoEUCC is the responsible organization for the issuing and implementation of policies and legislation adapted for protection and conservation of the environment and for sustainable development and management of natural resources.

The main responsibilities of the MoEUCC, relevant to the Project are:

- implementation of the EIA regulations and decision-making in the EIA approval processes,
- setting policies and principles for environmental management in Türkiye, including the administrative framework for environmental enforcement,
- defining and applying environmental quality standards,
- supervision of the network of environmental laboratories in Türkiye,
- pollution control and inspection activities,
- agroforestry support, soil management and erosion control, and
- protection of Türkiye’s natural heritage including national parks, areas of conservation interest, biodiversity and wildlife.

Turkish National Regulations that are applicable to the Project are provided in Appendix A.

2.1.2 Environmental Impact Assessment Procedure in Türkiye

The “EIA Regulation” was published in the Official Gazette on July 29th, 2022. According to the regulation, the industries or facilities listed in Annex 1 and Annex 2 of the regulation should obtain an EIA permit. The EIA process is carried out by companies licensed by the MoEUCC. The report submission and official correspondence process is carried out online.

The EIA submission and approval process of the Project listed in Annex 1 is more detailed and longer. It includes scoping and public participation steps, and is directed by the MoEUCC, the central authority. During the process, an application report and an EIA Report are prepared by a licensed company. The “EIA Positive” or “EIA Negative” decision is obtained at the end of the process.

The projects listed in Annex 2 have shorter EIA processes and comprise of smaller industries. The EIA submission and approval process does not include the scoping and public participation steps and is directed by the Provincial Directorate of Environment, Urbanization and Climate Change (“PDoEUCC”). During the process, a Project Introduction File (Pre-EIA Report) is prepared by authorized licensed company. If the “EIA is not required” decision is obtained, the Project can be implemented. However, if “EIA is required” decision is obtained, the same process for the Annex 1 projects, needs to be initiated.

The Turkish EIA procedure follows a process of selection and elimination criteria, with the final decision of the MoEUCC. The MoEUCC, establishes a “EIA Commission”, which has considerable influence on the review and supervision of the EIA report. The EIA commission comprises representatives from relevant institutions and establishments and Ministry authorities. This commission is responsible for defining all required studies for the EIA report.

The MoEUCC, when deciding regarding the EIA Report, takes into consideration the studies and decisions made by the EIA Commission.

As so required, the MoEUCC may invite research and specialist organizations, professional associations/chambers, trade unions, associations, and Non-Governmental Organization (“NGO”) representatives to the commission meetings. Main steps in the Turkish EIA Process to be followed are as follows:

- First site visit by informing the PDoEUCC before the EIA Application File studies,
- Submission of the EIA Application File to the MoEUCC,
- Public Participation Meeting (announcements in one national and one local newspaper need to be given and other notifications need to be made before the meeting),
- Issuing of the special EIA format by the MoEUCC for the Project (the special EIA format defines baseline and impact assessment studies required specifically for the Project) based on the comments of the EIA commission and outcomes from the Public Participation Meeting,
- Submission of the EIA Report to the MoEUCC,
- Commission meetings during the EIA process,
- Revision and finalization of the EIA Report,
- Public disclosure of the Final EIA Report by PDoEUCC,
- Obtaining final decision from the MoEUCC (EIA Positive or EIA Negative).

An EIA process was carried out for the Project per the requirements of national EIA Regulation and the “EIA Positive” decision has been acquired on October 27, 2022 (Decision no: 6891).

2.1.3 Land Acquisition Legislation

Fundamental provisions regarding land ownership in Türkiye are set out under the Land Registry Law no 2644. Cadastral arrangements are subject to the Cadastre Law no 3402. Nevertheless, both land registry and cadastre laws have provisions concerning miscellaneous laws. Some of the laws concerning the land acquisition and registry are as follows:

- Expropriation Law (No.2942, 1983, amended in 2022)
- Forest Law (No. 6831, 1956, amended in 2021)
- Pasture Law (No. 4342, 1998, amended in 2018)
- Cadastral Law (No. 3402, 1987, amended in 2020)
- Land Registry Law (No. 2644, 1934, amended in 2021)
- Village Law (Law No. 442, 1924, amended in 2022)
- Law on the Protection of Cemeteries (Law No. 3998, 1994, amended in 2018)
- Civil Code (Law No. 4721, 2001, amended in 2023)
- Settlement Law (Law No. 5543, 2006, amended in 2022)

- Law on Supporting the Development of Forest Villagers, Valuation of Areas Taken out of Forest Area Borders on behalf of the Treasury and Vending of Agriculture Lands Owned by the Treasury (Law No. 6292, 2012, amended in 2023)

Cadastre Law also defines the process related to identification of owners of land without title deeds or circumstances where there is a confusion on the matter of land possession.

Industrial Zones Law (No: 4737 Published in Official Gazette : Date : 19/1/2002 Number : 24645) regulates the principles regarding the establishment, management and operation of industrial zones. This Law covers the establishment and announcement of industrial zones, the investment permit process, incentive measures and the provisions determining the duties and powers of the management company.

In the parcels within the boundaries of Niğde-Bor Energy Specialized Industrial Zone, where the project site is located, a change of qualification was made with the letter dated 01.06.2018 and numbered 7112 of the Republic of Türkiye Governorship of Niğde, Directorate of National Real Estate and registered on behalf of the treasury. Within the scope of the project, with the letter of the Ministry of Industry and Technology numbered E-29966012-452.05-3681574 and dated 16.05.2022, a preliminary allocation letter was given to Kalyon Enerji Yatırımları Anonim Şirketi, which won the competition held by the Ministry of Energy and Natural Resources on 08.04.2022 for the G4 Bor-3 region. The contract for the YEKA area was taken from Kalyon Enerji Yatırımları A.Ş, to its subsidiary, Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş as of March 7, 2023.

2.1.4 Permitting Framework

The main permits and approvals applicable to the scope of works are given below.

Table 2-1: The Main Permits and Approvals Required

Subject	Permit / Approval	Relevant Regulatory Framework	Status
Project Implementation	Making Pre-licence Applications for Projects	Energy Market License Regulation	Obtained
	Immovable Procurement Application	Regulation on Management, Pursuing and Collecting of Treasury Receivables	The preliminary permit agreement has been signed and the process will be completed with the acquisition of a production license.
	Preliminary and Final Project Approvals	Electric Facilities Project Regulation (Official Gazette: 29221(repeated))	The preliminary project has been approved and the final project approval process is ongoing.
Land Use	Land use agreements for state owned lands - Preparation and Approval of 1/25000 and 1/5000 Master Development Plan - 1/1000 Implementation Development Plan Approval - Cadastral Control	Relevant laws and regulations specific to the land use type - Industrial Zones Law (No: 4737, 2002) - Regulation on the Management of Treasury Properties	Obtained

Subject	Permit / Approval	Relevant Regulatory Framework	Status
	Permit for the use of agricultural lands for non-agricultural purposes (if required)	Law on Soil Protection and Land Use (No: 5403, 2005)	Not applicable to this project as the project land is within public land(industrial)
	Approval of expropriation plans (if required)	Expropriation Law (No: 2942, 1983)	Not applicable to this Project as the YEKA land is within public land (industrial)
	Permit for the use of forest lands (if required)	Forestry Law (No. 6831,1956) Implementation Regulation of 16th Article of the Forestry Law Implementation Regulation of 17/3rd and 18th Articles of the Forestry Law	Not applicable to this Project as the YEKA land is within public land (industrial)
	Permit for the use of pasture lands (change of the purpose of allocation) (if required)	Pasture Law (No: 4342, 1998)	Obtained
Construction	EIA Approval	Regulation on Environmental Impact Assessment	Obtained
	Permits and approvals for roads, water bodies, canals, energy supply lines, pipelines, utilization of municipal infrastructure etc.	Protocols/approvals/official letters of related state authorities	Completed
	Workplace notification for construction	Regulation on Starting Up and Operating a Workplace	Completed
	Construction permit	Industrial Zones Law (No: 4737, 2002)	In progress
	Building permits, Occupancy permits	Zoning Law No. 3194 and its sub-legislation	To be obtained prior to start of construction
	Permit for on-site fuel storage	Regulation on Environmental Permits and Licenses	To be obtained at the start of the construction
	Approval of wastewater treatment plant application project	Wastewater Treatment/Deep Sea Discharge Facility Project Approval Circular No. 2018/14 Communiqué on Technical Procedures for Wastewater Treatment Plants	To be obtained before wastewater discharge
	Temporary operating certificate/environmental permit (discharge, emission, etc.) for	Regulation on Environmental Permits and Licenses	In progress

Subject	Permit / Approval	Relevant Regulatory Framework	Status
	camp site wastewater discharge, emission due to heating	Regulation on Water Pollution Control	
	Water use agreement with the Municipality (if required)	-	Completed
	Groundwater use permit (if required)	Law on Groundwater Resources (No. 167, 1960)	In progress
	Wastewater acceptance letter from the Bor Municipality confirming that Municipality WWTP is capable of handling the load (if required)	-	To be obtained at the start of the construction
	Waste management plan approval,	Regulation on Waste Management	To be obtained at the start of the construction
	Temporary storage permit (If a thousand kilograms or more of hazardous waste will be produced per month)	Regulation on Waste Management	To be obtained at the start of the construction
	Agreements with licensed waste management and disposal companies	Regulation on Waste Management	In progress
	Night work permit (if required)	Regulation on Assessment and Management of Environmental Noise	NA
	Private security permit	Regulation on the Implementation of the Law Concerning Private Security Services	In progress
Operation	License Application	Electricity Market License Regulation	In progress
	Facility Provisional Acceptance	-	In progress
	Energy identity certificate (for buildings)	Regulation on Energy Performance in Buildings	To be obtained prior to operation
	Fire report approval	Regulation on Fire Protection of Buildings	To be obtained prior to operation
	Temporary operating certificate/environmental permit for wastewater discharge (if required)	Regulation on Environmental Permits and Licenses	To be obtained prior to operation
	Groundwater use permit (if required)	Law on Groundwater Resources (No. 167, 1960)	To be obtained prior to operation
	Waste management plan approval,	Waste Management Regulation	To be obtained at the start of operation

Subject	Permit / Approval	Relevant Regulatory Framework	Status
	Temporary Storage Permit (If a thousand kilograms or more of hazardous waste will be produced per month) Agreements made with licensed waste management and disposal companies		
	Trial permit /Business license	Regulation on Business License	To be obtained prior to operation
	Private security permit	Regulation on the Implementation of the Law Concerning Private Security Services	To be obtained at the start of operation
	OHTL Connection Agreement	Regulation on Electricity Market Connection and System Utilization	To be obtained prior to operation

2.2 Applicable International Legislation

Türkiye is a party to many international agreements regarding multiple social and environmental subjects. These are listed in in Appendix A and their applicability will be further discussed in the relevant chapters of this ESIA.

Türkiye has also ratified the following international conventions and agreements related to human rights that apply may apply to this Project.

Council of Europe Documents

- European Convention for the Protection of Human Rights and Fundamental Freedoms (As Amended by Protocol No. 11)
- Council of Europe Convention on the Prevention of Terrorism
- European Convention on the Exercise of Children's Rights
- Protocol No. 4 to the Convention for The Protection of Human Rights and Fundamental Freedoms Securing Certain Rights and Freedoms Other Than Those Already Included in the Convention and in the First Protocol Thereto
- Protocol to the Convention for the Protection of Human Rights and Fundamental Freedoms
- European Social Charter

United Nations Documents

- The Statute of The Council of Europe
- Report of The Office of The United Nations High Commissioner for Human Rights on the International Workshop on Enhancing Cooperation Between International and Regional Mechanisms for The Promotion and Protection of Human Rights
- The Role of The Ombudsman, Mediator and Other National Human Rights Institutions in the Promotion and Protection of Human Rights

- International Covenant on Civil and Political Rights
- The Universal Declaration of Human Rights

The ILO Conventions Ratified by Türkiye

- C 2 Unemployment Convention, 1919
- C 11 Right of Association (Agriculture) Convention, 1921
- C 14 Weekly Rest (Industry) Convention, 1921
- C 15 Minimum Age (Trimmers and Stokers) Convention, 1921
- C 26 Minimum Wage-Fixing Machinery Convention, 1928
- C 29 Forced Labour Convention, 1930
- C 34 Fee-Charging Employment Agencies Convention, 1933
- C 42 Workmen's Compensation (Occupational Diseases) Convention (Revised), 1934
- C 45 Underground Work (Women) Convention, 1935
- C 53 Officers' Competency Certificates Convention, 1936
- C 55 Shipowners' Liability (Sick and Injured Seamen) Convention, 1936
- C 58 Minimum Age (Sea) Convention (Revised), 1936
- C 59 Minimum Age (Industry) Convention (Revised), 1937
- C 68 Food and Catering (Ships' Crews) Convention, 1946
- C 69 Certification of Ships' Cooks Convention, 1946
- C 73 Medical Examination (Seafarers Convention, 1946
- C 77 Medical Examination of Young Persons (Industry) Convention, 1946
- C 80 Final Articles Revision Convention, 1946
- C 81 Labour Inspection Convention, 1947
- C 87 Freedom of Association and Protection of the Right to Organise Convention, 1948
- C 88 Employment Service Convention, 1948
- C 92 Accommodation of Crews Convention (Revised), 1949
- C 94 Labour Clauses (Public Contracts) Convention, 1949
- C 95 Protection of Wages Convention, 1949
- C 96 Fee-Charging Employment Agencies Convention (Revised), 1949
- C 98 Right to Organise and Collective Bargaining Convention, 1949
- C 99 Minimum Wage Fixing Machinery (Agriculture) Convention, 1951
- C100 Equal Remuneration Convention, 1951

- C102 Social Security (Minimum Standards) Convention, 1952
- C105 Abolition of Forced Labour Convention, 1957
- C108 Seafarers' Identity Documents Convention, 1958
- C111 Discrimination (Employment and Occupation) Convention, 1958
- C115 Radiation Protection Convention, 1960
- C116 Final Articles Revision Convention, 1961
- C118 Equality of Treatment (Social Security Convention, 1962
- C119 Guarding of Machinery Convention, 1963
- C122 Employment Policy Convention, 1964
- C123 Minimum Age (Underground Work) Convention, 1965
- C127 Maximum Weight Convention, 1967
- C133 Accommodation of Crews (Supplementary Provisions) Convention, 1970
- C134 Prevention of Accidents (Seafarers) Convention, 1970
- C135 Workers' Representatives Convention, 1971
- C138 Minimum Age Convention, 1973
- C142 Human Resources Development Convention, 1975
- C144 Tripartite Consultation (International Labour Standards) Convention, 1976
- C146 Seafarers' Annual Leave with Pay Convention, 1976
- C151 Labour Relations (Public Service) Convention, 1978
- C152 Occupational Safety and Health (Dock Work) Convention, 1979
- C153 Hours of Work and Rest Periods (Road Transport) Convention, 1979
- C155 Occupational Safety and Health Convention, 1981
- C158 Termination of Employment Convention, 1982
- C159 Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983
- C161 Occupational Health Services Convention, 1985
- C164 Health Protection and Medical Care (Seafarers) Convention, 1987
- C166 Repatriation of Seafarers Convention (Revised), 1987
- C167 Safety and Health in Construction Convention, 1988
- C176 Safety and Health in Mines Convention, 1995
- C182 Worst Forms of Child Labour Convention, 1999
- C187 Promotional Framework for Occupational Safety and Health Convention, 2006.

Other International Standards

The following standards are referred to within the IFC Guidelines:

- WHO Ambient Air Quality Standards, and
- WHO Drinking Water Standards.

In addition, the following guidelines and standards may be utilized:

- Dutch Intervention Values for Soil Quality, as/if needed, and
- IUCN Red Data Book for protected species (fauna and flora).
- Guidance on Heritage Impact Assessments for Cultural World Heritage Properties, ICOMOS 2011

2.3 International Financing Institutions' Guidelines

For the preparation of the present document, international conventions and agreements, ESIA International Standards (i.e., Equator Principles, and IFC Performance Standards and guidelines) have been analysed and considered together with national standards.

The Equator Principles Financial Institutions (EPFIs) emphasize that they will not provide loans to projects where the borrower will not or is unable to comply with the EPFIs social and environmental policies and procedures that implement the Equator Principles.

In addition, the Equator Principles endorse the applicable IFC Performance Standards, IFC General EHS Guidelines and IFC Industry Specific EHS Guidelines. The Performance Standards establish the standards that the project is to meet throughout the life of an investment by the IFC or other relevant financial institutions. General and Industry Specific EHS Guidelines provide implementation guidelines and environmental quality limits that projects should comply with.

The Equator Principles, the IFC Performance Standards and Other Guidelines are listed below.

2.3.1 Equator Principles IV (2020)

EPs are a set of voluntary environmental and social guidelines that have been adapted by a significant number of financial institutions influential in the Project finance market (collectively the EPFIs). The EPs comprise a set of ten broad principles that are underpinned by the environmental and social policies, standards and guidelines.

The EPFIs emphasize that they will not provide loans to projects where the borrower will not or is unable to comply with the EPFIs social and environmental policies and procedures that implement the Equator Principles.

The EPFIs have ten (10) principles:

- Equator Principle 1: Review and Categorization
- Equator Principle 2: Environmental and Social Assessment
- Equator Principle 3: Applicable Environmental and Social Standards
- Equator Principle 4: Environmental and Social Management System and Equator Principles Action Plan
- Equator Principle 5: Stakeholder Engagement
- Equator Principle 6: Grievance Mechanism
- Equator Principle 7: Independent Review
- Equator Principle 8: Covenants

- Equator Principle 9: Independent Monitoring and Reporting
- Equator Principle 10: Reporting and Transparency

The client is expected to include assessments of potential adverse Human Rights impacts and climate change risks as part of the ESIA. The client should refer to the e United Nations Guiding Principles on Business and Human Rights (UNGP) when assessing Human Rights risks and impacts, and the Climate Change Risk Assessment should be aligned with Climate Physical Risk and Climate Transition Risk categories of the Task Force on Climate-related Financial Disclosures (TCFD). A Climate Change Risk Assessment is required: For all Category A and, as appropriate, Category B Projects, and will include consideration of relevant physical risks as defined by the TCFD. For all Projects, in all locations, when combined Scope 1 and Scope 2 Emissions are expected to be more than 100,000 tonnes of CO_2 equivalent annually. Consideration must be given to relevant Climate Transition Risks (as defined by the TCFD) and an alternatives analysis completed which evaluates lower Greenhouse Gas (GHG) intensive alternatives. The depth and nature of the Climate Change Risk Assessment will depend on the type of Project as well as the nature of risks, including their materiality and severity.

2.3.2 IFC Performance Standards

The eight IFC PSs establish the standards that a project is to meet throughout the life of an investment by the IFC or any other relevant financial institution. These are the following:

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
- Performance Standard 2: Labour and Working Conditions
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security
- Performance Standard 5: Land Acquisition and Involuntary Resettlement
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 7: Indigenous Peoples
- Performance Standard 8: Cultural Heritage

2.3.2.1 IFC General EHS Guidelines

The General EHS Guidelines (dated April 30th, 2007) provide guidance to users on common EHS issues potentially applicable to all industry sectors. During the design, construction, operation, and decommissioning of a project (the Project lifecycle) the Project owner will consider ambient conditions and apply pollution prevention and control technologies and practices (techniques) that are best suited to avoid or, where avoidance is not feasible, minimize or reduce adverse impacts on human health and the environment while remaining technically and financially feasible and cost-effective. The Project-specific pollution prevention and control techniques included in General EHS Guidelines involve the subjects listed below:

- 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 & Safety,
- Community Health & Safety, and
- Construction and Decommissioning.

2.3.2.2 Performance Indicators and Monitoring, Documents Pertaining to Human Rights

The IFC's Sustainability Framework – consisting of the Policy on Environmental and Social Sustainability, Performance Standards on Environmental and Social Sustainability, and Access to Information Policy – were released publicly on August 1st, 2011, with an effective date of January 1st, 2012.

The external context has evolved rapidly in certain thematic areas, including increased attention towards climate change, ecosystem services, financial intermediaries, and human rights. With regard to the latter, the consultation process confirmed that human rights are now a major sustainability issue for businesses and their stakeholders. The IFC's commitment to respecting human rights in its business activities is captured in the Sustainability Policy, while IFC Owners' responsibility to respect human rights is captured in Performance Standard 1. Other provisions in the Performance Standards also support various human rights relevant to business. In that context, many human rights risks for business can be effectively addressed through social and environmental considerations. Some major items in that respect will be under the categories of:

- Labour and Working Conditions;
- Community Health, Safety, and Security;
- Land Acquisition and Involuntary Resettlement;
- Indigenous Peoples (not applicable to the Project); and
- Cultural Heritage.

2.3.2.3 Other IFC Guidelines

IFC Guidelines that are applicable to the Project are provided as follows:

- IFC's Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)
- IFC's Good Practice Note on Managing Contractors' Environmental and Social Performance (2017)
- IFC's Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)
- IFC's Handbook for Addressing Project-Induced In-Migration (2009)
- IFC's Introduction to Health Impact Assessment (2009)
- IFC and EBRD's Guidance Note on Workers' Accommodation: Processes and Standards (2009)
- IFC's Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (2013)

- IFC's Environmental and Social Management System Implementation Handbook: Construction (2014)
- IFC's Environmental and Social Management System Implementation Handbook: General (2015)
- IFC's Stakeholder Engagement Handbook: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)
- Interim Advice for IFC Clients on Supporting Workers in the Context of COVID-19

2.3.3 OECD's Common Approaches

The OECD Common Approaches recognizes that the primary role of ECAs is to promote trade in a competitive environment (in contrast to development banks and agencies which focus primarily on development assistance) and that ECAs have a responsibility to consider the positive and negative Environmental and Social Human Rights risks (ESHR) and impacts of projects, in particular those in sensitive sectors and/or located in or near sensitive areas, and the ESHR risks associated with existing operations, in deciding whether to offer support.

2.3.4 Environmental Limits

A list of potentially applicable limits and criteria derived from the applicable requirements are presented in Appendix B for each environmental component. According to the recommendations of the IFC guidelines, when national regulations differ from levels and measures presented in the international standards, the Project is expected to achieve whichever is more stringent where possible.

Project Standards are presented in Appendix B. The criteria used to define Project Standards are as follows:

- In the presence of different limits in national and international standards the most stringent one is adopted as Project Standard.
- In the absence of the IFC limits, national limits are adopted as Project Standards.

3.0 PROJECT DESCRIPTION

3.1 Project Overview

G4 Bor-3 Solar Power Plant Project ("the Project") having a capacity of 130 MWp /100 MWe, is planned by Kalyon Enerji Yatırımları A.Ş. ("Kalyon Enerji") and this Project will be developed and constructed by Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş ("Client"), a subsidiary of Kalyon Enerji. The Project will be located in Niğde Province, in the Bor District, Seslikaya and Badak neighbourhoods in Türkiye. Once the Solar Power Plant is put into operation, it is planned to produce 100 MWe of electricity annually, and the electricity produced will be connected to the Bor Substation via ~13 km 154 kV OHTL.

The Project pre-construction activities, namely, mobilization of temporary site facilities, site preparation, grading and levelling, material delivery and storage and certain early trenching activities for cable laying has started in March 2023.

Project layout is presented in Figure 3-5. The figures below represent the actual site conditions.

Figure 3-1: Project Site Photos (Dated March 20, 2023, provided by the client)

Figure 3-2: Photos of General Site Activities (Dated March 21, 2023, taken by WSP Golder)

Figure 3-3: Photos of Equipment and Material Storage (Dated March 21, 2023, taken by WSP Golder)

Figure 3-4: Photos of Other SPP Projects Located Adjacent to the Project Site (Dated March 21, 2023, taken by WSP Golder)

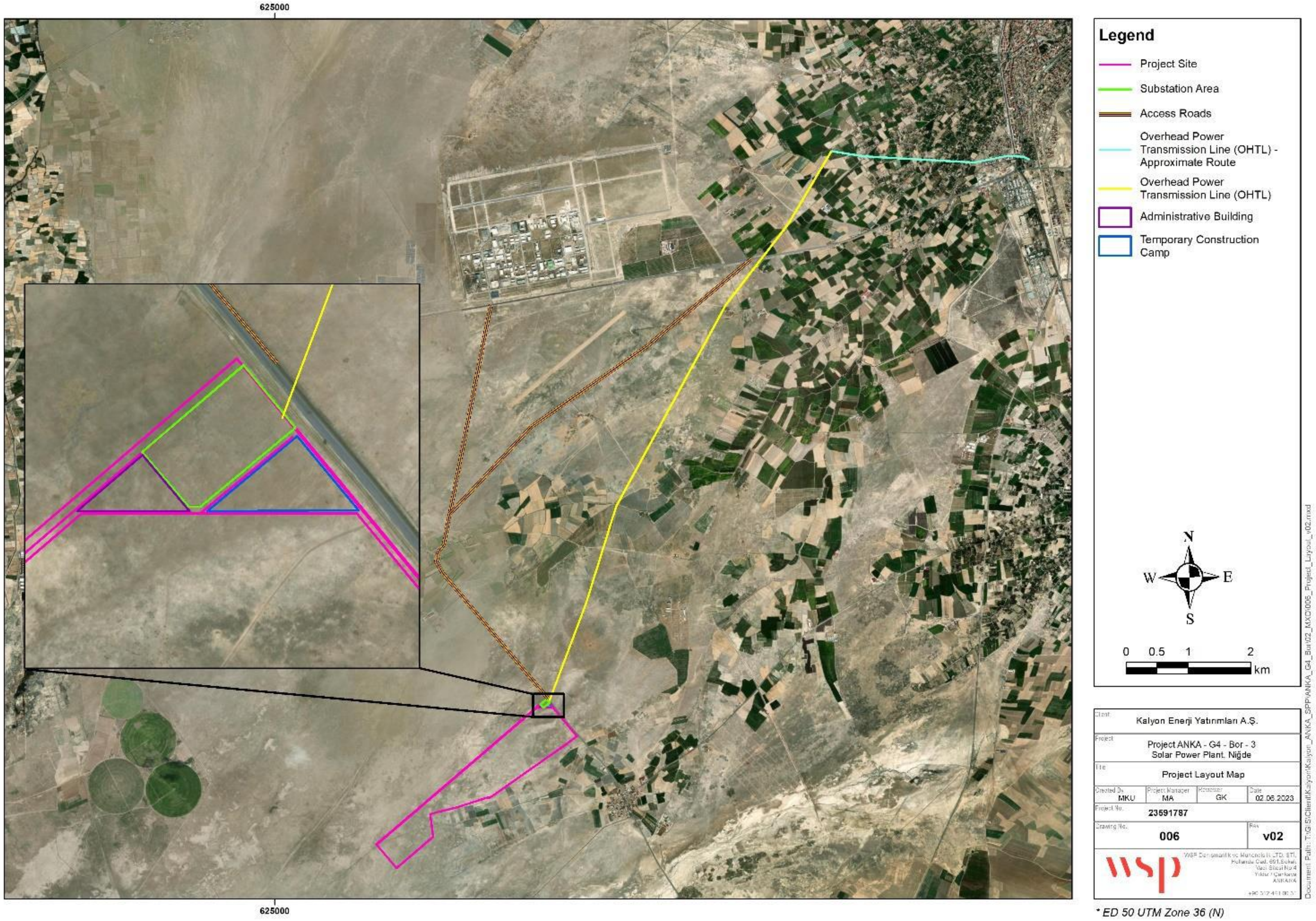


Figure 3-5: Project Layout

3.2 Project Components

The main components of the plant consist of solar panels, tracker (solar tracking system) and PV module carrier system, DC Combiner Box, inverter stations and substation. Associated infrastructure and utilities can be listed as the Transformer Center Building (Supervisory Control and Data Acquisition (SCADA)), administration building, dining hall, security building, personnel workshop.

Main components, their arrangements and working principles are presented in Figure 3-6.

Cables

Cables

Cables

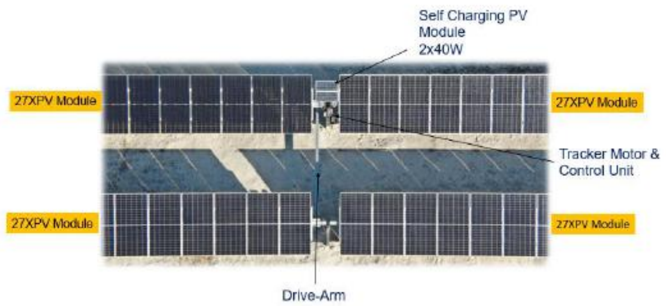
PV Module & Tracker (Panel Carrier) System

- PV Cells converts the sunlight into electricity.
- Parallel and serial connections PV Cells creates the PV Modules.
- PV Modules are mounted on tracker system. One Axis Tracker System supports PV Modules produce more energy with following up the sun during the daytime from East to West direction.

MONOPERC PV MODULE

Panel Power: 400 W
Panel QTY: 325080 PCS

SINGLE AXIS TRACKER SYSTEM



DC Combiner Box

- Electricity produced by PV Modules are collecting trough DC Combiner Boxes.
- DC Combiner Boxes able to provide the information of the PV Module series Current/Voltage values for the monitoring purpose to check status of the PV Module Strings.

Inverter Station

- Inverter Station combines the electricity from the DC Combiner Boxes.
- Inverter convert the electricity from DC form to the AC form which is the national grid transmission form.
- Inverter injects the electricity to transformer with 690V voltage level, Transformer placed in the Inverter Station step-up the voltage level to the 33.6 kV.
- Through the RMU (Ring Main Unit) switchgears the AC electricity combining together from couple of Inverter Stations and sending to the Substation.

4.73 MW CENTRALIZED INVERTER STATION

154/33.6 kV Substation and Switchyard

- Combined AC electricity from the Solar feeders is collecting with MV Switchgears in the Substations.
- Main Transformers in the substation steps-up the AC electricity voltage level required in the system connection agreement. (154kV)

154 kV Overhead Transmission Line

- HV electricity injecting to the national grid trough the overhead transmission line.

Figure 3-6: Project Illustration

PV Module

Photovoltaic -modules are the environment where currents and voltages are formed by movements such as the jumping of electrons and displacement between poles due to photovoltaic effect caused by the photons that form the light hitting the solar cells.

-PV modules consist of many solar cells. These cells are made of an element called silicon, which is -second most abundant element in earth crust. Every cell consists of a positive and a negative layer to create an electric current, as seen in batteries. In addition, when photons from the sun are absorbed by this cell, which is also located on the solar panel, the energies released cause the electrons to move freely.

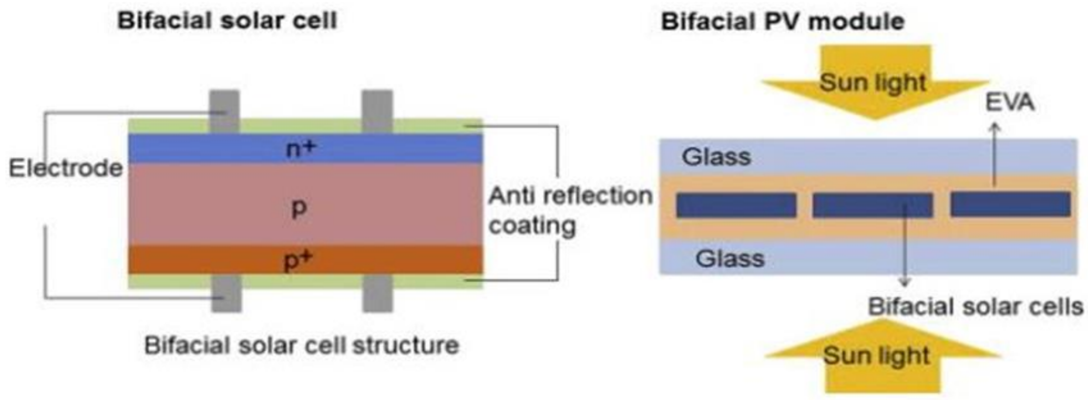


Figure 3-7 Bifacial Cell Structure

As shown in Figure 3-7, the -PV modules are actually formed by connecting small solar cells in series. These solar cells are composed of semiconductor materials. The electron detached by the photon hitting the negative pole goes towards the positive pole. This path is traveled through the cable connected to the end of the circuit.

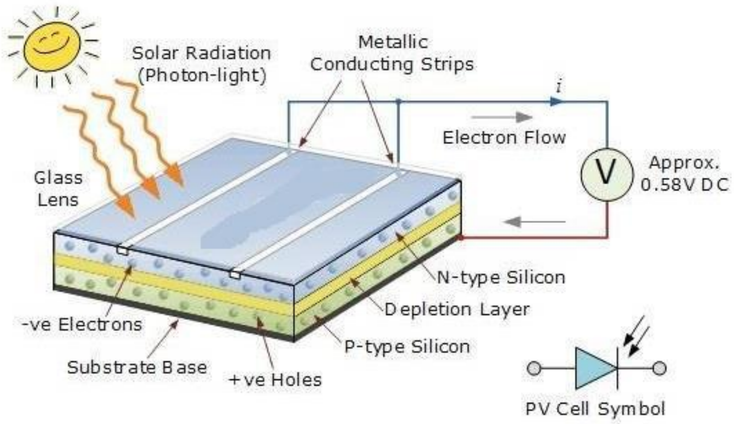


Figure 3-8 Cell Structure

DC Combiner Box

It allows the strings' cables which consist of certain amount of PV modules connected in series and parallel to be collected in the appropriate -combiner box and collected in two main cable lines with thicker sections than this box. Taking many solar cables consisting of plus and minus lines to the inverter leads to both cable waste and energy loss. For this reason, a certain -PV modules group should be gathered on a single plus/minus line. PV Array or String is called the -PV modules groups with their specific voltage and current values adjusted by means of the PV junction box or the combiner box in general terms. The PV combiner box can also be equipped with DC breakers and switches, facilitating on-line service/maintenance and ensuring that the line is de-energized in the event of a problem.

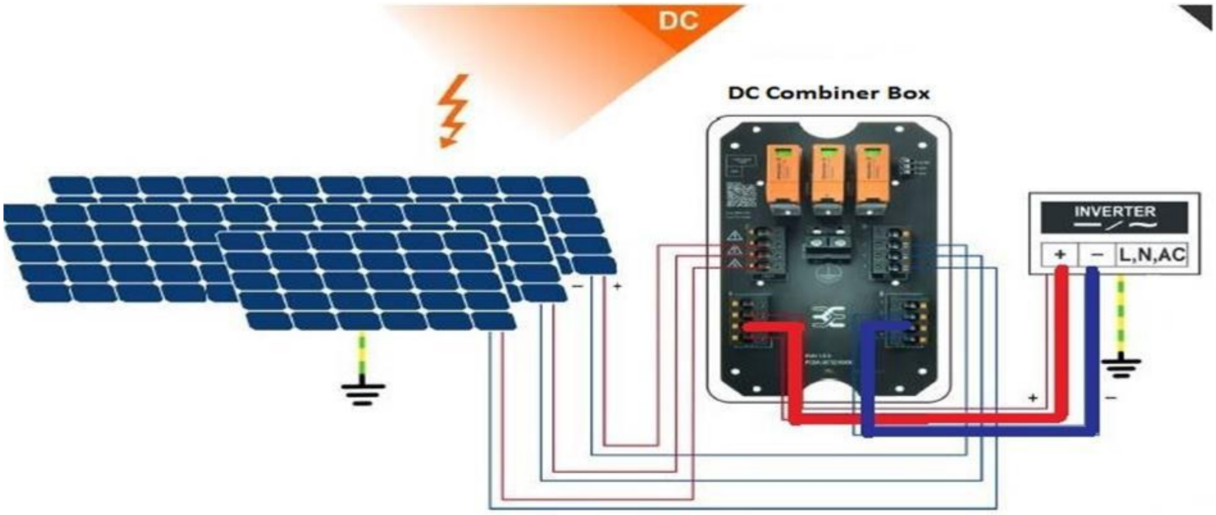


Figure 3-9 Visual Demonstration of the Collection of Strings in the DC Combiner Box

Inverter Station

Inverter station consists of inverter, transformer and medium voltage disconnector-breaker unit.

The inverter is an electrical power conversion element. Another common name for the inverter is power converter or inverter. An inverter is simply a device that converts direct current (DC) into alternating current (AC) whose amplitude and direction change periodically.

The inverter provides AC current at the desired voltage, power or frequency values. Inverters are used to generate electricity from renewable energy sources. In particular, inverter types with more features are produced to make the energy obtained from wind and solar energy systems suitable for use, working with higher quality and stability.

The AC voltage obtained in the inverter is transferred to the transformer and increased from 690V to 33600V. In this way, both the power loss during the transmission of energy is minimized and it is possible to use a cable with a smaller cross-section.

The voltage raised at the transformer is transferred to the MV Disconnector -Breaker Unit (RMU). The energy in the RMU is transported via cables to the 154kV -Substation Building. Breakers in the RMU cut off power from the inverter station to protect the system in the event of failures. Separators, on the other hand, provide the opportunity to work safely by cutting the power in the line in cases where power failure is required.

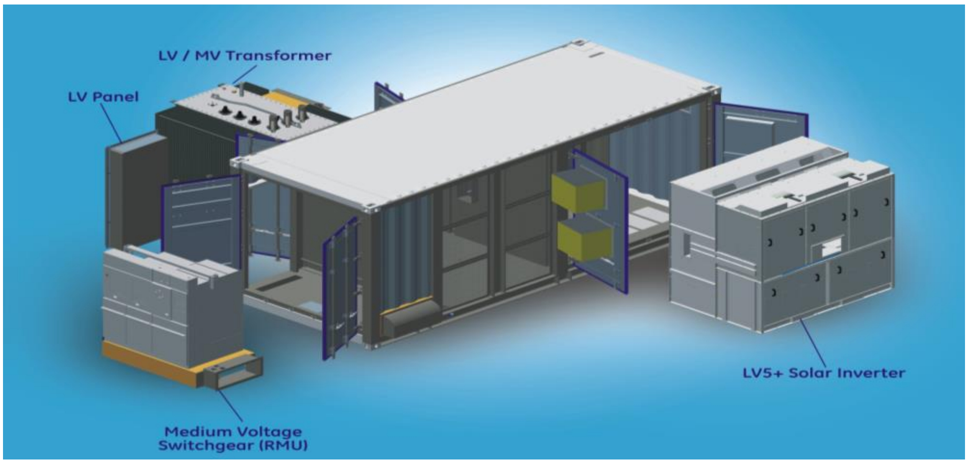


Figure 3-10 Visual Demonstration of an Inverter Station

Substation and Switchyard

It is a SCADA and Switchgear station that is the main link between the generation plant and the transmission system. The power generated in a power plant is transmitted through a switchyard. These are the facilities where electricity generation, transmission and distribution are carried out.

Substation and switchyard are composed of:

- Transformer: Electric transformers are used in switchyards. With these transformers, electricity is lowered or raised. Thus, the voltage is distributed by bringing it to the desired transmission level. Transformers connect two or more circuits by electromagnetic induction.
- Busbar: Busbars collect and distribute electrical energy at different frequencies and voltages and provide communication between the control and control sections.
- Breakers: Breakers interfere with short circuits or overcurrent that may occur in large pure fields. When the breaker is closed, it provides energy flow from the circuit. In the open state, it prevents the flow of power.
- Control Equipment: It prevents malfunctions that may occur in the network and devices from causing permanent damage. These are the control circuits used for this purpose.
- Measuring Instruments: Switchyards have instruments that measure values such as current, voltage, power and frequency. Meters are used to measure the electrical energy consumed. Current and voltage transformers are used to measure medium and high voltage. Switchyards consist of switching, protection and control elements other than transformers. Protection elements differ according to the size of the site.
- SCADA: Automation of substations uses a SCADA system to optimize the management of capital assets and improve operation and maintenance efficiency with as little human intervention as possible. Problems that may occur in substations will lead to life or material problems. For this reason, quickly detecting a malfunction occurring in these centers, notifying the relevant people and making the correct intervention according to the type of malfunction will prevent vital and material losses. This system also includes the layout of substation and feeder operating functions and applications from alarm processing to integrated volt-var control. SCADA in the automation system has basic functions such as monitoring and control, report generation and historical data storage, as well as various functions for special applications in the substation automation scheme.

Layout of Project components is shown in Figure 3-11.

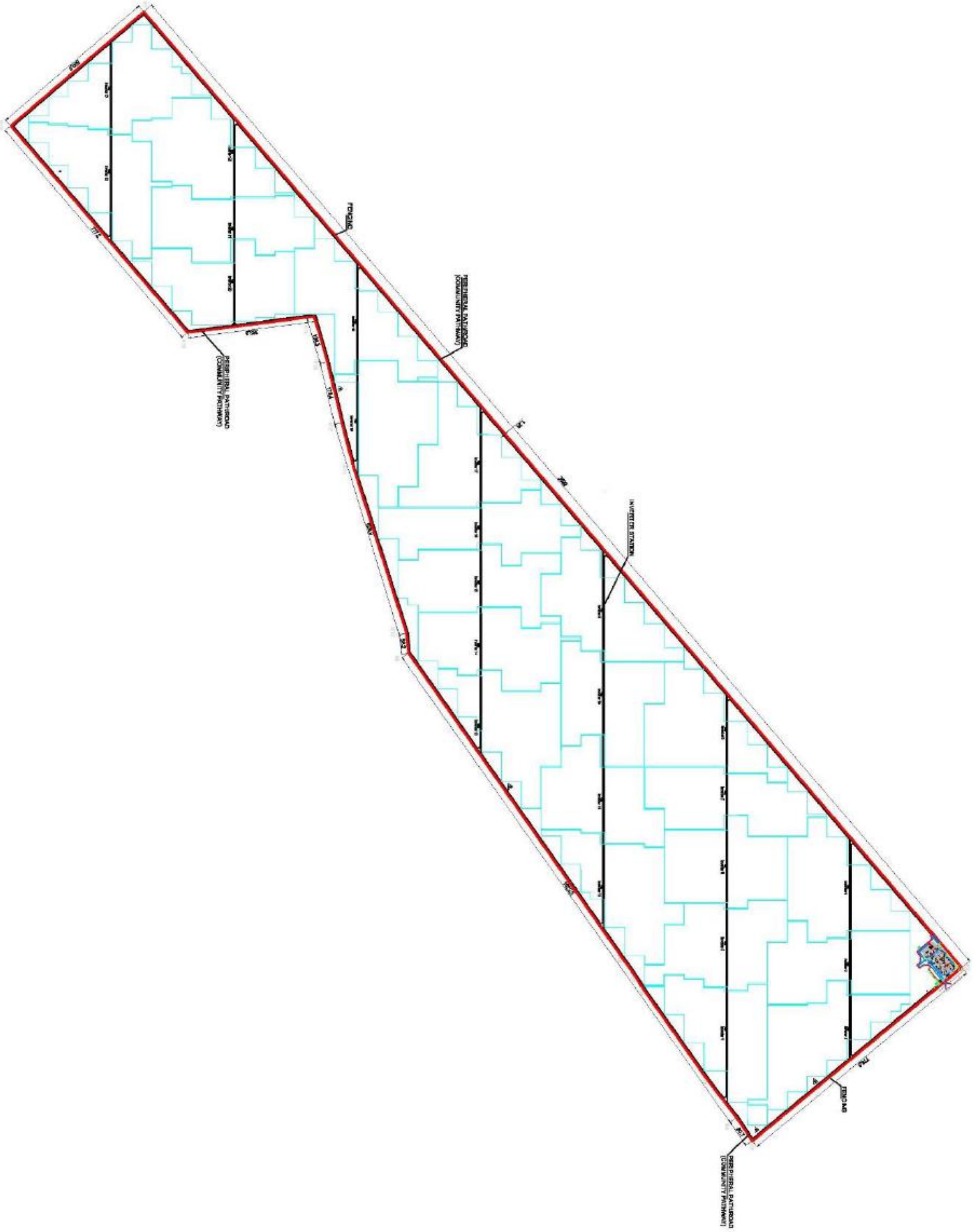


Figure 3-11: Layout of Project Components

3.3 Project Phases

3.3.1 Construction Phase

The construction phase activities include earthworks (excavation, filling) to create the surface over which the project will be constructed and works after earthworks such as laying of concrete foundations, fencing, establishment of internal roads, erection of buildings and infrastructures, material storage, construction of temporary worker camps and offices, installation of electrical, telecommunication systems, assembly of panel systems and installation of solar panels, construction of the substation and control building, testing, commissioning and connection to the grid.

According to the geological and geotechnical surveys and site observation there is no topsoil present in the area as the area was used for grazing purposes for many years.

The Project pre-construction activities, namely, mobilization of temporary site facilities, site preparation, grading and levelling, material delivery and storage and certain early trenching activities for cable laying has started in March 2023.

Workflow charts for each Project component are presented below.

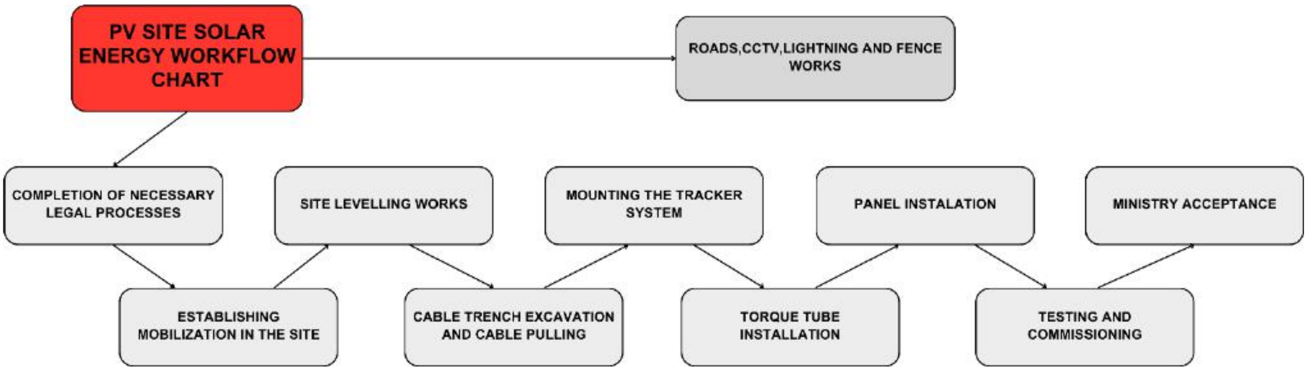


Figure 3-12: Workflow Chart of PV Site Solar Energy

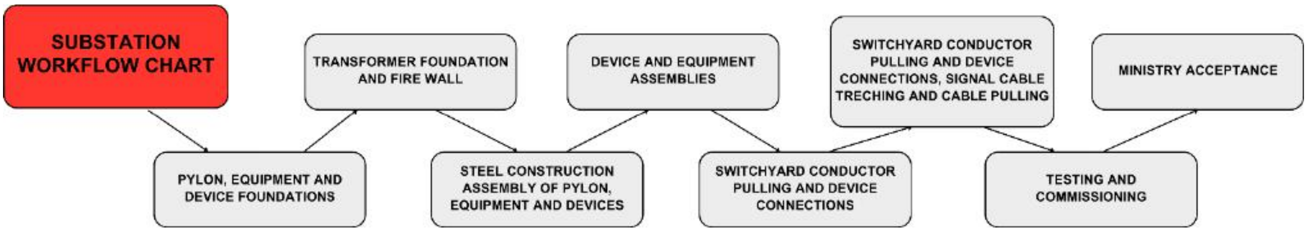


Figure 3-13: Workflow Chart of Substation

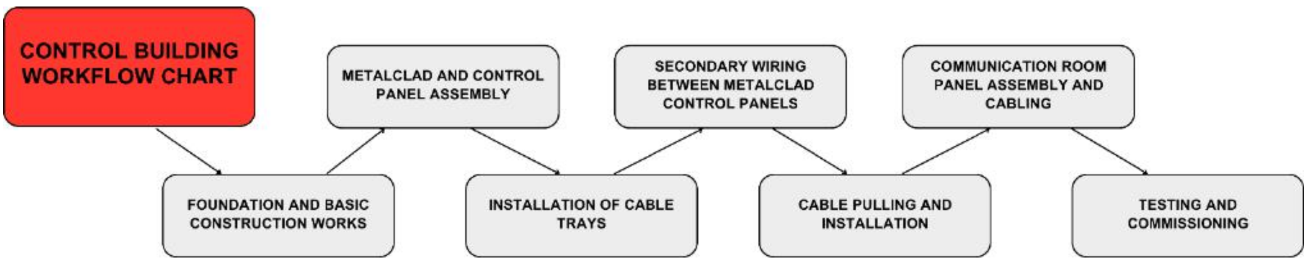


Figure 3-14: Workflow Chart of Control Building

3.3.2 Operation Phase

Maintenance will be necessary during the Project's operation phase to ensure a extended system lifetime, manufacturer warranty compliance, and energy production efficiency. Regular panel cleaning, maintenance of electrical equipment, control systems, and access roads are all examples of routine maintenance activities.

3.3.3 Decommissioning Phase

The Project would be decommissioned once it has reached the end of its economic life after the Project's anticipated economic useful lifespan of about 30 years. Decommissioning activities will include disassemble, waste transports, management and restoration of the area etc. The ground surface will be covered according to appropriate vegetation selection (compatible with the soil, climate and flora of the region) after the rehabilitation operations are completed. The Project site will be handed over to the Ministry of Industry and Technology after the decommissioning works.

3.4 Associated Facilities

According to the OECD definition and IFC Performance Standards, Associated Facilities are defined as:

- OECD - “Associated facilities are those facilities that are not a component of the project but that would not be constructed or expanded if the project did not exist and on whose existence the viability of the project depends; such facilities may be funded, owned, managed, constructed and operated by the buyer and/or project sponsor or separately from the project.”
- IFC – PS1 par. 8 – “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”.

3.4.1 OHTL

Transmission line is the system that provides electrical energy transmission between substations and end consumers. An overhead transmission line consists of a copper or aluminum conductor cable, a carrier pole and an insulating insulator that provides the connection between the pole and the conductor.

According to Electricity Market Law in Türkiye, OHTL investments can be constructed or financed jointly by the legal entity or entities requesting connection to facilities in the following cases:

- Where it is necessary to construct a new transmission facility for the connection of generation and consumption facilities to the transmission system and new transmission lines to connect this facility to the transmission system,
- Where TEİAŞ does not have sufficient financing for the construction of these facilities
- Investment cannot be planned on time by TEİAŞ,

The investment cost is repaid by deducting from the transmission system usage fee within the framework of a facility contract to be signed between the relevant legal entity or entities and TEİAŞ, and connection and system usage agreements. According to the information obtained from the Client, a contractor company will be retained by an ordinary partnership that will be established with the participation of YEKA Project Owners in the same area (i.e., Bor-1 and Bor-2 SPP Project Owners) including the Client for the construction of energy transmission lines for all YEKA Projects. Under the understanding that the ~13 km transmission line will have the sole purpose to transmit the electricity generated at G4-Bor-3 SPP to the national grid and Kalyon Enerji will have control over the contractor, albeit limitedly, OHTL should be considered as an associated facility. However, it should be noted that the transmission line will also serve other adjacent YEKA Projects as an alternative connection.

At the time of writing, it is not clear whether OHTL will be counted as an associated facility for the reasons listed above. Therefore, it is not considered as an associated facility within the scope of the ESIA report.

3.4.2 Water Pipeline

A groundwater well will be drilled in the Industrial Specialized Zone declared for YEKA Projects and a pipeline will be constructed to Project area within the jurisdiction of the Special Provincial Directorate of Administration of Niğde for the supply of potable water needed for personnel and utility purposes during the operation phase by the managing company of the Industrial Specialized Zone. As per Industrial Zones Law No:4737 installation of the infrastructure is under the responsibility of the managing company of the Industrial Specialized Zone Therefore, the well and the water pipeline is not considered as an associated facility within the scope of the ESIA report.

3.5 Project Rationale

Solar power is a clean and renewable energy source that utilizes sunlight to generate electricity. By establishing a solar power plant, dependence on fossil fuels can be reduced and climate change can be mitigated by reducing greenhouse gas emissions.

Solar power provides an opportunity for countries to achieve energy independence. By generating electricity locally from the sun, reliance on imported fossil fuels can be reduced and energy costs can be stabilized. Once the initial investment is made to set up the solar power plant, the operational costs are relatively low. Solar power has a long lifespan, and the fuel source (sunlight) is infinite at free, making it a financially viable and sustainable option.

Solar power plants offer scalability and modularity. Depending on the available space and energy demand, the plant's capacity can be expanded by adding more solar panels. This flexibility allows for the customization and optimization of the project to meet specific energy needs.

Solar power technology has been advancing rapidly, resulting in improved efficiency and reduced costs. Continued investments in solar power plants can help drive further technological innovations, making solar energy even more accessible and cost-effective.

Türkiye has favorable conditions for solar power generation due to its geographic location, receiving an average of 2,741 hours of sunlight per year. The government has also implemented supportive policies and incentives to promote the development of solar energy, including feed-in tariffs, long-term power purchase agreements, and various investment incentives.[2]

Türkiye has been actively investing in solar power capacity and has experienced significant growth in recent years. According to the installed capacity report of TEİAŞ for December 2022, Türkiye's total installed solar power capacity has reached around 9.4 gigawatts (GW). [3]

Türkiye's monthly geographical average global radiation distribution is presented below.

[2] https://enerji.gov.tr/bilgi-merkezi-enerji-gunes

[3] https://www.teias.gov.tr/kurulu-guc-raporlari

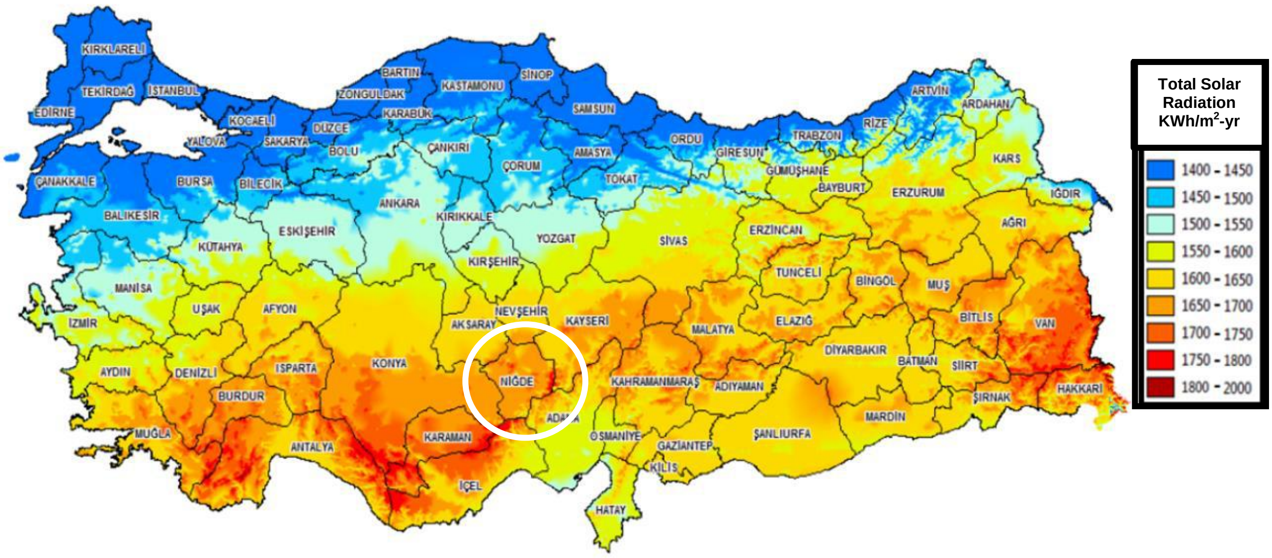


Figure 3-15: Türkiye's Monthly Average Global Radiation Distribution

Source: Republic of Türkiye Ministry of Energy and Natural Sources[4]

It is of great importance to create a balanced portfolio in electricity generation by increasing the share of renewable energy resources and resource diversity in total electricity generation. With the YEKA model realized in this context, on the one hand, the cost of electricity purchased from renewable energy generation facilities will be reduced, while on the other hand, the development of domestic production in renewable energy technologies and the capacity of qualified human resources will be increased.

The Regulation on Renewable Energy Resource Areas was published in the Official Gazette dated 09/10/2016 and numbered 29852. With this Regulation, a new investment model for the utilization of renewable energy resources was introduced. The advantages of the YEKA model are listed below.

- YEKA will be established on public and treasury immovables and immovables subject to private ownership, and renewable energy resources will be used more effectively and efficiently,
- By paving the way for indigenization in renewable energy technologies, it will become an important production capacity in Türkiye, together with its subsidiary sectors. Thus, it will trigger many of the sectors with direct and indirect employment and contribute positively to their development. Especially with the obligation to produce facility components with high local content (wind turbines, solar modules, etc.) with Türkiye's domestic facilities, contributions will be made to the development of our subsidiary industry (supply chain) that will be needed.
- Contributions will be made to ensure technology transfer and Research and Development (R&D) activities will be developed in Türkiye on renewable energy issues,
- The electricity to be generated in YEKAs will be purchased under more economical conditions compared to market prices,
- Factories and R&D centers to be established within the scope of the Allocation in Return for Domestic Production (APL) model will provide significant employment and technology transfer.

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[4] https://enerji.gov.tr/eigm-yenilenebilir-enerji-kaynaklar-gunes#:~:text=Bakanl%C4%B1%C4%9F%C4%B1m%C4%B1zca%20haz%C4%B1rlanan%2C%20T%C3%BCrkiye%20G%C3%BCne%C5%9F%20Enerjisi,kWh%2Fm2%20olarak%20hesaplanm%C4%B1%C5%9Ft%C4%B1r.

It is evaluated that there will be a significant acceleration in the utilization of Türkiye's renewable energy potential, renewable energy investments will increase further in our country, and thus Türkiye will have positive effects on becoming an important center with its logistics advantage, economic power and qualified personnel competence.

According to the Niğde Bor Energy Specialized Industrial Region Site Selection Survey Report of the Ministry of Science, Industry and Technology (former Ministry of Industry and Technology), Niğde is one of the provinces with the best solar potential in Türkiye in terms of high annual average global radiation value (1,620 kWh/m^2 - year) and average daily sunshine duration (Niğde: 8.03 hours, TR average: 7.20 hours).

Overall, establishing the Project aligns with sustainability goals, promotes environmental responsibility, reduces carbon emissions, and offers economic benefits while contributing to the transition towards a cleaner and more resilient energy future.

3.6 Project Parties

Project parties that will be involved in the SPP investment are illustrated below.

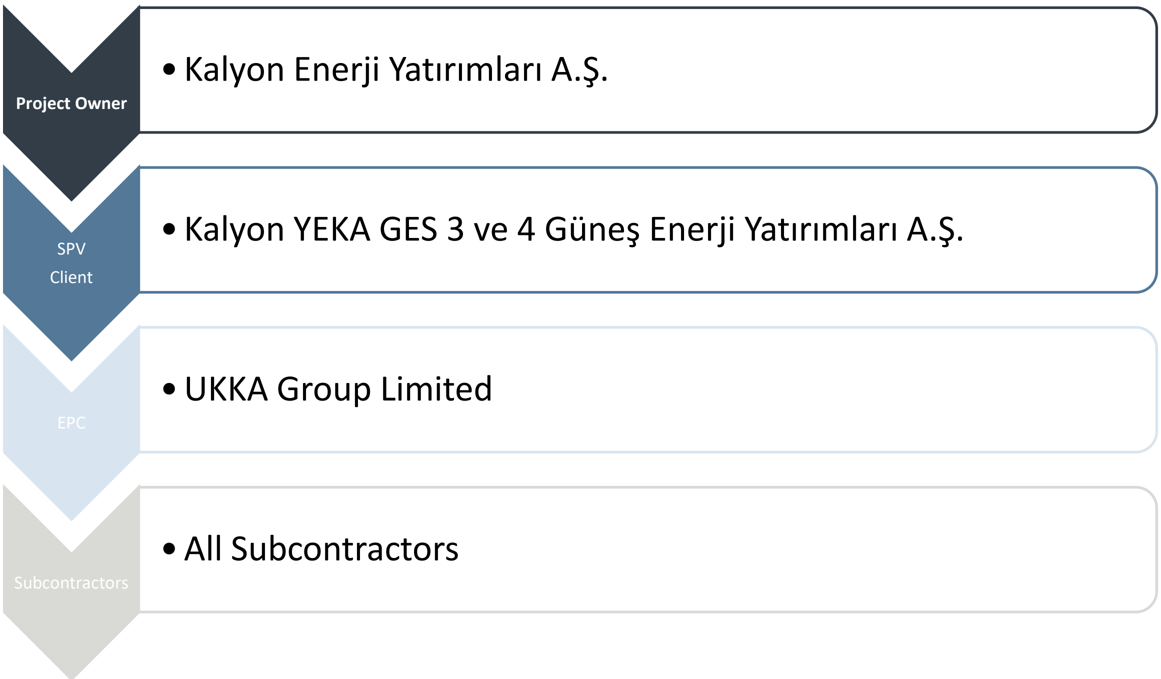

Figure 3-16: Illustration of Project Parties

Project Owner: Kalyon Enerji Yatırımları A.Ş.

SPV and the Client: Kalyon YEKA GES 3 ve 4 Güneş Enerji Yatırımları A.Ş., special purpose vehicle established for construction and operation of the facility, subsidiary of Kalyon Enerji Yatırımları A.Ş.

EPC: UKKA Group Limited, responsible for engineering, procurement, and construction during the construction phase of the facility.

TEİAŞ: Turkish Electricity Transmission Corporation, a public government company, that operates and owns the transmission of electricity, is responsible for the planning of a transmission investment for the new transmission facilities to be established, to establish new transmission facilities. The right of ownership and operation boundary of TEİAŞ starts at the connection point to the transmission system. In case the connection of the generation or consumption facility to the transmission system is carried out through the switchyard of another generation or consumption facility, the right of use, operation, and maintenance of the connected feeder belongs to TEİAŞ. However, TEİAŞ may request the operation and maintenance of such equipment to be performed by the relevant generation or consumption facility at a specified cost.

Global Enco Energy: contractor responsible for the construction of energy transmission lines for all YEKA Projects under an ordinary partnership that will be established with the participation of YEKA Project Owners including Kalyon Enerji.

3.7 Project Schedule

A summary of the Project schedule is presented below. According to the schedule, the construction period of the Project is estimated to be 8 months and the overall operational period is estimated as 30 years. The detailed Project schedule is given in Appendix C.

Table 3-1: Project Schedule Summary

Activity	Start Date	Finish Date
Permitting		
The signing of the YEKA Contract	16-May-22	-
Master Plan Approval	18-May-22	17-Feb-23
EMRA (EPDK) Pre-License Approval	01-Jun-22	01-Sep-22
Base Plan Approval of the Site	01-Jun-22	01-Sep-22
Environmental Impact Assessment Approval	01-Jun-22	01-Nov-22
Signing TEİAŞ Connection Agreement	05-Oct-22	05-Jan-23
Transfer of Land Ownership	18-Nov-22	01-Mar-23
Baseline Studies (Physical Measurements & Biodiversity Monitoring)	10-Jan-23	10-Mar-23
Land Allocation Approval	01-Mar-23	13-Mar-23
Ministry Approval of Design	12-Apr-23	26-Apr-23
Construction Permit	27-Apr-23	26-May-23
Electricity Generation License Approval	27-Apr-23	25-Jun-23
Final Delivery Acceptance Certificate Application & Issuance	09-Jul-23	13-Jul-23
Engineering	**06-Sep-22**	**30-Apr-23**
Substation Contracting & Engineering	06-Sep-22	01-Apr-23
SPP Engineering	28-Sep-22	11-Apr-23
OHTL Contracting, Engineering	04-Oct-22	11-Apr-23
CCTV & Lighting Engineering	01-Apr-23	30-Apr-23
Procurement	**07-Feb-23**	**03-Aug-23**
Construction	**24-Feb-23**	**16-Oct-23**
Solar System	24-Feb-23	16-Oct-23
Substation	13-Mar-23	13-Oct-23
OHTL	12-Apr-23	15-Jul-23

Activity	Start Date	Finish Date
Test & Commissioning & Provisional Acceptance	**03-Jul-23**	**04-Nov-23**
Solar System	03-Jul-23	04-Nov-23
Substation	14-Oct-23	28-Oct-23
OHTL	16-Jul-23	20-Jul-23

3.8 Project Location and Ownership

The Project will be located in Niğde Province, in the Bor District, Seslikaya and Badak neighbourhoods in Türkiye. Project location map is given below.

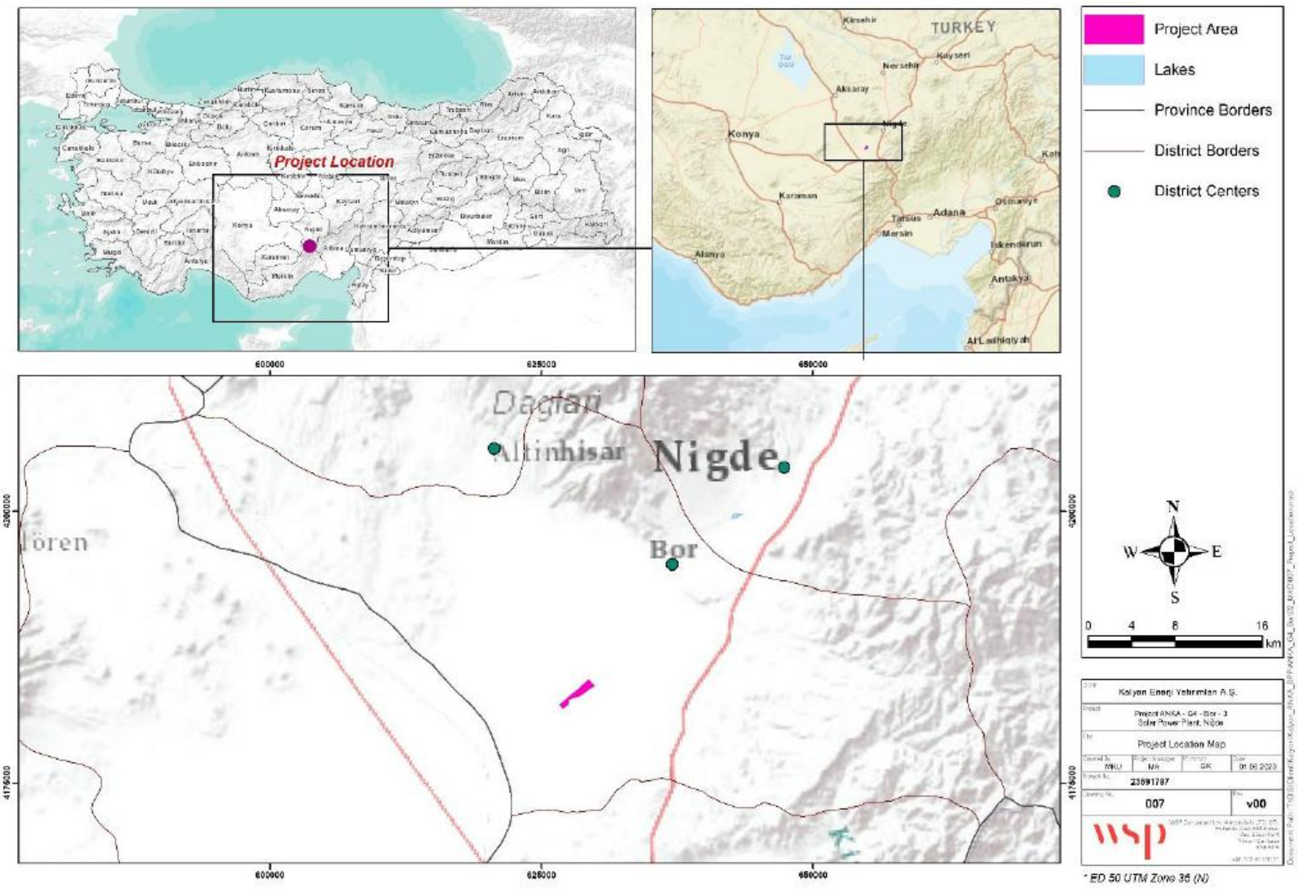

Figure 3-17: Project Location Map

The Project is part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor district of Niğde province on 29.09.2023. The legal status of the plot was formerly pastureland and it was declared an industrial zone suitable for the development of a solar project: a Renewable Energy Resource Area.

The Project will be established on a pastureland of 201.6 hectares. The Project area has been classified as an "Industrial Zone" in the 1/100.000 Scale Environmental Plan. The area lays within the borders of the "Niğde-Bor Energy Specialized Industrial Zone".

Access to the Project area can be provided from 2 alternative roads as shown in Figure 3-5. The existing roads will be used in the Projects' construction phase and no link road is planned. There will not be any heavy-load transportation that goes beyond standard road transportation limitations, therefore, no road improvement is required for transportation. Internal access roads will be designed and constructed inside the Project area.

The closest settlements to the SPP site are Seslikaya Village at 1.4 km, Emen Village at 2.7 km and Badak Village at 4.9 km, and the nearest residence is located 700 m southeast of Seslikaya Village. As reported by Kalyon, there is an idle barn approximately 80 m from the Project area. Nearest settlements to the Project site is shown in Figure 3-18

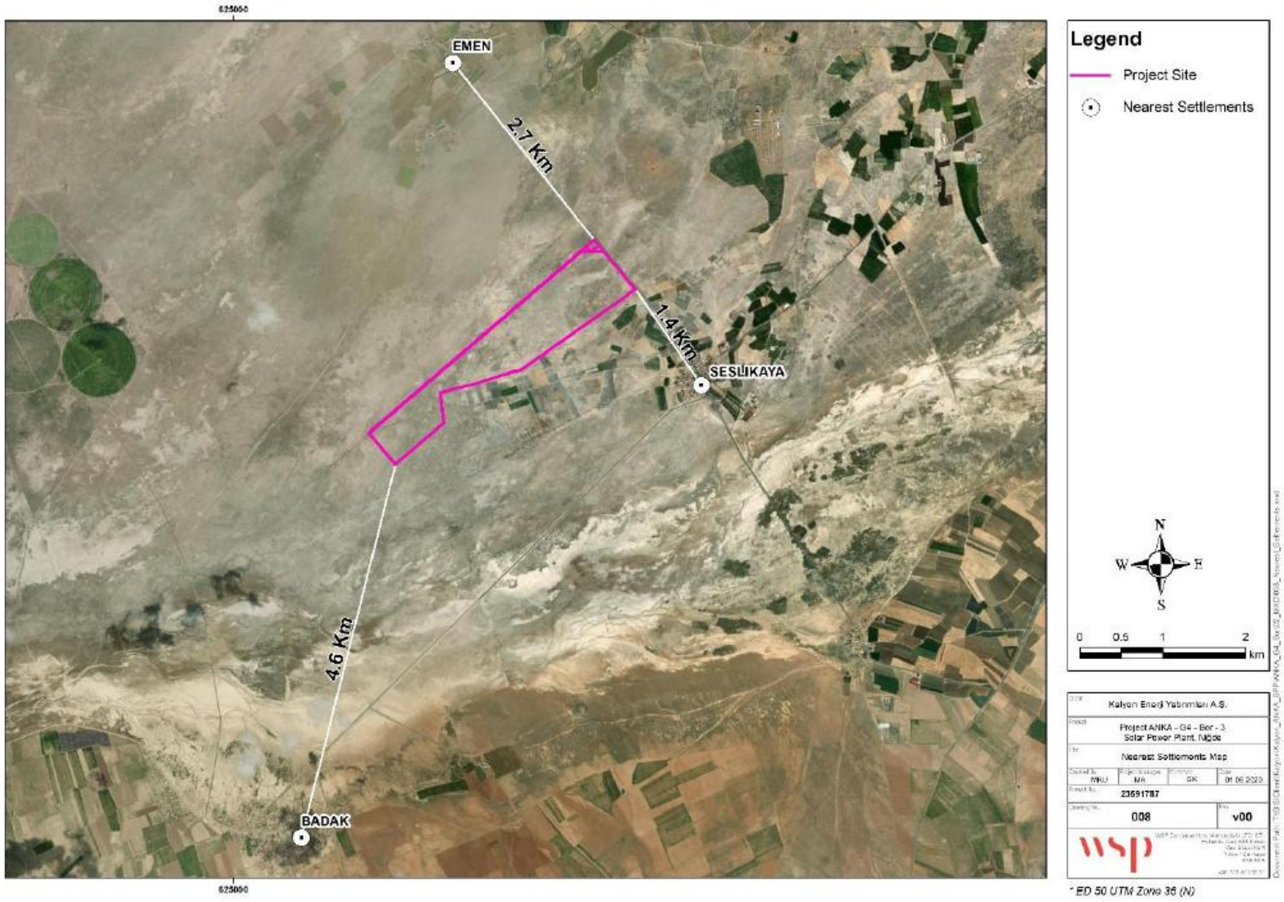

Figure 3-18: Map Showing Nearest Settlements to the Project Site

3.9 Project Labor and Working Conditions

Workforce

It is planned to employ 368 people during the construction phase of the Project and 23 people during the operation phase. It is projected that among 368 people to be worked during construction period, 82 of the employees will be skilled, 100 of the employees will be semiskilled and 186 of the employees will be unskilled. Where possible workforce is being sourced from local communities during the Project construction phase.

Temporary Worker Accommodation

A large proportion (approximately 300 workers, mostly unskilled and semiskilled) of the workforce will be accommodated in the construction camp that is under construction as of June 2023. The camp is located inside the Project site borders (see Figure 3-5). The rest (approximately 68 workers, skilled) will be accommodated in rental houses and hotels in in Bor District and Niğde Province. The main construction camps will provide at least the following facilities:

- Accommodation with water and electricity supplies
- Office buildings
- Boundary fences/walls with gate, security office and traffic barrier
- Paved roads, hard standing for lorries and car parking and paved walkways serving all buildings
- Equipment storage and maintenance areas
- Toilets and washrooms
- Kitchens and cold storage for food
- Dining rooms
- Laundry
- Medical treatment room
- Recreation facilities
- Offices with telephones, data and postal services
- Diesel generators
- External lighting to roads and walkways
- Waste accumulation and storage area
- Wastewater treatment plant
- Emergency muster point

Most of the installed housing units will be containerized on pre-installed concrete sleepers and connected to the pre-installed water and sewage lines and electric cabling. Camp will be fenced, lighted and guarded. The camp will be removed after the construction period. No lodging is planned during the operation phase. Employees will accommodate in houses in the vicinity of the Project area.

Working Hours

Working hours will be planned in compliance with the Labour Law. Construction working hours are planned to be 8 hours/day and operation working hours are planned to be in 3 shifts of 8 hours each.

3.10 Resource and Infrastructure Requirements

3.10.1 General

Waste Management Facilities

The existing licensed waste management infrastructure including landfills and other recycling/recovery facilities in Niğde Province is given below.

Table 3-2: Waste Management Facilities in Niğde

Facility Type	Number
Landfill (Municipality)	1
Licensed Packaging Waste Collection, Separation and Recycling Facilities	3
Hazardous Waste Recovery Facilities	7
Waste Oil Recovery Facility	2
Vegetable Waste Oil Recovery Facility	1
Waste Battery and Accumulator Recovery Facility	0
End-of-life Tire Recovery Facility	1
Medical Waste Sterilisation Facility	1
Non-Hazardous Waste Recovery Facility	18
Waste Electrical and Electronic Equipment Processing Facility	5
Mine Waste Disposal Facility	1
Excavated Soil, Construction and Demolition Waste Storage/Recycling Facility	0

Source: Niğde Provincial Environmental Status Report for 2021 (2022) (https://webdosya.csb.gov.tr/db/ced/icerikler/nigde-ilcdr-2021-20220630094936.pdf).

Wastewater Infrastructure

Urban wastewater management facilities in Niğde are listed below.

Table 3-3: Urban wastewater Management Facilities in Niğde

Settlement	Treatment Facility	Capacity (ton/day)
Bor Municipality	Wastewater Treatment Plant (Physical, Biological)	**24.5**
Central District	Wastewater Treatment Plant (Biological, Advanced)	20.4
Altunhisar Municipality	Wastewater Treatment Plant (Physical)	1.2
Çukurkuyu Municipality	Wastewater Treatment Plant (Physical)	1.44
Edikli Municipality	Wastewater Treatment Plant (Physical, Biological)	0.5
Karaatlı Municipality	Wastewater Treatment Plant (Physical, Biological)	0.5

Source: Niğde Provincial Environmental Status Report for 2021 (2022) (https://webdosya.csb.gov.tr/db/ced/icerikler/nigde-ilcdr-2021-20220630094936.pdf).

3.10.2 Construction Phase

3.10.2.1 Materials

The estimated quantities of the materials that may be needed for the establishment of the Project is given in Table 3-4.

Table 3-4: Construction Materials and Estimated Quantities

Material	Quantity
Concrete	3000 m^3
Steel	7152 tons (such as torque tube, I-H profile, and C profile)
Filling Material	40000 m3 Broken Stones 11500 m3 Fine Sand 420000 pcs Pumice Block 3500 m3 stabilized filling material
Wire/Fence	9000 m

The material needed for the construction activities, including bedding, padding, back fiilling and aggregate, concrete will be provided from companies in Bor district which have permits/licenses in accordance with national regulations.

Components of solar power plant, their origin and transportation methods are summarized below.

Table 3-5: Solar Power Plant Production Components and their Origin

Equipment	Quantity	Origin	Transportation Method
PV Panels*	325080 pcs	Türkiye (Kalyon PV)	By road
DC Combiner Box	-	India	By sea and road
Inverter Station	24 pcs	Inverter: United Kingdom Transformer: Türkiye RMU: Türkiye	Inverter: By road Transformer: By road RMU: By road
Substation and Switchyard	-	Türkiye	By road
Cable	850000 m DC 45000 m MV 90000 m Fiber 5000 m Cat6	Türkiye	By road

* Polysilicon, raw material of PV panels, will be provided from Germany and United States of America. Transportation will be provided by road from Germany and by air from the United States of America.

Vehicle and equipment list that is planned to be utilized during the construction phase of the Project is given below.

Table 3-6: Vehicle and Equipment List for the Construction Phase

Equipment / Vehicle	Number
Generator	8
Pile Driver	6
Backhoe Loader	5
Loader	1
Excavator	4

Equipment / Vehicle	Number
Grader	1
Truck	6
Water Truck	2
Cylinder	2
Telehandler	1
Lowbed	1
Crane	1

3.10.2.2 Infrastructure

Electricity and Fuel

During the construction phase of the Project, it is planned to meet the electricity demand for the activities to be carried out by means of diesel generators until connection to the local electricity grid is completed. The amount of diesel required for the construction phase is estimated to be 115,000 liters and electrical energy required for the rest of the construction phase when the connection to electricity grid is completed is estimated as 405,000 KWh.

The diesel fuel to be used in the construction phase will be brought to the Project site by road tankers having necessary permissions and licenses. Specific supply areas will be established to supply fuel to the vehicles. These areas will be designed with prevention measures to protect surface waters, ground waters and surface water drainage lines. The diesel fuel will be refueled directly to the vehicles without being stored. Total diesel fuel consumption due to vehicles is estimated to be 100,000 liters during construction phase.

Water Supply and Consumption

- Potable water needs of the personnel

The personnel who will work in the construction phase will need drinking and utility water. 368 people will be employed during the Project construction phase including offsite accommodation and construction camps. Water demand per capita is estimated as 228 L/person day based on 2020 data of TUIK (Turkish Statistical Institute) Municipal Water Statistics. As such, the water consumption per day is calculated as follows:

Water demand of personnel = 368 individuals x 228 L/person day = 83,904 L/day ≈ 83.90 m^3/day.

The drinking water of the personnel will be bottled water. The potable water needed for personnel need at the construction camps will be supplied from Kemerhisar Municipality by water tankers. Potable water needed for the personnel residing in off-site accommodation will be supplied through municipality potable network.

- Water needs for dust suppression during dry periods

Water need for dust suppression during dry periods is estimated to be 50 m^3/day and it will be supplied through the effluent of the wastewater treatment plant having advanced treatment. Additional water need will be supplied from Kemerhisar Municipality by water tankers.

Total potable and dust suppression water requirement for the construction phase is estimated to be 133,90 m^3/day.

3.10.3 Operation Phase

3.10.3.1 Materials

Utilization of any materials other than the materials to be used in the maintenance and repair operations is not expected during the operating phase.

Estimated annual chemical usage amounts during the operation phase of the Project are given below.

Table 3-7: Annual Chemical Usage Amounts

Chemical	Amount
Slew Drive Grease	21 L
Silica Gel	10 L
Ethyl Alcohol	5 L
Transformer Protective Paint	0.5 L
Contact & Circuit Cleaner	1 L
Rust Remover	1 L
Oil Solubilizer	2 L
General Cleaner	50 L
Galvanized Spray Paint	3 L
Breaker Contact Grease	1 kg
Transformer Oil	50 L

Vehicle and equipment to be kept in the facility during the operation phase will be limited with pick-ups and cars and 1 diesel emergency generator.

3.10.3.2 Infrastructure

Electricity and Fuel

During the operation phase of the Project, electricity demand will be supplied through electricity grid. The amount of electrical energy required for the facility was calculated as 172,000 kWh annually.

There will be no fuel station during the operation phase of the Project. Diesel fuel needs of the vehicles will be met from gas stations located in the district center. The fuel needed for the emergency generator will be met by purchasing in barrels.

Water Supply and Consumption

- Potable water needs of the personnel;

The personnel who will work in the operation phase will need drinking and utility water. 23 people will be employed during the Project operation phase. Water demand per capita is estimated as 228 L/person day based on 2020 data of TUIK (Turkish Statistical Institute) Municipal Water Statistics. As such, the water consumption per day is calculated as follows:

Water demand of personnel = 23 individuals x 228 L/person day = 5,244 L/day ≈ 5.24 m^3/day.

The drinking water of the personnel will be bottled water. For the potable water, a groundwater well will be drilled in the Industrial Specialized Zone declared for YEKA Projects and a pipeline will be constructed to Project area within the jurisdiction of the Special Provincial Directorate of Administration of Niğde for the supply of potable water needed for personnel and utility purposes during the operation phase by the managing company of the Industrial Specialized Zone. The water extracted from the groundwater well will be treated in a potable water treatment plant that will be operated by the managing company of the Industrial Specialized Zone to meet the criteria required by national regulation and WHO Guidelines.

- Water needs for PV panel cleaning;

There are two alternative cleaning methods for cleaning PV panels: dry cleaning, where no water is required, and wet cleaning, where water is required for cyclical cleaning during certain months of the year.

According to the experience gained from other projects operated by Kalyon Enerji, there has been no need for panel cleaning in the region. However, if panel cleaning with wet cleaning method is required in the following years of operation, the amount of water required per wet cleaning is calculated as 260 m^3according to the assumption that 2 tons per MWp will be required. The deionized water will be supplied by getting services from a related supplier for wet cleaning.

3.11 Emission, Wastewater and Waste

3.11.1 Construction Phase

Emission

Construction activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind.

Exhaust gas emissions such as Nitrogen Oxides (NO_x), Carbon Monoxide (CO), Hydrocarbon (HC), Particulate Matter (PM) and Sulphur dioxide (SO_2) will occur due to the diesel engines that will be used for electricity generation and construction equipment that will be operated during land preparation / construction activities.

Heating and hot water needs will be provided by Liquefied Natural Gas (LNG) heating center composed of 2 boilers having 10,000 m^3 volume and 1500 kW capacity in which similar exhaust gas emissions will occur.

During construction activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, cranes and the transportation of equipment, materials and people.

Wastewater

Sources of wastewater to be produced during construction phase of the Project is listed below:

- Domestic wastewater due to personnel working;

Water demand per capita is estimated as 228 L/person day based on 2020 data of TUIK (Turkish Statistical Institute) Municipal Water Statistics. It is assumed that all the domestic water to be used by the Project personnel will be converted to domestic wastewater. As such, the wastewater generation per day during the construction period is calculated as 83.90 m^3/day including offsite accommodation and construction camp. Domestic wastewater generated by personnel at the camp site will be collected by sewage infrastructure and treated in package wastewater treatment plant. The effluent of the wastewater treatment plant will be used in dust suppression/irrigation in line with the environmental permit to be secured from the Provincial Directorate of Environment, Urbanization and Climate Change as per the Regulation on Environmental Permits and Licenses. Until the package wastewater treatment plant is commissioned, wastewater has been stored in septic tanks and periodically transported to the licensed wastewater treatment plant of Karapınar Solar Power Plant during pre-construction works which is operated by Kalyon Enerji. As of June, a protocol has been signed with Niğde Bor Mixed and Leather Specialized Organized Industrial Zone located 5 km from the Project area and generated wastewater will be transported to its licensed wastewater treatment plant by vacuum trucks.

No wastewater generation is expected as a result from dust suppression activities, since the water to be used for dust suppression activities is expected to evaporate.

Waste

General non-hazardous and hazardous wastes generated due to construction activities are mainly, municipal waste, packaging waste, waste oil, contaminated packaging wastes, hydraulic fluids, used batteries, empty paint and chemical containers, filters, fluorescent tubes, scrap metals and cables, welding waste, end-of-life tires, electrical and electronic wastes, treatment sludge and medical waste. No excavation waste is expected as the resulting material will be used for filling.

Information on the management of wastes is provided in Chapter 7.

3.11.2 Operation Phase

Emission

No air or noise emission is expected during the operation phase considering the nature of the Project. Low-level noise emissions from inverters are generally reduced by a combination of shielding, noise cancellation, filtering, and noise suppression. Heating and hot water needs will be provided by electric heaters and air conditioners.

Wastewater

Sources of wastewater to be produced during operation phase of the Project is listed below:

- Domestic wastewater due to personnel working;

Water demand per capita is estimated as 228 L/person day based on 2020 data of TUIK (Turkish Statistical Institute) Municipal Water Statistics. It is assumed that all the domestic water to be used by the Project personnel will be converted to domestic wastewater. As such, the wastewater generation per day during the operation period is calculated as 5.24 m^3/day. Domestic wastewater generated by personnel will be collected by sewage infrastructure and stored in septic tanks and periodically transported to a licensed wastewater treatment plant.

- Wash water

Any wash water utilized for the internal cleaning of vessels and equipment will be disposed to appropriate location depending on contamination i.e., open drain or other appropriate drains with removal facilities using vacuum tanker or other portable vacuum collection system.

There are two alternative cleaning methods for cleaning PV panels: dry cleaning, where no water is required, and wet cleaning, where water is required for cyclical cleaning during certain months of the year. According to the experience gained from other projects operated by Kalyon Enerji, there has been no need for panel cleaning. If panel cleaning with wet cleaning method is implemented no chemical or hazardous material will be used during cleaning. No wastewater generation is expected as a result from panel cleaning activities since the water to be used is expected to evaporate.

Waste

Typical non-hazardous and hazardous wastes routinely generated at facilities are general office and packaging wastes, municipal wastes, waste oils, oil contaminated rags, hydraulic fluids, used batteries, empty paint cans, waste chemicals and used chemical containers, used filters, fluorescent tubes, scrap metals and cables, electrical and electronic wastes, end-of-life or damaged PV panels, and medical waste.

Polychlorinated Biphenyls (PCB) will not be used as dielectric fluid to provide electrical insulation. Therefore, hazardous waste containing PCB generation is not expected.

Information on the management of wastes is provided in Chapter 7.

4.0 ALTERNATIVES ANALYSIS

IFC PS1 requires full and detailed justification for any proposed alternatives through the environmental and social risks and impacts identification and assessment process. The purpose of this section is to summarize how the Project siting and components represent an optimized design that is technically and financially viable while minimizing overall environmental and social impacts.

4.1 Site Alternatives

The Project is part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor district of Niğde province on 29.09.2023. The legal status of the plot was formerly pastureland and it was declared an industrial zone suitable for the development of a solar project: a Renewable Energy Resource Area. Consequently, it was launched the "Competition Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy"; YEKA SPP-4 (Bor-1, Bor-2 and Bor-3) competitions were held on 08.04.2022. YEKA Right of Use Agreements were signed on 16.05.2022 with Kalyon Enerji Yatırımları A.Ş., which won the competition held by the Ministry of Energy and Natural Resources for the G4 Bor-3 region.

Considering that only the Ministry of Energy and Natural Resources can declare YEKA, the Project area was defined by the Ministry before the Right of Use Agreements were signed by Kalyon Enerji. Therefore, a Site Selection Survey Report for the Niğde Bor Energy Specialized Industrial Region (ESIR) was carried out by Ministry of Science, Industry and Technology in 2015. In this report, the following reasons were given for site selection.

- Niğde province is one of the provinces with the best solar potential in Türkiye in terms of high annual average global radiation value (1,620 kWh/m^2 -year) and average daily sunshine duration (Niğde: 8.03 hours, TR average: 7.20 hours),
- Soils are generally infertile and poor in other energy sources,
- The total pasture area of 25,390,483.43 m^2 between Emen, Badak, Seslikaya Villages in Bor District of Niğde Province is of poor/very poor quality,
- According to the calculations made in terms of solar heating values, it is seen that the amount of electrical energy to be obtained from a solar field to be established on the determined land will be approximately 56% - 61% more than in the Bavaria region of Germany, where solar field investments are the most intensive in the world,
- If the lands determined in Bor District are declared as ESIR, the stage of reaching an agreement with the local authorities, which is an important stage of the investment process, will be simplified for the investor, and hundreds of investors who demand to produce energy from different points will benefit from the advantages brought by the ESIR by completing many legal processes in a short time in this region,
- Land's solar radiation values and sunbathing times, geographical location, low slope, lack of elevation in the east and west, idle land unsuitable for agriculture, lack of pollination, low rainfall and low humidity, low average temperature values, being the region with the lowest earthquake risk,
- Parcelization can be made in a size that can meet the production capacity of the companies that will apply for production,
- If the ESIR operates at full capacity, a minimum total installed capacity of 1,100 MW/h(p) will be achieved with an employment of 1,210 people and a total annual installed capacity of 1,727,780,036.12 kWh of electrical energy can be obtained, this amount of environmentally friendly/renewable energy production will contribute to achieving a sustainable environment by reducing CO_2 emissions by 942,158,453.17 kg/year,

and will contribute to the solution of the current deficit problem due to energy imports, which constitutes the biggest problem of the country's economy by preventing hydrocarbon imports equivalent to 148,589,083.06 Tonne of oil equivalent (TOE),

- The potential to attract investment if a solar farm is established on the entire designated land,
- Within Niğde University, "Nanotechnology Research and Application Center Laboratory", one of the few laboratories in Türkiye, has been established, many scientists experienced in solar cells are employed within the university and PV Photovoltaic cells have started to be manufactured in the said laboratory since the second half of 2014. The efficiency of the cells is at the level of 19% as of today, with the help of the facilities of Niğde University Laboratory and lecturers who are experts in this field.
- Supporting domestic companies that want to invest in PV with a national technology, producing solar energy panels in Niğde, establishing companies operating in our country that produce technology and solutions that can compete with their counterparts abroad and establishing research centers that these companies will come together, R&D of photovoltaic technologies, ensuring that systems are more efficient and raising expert scientists in this field.

Also, the report includes an assessment of the environmental and social issues (e.g., availability of water and electricity supply, wastewater and stormwater discharge facilities, location relative to the expansion direction of the city, earthquake zone, drainage and vulnerability to flooding, geological problems, impact on underground and underground drinking and potable water, impact on special protection areas, national park and natural monuments, location relative to solid waste disposal areas.

4.2 Technology Alternatives

There are two main types of solar energy technologies: photovoltaics (PV) and concentrating solar-thermal power (CSP). Concentrating solar-thermal power (CSP) systems use mirrors to reflect and concentrate sunlight onto receivers that collect solar energy and convert it to heat, which can then be used to produce electricity or stored for later use. It is used primarily in very large power plants. CSP technology often relies on water for cooling and steam generation whereas PV technology requires minimal to no water for electricity generation, PV systems typically require occasional cleaning to maintain optimal performance, while CSP systems involve more extensive maintenance and monitoring due to the use of mirrors, tracking mechanisms, and heat transfer fluids.[5] CSP systems typically require large open areas with specific land requirements and solar resource availability whereas PV panels can be installed on various surfaces. It is worth noting that CSP technology has its own advantages, such as the ability to incorporate thermal energy storage, which allows for continuous electricity generation even when the sun is not shining.[6] The choice between PV and CSP depends on factors such as project scale, location, energy requirements, and other specific considerations.

The Ministry identified photovoltaic solar energy as the project technology during the tender stage. Therefore, no other technology alternative was considered.

4.3 No Project Alternative

The 'No Project' alternative is the situation where the Project, does not proceed. Under this scenario, there would not be any negative impacts on the environment, the beneficial socio-economic outcomes, economic benefit to local and national stakeholders and contribution to a sustainable environment would not happen. However, considering that the Project area has been designated as YEKA and set aside for such projects, the Project area would still be used for other renewable energy projects if the "No Project" option was chosen.

[5] https://www.sciencedirect.com/topics/earth-and-planetary-sciences/solar-energy-technology

[6] https://www.solarfeeds.com/mag/csp-and-pv-differences-comparison/

5.0 ESIA METODOLOGY

This chapter aims at describing the methodological approach of the process behind this ESIA, which is basically composed by three major steps:

1) **Definition of the baseline**, or the description of the environmental (i.e., physical, and biological components) and social context prior the realisation of the Project;

2) **Impact and risks assessment**, which is the evaluation of the possible interferences created by the Project on the environmental and social baseline conditions; and

3) **Identification of mitigation measures and definition of the Environmental and Social Management System Framework**, which identifies measures to avoid, reduce, mitigate, or offset the impacts and risks previously identified and assessed and organizes them in an ESMS framework for later implementation during Project construction and operations

The general methodology adopted by WSP Türkiye for the Environmental, and Social Impact Assessment has been designed to be analytical and transparent and allow for a semi-quantitative analysis of the impacts on the various environmental and social components. This methodology is based on the concept that projects can generate both negative and positive impacts and the significance of each impact can be evaluated considering both the characteristics of different Project activities and the environmental and social context.

This methodology is based on three main analytical phases, as described below:

- **Phase 1: Identification of Project Actions and Impact Factors**
  - **Project actions:** activities directly or indirectly related to the Project that can interfere with the context, generating environmental or social pressures;
  - **Impact factors**: direct or indirect interferences generated by the Project actions on the context and able to influence the state or quality of one or more environmental and social components;
- **Phase 2: Identification of Environmental and Social Components and Sensitivity Level Allocation**
  - **Identification of the components potentially subjected to interference:** using a specific cross-refence matrix between the impact factors and project actions, the components potentially subjected to an impact are identified for each phase of the Project (i.e., construction, operation and decommissioning).
  - **Sensitivity of the component**: conditions that characterise the current quality and state of the environment and/or its resources, and social component ;
- **Phase 3: Impact Assessment**
  - **Impacts**: changes to the environmental and social components caused by the impact factors ;
  - **Mitigation measures**: actions adapted to mitigate negative impacts or to maximize the effects of positive impacts on the environmental and social components.

The three building blocks are illustrated in the figure below and described in the following paragraphs.

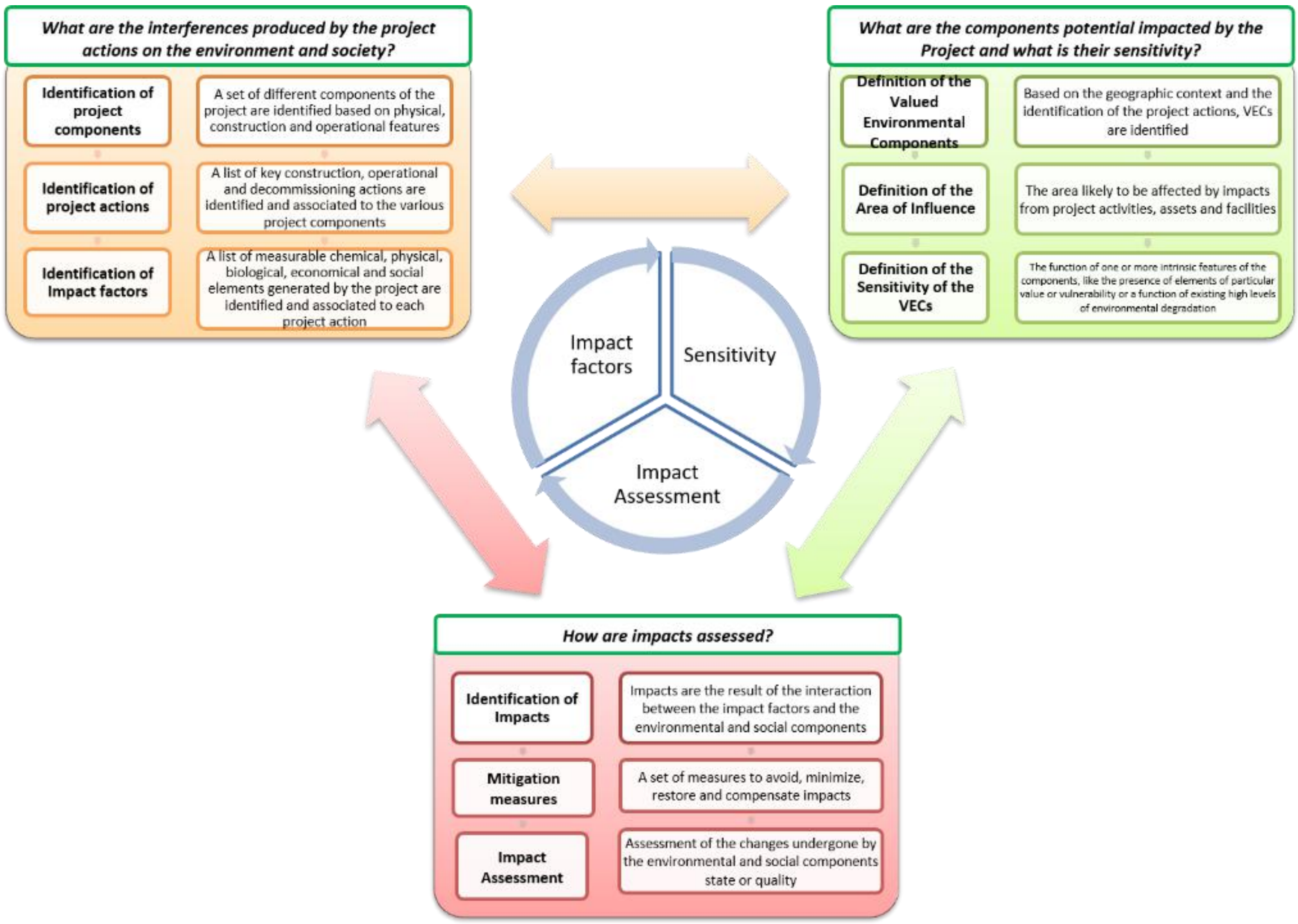

Figure 5-1: Three Phases of ESIA Process

5.1 Identification of Area of Influence

The Area of Influence ("AoI") of the Project is the area in which a direct or indirect impact on the biological, physical and social components might occur.

As defined by IFC PS1, the Area of Influence encompasses:

- 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 impacted by the Project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

The baseline conditions represent the environmental (i.e., physical, and biological components) and social context prior the realization of the Project, thus, before any possible disturbance from Project activities may occur. The definition of the baseline conditions represents the starting point upon which the impact assessment is built. The goal is to assign a sensitivity value to each environmental and social component expected to be affected by the Project.

The identification of the Project's Area of Influence varies according to the environmental and social component assessed and is hence clearly defined below and in Chapter 6 separately for physical, biological and social components. Regional Study Area (RSA) term is also used in the methodology as a source of high-level information in case of absence of site-specific data at the AoI level or regional level data is required to define the components and assess the impacts. As such, the RSA contains the Project AoI.

The Project AoI is presented in following tables and Figure 5-2.

Table 5-1: Area of Influence – Physical Components

ESIA Component	AoI
Soil and Subsoil	AoI includes the Project footprint
Hydrology and Surface Water Quality	AoI includes the Project footprint
Hydrogeology and Groundwater Quality	AoI includes the Project footprint. In case of groundwater use within the scope of the Project, AoI will include the cone of depression formed around the well.
Air Quality	AoI includes an area having boundaries 2 km away from the Project site
Noise and Vibration	AoI includes an area having boundaries 2 km away from the Project site

Table 5-2: Area of Influence – Biological Components

Biological RSA and LSA	Definition
Terrestrial and Freshwater	AoI includes an area having boundaries 1 km away from the Project site

Table 5-3: Area of Influence – Social Components

ESIA Component	AoI
Socioeconomical	AoI includes Emen, Seslikaya and Badak villages
Cultural Heritage	AoI includes the Project footprint

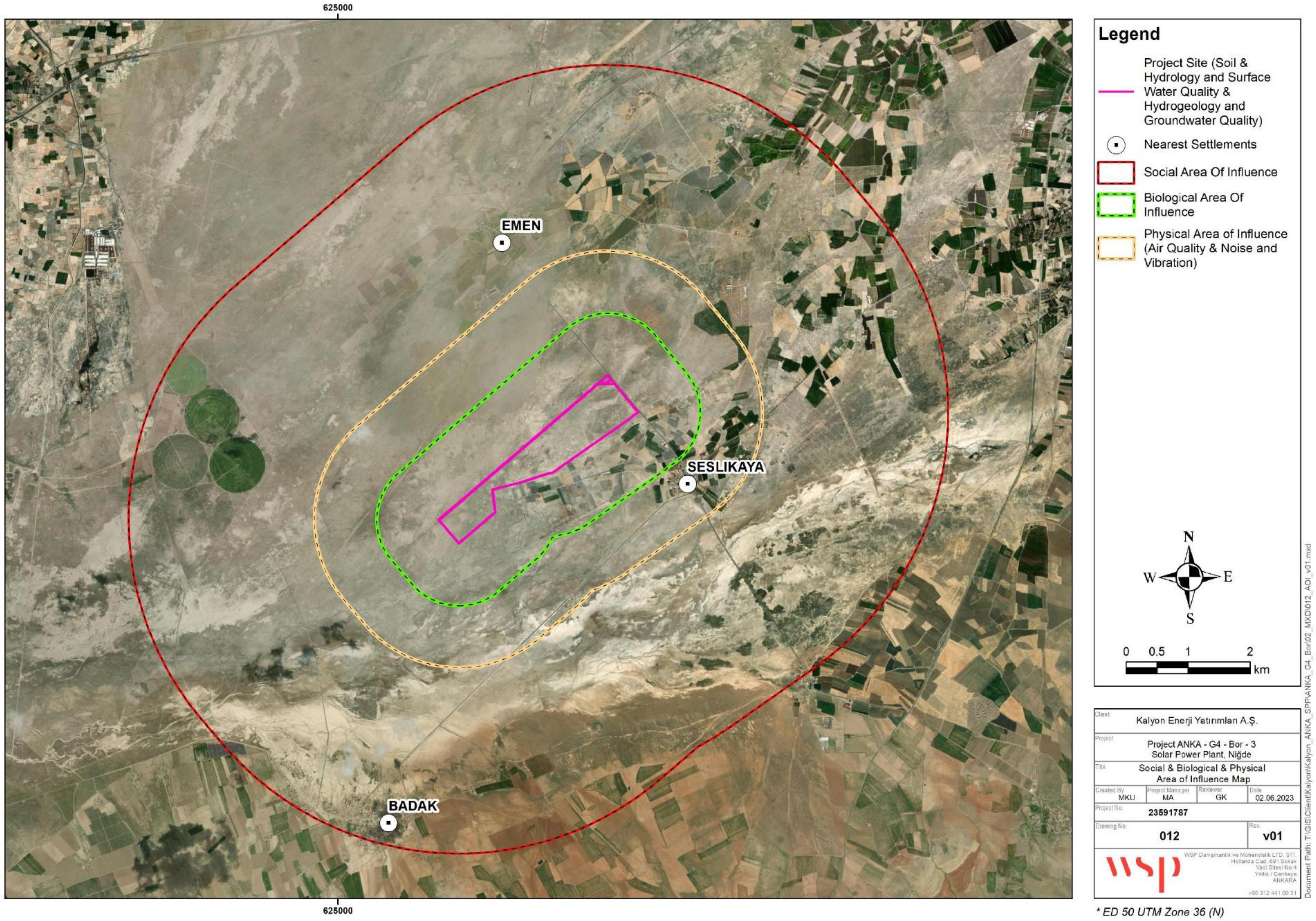

Figure 5-2: Area of Influence Map of the Project

5.2 Identification of the Project Components

Project components are identified coherently with the definition of the IFC PS1 as follows:

- The Project and the Client's activities and facilities that are directly owned, operated, or managed (including by contractors) and that are an essential component of the Project;
- Unplanned but predictable developments caused by the Project that may occur later or at a different location; and
- 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 (IFC Guidance Notes: Performance Standards on Environmental and Social Sustainability, 2012).

5.3 Identification of the Project Actions

Project actions are activities directly or indirectly related to the project which can interfere with the environment as primary generative elements of environmental or social pressures, defined in the context of this methodology as impact factors.

Project actions associated with the Project's development from the site preparation and construction phases, through operations to decommissioning are listed below.

5.3.1 Land Site Preparation and Construction Phase

- **General engineering/construction works**: earthworks (excavation, filling) to create the surface over which the project will be constructed and works after earthworks such as laying of concrete foundations, fencing, establishment of internal roads, erection of buildings and infrastructures, material storage, construction of temporary worker camps and offices, installation of electrical, telecommunication systems, assembly of panel systems and installation of solar panels, construction of the substation and control building, testing, commissioning and connection to the grid. This Project action also includes all activities and services relating to the accommodation of workers at camps including bedding, catering, management of free time, and all the administrative and management activities to ensure full respect of workers' rights and duties.
- **Material transportation**: includes transportation of the project elements and construction material from the ports-station etc. to the laydown area and camps and from the laydown area /camps to the working or construction areas.
- **Material storage**: includes temporary storage of the project elements or other construction materials in the laydown area.

5.3.2 Operation Phase

- **Plant/infrastructure operation**: includes technical and administrative activities (operation of the plant/infrastructure, surveillance, monitoring, maintenance) to maintenance the project parts in operation according to standard operating procedures.

5.3.3 Decommissioning Phase

- **General decommissioning works:** include disassemble, waste transports, management and restoration of the area etc.

5.4 Identification of the Impact Factors

Project Actions generate Impact Factors, intended as potential interferences that can influence, both positively or negatively, directly or indirectly, the environmental and/or social components.

By taken into consideration the national EIA process, international guidelines and previous experiences, Impact Factors as determined by the Project Actions are listed in the following table.

Table 5-4: Project Actions and Relevant Impact Factors

Project actions	Impact factors
Construction	
General engineering/construction works	Removal of soil Minor leakage of contaminants into soil Emissions of particulate matter Gaseous emissions from vehicles and construction equipment Demand for potable water Emission of noise Increase of population Introduction of alien species (potential risk) Land occupation (Loss of Income, soil) Demand for workforce Population influx Demand for goods, materials and services Access to ecosystem services Increase of population influx Risk of Increasing Communicable Diseases and Waste Increase of traffic Minor leakage to groundwater Minor leakage to surface water Introduction of buildings/infrastructures Emission of light Discharge of wastewater
Material transportation	Emissions of particulate matter Gaseous emissions from vehicles and construction equipment Emission of noise Increase of traffic
Material storage	Emissions of particulate matter Change in land use (temporary) Minor leakage of contaminants into soil Minor leakage to groundwater Minor leakage to surface water Increase of traffic
Operation	
Plant/infrastructure operation	Minor leakage of contaminants into soil Gaseous emissions from vehicles and equipment

Project actions	Impact factors
	Demand for potable water Discharge of wastewater Increase of population Benefit to national economy Labour and working conditions related impacts Increase of traffic Minor leakage to surface water Minor leakage to groundwater Introduction of buildings/infrastructures Emission of light
Decommissioning	
General decommissioning works	Removal of soil Minor leakage of contaminants into soil Emissions of particulate matter Gaseous emissions from vehicles and construction equipment Demand for potable water Emission of noise Increase of population Introduction of alien species (potential risk) Land occupation (Loss of Income, soil) Demand for workforce Population influx Demand for goods, materials and services Access to ecosystem services Increase of population influx Risk of increasing communicable diseases and waste Increase of traffic Minor leakage to groundwater Minor leakage to surface water Emission of light

5.5 Identification of the Environmental and Social Components

Impacts are identified as potential interferences of the impact factors with the environmental components identified in the study area. The analysis is conducted by means of matrices where environmental components are listed as rows and impact factors as columns.

When an impact factor has a potential to alter an environmental and social component, an impact is identified in the matrix. Impact factors can have a direct or indirect impact over a certain component.

All direct and indirect impacts identified are described in terms of their mechanism of action and likely consequences.

Matrixes have been created to link physical, biological and social components to the Project actions and presented in Table 5-5 and Table 5-6.

Table 5-5: Matrix for Physical and Biological Components and Impact Factors

Environmental Components / Project Actions		Physical Components								Biological Components					
		Meteorology and climatology	Air quality	Geology and geomorphology	Seismology	Soil	Hydrology and surface water quality	Hydrogeology and groundwater quality	Noise and vibration	Amphibians	Reptiles	Birds	Mammals	Habitats (Critical Habitat Assessment)	Flora
Construction Phase	General engineering/construction works	√	√	√	√	√	√	√	√	√	√	√	√	√	√
	Material transportation	√	√						√	√	√	√	√		
	Material storage		√			√		√						√	
Operation Phase	Plant/infrastructure operation	√		√	√	√	√	√		√	√	√	√	√	
Decommissioning	General decommissioning works	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Table 5-6: Matrix for Social Components and Impact Factors

Project Actions		Social Components										
		Infrastructure facilities	Transportation and traffic	Land use and agriculture	Demographics	Employment and livelihoods	Education	Health issues and facilities	Cultural heritage and archaeology	Conflicts and social tensions	Ecosystem services	Visual
Construction Phase	General engineering/construction works	√	√	√	√	√	√	√	√	√	√	√
	Material transportation		√					√		√	√	
	Material storage		√	√								√
Operation Phase	Plant/infrastructure operation	√	√	√	√	√		√		√	√	√
Decommissioning	General decommissioning works	√	√	√	√	√	√	√	√	√	√	√

5.6 Impact Assessment

5.6.1 Assignment of the Sensitivity Level

As previously stated, the final goal in determining the Project's baseline is the evaluation of the sensitivity of each environmental and social component as a precondition to perform the impact assessment.

Each environmental and social component in the area of influence of the Project has a different sensitivity to the impact factors generated by the Project or can pose a different level of risk to the Project. The sensitivity of an environmental component is typically evaluated based on the presence/absence of some features which define both the current degree of the environmental quality and the susceptibility to environmental changes of the component. As examples, for physical components the sensitivity is typically related to the presence of elements that are at the highest or lowest scale of quality, for biodiversity it is related to the presence of threatened, endemic, or protected species or habitats and for social components to the presence of vulnerable elements of the community like poor, elderly, members of ethnic or religious minorities, indigenous people, etc. The **sensitivity ("S")** of the component is defined using component specific metrics during the baseline and can assume values between 1 and 5 associated to a definition from Low to High. The S value is assigned considering both the component's characteristics and the possible presence of sensitivity features.

The following list presents potential sensitivity features to be considered in defining the sensitivity of typical environmental and social components considered in ESIA studies. The specific metrics and levels of sensitivity for each of the features considered defined during the baseline studies and presented in this ESIA Report.

Geology and geomorphology & Natural Hazard Seismology:

- Presence of faults: areas with active faults are considered to pose highest risks to the Project and hence are considered of higher sensitivity;
- Presence of landslides: areas within the range of landslides are considered to pose highest risks to the Project and hence are considered of higher sensitivity;
- Other geohazards: (karst areas, slope erosion, liquefaction, stream channels, etc.). the presence of other geohazards in the Project area is considered of higher sensitivity; and
- Seismicity: the location of the Project in areas classified as at seismic risk is considered of higher sensitivity.

Soils:

- Soil agricultural potential: soils with highest agricultural potential according to local or global assessments are attributed a higher sensitivity;
- Soil erosion potential: soils with highest erosion potential according to local or global assessments are attributed a higher sensitivity; and
- Soil pollution potential: soils in areas identified and previously used for industrial, mining, or intensive agriculture are attributed a higher sensitivity.

Surface water:

- Presence of waterbodies in the Project area of influence and level of ecological integrity; the sensitivity increases with the level of ecological integrity;
- Presence of waterbodies in the Project area of influence and level of water/sediment pollution; the sensitivity increases in the presence of polluted watercourse; and

- Presence of waterbodies and level of tolerance to hydrological changes; the sensitivity is higher for waterbodies with a low level of tolerance for hydrological changes.

Groundwater:

- Presence of shallow aquifers; the sensitivity increases with the presence of shallow aquifers that could be more easily exposed to contamination source;
- Productivity of exploited aquifers; aquifers with low productivity might be depleted in case the Project entails groundwater abstraction. The sensitivity is higher for aquifer with low productivity;
- Presence and extent of existing groundwater exploitation; the sensitivity is higher for aquifers already exploited;
- Rock permeability; the sensitivity increases in case the subsoil is made of rocks with high permeability; and
- Aquifer vulnerability; the sensitivity increases with the vulnerability of the aquifer as determined by accepted methodologies.

Air quality:

- Presence of settlements and population potentially exposed to air emissions from the Project; the sensitivity increases with the number of people exposed;
- Presence of vulnerable targets (schools, hospitals, retirement houses, etc.) exposed to air emissions from the Project; the sensitivity increases with the number of vulnerable people exposed;
- Air quality levels in the areas affected by the Project; the sensitivity increases in areas already polluted and in areas designated for air quality protection; and
- Presence of sensitive ecological receptors like protected or classified areas, protected or endangered habitats and species.

Noise and vibration:

- Presence of settlements and population potentially exposed to noise and vibration from the Project; the sensitivity increases with the number of people exposed;
- Presence of vulnerable targets (schools, hospitals, retirement houses, etc.) exposed to noise and vibration from the Project; the sensitivity increases with the number of vulnerable people exposed;
- Noise and vibration levels and/or sources in the areas affected by the Project; the sensitivity increases in areas already experiencing high levels of noise and vibrations and in areas designated for protection from noise and vibrations; and
- Presence of sensitive ecological receptors like protected or classified areas, protected or endangered habitats and species.

Landscape and components with sensitivity to visual quality:

- Presence and number of settlements/people within the visual zone of visual influence.
- Presence of areas of touristic interest within the visual zone of visual influence.

- Presence of roads and volume of traffic within the visual zone of visual influence.
- Presence of archaeological, cultural, historic areas within the visual zone of visual influence.
- Presence of natural parks protected and classified areas within the visual zone of visual influence.

Habitats and biodiversity features:

- Number of species of flora or fauna present in the habitat. The sensitivity increases with the number of species present.
- Presence of threatened species of flora or fauna in the habitat as defined by global (IUCN) or national red lists. The sensitivity increases with the number of threatened species present and the threat level.
- Presence of endemic or restricted range species of flora or fauna in the habitat as defined by global (IUCN) or national red lists. The sensitivity increases with the number of species present and the level of endemicity.
- Presence of protected species or species listed in international conventions for the protection of biodiversity. The sensitivity increases with the number of protected/listed species.
- Presence of invasive alien species. The sensitivity is higher for habitats in areas with a higher number of invasive alien species present.
- Presence of natural habitats; the sensitivity increases with the surface of natural habitats present in the Project area of influence.
- Presence of threatened or protected habitats; the sensitivity increases with the surface of threatened or protected habitats present in the Project area of influence.
- Presence of critical habitats; the sensitivity increases with the surface of critical habitats present in the Project area of influence.
- Presence of relevant nursery, spawning or feeding grounds or migration routes.

Protected areas:

- Presence of protected areas; the sensitivity increases with the number, extent and level of protection of protected areas present in the Project area of influence.

Local communities:

- Presence of skilled personnel in the local community; the sensitivity (to positive impacts) is higher the more people with skills relevant to the Project.
- Presence of businesses and economic activities relevant to the Project; The sensitivity to positive impacts is higher for communities with a well-structured business community.
- Level of health care available; the Project could cause a population influx that can put a strain to existing health services if left unmanaged. The sensitivity of communities is higher in areas with an insufficient level of healthcare available.
- Presence of communicable diseases; the spreading of communicable diseases can be exacerbated by the influx of workers due to the Project. The sensitivity of communities is higher for those more prone to be affected due to local conditions.

- Overall health state of the population; the Project might cause increased levels of exposure to environmental health determinants like air pollutants, noise and vibrations, etc. The sensitivity of communities is higher in the presence of existing health issues in the communities potentially affected by the Project.
- The presence of environmental health determinants like air and water pollution, soil and groundwater contamination increase the community sensitivity.
- Areas with concentrated fisheries activities; areas with abundance of fishery resources.

Education

- Presence of education facilities;
- Level of education of the population;

Health

- Level of health care available; the Project could cause a population influx that can put a strain to existing health services if left unmanaged. The sensitivity is higher in areas with an insufficient level of healthcare available;
- Presence of communicable diseases; the spreading of communicable diseases can be exacerbated by the influx of workers due to the Project. The sensitivity is higher in areas affected by a high level of communicable diseases.
- Overall health state of the population; the Project might cause increased levels of exposure to environmental health determinants like air pollutants, noise and vibrations, etc. The sensitivity is higher in the presence of existing health issues in the communities potentially affected by the Project.
- Presence of existing environmental health determinants. The presence of environmental health determinants like air and water pollution, soil and groundwater contamination are increasing the sensitivity.

Ecosystem Services

- Presence of ecosystem services;
- Dependence of the local communities from ecosystem services

Cultural heritage:

- Presence of protected or recognized sites of archaeological or cultural value; the sensitivity increases with the number, cultural/scientific value and level of protection of sites potentially affected;
- Presence of sites with a high archaeological potential in the absence of specific site information or appropriate protection mechanisms; the sensitivity increases with the archaeological potential as indicated by relevant experts;
- Presence of intangible cultural values like sacred sites, initiation sites, sites used for cultural events, sites recognized in oral traditions, etc. the sensitivity increases with the number of sites and values as recognized by the local communities.

The component's Sensitivity can vary from low (1) to high (5) according to the following definitions:

- **Low (1):** the component does not present elements of sensitivity;
- **Medium-low (2)**: the component presents few elements of sensitivity that have limited significance;
- **Medium (3):** the component presents numerous elements of sensitivity that have limited significance;

- **Medium-high (4):** the component presents few elements of sensitivity that have high significance; and
- **High (5):** the component presents numerous elements of sensitivity that have high significance

The list of sensitivity features represents a tool/guideline used by the experts along with the “expert judgement” to rank the sensitivity of each component in the abovementioned five classes. For the biodiversity components the sensitivity assessment also considered the ecological and biological characteristics of each component in relation to the possible impacts generated by the Project.

5.6.2 Scoring of the Impact Factors

The **impact factors** identified during the analysis of the Project and through the definition of the Project phases and Project actions are assessed in their relevance, using a scoring system. The parameters considered to assess the impact factor score are the following:

Duration (D): is the duration of the impact factor and can vary from short to long according to the following definitions:

- very short, when the duration is shorter than a month;
- short when the duration is between a month and one year;
- medium when the duration is between one and two years;
- long when the duration is between two and five years;
- very long when the duration is over five year.

Frequency (F): is the frequency with which the impact factor manifests itself:

- single event;
- infrequent, if it consists of a few events evenly or randomly distributed over time;
- recurrent, if it consists of numerous events evenly or randomly distributed over time;
- frequent if it consists of a high number of events evenly or randomly distributed over time;
- continuous, if the event has no interruption over time.

Geographic extent (G): is the geographical area within which the impact factor can exert its effects:

- Project site; the impact factor is confined within the facilities owned or exclusively controlled by the Project;
- local; the impact factor extends to the areas or communities neighbouring the Project site
- regional; the impact factor extends to an area beyond the surroundings of the Project site and to regional physical (airshed – watershed, etc) or administrative boundaries
- national; the impact factor extends throughout several regions or to the entire country
- international: the impact factor has an international or global reach

Intensity (I): is a measure of the physical, economic or social severity of the impact factor:

- negligible: the impact factor is generated in quantities that cannot be easily detected or perceived and that are unlikely to be able to cause any detectable change in the target environmental or social components;

- low: the impact factor is generated in quantities that can be detected or perceived but whose effects are unlikely to cause tangible changes in the target environmental or social components;
- medium, the impact factor is generated in quantities that are well within legal standards or accepted practices and/or whose effects are likely to cause tangible changes in the target environmental or social components;
- high, the impact factor is generated in quantities that at the limit of legal standards or accepted practices and/or whose effects are likely to cause serious impairment in the target environmental or social components;
- very high, the impact factor is generated in quantities that are at risk of exceeding the limits of legal standards or accepted practices and/or whose effects are likely to cause very serious to catastrophic damage to the target environmental or social components;

Each of the parameters listed above can have a value between 1 and 5, and severity of the impact is determined through an **Impact Factor Score** which is the sum of the 4 parameters, hence it can assume a value between 5 and 20.

5.6.3 Calculation of the Impact Value

The calculation of the **Impact Value** is done by multiplying the Impact Factor Score for the value of the sensitivity of the target component, determined during the baseline. The result is then corrected by considering the reversibility of the impact.

The reversibility is the property of an impact to diminish its magnitude over time and to eventually recede entirely. Reversibility may vary from reversible to irreversible according to the following definitions:

- reversible in the short term if the initial condition of the component will be restored in a period between weeks and months after the end of the impact factor and/or the restoration activities;
- reversible in the short/midterm if the initial condition of the component will be restored in a period between a few months and one year after the end of the impact factor and/or the restoration activities;
- reversible in the midterm if the initial condition of the component will be restored in a period between one year and five years after the end of the impact factor and/or the restoration activities;
- reversible in the long term if the initial condition of the component will be restored in a period between five and 25 years after the end of the impact factor and/or the restoration activities;
- irreversible, if it is not possible to predict the restoration of the initial conditions.

The reversibility of the impact is measured on a scale 1 to 5, with 5 ranked as irreversible and 1 ranked as reversible within short-term.

The **Impact Value (“IV”)** is calculated by multiplying the Impact Factor Score + the Sensitivity and by the value of the Reversibility IV= IFS x S x R

5.7 Calculation of the Residual Impact

The next step consists in defining mitigation measures and assessing their effectiveness to reduce or eliminate the negative impact (or to maximize the positive one). The mitigation measures are defined with reference to the mitigation hierarchy listed below in descending order of effectiveness:

- Avoid;

- Minimize;
- Restore;
- Offset;
- Compensate.

The effectiveness of the mitigation measures defined in the environmental and social management plans is assessed using expert judgement and the outcomes from previous applications of similar mitigation measures to similar Projects. The definitions of the mitigation effectiveness may vary from none to high, as described below:

- None: the measures can reduce the impacts by less than 20% of the expected outcome;
- Medium low: the measures can reduce the impacts by 20% - 40% of the expected outcome;
- Medium: the measures can reduce the impacts by 40% - 60% of the expected outcome;
- Medium high: the measures can reduce the impacts by 60% - 80% of the expected outcome;
- High: the measures can reduce the impacts by more than 80% of the expected outcome.

The Mitigation effectiveness is measured on a scale from 1 to 0.2 (1 = minimum effectiveness; 0.2 = maximum effectiveness) and the **Residual Impact Value (RIV)** is calculated multiplying the impact value with the impact mitigation effectiveness as per the following formula: RIV = IV x M

Positive impacts

Positive impacts are typically associated with economic and social opportunities and sometimes with environmental aspects a Project can solve (for example: a Project located in a brownfield where existing environmental issues can be addressed). Projects are typically promoting activities to enhance the economic, social, and environmental opportunities through specific programs, plans and measures including, for example, professional skills generation, community investment, shared value programs, remediation programs, biodiversity conservation Projects, etc.

The assessment of positive impacts is based on the same parameters used to evaluate the negative ones. The only difference is that the mitigation measures are replaced by enhancement measures, or measures to maximize the potential positive impacts.

The enhancement measures effectiveness defined in the environmental and social management plan is assessed using expert judgement and the outcomes of previous application of similar enhancement measures to similar Projects. The definitions of the enhancement effectiveness may vary from none to high as shown below:

- None: the measures can enhance the positive impacts by less than 10% of the expected outcome;
- Medium low: the measures can enhance the positive impacts by 10% - 20% of the expected outcome;
- Medium: the measures can enhance the positive impacts by 20% - 30% of the expected outcome;
- Medium high: the measures can enhance the positive the impacts by 30% - 40% of the expected outcome;
- High: the measures can enhance the positive impacts by more than 40% of the expected outcome.

5.8 Scale of Residual Impacts

The scale of the residual impact resulting from the calculation described above ranges from 0,8 to 500. The impact value is then scaled in 5 levels by diving the entire distribution of values obtained in 5 classes with an equal number of values obtained.

The residual negative impacts are classified in 5 levels using the table below.

Residual impact score	Residual impact definition	Colour Code
0.8 – 33.0	Negligible	
33.1 – 76.0	Low	
76.1 – 136.0	Medium	
136.1 – 228.0	High	
228.1 – 500.0	Very High	

The residual positive impacts are classified in 5 levels using the table below.

Residual impact score	Residual impact definition	Colour Code
0.8 – 33.0	Negligible	
33.1 – 76.0	Low	
76.1 - 136.0	Medium	
136.1 - 228.0	High	
228.1 – 500.0	Very High	

5.9 Overall Assessment

The methodology described above allows for an analytical assessment of impacts caused by individual impact factors over individual environmental and social components. The process therefore results in a table presenting several impacts from different impact factors for each component.

The table defines the assessment of the overall impact on each component. It represents a synthesis of the impacts on a component from all the impact factors generated by the Project actions. The impact assessment provides a comprehensive view of the impact value that affects the environmental or biological component.

The impact assessment is expressed based on the assessor’s experience, assigning higher weight to the values less favourable to the component’s protection, in order to guide the assessment toward a more conservative approach.

Impacts are presented in separate tables for negative and positive impacts to avoid automatic trade-offs and/or mediating between positive and negative aspects, as they are often targeting different sections of the community.

5.10 Cumulative Impact Assessment

Cumulative impacts are caused by the accumulation and interaction of multiple stresses affecting the parts and the functions of ecosystems. Of particular concern is the knowledge that ecological systems sometimes change abruptly and unexpectedly in response to apparently small incremental stresses.

IFC Performance Standard 1 (2012) and another recent publication by IFC (Good Practice Handbook on Cumulative Impact Assessment and Management, August 2013) require that the ESIA includes a cumulative impact assessment ("CIA"), i.e., "*cumulative impacts that* result *from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted*".

IFC guidelines denote that the scope of the CIA should be commensurate with the extent of cumulative impacts anticipated. This gives good direction to produce a focused assessment, considering only relevant disciplines. Cumulative impacts are limited to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities[7]. In addition, although the quoted requirements indicate that *past, present and reasonably foreseeable/reasonably defined developments* including *unplanned but predictable activities* should be considered in the assessment, it is clear that most if not all of past and existing developments have generated or generate impacts that contribute in defining the existing baseline on which the Project will cumulate its impacts. This implies that impacts of past and existing projects will be captured in the baseline investigations, and the cumulative impact assessments therefore comes down to assessing how the Project impacts may cumulate with future impacts of existing projects or with impacts from future or reasonable planned and foreseeable developments, whose impacts have to be estimated and predicted as they are not yet occurring.

Cumulative impacts can result from various types of interaction among different impact factors:

- Impacts arising from the accumulation of different impact factors at a specific location or over a specific receptor; as an example, the concurrent presence of the emission of noise and emission of dust during construction at the same location;
- Impacts arising from the same impact factor over the same receptor in a different geographic location; as an example, the degradation of the same habitats in different locations may harm the population of associated species across their entire distribution area.
- Impacts arising from the concurrent presence of impact factors caused by the Project and other development projects; as an example, we can consider the emission of dust from the construction and the concurrent construction of a new infrastructure Project at the same location.

The process followed for the assessment is consistent with the framework provided by IFC and illustrated in the figure below, as described in the following paragraphs. Good Practice Handbook proposes as a useful preliminary approach for developers in emerging markets the conduct of a rapid cumulative impact assessment ("RCIA") which is illustrated below (Figure 5-3).

[7] Examples of cumulative impacts include: incremental contribution of gaseous emissions to an airshed; reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed; interference with migratory routes or wildlife movement; or more traffic congestion and accidents due to increases in vehicular traffic on community roadways.

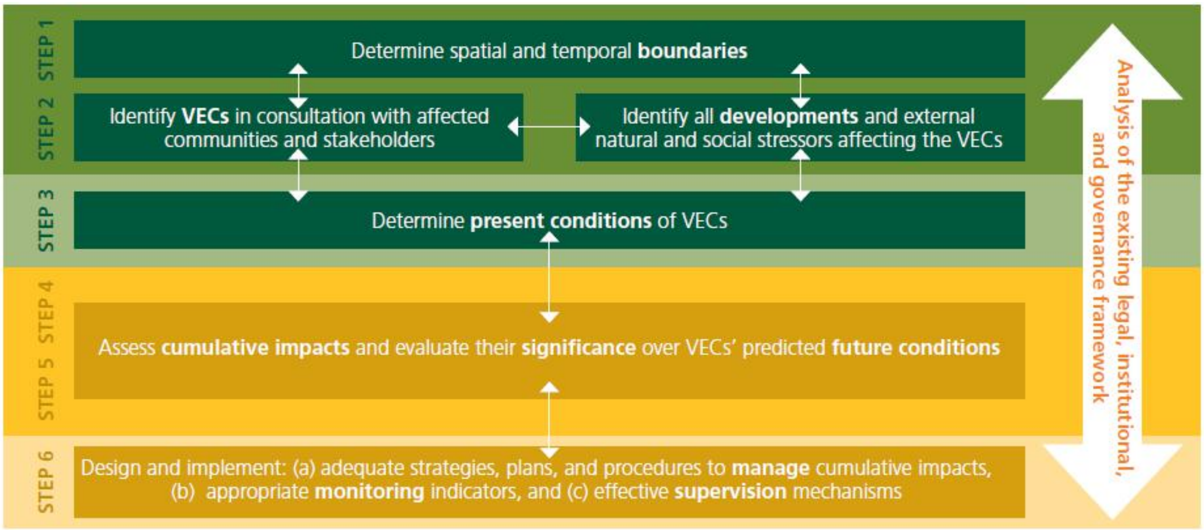

Figure 5-3: RCIA: Six-Step Approach

For the purposes of the present study, the cumulative impact assessment ("CIA") is limited to those residual impacts (post mitigation) resulting from past projects (captured through the baseline investigations) and from future residual effects of present or reasonably foreseeable projects and activities.

The foreseeable projects that will supplement the Project with a third-party service or other independent projects proposed in the area were identified and described to be considered in the CIA. There must be a reasonable potential that the other projects' impacts will overlap with those of the Project in time and/or space. If this overlap is not apparent, then a CIA is not warranted.

For cumulative effects to occur, residual impacts from the Project need to cumulate with residual impacts from other projects.

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List of Species

6.0 ENVIRONMENTAL AND SOCIAL BASELINE

This chapter is aimed at providing a description of the environmental (physical and biological) and social context in the Regional Study Area (RSA) and Area of Influence (AoI) of the project prior to its realization.

Following the directions outlined in the Methodology (Chapter 5), the work presented here will include information on all relevant components to provide an understanding of the environmental and social state of the area (e.g., air quality, terrestrial fauna and flora, land use, etc.), and to assess their sensitivity.

All information reported in this chapter represent the starting point to the following Impact Assessment (Chapter 7).

The baseline description process has been aligned to the identified project components (Chapter 3).

The identification of the Project's Area of Influence varies according to the environmental and social component assessed and is hence summarized in the Methodology (Chapter 5) and detailed separately for physical, biological, and social components in this chapter. RSA term is also used in the methodology as a source of high-level information in case of absence of site-specific data at the AoI level or regional level data is required to define the components and assess the impacts. As such, the RSA contains the Project AoI. RSA provides information containing a geographically distinct assemblage of environmental conditions, defined as a starting point for the understanding of the environmental context at regional scale using secondary sources such as scientific papers, grey literature, and databases, and are described under each component. For each of the component investigated, the AoI was defined taking into consideration the Project footprint plus a buffer of variable width depending on the components' characteristics and the Project activities. The AoI for each physical component are represented and described in the respective chapters.

6.1 Physical Components

6.1.1 General Methodology

6.1.1.1 Desktop Studies

Literature review focused on the regional study area to document available data on air quality, soil quality, water quality, pollution sources, hydrology and hydrogeology, geology, and geomorphology. Both scientific and grey literature were considered to provide an accurate description of the physical characteristics of the onshore environment in the Project Area.

6.1.1.2 Field Studies

Within the scope of the Gap Analysis, a site visit was conducted by WSP Türkiye on 21 March 2023 with the company of Client representatives. The Project area and its vicinity and onshore plant area were observed in terms of physical and biological components. In addition, interviews were held with the Mukhtars of the neighborhoods of Emen,Seslikaya and Badak Villages.

6.1.2 Meteorology and Climatology

Definition	Meteorological characteristics of the AoI is critical in evaluating the air quality and dispersion of pollutants in the air and structural safety of Project components and the Project environment.
Area of Influence	**AoI:** 2,000 m buffer zone

Rationale for AoI	**Rationale:** The nearby receptors (i.e., communities), around the Project site, potentially exposed to pollutant emissions.
Data sources	**Primary sources**: Data from Niğde Meteorology Station
	Secondary sources: Secondary data from scientific papers, grey literature, and databases.

This section presents the baseline conditions for local and regional meteorology and climatology providing the basis for air quality evaluation. Parameters within this section will provide critical information on assessing air quality baselines and to identify dispersion pathways and ranges of pollutants in the air and provide input for the structural design.

Meteorological data were obtained from Meteorology Stations located around the Project site. The data were recorded in Niğde Meteorology Station and obtained from the Turkish State Meteorology General Directorate to establish the basic conditions for meteorology and climatology. The location of the meteorology station is shown in Figure 6-1.

The continental climate is prevailing in the Niğde province and winters are cold and snowy, and summers are hot and dry.

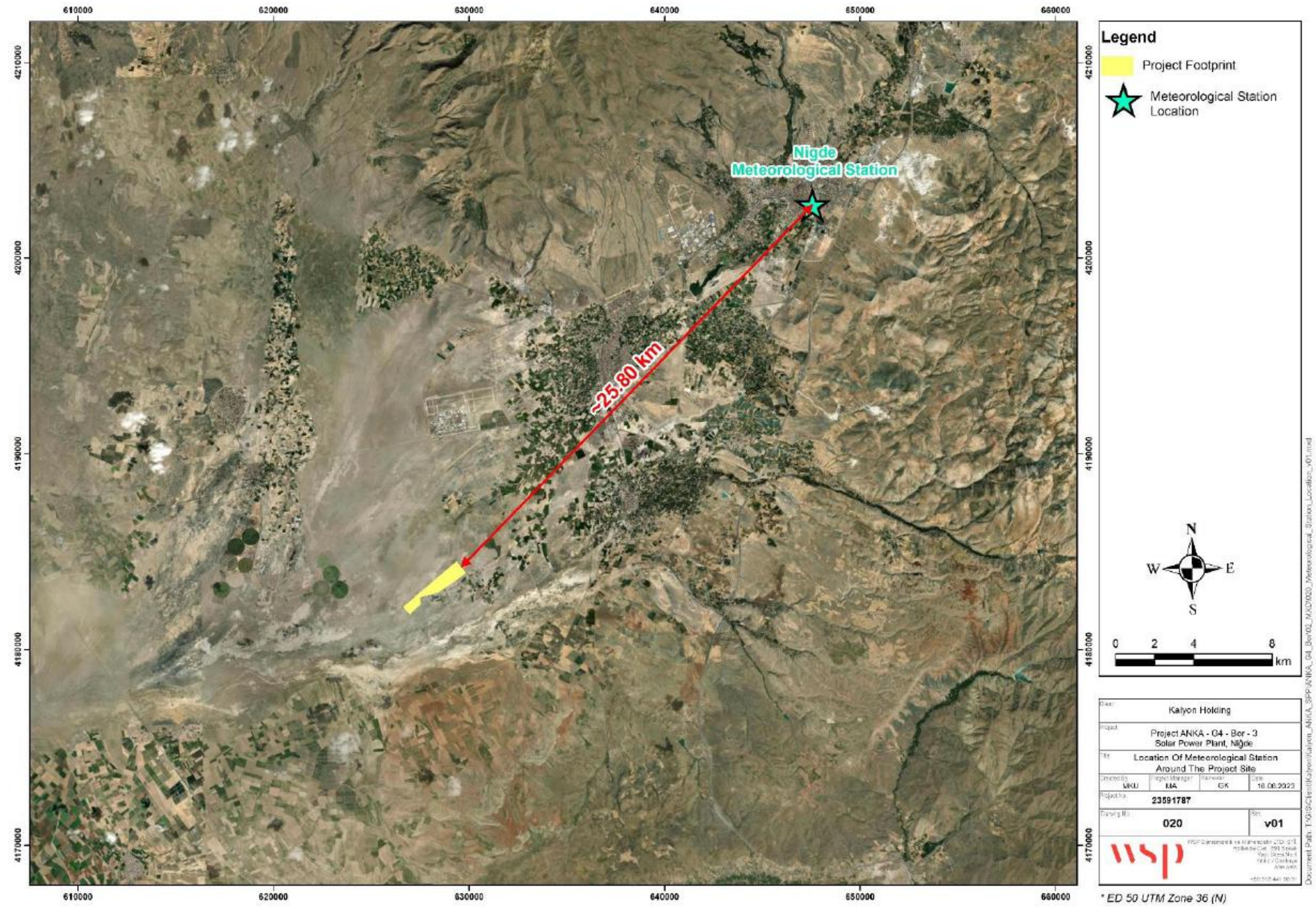


Figure 6-1: Location of Niğde Meteorological Station with respect to project Area

Pressure

According to the long term (1960-2021) observation records of Niğde Meteorology Station, the average pressure is 879.6 hPa per year, the maximum pressure is observed as 899.9 hPa, and the minimum pressure is 852.9 hPa (see Table 6-1 and Figure 6-2).

Table 6-1: Niğde Meteorological Station - Pressure Measurements (hPa) (1960 - 2021)

Months	Average Pressure (hPa)	Maximum Pressure (hPa)	Minimum Pressure (hPa)
January	880.2	899.9	852.9
February	879	895.5	856.3
March	878.1	892.8	854.7
April	877.7	890.3	860.1
May	878.8	888.5	865.0
June	878.5	886.9	866.7
July	877.3	885.3	869.1
August	878.2	885.1	870.3
September	880.6	889.2	868.4
October	882.7	891.9	865.6
November	882.8	893.3	865.0
December	881.4	896.4	852.9
Annual	**879.6**	**899.9**	**852.9**

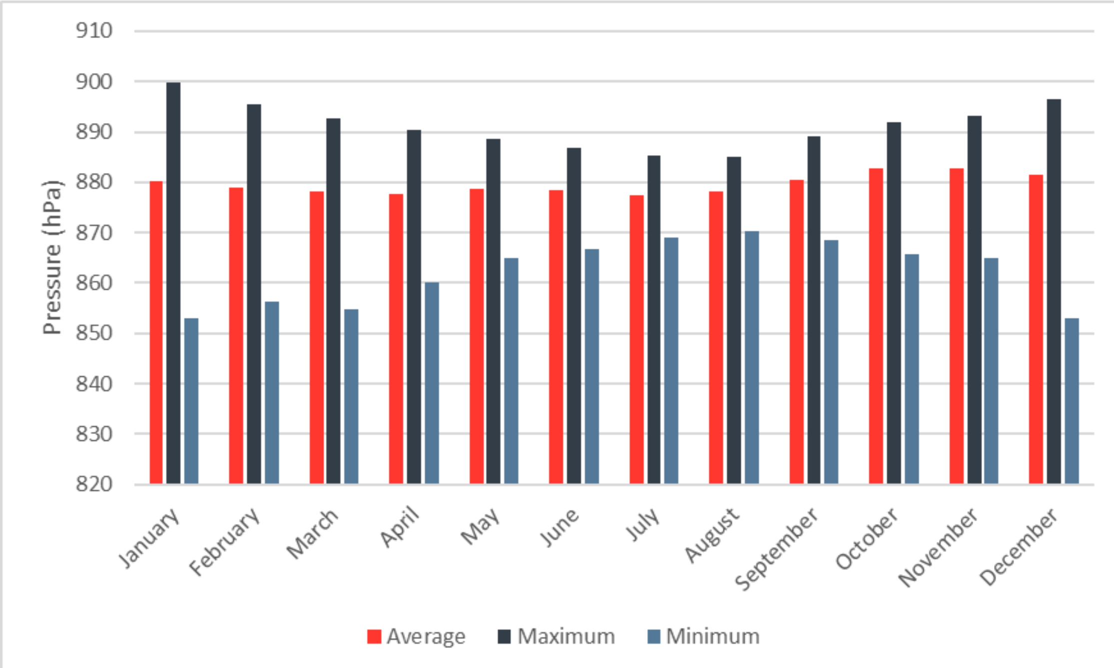


Figure 6-2: Niğde Meteorological Station - Pressure Measurements (1960 - 2021)

Temperature

According to the observation records of Niğde Meteorology Station between 1960 and 2021, the annual average temperature is 11.2°C. The highest temperature was recorded in July and August with 38.5°C, and the lowest temperature was measured in February with -24.2°C. Temperature values for 1960-2021 are presented in Table 6-2 and Figure 6-3.

Table 6-2: Niğde Meteorological Station - Temperature Measurements (°C) (1960 - 2021)

Months	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)
January	-0.3	19.9	-21.7
February	1.2	20.5	-24.2
March	5.4	26.3	-23.9
April	10.6	30.8	-6.9
May	15.0	32.1	-2.6
June	19.0	34.8	3.5
July	22.4	38.5	7.1
August	22.1	38.5	6.7
September	18.0	37.3	1.0
October	12.5	30.6	-5.2
November	6.4	24.6	-14.7
December	1.9	20.9	-20.6

Months	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)
Annual	**11.2**	**38.5**	**-24.2**

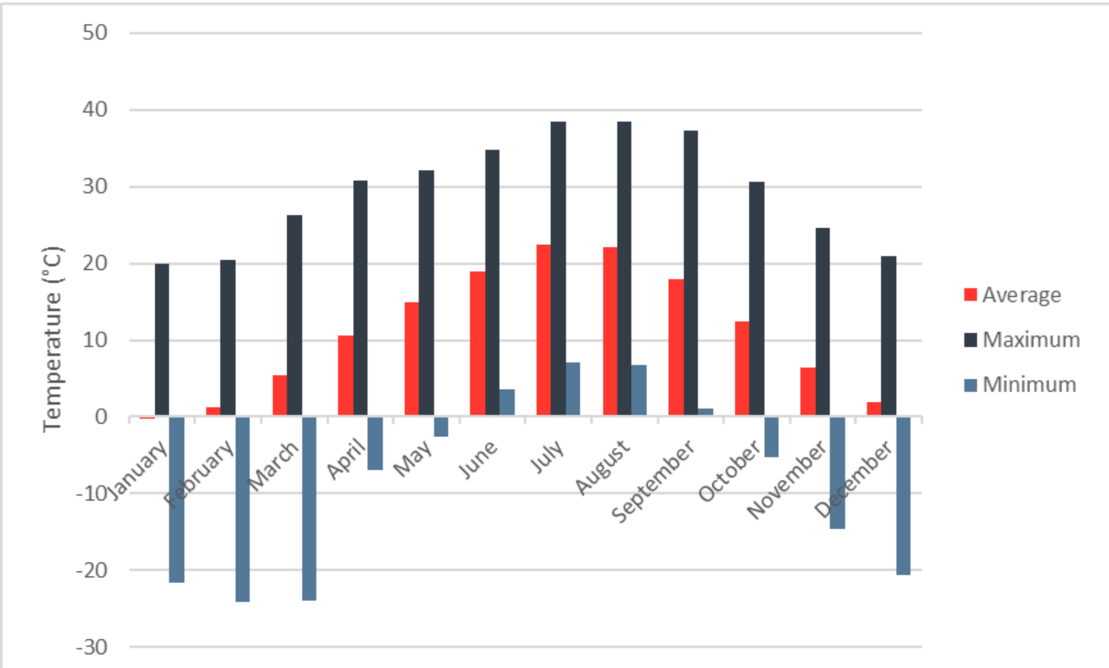


Figure 6-3: Niğde Meteorological Station - Temperature Measurements (°C) (1960 - 2021)

Precipitation

According to the observation records of Niğde Meteorology Station between 1960 and 2021, the annual average total precipitation is 336.9 mm. The maximum amount of precipitation per day was measured in December with 54.5 mm. Precipitation values for 1960-2021 are presented in Table 6-3 and Figure 6-4.

Table 6-3: Niğde Meteorological Station - Precipitation Measurements (mm) (1960 - 2021)

Months	Average Total Precipitation (mm)	Maximum Daily Precipitation (mm)
January	32.9	40.6
February	31.4	30.1
March	36.3	32.6
April	42.8	42.9
May	46.7	43.1
June	27.1	39.2
July	5.1	22.5

Months	Average Total Precipitation (mm)	Maximum Daily Precipitation (mm)
August	5.4	20.6
September	10.1	27.8
October	26.4	34.4
November	31.4	43.7
December	41.3	54.5
Annual	**336.9**	**54.5**

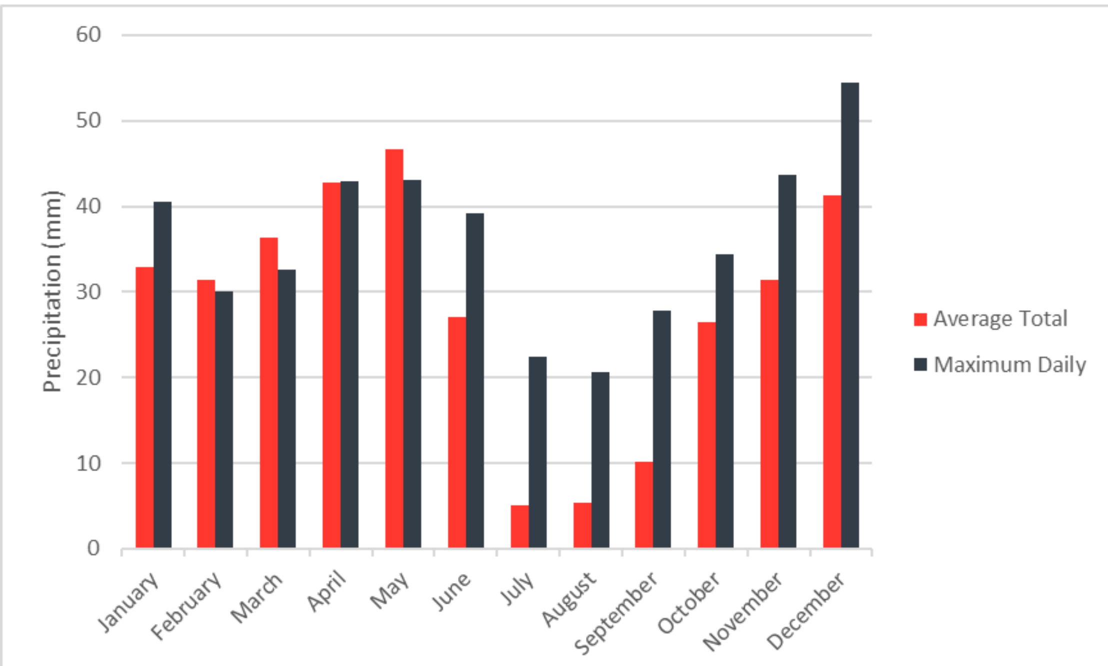


Figure 6-4: Niğde Meteorological Station - Precipitation Measurements (mm) (1960 - 2021)

Relative Humidity

According to the observation records of Niğde Meteorology Station between 1960 and 2021, the annual average relative humidity is 58.5%. Relative humidity values for 1960-2021 are presented in Table 6-4 and Figure 6-5.

Table 6-4: Niğde Meteorological Station - Relative Humidity Measurements (%) (1960 - 2021)

Months	Average Relative Humidity (%)
January	72.8
February	69.9
March	63.1
April	57.7

Months	Average Relative Humidity (%)
May	55.9
June	50.4
July	43.5
August	43.6
September	47.8
October	58.0
November	66.4
December	72.9
Annual	58.5

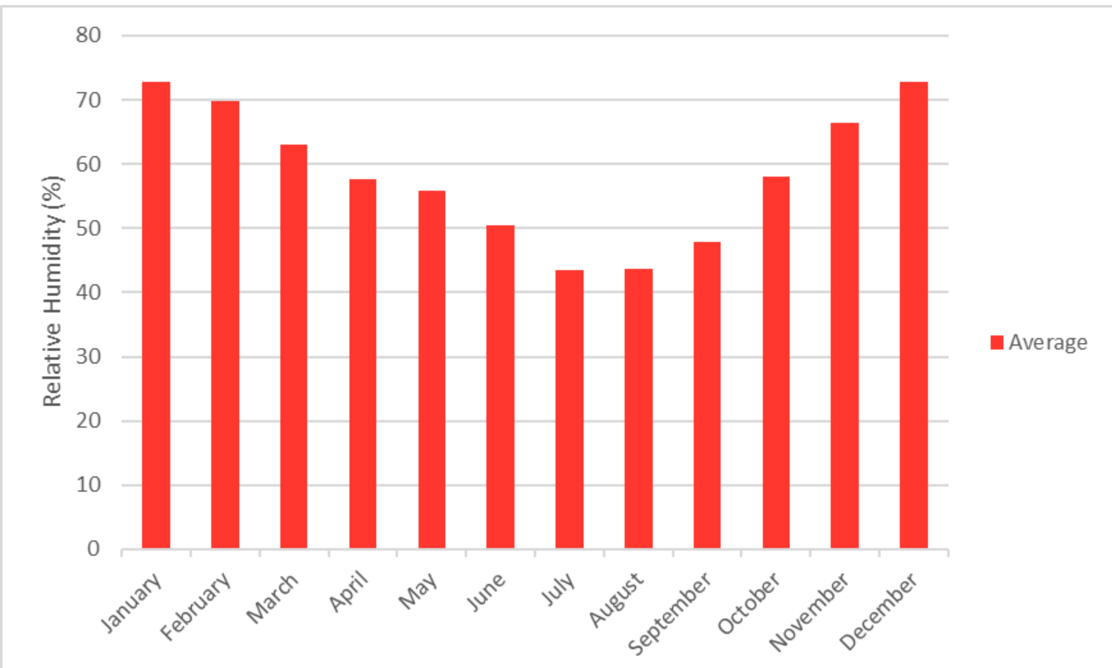


Figure 6-5: Niğde Meteorological Station - Relative Humidity Measurements (%) (1960 - 2021)

Evaporation

According to the observation records of Niğde Meteorology Station between 1960 and 2021, the average total evaporation was 1272.6 mm, and the daily maximum evaporation was 17 mm in June and July. Evaporation Values for 1960-2021 are presented in Table 6-5 and Figure 6-6.

Table 6-5: Niğde Meteorological Station - Evaporation Measurements (mm) (1960 - 2021)

Months	Average Evaporation (mm)	Daily Maximum Evaporation (mm)
January	0	-
February	0	-
March	0	-
April	58.3	12.1
May	168.2	15.0
June	214.3	17.0
July	273.0	17.0
August	257.9	13.0
September	185.3	11.0
October	100.4	10.0
November	15.2	5.4
December	0	-
Annual	1272.6	17

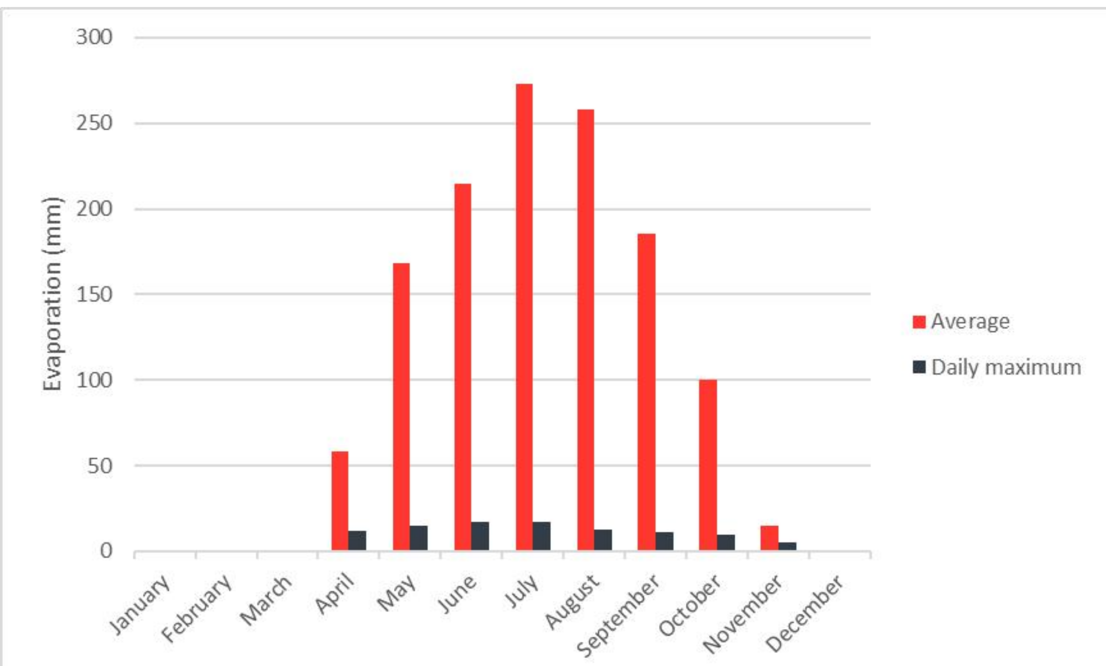


Figure 6-6: Niğde Meteorological Station - Evaporation Measurements (mm) (1960 - 2021)

Wind Distribution

Number of Winds

The total number of the wind blowing measured at Niğde Meteorological Station between 1960 and 2021 is given in Table 6-6 and Figure 6-7. As can be seen from the Table 6-6 and Figure 6-7, dominant wind direction is blowing from north-northeast (NNE) direction, second degree dominant wind direction is blowing from northeast (NE) direction.

Table 6-6: Niğde Meteorological Station - Wind Direction Measurements (mm) (1960 - 2021) (blowing from)

Direction	Annual Total Wind
N	13822
NNE	130642
NE	111696
ENE	41862
E	8542
ESE	5559
SE	5233
SSE	19996
S	16914
SSW	60972
SW	36470
WSW	46016
W	12218
WNW	8210
NW	2896
NNW	8911

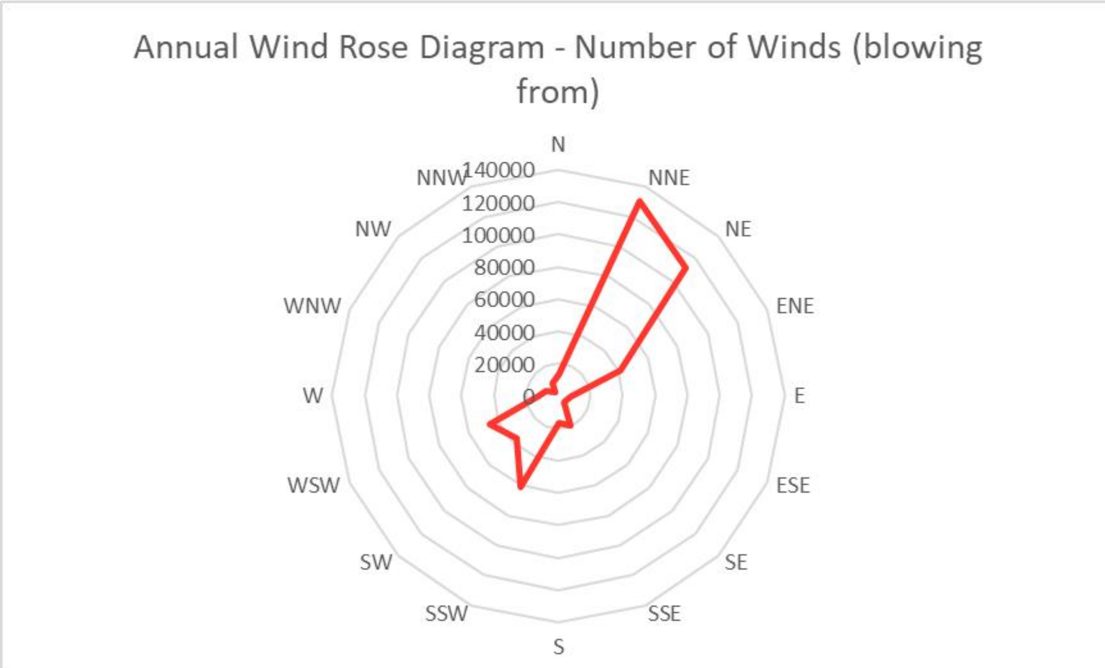


Figure 6-7: Niğde Meteorological Station - Wind Direction Measurements (mm) (1960 - 2021) (blowing from)

Wind Speed

According to data from Niğde Meteorology Station between 1960 and 2021, the annual average wind speed is 3.0 m/s. Maximum monthly wind speed is measured as 38.3 m/sec blowing from south-southeast (SSE) direction (see Table 6-7)

Table 6-7: Niğde Meteorological Station - Wind Speed (m/ sec) (1960 - 2021)

	Average Monthly Wind Speed (m/sec)	Maximum Monthly Wind speed (m/sec) and Direction
I	3	SSE 32.0
II	3.3	SSE 30.4
III	3.4	SE 31.0
IV	3.3	SSE 38.3
V	2.8	SE 28.3
VI	2.8	SE 26.2
VII	3.1	S 20.9
VIII	3	W 24.3
IX	2.7	S 25.3
X	2.5	S 21.7
XI	2.7	WSW 35.9

	Average Monthly Wind Speed (m/sec)	Maximum Monthly Wind speed (m/sec) and Direction
XII	2.9	SSE 27.8
Annual	3	SSE 38.3

Other parameters

According to the observation records of Niğde Meteorology Station between 1960 and 2021:

- the average annual number of snow days is 22.35, the number of snow-covered days is 32.92, the number of foggy days is 4.72, the number of hail days is 2.88, the number of frosty days was 24.11, and the number of thunderstorm days was 4.98.
- The maximum snow thickness was measured as 39 cm in December 2002.
- The number of strong windy days is 51.99 days per year, and the number of stormy days is 9.68 days per year.

6.1.3 Air Quality

Definition	Ambient air quality is a broader term used to describe the level of air pollution in outdoor environments. WHO defines ambient air pollution as potentially harmful pollutants emitted by industries, households, vehicles, etc. Construction and decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. Exhaust gas emissions such as nitrogen oxides, carbon monoxide, hydrocarbon, particulate matter, and sulfur dioxide, will occur due to the diesel engines that will be used for electricity generation, construction equipment will be operated during the land preparation / construction activities.
Area of Influence	2,000 m buffer zone including Project footprint (See Figure 6-8)
Rationale for the AoI	**Rationale:** The nearby receptors (i.e., communities), around the Project site, potentially exposed to pollutant emissions.
Data sources	**Primary sources**: ▪ Baseline air quality measurements conducted in 2023 in the scope of ESIA studies.
	Secondary sources: ▪ Data from Air Quality Monitoring Stations in Niğde Province ▪ Secondary data from scientific papers, grey literature, and databases.

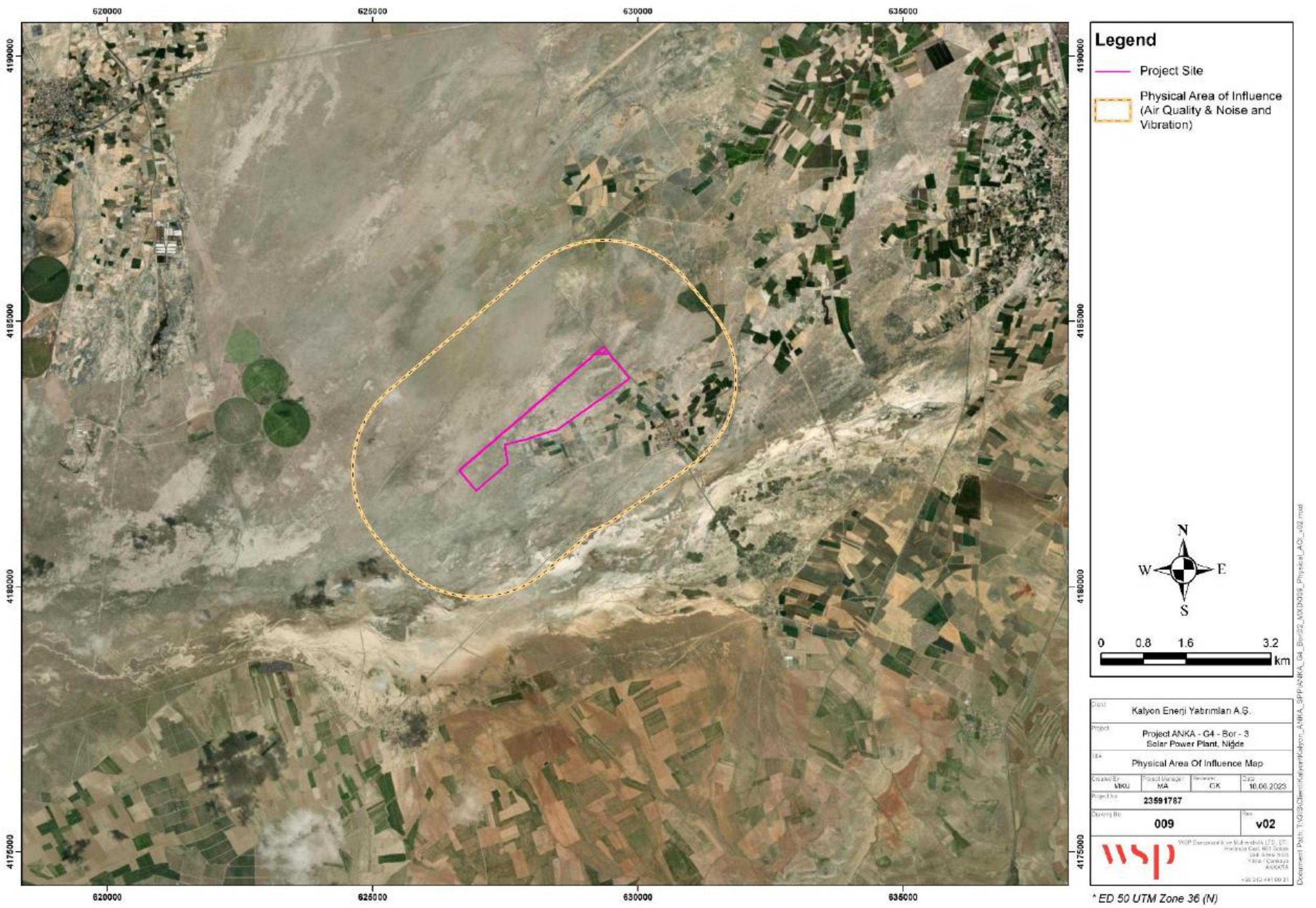


Figure 6-8: Map Showing Physical Area of Influence of Air Quality and Noise Components

Methodological Approach

Air Quality Monitoring Stations

Information about the air quality in the RSA is provided from the National Air Quality Monitoring Stations in Niğde. The air quality data at this station are published on the website of the Continuous Monitoring Center (CMC) of MoEUCC. There are two CMC in Niğde, namely Niğde Center and Bor. The Bor CMC is approximately 12 km to the project area. Therefore, Bor CMC data is used for RC data and 2022 data is summarized. The air quality monitoring station is given in Figure 6-9.

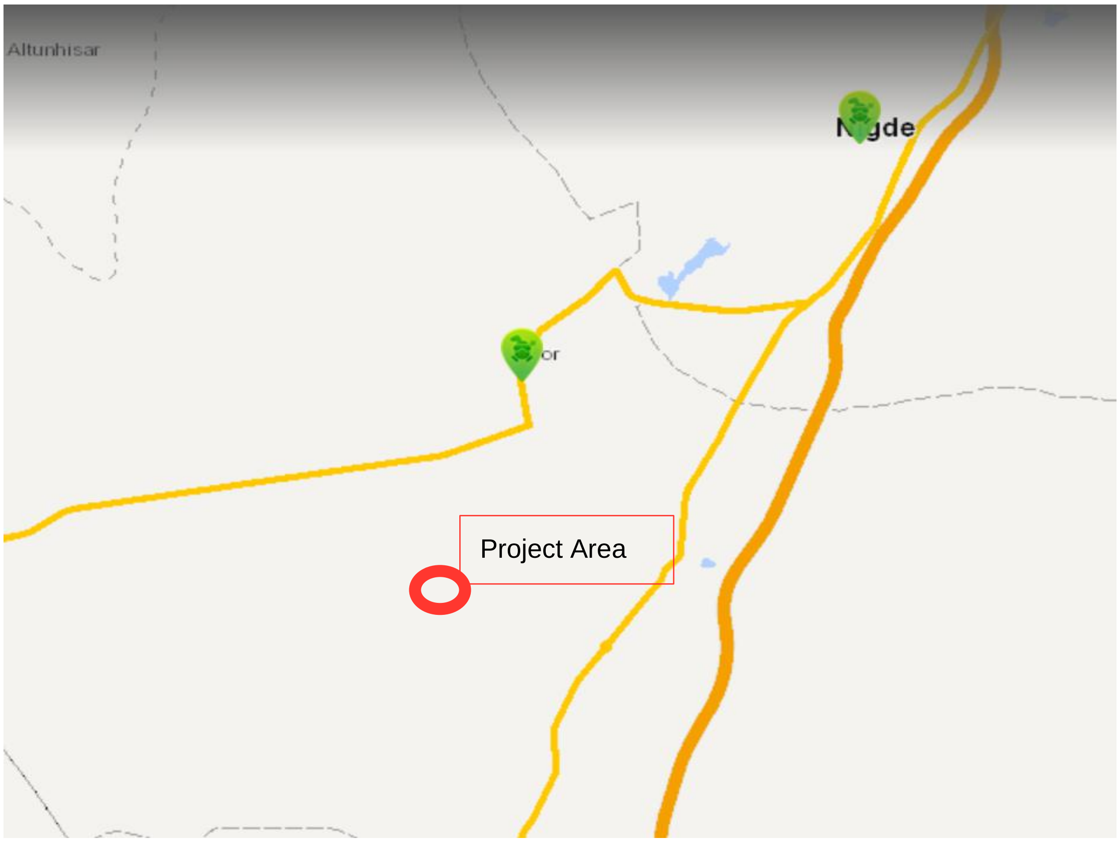


Figure 6-9: Continuous Measurement Center of MoEUCC and Project Area

Within the scope of ESIA studies, PM10, PM2.5 and settled dust measurements were conducted. PM10 and PM2.5 measurements were conducted at the same measurement points. The details of measurement points and periods are given in Table 6-8, Table 6-9, Table 6-10 and Figure 6-10. PM10 and PM2.5 measurements were conducted for 24 hours in 6 measurement points (points 1-6) and for 1-month in 2 measurement points (points 7-8). Settled dust measurements were conducted for 2-months at six points.

Table 6-8: PM10 Measurement Coordinates and Periods

Points	Coordinates		Measurement Period and Date
PM10-1	37.870314°	34.521536°	24 hours – 10.01.2023
PM10-2	37.864674°	34.514066°	24 hours – 11.01.2023

Points	Coordinates		Measurement Period and Date
PM10-3	37.859112°	34.509409°	24 hours – 12.01.2023
PM10-4	37.852616°	34.502700°	24 hours – 13.01.2023
PM10-5	37.827625°	34.486226°	24 hours – 14.01.2023
PM10-6	37.791926°	34.477301°	24 hours – 15.01.2023
PM10-7	37.790111°	34.473330°	1 month – between 10.01.2023 and 08.02.2023
PM10-8	37.782635°	34.482031°	1 month – between 09.02.2023 and 10.03.2023

Table 6-9: PM2.5 Measurement Coordinates and Periods

Points	Coordinates		Measurement Period and Date
PM2.5-1	37.870314°	34.521536°	24 hours – 10.01.2023
PM2.5-2	37.864674°	34.514066°	24 hours – 11.01.2023
PM2.5-3	37.859112°	34.509409°	24 hours – 12.01.2023
PM2.5-4	37.852616°	34.502700°	24 hours – 13.01.2023
PM2.5-5	37.827625°	34.486226°	24 hours – 14.01.2023
PM2.5-6	37.791926°	34.477301°	24 hours – 15.01.2023
PM2.5-7	37.790111°	34.473330°	1 month – between 10.01.2023 and 08.02.2023
PM2.5-8	37.782635°	34.482031°	1 month – between 09.02.2023 and 10.03.2023

Table 6-10: Settled Dust Measurement Coordinates and Period

Points	Coordinates		Measurement Period and Date
SD-1	37.870461°	34.521186°	2 months – between 10.01.2023 and 10.03.2023
SD-2	37.859250°	34.509049°	2 months – between 10.01.2023 and 10.03.2023
SD-3	37.827763°	34.485962°	2 months – between 10.01.2023 and 10.03.2023
SD-4	37.791988°	34.477061°	2 months – between 10.01.2023 and 10.03.2023
SD-5	37.790135°	34.473243°	2 months – between 10.01.2023 and 10.03.2023
SD-6	37.782737°	34.481898°	2 months – between 10.01.2023 and 10.03.2023

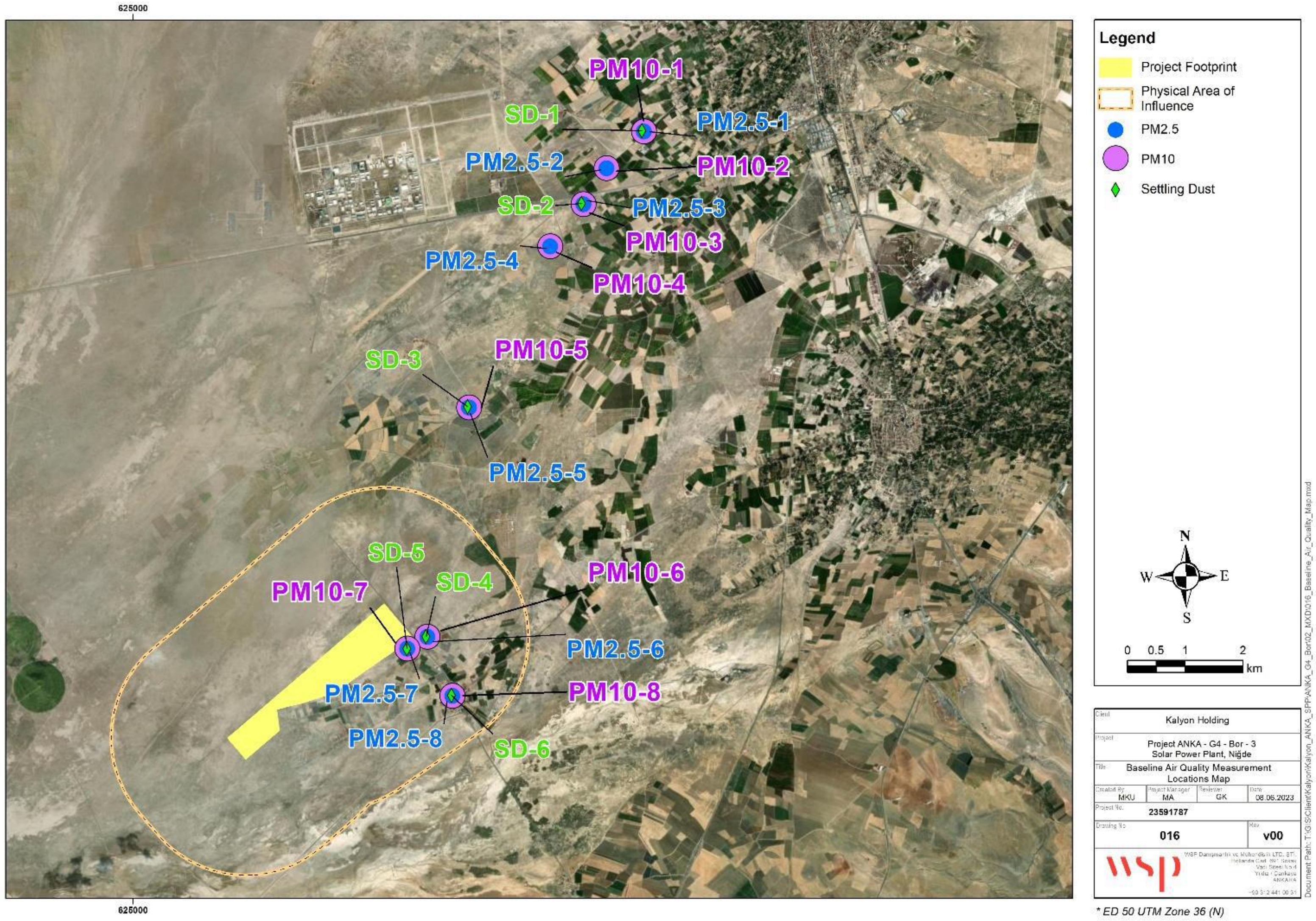


Figure 6-10: Baseline Air Quality Measurement Points

Air sampling methodologies are provided from the laboratories and summarised below.

- PM10 and PM2.5 measurement studies are conducted according to the TS 12341 standard: "Standard gravimetric measurement method for the determination of the PM10 or PM2.5 mass concentration of suspended particulate matter". In this method, air vacuumed from the ambient air by a pump passes a filter and collected on the filter for 24 hours. After the sampling period, the filter is transported to the laboratory and gravimetric analysis is conducted. By calculating the amount of dust on the filter, PM10 and PM2.5 concentrations in the ambient air are achieved.
- Settled dust measurement study is conducted according to TS 2342 standard: "Methods for the measurement of air pollution methods for the installation and the use of the directional dust gauge". This method is based on collection of particles settled due to the factors such as gravity, precipitation in a directional dust gauge, collection of the gauge after the sampling period (720 hours) and calculation of the dust concentration.

Regional Study Area

The data of the Bor CMC of the Ministry of Environment, Urbanization and Climate Change is presented in Table 6-11.

Table 6-11: Air Quality of Bor District*

Parameter	Unit	Minimum Value	Minimum Date	Maximum Value	Maximum Date	Average Value	Turkish Air Quality Standards (µg/Nm3)
PM10	µg/m3	1.76	04.03.2022	198.78	06.04.2022	57.46	20
SO2	µg/m3	3.85	15.09.2022	66.92	06.01.2022	15.08	20

Source: (MoEUCC, 2022)

Area of Influnce

Within the scope of the ESIA, PM2.5, PM10 and settled dust, measurements were conducted. The results and evaluations are given in the following sub-sections.

PM10 Measurement Results

The results of PM10 measurements are given in Table 6-12 - Table 6-14. As can be seen from the results, the PM10 concentration around the Project area is below the Turkish and IFC Air Quality Standards. The highest PM10 concentration was measured as 39.48 µg/Nm3 at PM10-8 sampling point.

Table 6-12: PM10 Measurement Results for the PM10-1 - PM10-6 Sampling Points

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards[1] (µg/Nm3)	IFC Air Quality Standards (µg/Nm3)[2]
PM10-1	10.01.2023	13.02	50	50

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards[1] (µg/Nm3)	IFC Air Quality Standards (µg/Nm3)[2]
PM10-2	11.01.2023	13.45		
PM10-3	12.01.2023	15.05		
PM10-4	13.01.2023	12.29		
PM10-5	14.01.2023	14.99		
PM10-6	15.01.2023	13.54		

[1] Regulation on Control of Industrial Air Pollution (Dated 03.07.2009 and Numbered 27277) and Regulation on Assessment and Management of Air Quality (Dated 06.06.2008 and Numbered 26898)

[2] IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

Table 6-13: PM10 Measurement Results for the PM10-7 Sampling Point

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards[1](µg/Nm3)	IFC Air Quality Standards[2] (µg/Nm3)
PM10-7	10.01.2023	13.44	50	50
	11.01.2023	18.30		
	12.01.2023	27.87		
	13.01.2023	21.17		
	14.01.2023	20.01		
	15.01.2023	21.48		
	16.01.2023	25.66		
	17.01.2023	18.00		
	18.01.2023	28.24		
	19.01.2023	18.56		
	20.01.2023	25.48		
	21.01.2023	29.12		
	22.01.2023	24.73		
	23.01.2023	20.79		
	24.01.2023	21.78		
	25.01.2023	19.93		
	26.01.2023	18.56		
	27.01.2023	29.68		
	28.01.2023	14.98		

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards[1](µg/Nm3)	IFC Air Quality Standards[2] (µg/Nm3)
	29.01.2023	21.49		
	30.01.2023	24.73		
	31.01.2023	16.52		
	01.02.2023	25.11		
	02.02.2023	19.50		
	03.02.2023	20.11		
	04.02.2023	17.82		
	05.02.2023	23.33		
	06.02.2023	22.13		
	07.02.2023	23.16		
	08.02.2023	20.81		

[1] Regulation on Control of Industrial Air Pollution (Dated 03.07.2009 and Numbered 27277) and Regulation on Assessment and Management of Air Quality (Dated 06.06.2008 and Numbered 26898)

[2] IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

Table 6-14: PM10 Measurement Results for the PM10-8 Sampling Point

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards[1](µg/Nm3)	IFC Air Quality Standards[2] (µg/Nm3)
PM10-8	09.02.2023	20.04	50	50
	10.02.2023	18.74		
	11.02.2023	20.96		
	12.02.2023	38.59		
	13.02.2023	27.63		
	14.02.2023	20.13		
	15.02.2023	35.89		
	16.02.2023	39.48		
	17.02.2023	28.19		
	18.02.2023	18.70		
	19.02.2023	26.88		
	20.02.2023	24.54		
	21.02.2023	21.15		
	22.02.2023	24.54		
	23.02.2023	11.65		

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards[1](μg/Nm3)	IFC Air Quality Standards[2] (μg/Nm3)
	24.02.2023	12.45		
	25.02.2023	34.47		
	26.02.2023	32.91		
	27.02.2023	26.32		
	28.02.2023	36.28		
	01.03.2023	22.21		
	02.03.2023	22.20		
	03.03.2023	11.79		
	04.03.2023	31.01		
	05.03.2023	32.75		
	06.03.2023	19.70		
	07.03.2023	33.15		
	08.03.2023	26.40		
	09.03.2023	28.39		
	10.03.2023	19.97		

[1] Regulation on Control of Industrial Air Pollution (Dated 03.07.2009 and Numbered 27277) and Regulation on Assessment and Management of Air Quality (Dated 06.06.2008 and Numbered 26898)

[2] IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

PM2.5 Measurement Results

The results of PM2.5 measurements are given in Table 6-15 - Table 6-17. The PM2.5 measurement results around the Project area are below the IFC Air Quality Standards. The highest PM2.5 concentration was measured as 18.04 µg/Nm3 at PM2.5-8 sampling point.

Table 6-15: PM2.5 Measurement Results for the PM2.5-1 – PM2.5-6 Sampling Points

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (µg/Nm3)	IFC Air Quality Standards (µg/Nm3)[1]
PM2.5-1	10.01.2023	7.44	-	25
PM2.5-2	11.01.2023	6.93		
PM2.5-3	12.01.2023	5.48		
PM2.5-4	13.01.2023	6.39		
PM2.5-5	14.01.2023	8.27		

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (µg/Nm3)	IFC Air Quality Standards (µg/Nm3)[1]
PM2.5-6	15.01.2023	8.37		

[1] IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

Table 6-16: PM2.5 Measurement Results for the PM2.5-7 Sampling Point

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (µg/Nm3)	IFC Air Quality Standards (µg/Nm3)[1]
PM2.5-7	10.01.2023	7.32		25
	11.01.2023	5.45		
	12.01.2023	12.41		
	13.01.2023	11.81		
	14.01.2023	9.75		
	15.01.2023	14.57		
	16.01.2023	14.74		
	17.01.2023	6.79		
	18.01.2023	13.77		
	19.01.2023	7.32		
	20.01.2023	11.84		
	21.01.2023	10.16		
	22.01.2023	13.76		
	23.01.2023	12.92		
	24.01.2023	14.46		
	25.01.2023	8.25		
	26.01.2023	5.26		
	27.01.2023	12.51		
	28.01.2023	5.79		
	29.01.2023	13.53		
	30.01.2023	10.02		
	31.01.2023	7.99		
	01.02.2023	11.39		

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (µg/Nm3)	IFC Air Quality Standards (µg/Nm3)[1]
	02.02.2023	8.40		
	03.02.2023	13.39		
	04.02.2023	6.76		
	05.02.2023	14.00		
	06.02.2023	11.13		
	07.02.2023	8.49		
	08.02.2023	14.64		

[1] IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

Table 6-17: PM2.5 Measurement Results for the PM2.5-8 Sampling Point

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (µg/Nm3)	IFC Air Quality Standards (µg/Nm3)[2]
PM2.5-8	09.02.2023	10.80	-	25
	10.02.2023	16.34		
	11.02.2023	12.37		
	12.02.2023	18.04		
	13.02.2023	12.69		
	14.02.2023	14.40		
	15.02.2023	8.74		
	16.02.2023	15.01		
	17.02.2023	6.44		
	18.02.2023	2.91		
	19.02.2023	14.43		
	20.02.2023	10.34		
	21.02.2023	3.76		
	22.02.2023	7.58		
	23.02.2023	5.36		
	24.02.2023	2.72		
	25.02.2023	17.89		

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (μg/Nm3)	IFC Air Quality Standards (μg/Nm3)[2]
	26.02.2023	7.36		
	27.02.2023	11.93		
	28.02.2023	13.16		
	01.03.2023	4.95		
	02.03.2023	16.11		
	03.03.2023	7.26		
	04.03.2023	11.28		
	05.03.2023	15.99		
	06.03.2023	10.81		
	07.03.2023	15.39		
	08.03.2023	14.87		
	09.03.2023	9.97		
	10.03.2023	5.11		

[1] IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

Settled Dust Measurement Results

The settled dust measurement results around the Project area are below the regulatory limits. The highest settling dust concentration was measured as 182 mg/m2-day, at SD-8 air quality measurement point.

Table 6-18: Settled Dust Measurement Results (10.01.2023-10.03.2023)

Points	Settled dust Measurement Results (mg/m2-day)		Turkish Air Quality Standards (mg/m2-day)		IFC Air Quality Standards
	10.01.2023 - 09.02. 2023 (1st Period)	09.02.2023-10.03.2023 (2nd Period)	Long Term Limit	Short Term Limit	
SD-1	39	23	210	390	-
SD-2	98	86			
SD-3	102	15			
SD-4	41	171			
SD-5	26	174			

Points	Settled dust Measurement Results (mg/m2-day)		Turkish Air Quality Standards (mg/m2-day)		IFC Air Quality Standards
	10.01.2023 - 09.02.2023 (1st Period)	09.02.2023-10.03.2023 (2nd Period)	Long Term Limit	Short Term Limit	
SD-6	60	182			

Sensitivity Assessment

After analysing the baseline data, the sensitivity of the air quality component is given below.

Sensitivity features	Supported by	Sensitivity value
High PM10, PM2.5, and settled dust in the AoI (albeit below Project Standards) Close presence of communities, vulnerable targets and sensitive ecological receptors potentially exposed to air emissions. Other ongoing projects (under construction and planning stage) around the Project area.	Primary and secondary data	Medium-high

6.1.4 Noise and Vibration

Definition	Background noise/vibration or ambient noise/vibration is the sound level of environmental noise/vibration such as water waves, traffic noise, trains and airplanes, acoustic noise from animals, and electrical noise from equipment. During construction and decommissioning activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes, and the transportation of equipment, materials, and people.
Area of Influence	2,000 m buffer zone including Project footprint (See Figure 6-8)
Rationale for the AoI	The nearby receptors (i.e., communities) around the Project site may be affected from potential noise and vibration impacts.
Data sources	**Primary sources:** Field work and background noise and vibration measurements conducted in 2023 during ESIA Studies
	Secondary sources: ▪ Secondary data from scientific papers, grey literature, and databases

Methodological approach

Baseline data collected during ESIA studies is the only available data for this component since there is not any provincial level noise and vibration information. Details about the methodology used for the noise baseline data collection study are provided below.

Within the scope of the ESIA studies, background noise measurement was conducted at 7 points for 48 hours continuously between 12.01.2023 and 15.01.2023 in compliance with the Turkish legislation and IFC General EHS Guideline for Noise. On the other hand, vibration measurements were also conducted in AoI at two locations. Construction of SPP project adjacent to the Project site was ongoing at the time of the background noise measurements.

Measurement locations were presented in Table 6-19, Table 6-20 and Figure 6-11.

Table 6-19: Noise Level Measurement Coordinates and Periods

Points	Coordinates		Measurement Period and Date
N-1	37.864837°	34.513518°	48 hours – between 12.01.2023-14.01.2023
N-2	37.859338°	34.508945°	48 hours – between 12.01.2023-14.01.2023
N-3	37.852882°	34.502161°	48 hours – between 12.01.2023-14.01.2023
N-4	37.827842°	34.485640°	48 hours – between 13.01.2023-15.01.2023

Points	Coordinates		Measurement Period and Date
N-5	37.791996°	34.477007°	48 hours – between 13.01.2023-15.01.2023
N-6	37.790181°	34.472884°	48 hours – between 13.01.2023-15.01.2023
N-7	37.782704°	34.481807°	48 hours – between 13.01.2023-15.01.2023

Table 6-20: Vibration Level Measurement Coordinates and Periods

Points	Coordinates		Measurement Period and Date
V-1	37.790039°	34.473404°	Instantaneous measurement – 14.01.2023
V-2	37.792181°	34.476946°	Instantaneous measurement – 14.01.2023

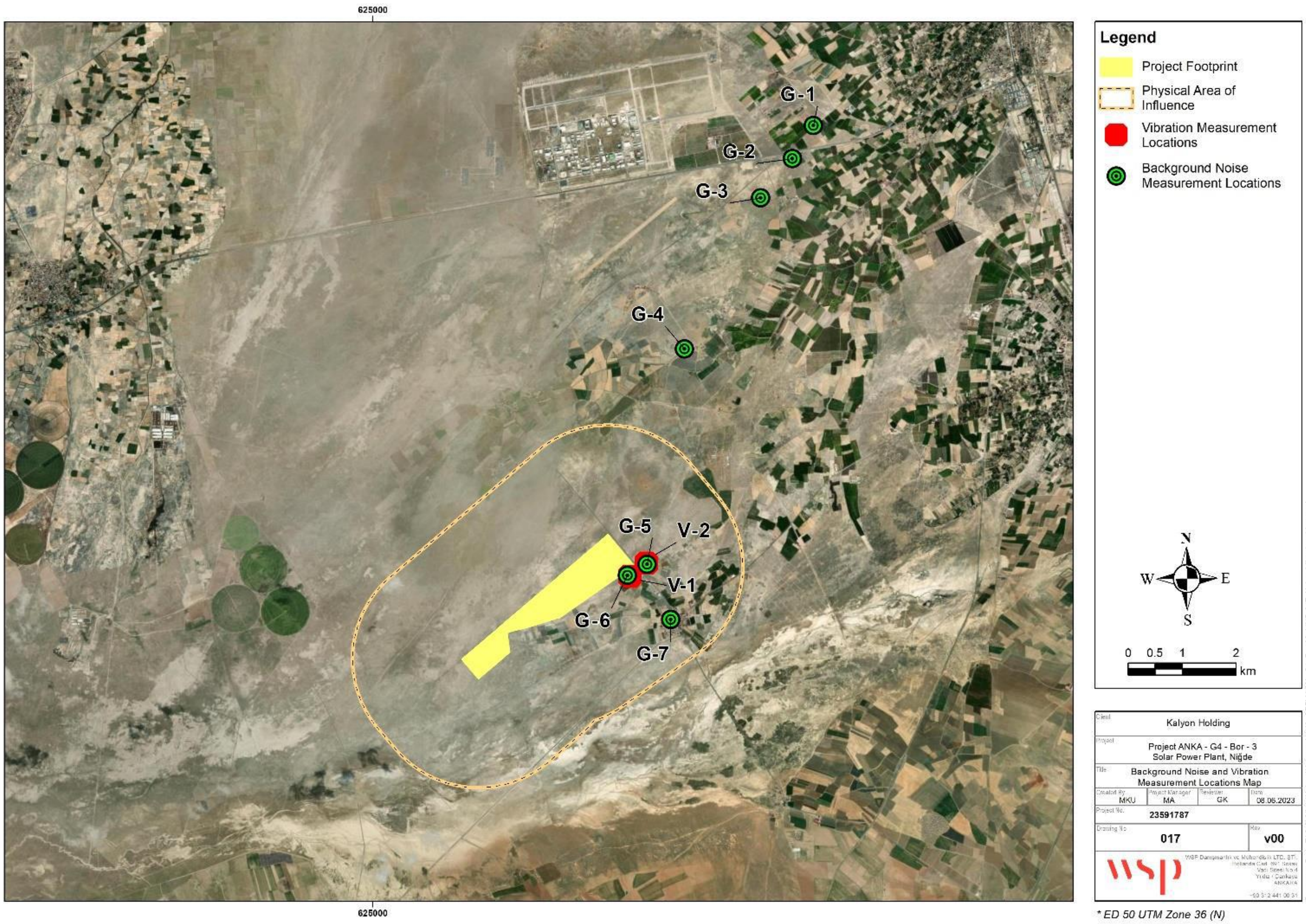


Figure 6-11: Map Showing Background Noise and Baseline Vibration Measurement Points

Area of Influence

The noise level limit values and time periods are defined different in Turkish Regulation on Control of Environmental Noise and in IFC Guidelines. Therefore, 48 hours continuous noise measurement results are presented as per both Turkish Legislation and IFC Guidelines in Table 6-21. The results do not exceed Turkish Legislation and IFC Guideline Limits. It should be noted that construction of SPP project adjacent to the Project site was ongoing at the time of the background noise measurements. As can be seen from the Table 6-22, baseline vibration measurements are well below the regulatory limits.

Table 6-21: Noise Level Measurement Results

Sampling Name	Date	Measurement Results as per Turkish Legislation[1] (dBA)			Measurement Results as per IFC[2] (dBA)	
		Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-22:00)	Night (22:00-07:00)
N-1	1/12/2023	53.5	48.1	42.2	51.9	42.5
	1/13/2023	55	49.9	42.6	54.4	43
	1/14/2023	46.6			46.6	
N-2	1/12/2023	55.9	47.3	45	53.5	44.7
	1/13/2023	50.4	50.1	44.9	50.5	44.9
	1/14/2023	51.6			51.6	
N-3	1/12/2023	42.6	42.7	36.7	43.5	36.3
	1/13/2023	51.1	39.7	36	50.2	36.7
	1/14/2023	48.9			48.9	
N-4	1/13/2023	48.8	43.9	35.9	48.1	35.8
	1/14/2023	46.2	43.8	44.6	45.9	44.3
	1/15/2023	48.5			48.5	
N-5	1/13/2023	48.8	43.9	42.1	48.1	41.7
	1/14/2023	42.6	40.9	36.7	42.4	36.9
	1/15/2023	40.1			40.1	
N-6	1/13/2023	53	52.8	41.8	53.1	43.6
	1/14/2023	51.8	46.2	44.4	51.2	44.3
	1/15/2023	43.8			43.8	
N-7	1/13/2023	51.5	53.3	35	52.4	41.3
	1/14/2023	41.5	41.8	36.8	41.7	37.1
	1/15/2023	39.8			39.8	

Sampling Name	Date	Measurement Results as per Turkish Legislation[1] (dBA)			Measurement Results as per IFC[2] (dBA)	
		Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-22:00)	Night (22:00-07:00)
Limit Values	-	65	60	55	55	45

[1] Regulation on Control of Environmental Noise
[2] IFC Environmental, Health, and Safety (EHS) Guidelines General EHS Guidelines: Environmental - Noise Management;

Table 6-22: Vibration Measurement Results

Sampling Point	Sampling Date	Vibration Measurement Results (mm/s)		
		X direction	Y direction	Z direction
V-1	14.01.2023	0.553	0.27	0.05
V-2	14.01.2023	0.275	0.203	0.528
Turkish Regulatory Limits[1]	-	5	5	5

[1] Regulation on Control of Environmental Noise

Sensitivity Assessment

After analysing the baseline data, the sensitivity assessment of noise and vibration component is given below.

Sensitivity features	Supported by	Sensitivity value
High noise levels in the AoI (albeit below Project Standards) Close presence of communities, vulnerable targets and sensitive ecological receptors potentially exposed to noise and vibration emissions Other ongoing projects (under construction and planning stage) around the Project site.	Primary and secondary data	Medium

6.1.5 Geology, Geomorphology and Seismicity

Definition	Geology is a field of study that focuses on the interactions between humans and 'he Earth's geologic systems, particularly as they relate to environmental issues. It involves understanding the geological processes and features that influence the environment, such as water resources, natural hazards, soil quality, and land use. Geology also includes address and mitigate human impacts on the environment, such as pollution, climate change, and ecosystem degradation. Geomorphology is the study of the nature and history of landforms and the processes which create them. Seismicity is a measure encompassing earthquake occurrences, mechanisms, and magnitude at a given geographical location.
Area of Influence	Project Footprint
Rationale for the AoI	**Rationale:** Within the scope of the Project, since the areas where the Project units are located are likely to be affected by the geological structure, the areas where the Project Site are located were selected as AoI.
Data Sources	**Primary Sources** ▪ Data And Geotechnical Report for Bor-3 SPP (October 2022)
	Secondary Sources: ▪ National EIA Report dated October 2022 ▪ Academic Journals, Grey Literature and Government Agency Reports & Databases.

6.1.5.1 Geomorphology and Geology

The Project Site is located in the Bor Plain (or Ereğli-Bor Neogene Basin), which has a flat topography in the southern part of the Central Anatolia. The elevations range from 1050 to 1100 m above sea level (Figure 6-12). Bor Plain is surrounded by Mount Bolkar (to the south) and Mount İtulumaz (to the east). The Melendiz, Keçiboyduran, and Hasan volcanics are located to the north and northwest of the plain. These volcanites consist of a series of lava flows covered by volcanics (lava flows, pyroclastites) later erupted by Mt. Hasan (3268 m).

The eastern part of the Bor Plain is part of the Niğde Massif, which forms the southern end of the Central Anatolian Massif and is the oldest unit of the Bor Plain. It is formed by thick Neogene lacustrine deposits and covered by Quaternary alluvial deposits. The 1/500,000 scaled Geological Map is shown in Figure 6-13. According to Altın et al. (2015)[1], the plain was occupied by the Pleistocene pluvial lake where alluvial and lacustrine deposits were formed. The lowest part of the Bor Plain stratigraphy contains sandstone, paleosol and mudstone layers. Pleistocene and Holocene alluvial and lacustrine deposits are composed of claystone, sandstone, mudstone, limestone and paleosol units. Quaternary deposits, which outcrops in east-west directions in the central part and in

[1] Altın, T.B. *et. al.*, 2015. Environmental and Climatic Changes during the Pleistocene–Holocene in the Bor Plain, Central Anatolia, Turkey

wide regions in northwest of the Regional Study Area, are formed by alluvial (Q and Q_1). Alluvial deposits mainly consist of pebble, sand and clayey materials.

A Geotechnical Report for the Project was prepared in October 2022. To determine the properties of the subsurface soils, boreholes were drilled to a depth of 15 m and Standard Penetration Tests (SPT) were carried out. According to the Geotechnical Report, from 38 Soil Core Samples (SPT) and two (2) Clay Core Rock Samples collected during the geotechnical soil investigation, the soil is composed of 62% clay (CH), 30% sandy clay (CL), 5% silty sand (SC) and 3% gravel-sand (SM) units.

The Ereğli-Bor Neogene Basin is located in north of the Central Taurus belt, west of the Ecemiş Fault and in southeast part of the Tuz Gölü Basin (Figure 6-14). The northeastern border of the Ereğli-Bor Basin is controlled by the branches of the Tuz Gölü Fault Zone (TGFZ). The Project Site is located approximately 11.2 km (air distance) southeastern end of the Tuz Gölü Fault Zone. TGFZ is a NW–SE trending, dipping towards SW, active, right lateral strike–slip component normal fault zone which extends between north of Tuz Gölü and Kemerhisar (Niğde) and has a length of 200 km (Kürçer and Gökten, 2014)[2]. This fault is one of the major faults that define the southern margins between Kemerhisar and Bor settlements. Hot springs located in Kemerhisar are resulted by this fault.

It is investigated that there is no risk of landslide and rockfall in the RSA. According to the information given in the EIA Report, the closest recorded landslide to the Project Site is located 17 km away.

Topographic Map, Geological Map and Fault Map showing the Project Site and its surroundings are given in Figure 6-12, Figure 6-13, Figure 6-14 respectively.

[2] Kürcer, A., Gökten, Y.E., 2014. Paleosismolojik Üç Boyutlu Sanal Fotoğraflama Yöntemi, Örnek Çalışma: Duru-2011 Hendeği, Tuz Gölü Fay Zonu, Orta Anadolu, Türkiye . Türkiye Jeoloji Bülteni , 57 (1) , 45-72

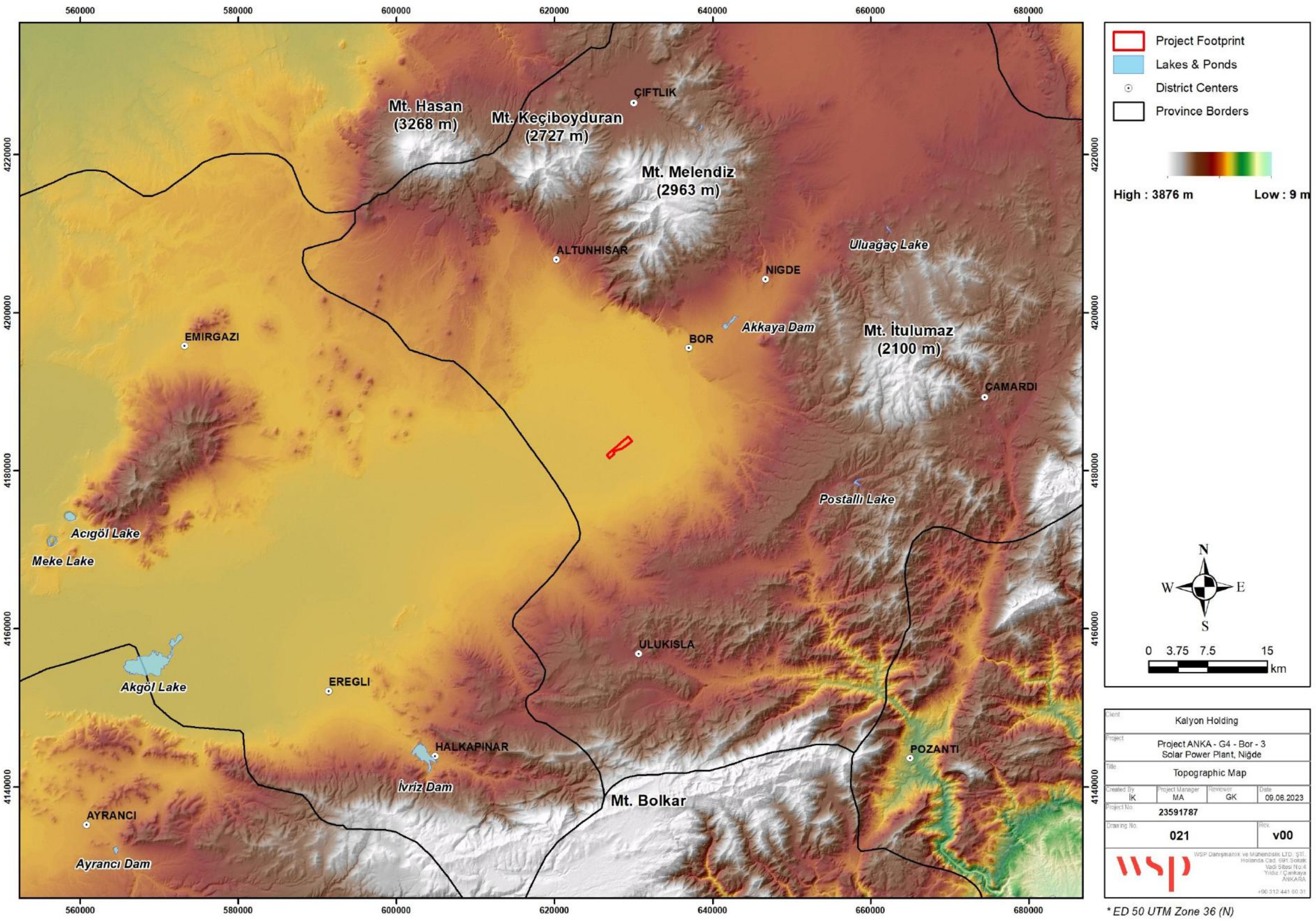


Figure 6-12: Topographic Map Showing the Project Site

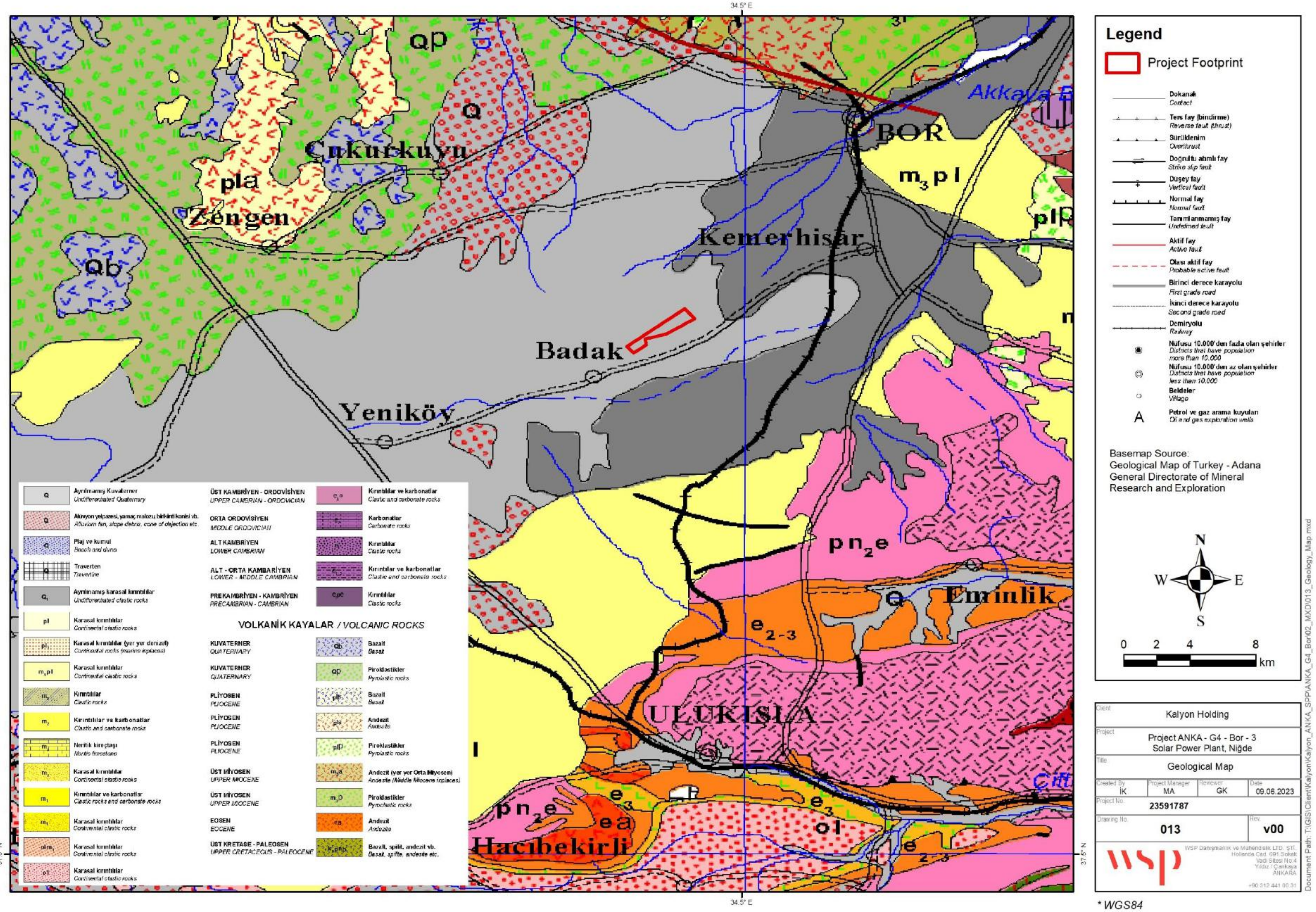


Figure 6-13: 1/500,000 Scale Geological Map of the Regional Study Area (Source: Adana Sheet, MTA)

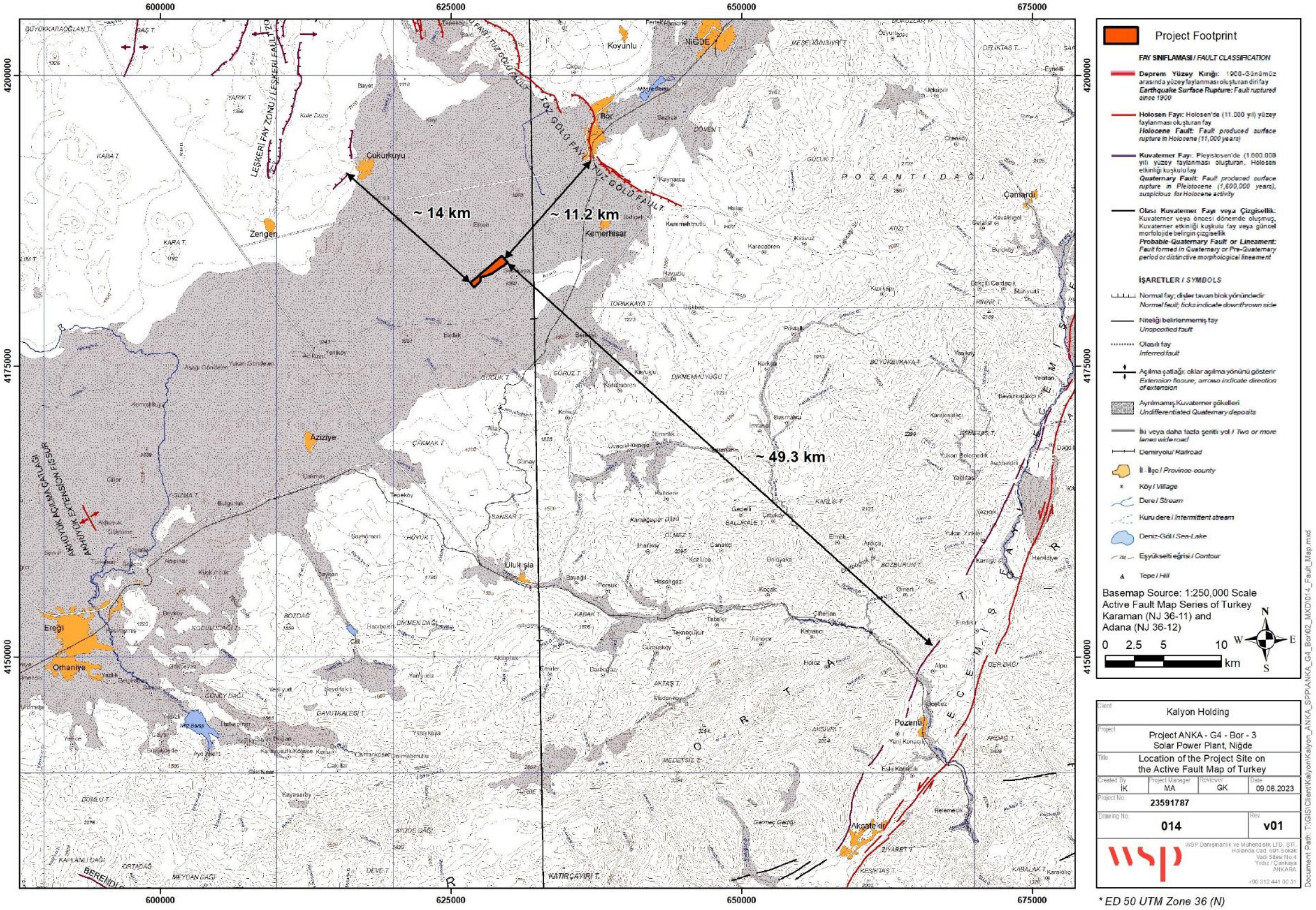


Figure 6-14: 1/250,000 Scale Active Fault Map of the Regional Study Area (Source: Adana-Karaman Sheets, MTA)

6.1.5.2 Seismicity

The Earthquake Zone Map of Türkiye which came into force in 1996 has been updated as Türkiye Earthquake Hazard Map by the Disaster & Emergency Management Authority, Presidential of Earthquake Department and published in the Official Gazette numbered 30364 and dated March 18, 2018.

Figure 6-15 shows the Project Site on Türkiye Earthquake Hazard Map developed by the Disaster and Emergency Management Authority (AFAD, 2018). The earthquake ground motion level (DD-2) is 10% probability of exceedance in 50 years (repetition period 475 years), and the ground type ZC (very tight sand, gravel and hard clay layers or weathered, weak rocks with many cracks) was taken into consideration. Accordingly, for the 475-year return period Peak Ground Acceleration (PGA) was calculated as 0.133 g.

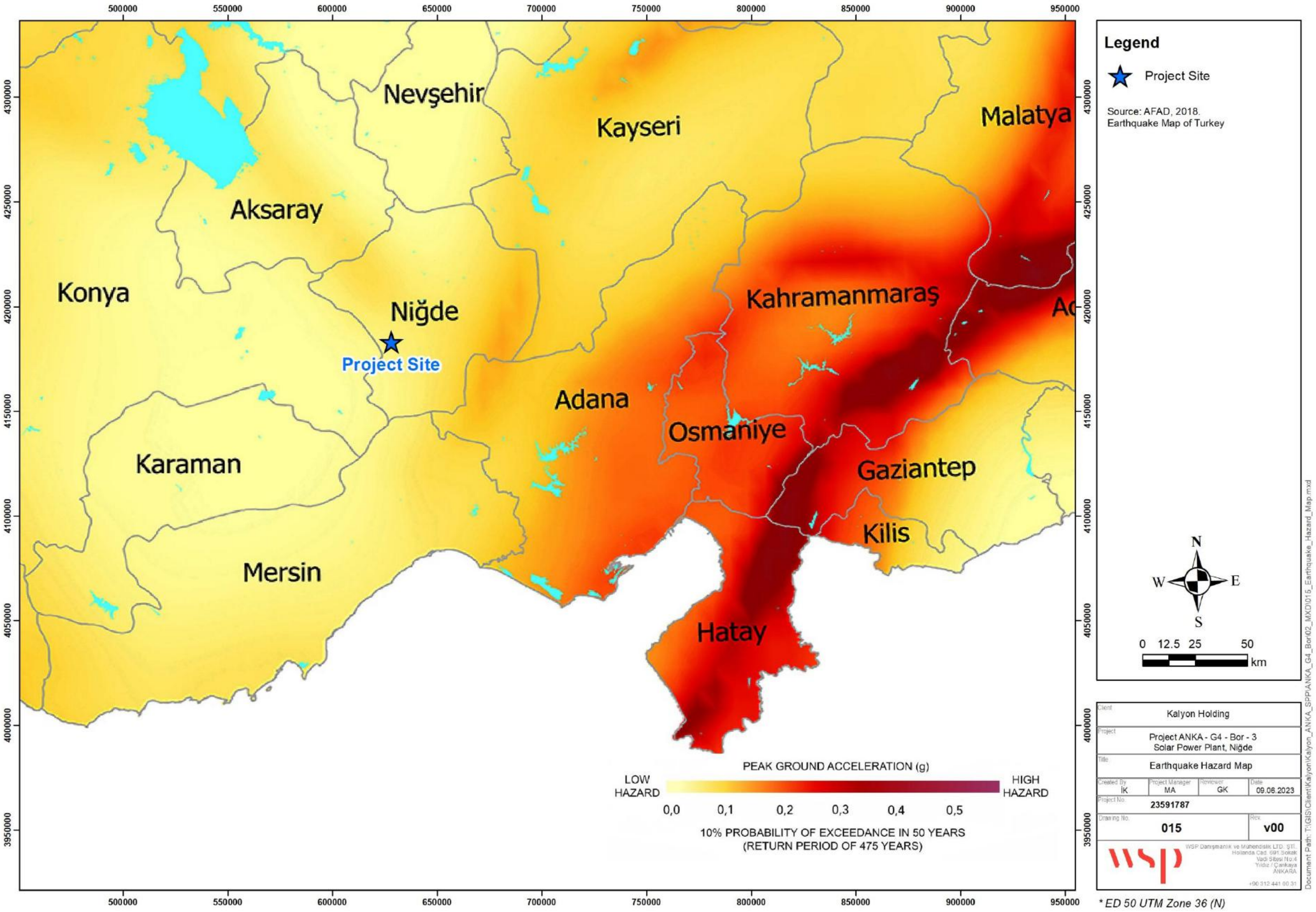


Figure 6-15: Location of the Project Site on the Earthquake Hazard Map

Sensitivity Assessment

Sensitivity Features	Supported by	Sensitivity Value
Geology, Geomorphology and Seismicity	Primary Data and Secondary Data	Low

6.1.6 Soil and Subsoil

Definition	Soil is a mixture of organic and inorganic materials on the surface of the Earth that provides a medium for plant growth and is composed of minerals, organic matter, water, air, and living organisms. In this section, the characteristics of the existing soil layer at the project location, such as its properties, purposes of use, and contamination status are examined.
Area of Influence	Project Footprint (Figure 5-1)
Rationale for the AoI	**Rationale:** Since the impact of the project on the soil layer during the Project will be limited to the units mentioned in the project, the Project site have been determined as AoI.
Data sources	**Primary Sources**: Baseline soil sampling study data conducted in January 2023
	Secondary Sources: Secondary data from various surveys for the Project, scientific papers, literature review and databases.

Regional Study Area

The large soil group in the region in which the Project Area is located is classified as Alluvial Soils (see Figure 16). The main soil properties of the region is given as follows:

- Large Soil Group: Alluvial Soils
- Combination of Soil Properties: Insufficient drainage, Composition: Fine, Alluvial Soil
- Other Soil Properties: Saline, Insufficient Drainage Erosion Degree: Erosion Degree: 1: None or Very Little,
- Current Land Use: Pasture
- Land Use Ability: IV. Class (land suitable for tillage agriculture)
- Subclass: Soil deficiency (stoniness, salinity, and alkalinity) – Age, drainage disorder or flood damage

Alluvial Soils

The materials carried by the rivers are deposited in flat and slightly sloping places, forming alluvial soils. These soils are formed regardless of climatic conditions. For this reason, they are defined as azonal soils. Lenses and deposits in various forms, consisting of elements such as gravel, sand, and clay, are called alluvium. Soils formed by alluvium are called alluvial soils.

Deltas are the most common alluvial soils. Stream-length plains in places where valley floors widen also consist of alluvial soils. In addition, the fertile agricultural lands at the bottom of many plains are alluvial. The main ones are; The depression plains on the North Anatolian fault zone are the Southern Marmara plains, Bakırçay, Gediz, Küçük Menderes and Büyük Menderes plains in the Aegean part, and Erzincan, Erzurum, Pasinler and Muş plains and other plains in Eastern Anatolia. Alluvial soils are deep and permeable soils. They are rich in plant nutrients. They are easily processed as they consist of sand, clay and gravel. For this reason, these fertile lands are the most fertile agricultural areas of Türkiye.

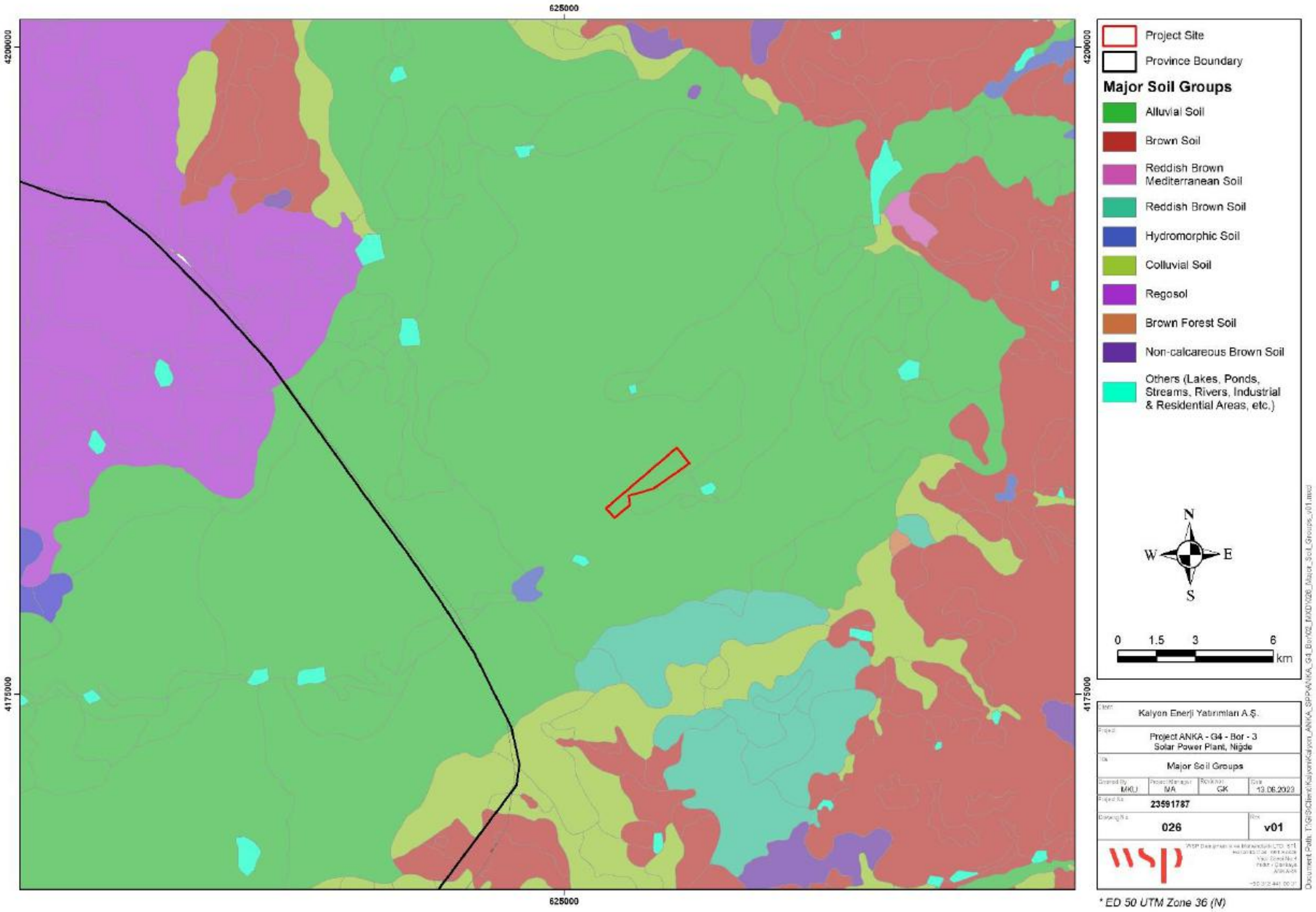


Figure 16: Map showing Major Soil Groups around the Project Area

Area of Influence

The "Soil Pollution Control and Sites Polluted by Point Source Contamination Regulation" was published on June 8. 2010 (Official Gazette: 27605) and was fully implemented on June 8. 2015. In accordance with the new regulation, it is obligatory to prevent pollution, stop pollution release in the polluted areas and determine the extent of pollution.

The soil concentrations measured for the purposes of this study were compared to the generic limit values mentioned in the Annex I of the Regulation.

Annex I of the updated regulation contains different generic limit values dependent on the exposure routes (pathways):

- Generic Limit Value-1: Soil ingestion and absorption through skin contact,
- Generic Limit Value-2: Inhalation of volatile matter in external environment,
- Generic Limit Value-3: Inhalation of fugitive dust in the external environment, and
- Generic Limit Value-4: Transport of pollutants into groundwater and drinking of groundwater (Safety Factor (SF) = 1 or 10).

The Generic Limit Value-1 and Generic Limit Value-3 are used for the surface/shallow soil samples and Generic Limit Value-2 and Generic Limit Value-4 are used for sub-soil samples.

In order to determine the existing soil contamination and quality of the Project Site, 4 soil samples were taken in January 2023 (see Table 6-23). Based on the current and future activities of the site, the parameters presented in Table 6-24 should be analysed in soil and samples as required by the Turkish Soil Pollution Control and Sites Polluted by Point Source Contamination Regulation.

Table 6-23: Baseline Soil Sampling Coordinates and Periods

Points	Coordinates		Measurement Period and Date
Baseline Soil-1	37.779970°	34.451467°	Spot sampling - January 2023
Baseline Soil -2	37.782460°	34.459168°	Composite sampling- January 2023
Baseline Soil -3	37.784477°	34.467476°	Spot sampling - January 2023
Baseline Soil -4	37.789105°	34.474415°	Spot sampling - January 2023

Table 6-24: Parameters to be Analysed According to the Turkish Soil Pollution Control and Sites Polluted by Point Source Contamination Regulation

NACE Code	Industrial Activity	Activity Based Contaminant Indicator Parameters
40.1	Electricity generation, transmission, and distribution	TOX, TPH, As, B, Ba, Cd, Cr, Cu, Hg, Mo, Pb, Sb, Se, Zn

Source: Soil Pollution Control and Sites Polluted by Point Source Contamination Regulation

Baseline data on Project site are complete for the purpose of a preliminary and general assessment on the soil quality. The analytical results were compared to the generic limit values mentioned in the Annex I of the Turkish Soil Pollution Control and Sites Polluted by Point Source Contamination Regulation. Soil sampling locations are shown in Figure 6-17 and the measurement results of the parameters are presented in following tables.

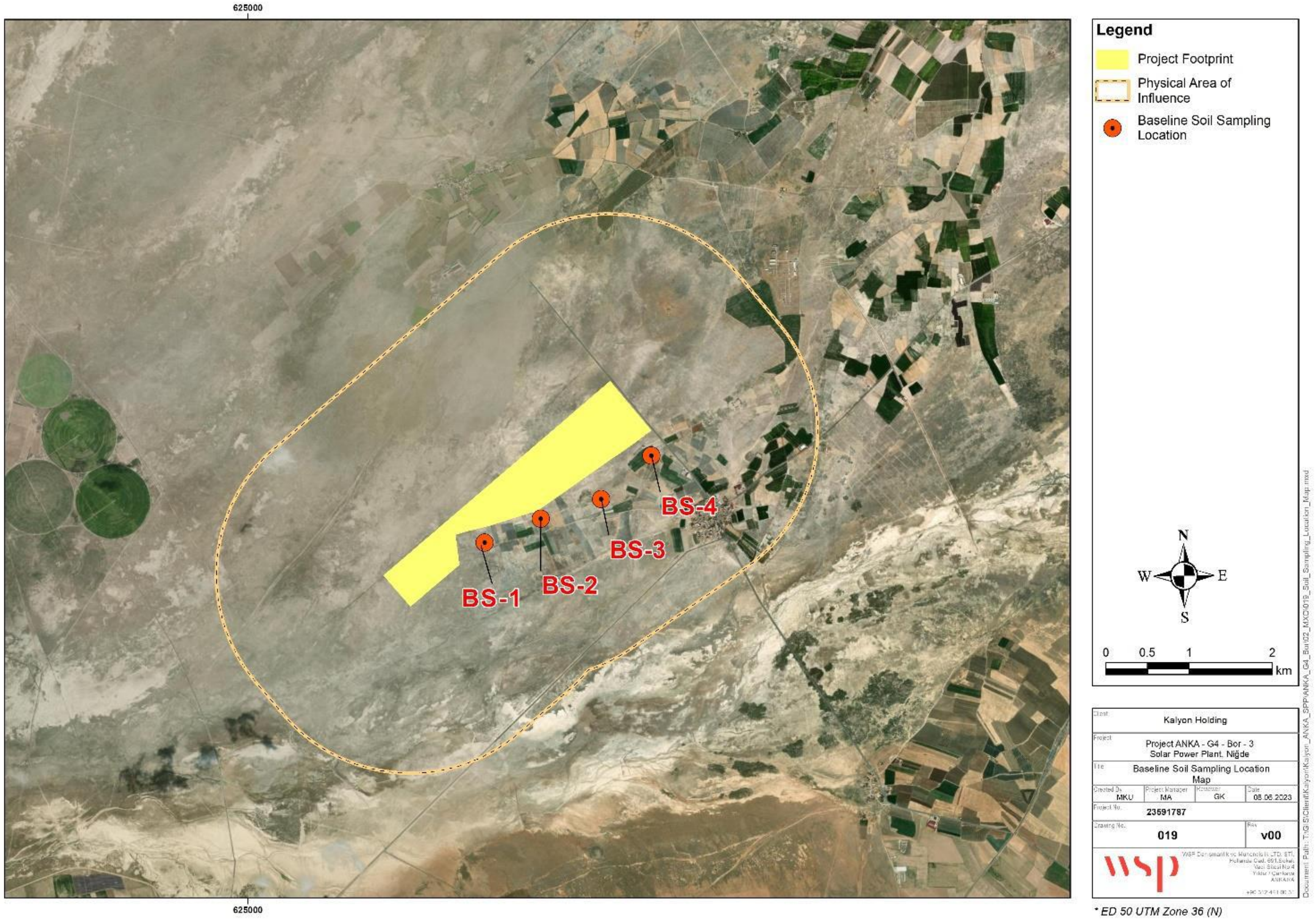


Figure 6-17: Map Showing Baseline Soil Sampling Points

Table 6-25: Baseline Soil Analyses Results

Parameter	Ingestion of soil or dermal contact (mg/kg oven dry soil)	Outdoor inhalation of fugitive dust (mg/kg oven dry soil)	Baseline Soil-1	Baseline Soil-2	Baseline Soil-3	Baseline Soil-4
TOX (mg/kg)	-	-	43	39	46	34.1
TPH (mg/kg)	-	-	441	< 100	< 100	<100
Arsenic (mg/kg)	0.4	471	71	24.6	43.4	18.9
Boron (mg/kg)	-	-	169	101	84.3	50.6
Barium (mg/kg)	15643	433702	148	147	182	102
Cadmium (mg/kg)	70	1124	< 0,05	0.117	0.165	0.129
Chromium (mg/kg)	235	24	14.3	17.6	19.1	16.4
Copper (mg/kg)	3129	-	10.3	12.5	18.1	11
Mercury (mg/kg)	23	-	< 0,1	< 0,1	< 0,1	<0.1
Molybdenum (mg/kg)	391	-	0.205	0.128	0.269	0.117
Lead (mg/kg)	400	-	9.62	11.6	19.5	10.1
Antimony (mg/kg)	31	-	2.92	3.64	4.36	1.58
Selenium (mg/kg)	391	-	0.466	0.603	0.9	0.528
Zinc (mg/kg)	23464	-	20.3	28	37.3	21.8

According to the results, Arsenic concentration exceed the limits of “Ingestion of the soil and absorption by means of dermal contact”. The arsenic concentration could be found in the natural background of the soil, as the area has been used as pastureland and there is no other known historical contaminating use at the site.

According to the regulation; when calculating the limit values given above, it is assumed that the site is used for residential purposes or will be used for residential purposes in the future and people will be exposed to the pollutant at “maximum level for a reasonable period of time”. The reason for assuming that the site will be used for residential purposes now or in the future is that the generic values given above will be more protective in terms of health risk compared to other scenarios (e.g., business center, industrial purpose, etc.). (EPA, 1996a). One of the important reasons for using the pathways selected above is that in scenarios where land use for residential purposes is valid, pollutants will generally reach the receivers via these pathways. Another reason is that the methods, models, and assumptions to be used in the calculation of generic values for these pathways have been developed in a way that can be considered quite standard (EPA, 1996b). For each of these pathways, generic limit values have been determined that the pollutant will not pose a health risk to the recipient. Generic limit values are quite low as they are calculated assuming the worst possible case.

During construction and operational activities, in case contamination is suspected, a sample can be collected for laboratory analysis. If contamination is put in evidence through laboratory analyses, care must be taken during handling and disposal of the detected contaminated soil, in accordance with the Health & Safety and

Environmental regulations. The detailed information of the impact assessment for soil is presented in Chapter 7.

Sensitivity Assessment

Sensitivity features	Supported by	Sensitivity value
Soil contamination	Primary data and secondary data	Low-Medium

6.1.7 Hydrology and Surface Water

Definition	Hydrology is the scientific study of the movement, distribution, and management of water on Earth and other planets, including the water cycle, water resources, and environmental watershed sustainability. Hydrology subdivides into surface water hydrology, groundwater hydrology (hydrogeology), and marine hydrology. Domains of hydrology include hydrometeorology, surface hydrology, hydrogeology, drainage-basin management, and water quality, where water plays the central role.
Area of Influence	**AoI:** AoI includes the Project footprint
Rationale for the AoI	**Rationale:** AoI was defined considering the boundaries of the Project Site
Data Sources	**Secondary Sources:** Secondary Data from National EIA, Academic Journals, Grey Literature and Government Agency Reports & Databases.

Regional Study Area

The Project Area and its vicinity are located within the Konya Closed Basin, which is one of the 25 major basins of Türkiye determined by the State Hydraulic Works (SHW) considering geographical components including geographical location, climate, and stream network.

Konya Closed Basin is between 36°51' and 39°29' north latitudes and 31°36' and 34°52' east longitudes in Central Anatolia. Its surface area is 50,073 square kilometres[3] ,which is approximately 7% of Türkiye. The basin is surrounded by Sakarya and Kızılırmak Basins in the north, Kızılırmak and Seyhan Basins in the east, Eastern Mediterranean Basin in the south, and Antalya and Akarçay Basins in the west.

Konya closed basin is formed by the air movements of an old riverbed rising in the middle of Anatolia. A flat plain located at an altitude of 900-1050 meters covers a large part of the basin[4]. The mountains surrounding the plain also prevent the water from being drained from the basin into the sea. It means the Konya Basin has an

[3] General Directorate of Water Management (2022). Update of the Drought Management Plan of Konya Basin. Ankara: Republic of Türkiye Ministry of Agriculture and Forestry, General Directorate of Water Management.

[4] Yılmaz, S. (2010). Project for the Preparation of Watershed Protection Action Plans Konya Closed Basin. İstanbul: TÜBİTAK Marmara Research Center Environmental Institute.

important closed basin character that does not drain its water into the sea[5] [6]. Most significant surface waters in the basin are Meram Stream, Sille Creek, May Creek, Gödet Stream, İvriz Stream and Melendiz Stream.

According to the national EIA Report of the Project, there are no streams and water resources with natural flow in and around the Project Area and its vicinity. The nearest water source is the Acıöz Stream, which is 1 km south of the Project Area and south of Seslikaya Village, and the creek named Küçüköz afterwards[7].

The location map of both basins and surface water bodies is on Figure 6-18.

[5] Berke, M. Ö., Dıvrak, B. B., & Sarısoy, H. D. (2013). Water Today Report in Konya. WWF Türkiye.

[6] Yılmaz, S. (2010). Project for the Preparation of Watershed Protection Action Plans Konya Closed Basin. İstanbul: TÜBİTAK Marmara Research Centre Environmental Institute.

[7] EIA Report of the G4 -Bor-3 Solar Power Plant (140 MWp/100 MWe, 201.6 ha) Project, Niğde Province, Bor District, Seslikaya and Badak Neighbourhoods.

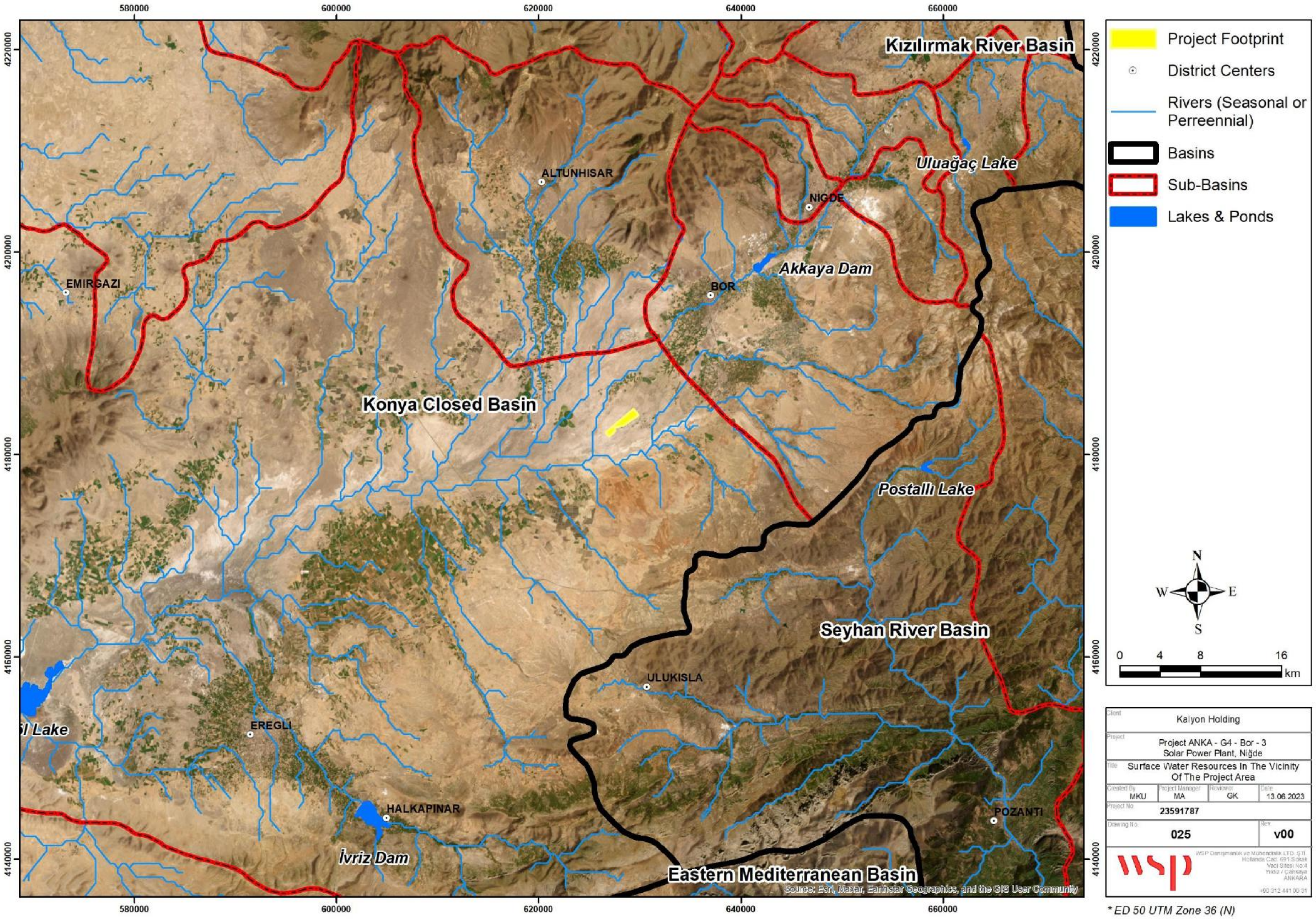


Figure 6-18: The Most Significant Surface Waters Near to the Project Area

Sensitivity Assessment

Sensitivity Features	Supported by	Sensitivity Value
Absence of surface water elements	Primary and Secondary Data	Negligible

6.1.8 Hydrogeology and Groundwater

Definition	Hydrogeology is the branch of geology concerned with the distribution and movement of groundwater in the soil and rocks of the Earth's crust (commonly in aquifers).
Area of Influence	**AoI:** AoI includes the Project footprint
Rationale for the AoI	**Rationale:** AoI was defined considering the boundaries of the Project Site
Data Sources	**Primary Sources**: Primary Data from groundwater sampling conducted in January 2023.
	Secondary Sources: Secondary Data from National EIA, Academic Journals, Grey Literature and Government Agency Reports & Databases.

For not only surface water but also groundwater resources management, Türkiye has been divided into 25 basins, considering geographical components including geographical location, climate and stream network. The Project components are within the Konya Closed Basin among these basins. According to the “Official Water Resources Statistics” published by State Hydraulic Works (SHW) in 2019, 2597 hm^3/year of Türkiye’s total 23,032.3 hm^3/year groundwater recharge comes from the Konya Closed Basin. Furthermore, 2023 hm^3/year of Türkiye’s 17,815.3 hm^3/year groundwater operating reserve comes from this basin (Table 6-26).

Although Konya Basin has only 2 per cent of the available surface water resources in Türkiye, its share in groundwater potential is 17 per cent. Konya Basin is the region with the lowest amount of usable surface water and the highest amount of groundwater in Türkiye[8].

Based on Bayari et al.'s simplified conceptual hydrogeologic model[9] (Figure 6-19), shallow aquifers and deep aquifers dominate the hydrogeology of the region. The deep, confined and thermal aquifer is composed of Tauride-Anatolite Block and Sakarya Zone Block units which are overlain by weakly permeable Paleogene units whereas the shallow, freshwater aquifer is comprised of Neogene units and covered with Quaternary Paleolake Sediments (QPS)[10]. The Paleogene and QPS units constitute the aquitard systems. Groundwater flows fed up the aquifers from the footprints of Taurus Mountains at the southeast, which is the main recharge area, towards Salt Lake at the north[7].

[8] General Directorate of Water Management (2022). Update of the Drought Management Plan for Konya Basin. Ankara: Republic of Türkiye Ministry of Agriculture and Forestry, General Directorate of Water Management.

[9] Bayarı, C. S., Pekkan, E., & Özyurt, N. N. (2008). Obruks, As Giant Collapse Dolines Caused by Hypogenic Karstification in Central Anatolia, Turkey: Analysis of Likely Formation Processes. Hydrogeology Journal.

[10] Bayarı, C. S., Öztürk, N. N., & Kilani, S. (2009). Radiocarbon Age Distribution of Groundwater in the Konya Closed Basin, Central Anatolia, Turkey. Hydrogeology Journal.

The most dominant hydrogeological unit along the Project Area is alluvium which is mainly composed of clay, silt and sand. The gravel levels are sparse and thin, and the static water level is very shallow. The thickness of the alluvium, varies between 10-100 m. The hydro-stratigraphical map of the Project Area and its vicinity according to the International Map of Europe (Scale: 1/1,500,000) is given in Figure 6-20.

Table 6-26: Basic Information on Groundwater Basins of Türkiye

Basin No.	Basin	Groundwater Recharge (hm^3/year)	Groundwater Operating Reservoir (hm^3/year)
1	Meriç-Ergene	507.7	498.2
2	Marmara	241.7	210.7
3	Susurluk	780.4	585.9
4	Northern Aegean	289.4	212.9
5	Gediz	1155.9	866.9
6	Küçük Menderes	179.2	179.2
7	Büyük Menderes	1045.4	761.5
8	Western Mediterranean	473.2	316.7
9	Antalya	1164.7	576.3
10	Burdur	106.4	89.5
11	Akarçay	345.4	345.4
12	Sakarya	2197.1	1545.2
13	Western Black Sea	641.2	607.6
14	Yeşilırmak	907.2	872.8
15	Kızılırmak	2003.1	1762.9
16	Konya	2597	2023
17	Eastern Mediterranean	96.5	70.5
18	Seyhan	838.8	749.9
19	Asi	393.2	289.5
20	Ceyhan	985.3	533.5
21	Fırat-Dicle	4994.8	3763.7
22	Eastern Black Sea	490.9	490.9
23	Çoruh	30	20
24	Aras	388.5	294.4
25	Lake Van	179.2	148.2

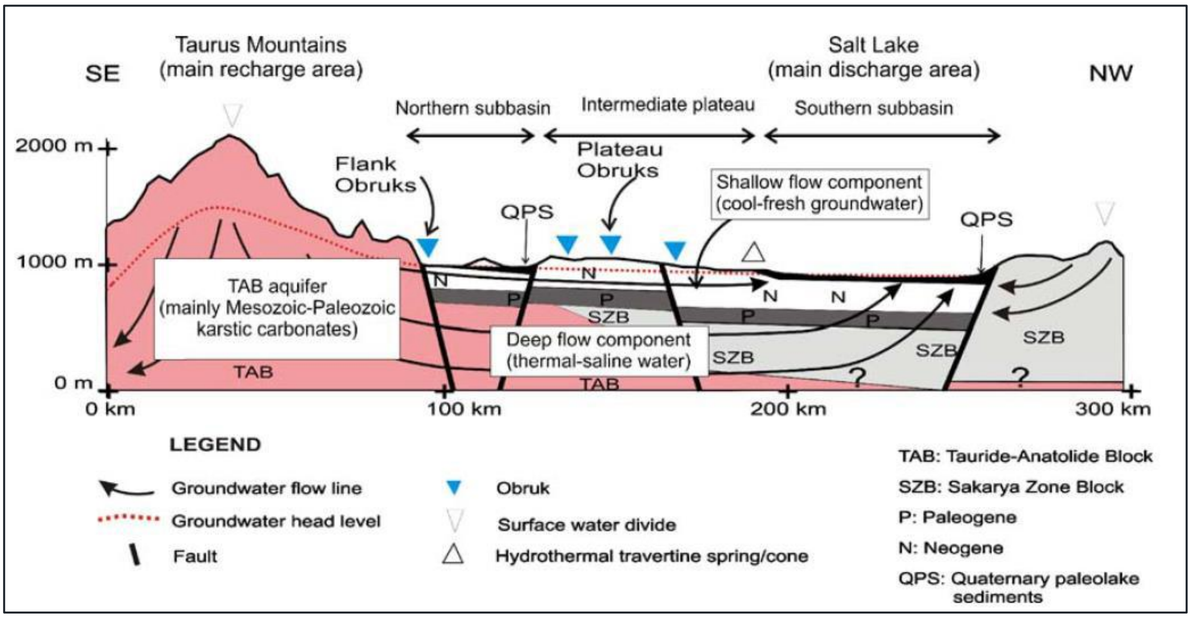


Figure 6-19: Schematic Representation of Groundwater Flow System in the Konya Closed Basin According to Bayarı et al. (2008)

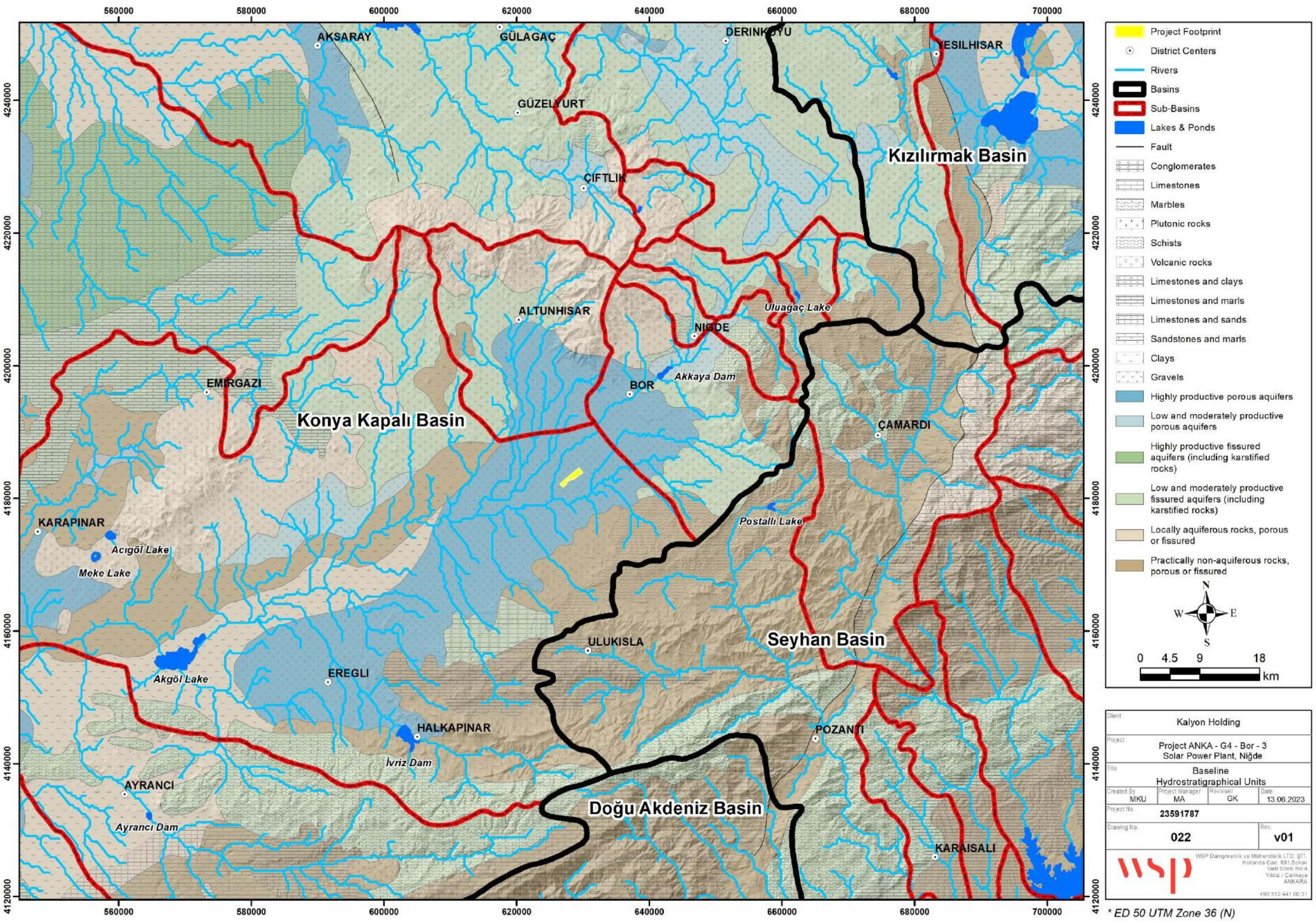


Figure 6-20: Hydrostratigraphical Map of the Project Area and Its Vicinity

According to the Geotechnical Report for the Project, in order to determine the vertical and horizontal distribution of the soil, 60 boreholes with a depth of 15 m were drilled and Standard Penetration Tests were applied. Groundwater levels were measured 2 days after the completion of boreholes (Table 6-27). Within the scope of the baseline, hydraulic head (groundwater elevation above the sea level) contours were drawn using these level measurements (Figure 6-21).

In the same geotechnical work, a water sample was taken from the nearest water well, which is in Seslikaya village, for the assessment of water, soil and gases for their aggressiveness to concrete (Figure 6-22). Since it is used for supplying drinking water, drinking water quality standards were used to examine the groundwater quality and to find out the parameters exceed the quality standards. These standards are:

- “Regulation of Water Intended for Human Consumption” (RWIHC) issued by the Ministry of Health, which was published in the Official Gazette dated 17.02.2005 and numbered 25730 (Amended: RG-20/10/2016-29863),
- Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the Quality of Water Intended for Human Consumption (recast),
- “Guidelines for Drinking Water Quality” developed by the World Health Organization (WHO, 2022).

The parameters analysed and the comparison of the values measured in these parameters with the values specified in the standards are given in Table 6-28. The smallest limit values determined in these standards were used in the comparisons. Therefore, no parameter exceeds the drinking water limit.

Table 6-27: Groundwater Level Measures from the Geotechnical Boreholes in October 2022

Borehole Name	Coordinates (UTM ED50 36N, m)		Depth to the Water Table From the Ground Surface, m	Borehole Depth
	X	Y		
SK-1	629315	4184297	3.2	15
SK-2	629294	4184279	3.5	15
SK-3	629279	4184265	3.5	15
SK-4	629271	4184275	3.6	15
SK-5	629270	4184239	4	15
SK-6	629256	4184254	3.5	15
SK-7	629372	4184114	4	15
SK-8	629195	4184114	5	15
SK-9	629512	4184018	-	15
SK-10	629312	4184018	-	15
SK-11	629032	4184018	-	15
SK-12	629545	4183848	6.5	15
SK-13	629352	4183848	6	15
SK-14	629138	4183848	5	15
SK-15	628940	4183848	5	15
SK-16	629552	4183667	4.7	15

Borehole Name	Coordinates (UTM ED50 36N, m)		Depth to the Water Table From the Ground Surface, m	Borehole Depth
	X	Y		
SK-17	629297	4183667	4.8	15
SK-18	629102	4183667	5	15
SK-19	628892	4183667	6	15
SK-20	628623	4183667	6.5	15
SK-21	629370	4183497	5.4	15
SK-22	629180	4183497	5.5	15
SK-23	629002	4183497	5	15
SK-24	628827	4183497	5.5	15
SK-25	628679	4183497	-	15
SK-26	628517	4183497	-	15
SK-27	629032	4183315	4.8	15
SK-28	628723	4183315	5.1	15
SK-29	628493	4183315	5.8	15
SK-30	628213	4183315	6	15
SK-31	628835	4183145	6	15
SK-32	628645	4183145	3.5	15
SK-33	628459	4183145	5	15
SK-34	628258	4183145	5	15
SK-35	628049	4183145	4.8	15
SK-36	628737	4183018	6	15
SK-37	628463	4182964	6.5	15
SK-38	628253	4182964	4.8	15
SK-39	628053	4182964	4.8	15
SK-40	627803	4182964	5.7	15
SK-41	628356	4182793	-15	0
SK-42	628184	4182793	-15	0
SK-43	628031	4182793	-15	0
SK-44	627842	4182793	6.5	15
SK-45	627645	4182793	6.6	15
SK-46	627778	4182609	7	15
SK-47	627423	4182612	7	15
SK-48	627398	4182442	6.5	15

Borehole Name	Coordinates (UTM ED50 36N, m)		Depth to the Water Table From the Ground Surface, m	Borehole Depth
	X	Y		
SK-49	627227	4182442	6.5	15
SK-50	627303	4182261	5.8	15
SK-51	626973	4182261	5.6	15
SK-52	627408	4182090	5.5	15
SK-53	627230	4182090	5	15
SK-54	627047	4182090	4.5	15
SK-55	626818	4182090	4.5	15
SK-56	627270	4181963	-15	0
SK-57	627033	4181909	6	15
SK-58	626783	4181909	6.3	15
SK-59	627042	4181787	4.5	15
SK-60	626858	4181787	4.8	15

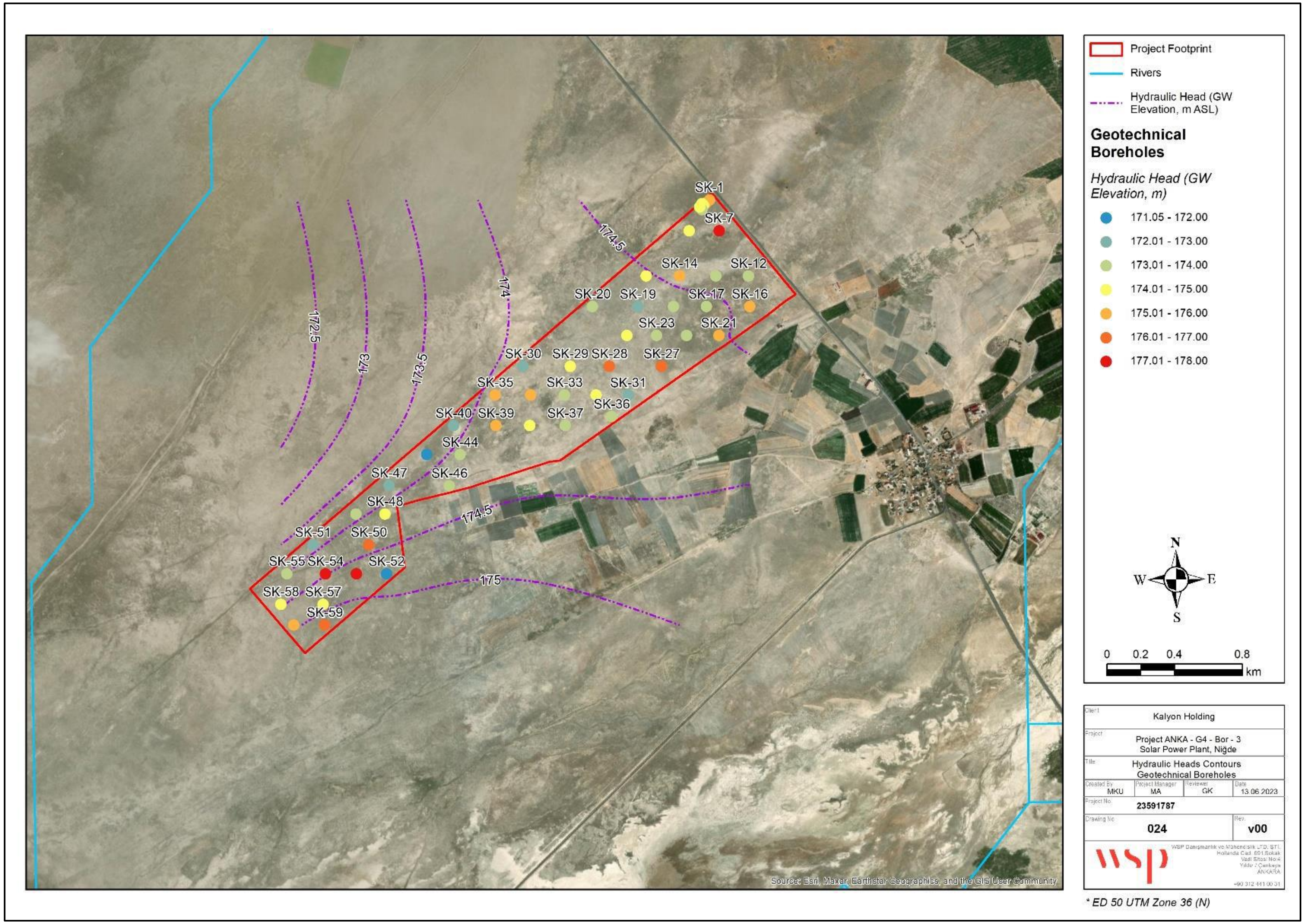


Figure 6-21: Groundwater Level Measurements and Hydraulic Head Distribution According to the Geotechnical Study Conducted in October 2022

Figure 6-22: Location of the Groundwater Sampling Point

Table 6-28: Hydrochemical Measurements

Parameter	Unit	Drinking Water Limit Values				Measured Concentration from the Well
		Turkish Drinking Water Standards[1]	EU Drinking Water Standards[2]	WHO Standards[3]	Strictest Regulation Value	
Dissolved Oxygen (DO)	mg/L	-	-	-	-	9.4
Oxygen Saturation	%	-	-	-	-	118.8
Salinity	‰	-	-	-	-	0.36
pH	-	6.5 - 9.5	6.5 - 9.5	-	6.5 - 9.5	6.8
Specific Electrical Conductivity	µS/cm	2500	2500	-	2500	0.22
Ammonium	mg/L	0.5	0.5	-	0.5	< 0.021
Arsenic	mg/L	0.01	0.01	0.01	0.01	0.009
Boron	mg/L	1	1.5	2.4	1	0.238
Cadmium	µg/L	0.005	0.005	0.003	0.003	< 0.0005
Chloride	mg/L	250	250	-	250	43.4
Lead	mg/L	0.01	0.01	0.01	0.01	< 0.0005
Mercury	mg/L	0.001	0.001	0.006	0.001	< 0.0001
Nitrate	mg/L	50	50	50	50	36.1
Sulphate	mg/L	250	250	-	250	82
Total Cyanide	mg/L	0.05	0.05	-		< 0.005
Total Pesticides	µg/L	0.5	0.5	-	0.5	< 0.005
Total Petroleum Hydrocarbon (TPH)	mg/L					< 0.1
Trichloroethylene	µg/L	10	10	100.8	10	< 0.1
Phosphate	mg/L	-	-	-	-	< 0.31
Total Suspended Solids (TSS)	mg/L	-	-	-	-	< 10

1 Regulation of Water Intended for Human Consumption (RWIHC) issued by the Ministry of Health, which was published in the Official Gazette dated 17.02.2005 and numbered 25730 (Amended: RG-20/10/2016-29863),

2 Directive (EU) 2020/2184 of the European Parliament and of the Council of 16 December 2020 on the Quality of Water Intended for Human Consumption (recast)

3 Guidelines for Drinking Water Quality" developed by the World Health Organization (WHO, 2022)

Sensitivity Assessment

Sensitivity Features	Supported by	Sensitivity Value
Presence of Groundwater in the AoI	Primary and Secondary Data	Low

6.1.9 Traffic

Definition	Traffic can be defined as activities including transport of materials and people from one location to another location which may lead to traffic load.
Area of Influence	2,000 m buffer zone including Project Footprint
Rationale for the AoI	**Rationale:** The nearby receptors (i.e., communities), around the Project Site, potentially exposed to pollutant emissions.
Data sources	**Secondary sources:** Secondary data from scientific papers, grey literature, and databases.

The Project area is 25.74 km away from Niğde City Center and 2.6 km away from Seslikaya district by road.

The distance of the Project area to the D330 highway, which is the nearest highway to the Project Area, is approximately 6.4 km. Information about the distance to the highways around the Project Area is given in Table 6-29 and Figure 6-23.

Table 6-29: Highways around the Project Area

Name of the Highway	Direction	Distance to the Project Area (km)
D330 Niğde-Malatya Road	Northeast	6.4
D805 Niğde-Ulukışla Road	Southeast	9.8
E-90 Adana-Aksaray Highway	Southwest	14.1
O-21 Niğde-Ankara Highway	Southeast	14.1

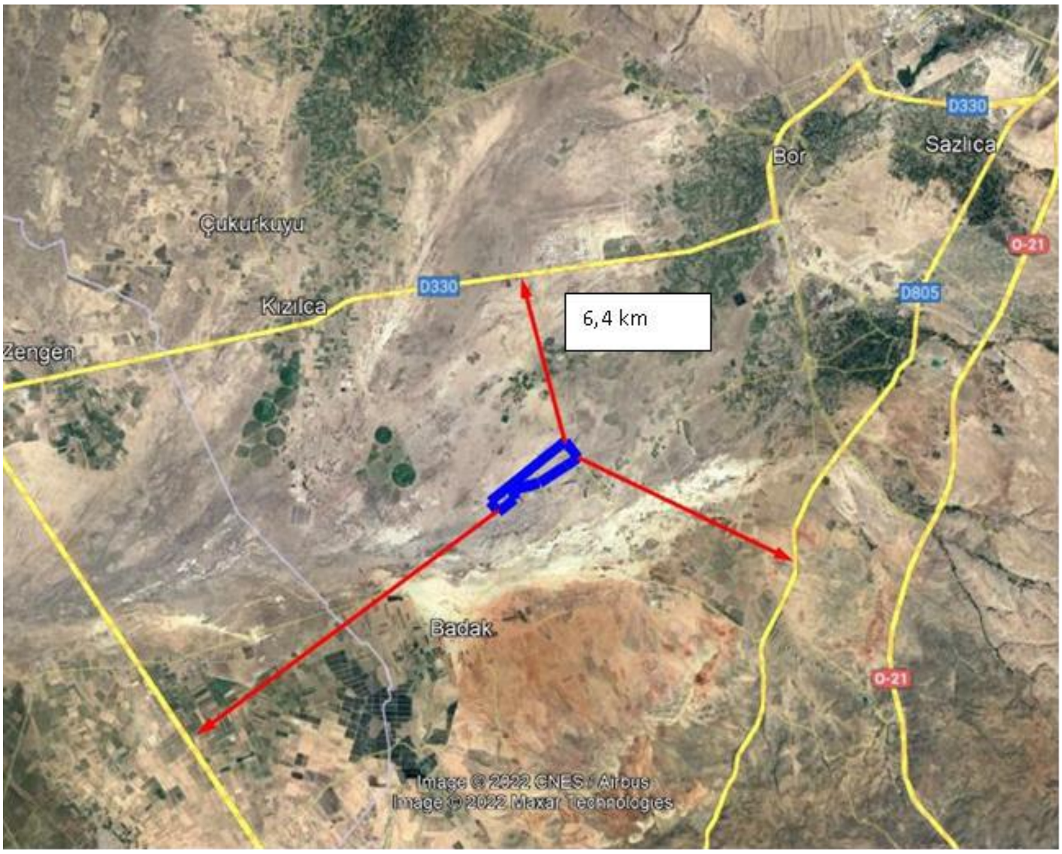


Figure 6-23: Satellite Image Showing the Highways around the Project Area

The nearest highways that can be used to reach the Project area are D330 Niğde - Malatya and D805 Niğde - Ulukışla highway. Within the scope of the Project, it is planned to use the D330 Highway. The existing access routes to D330 Highway are given in the Figure 6-24.

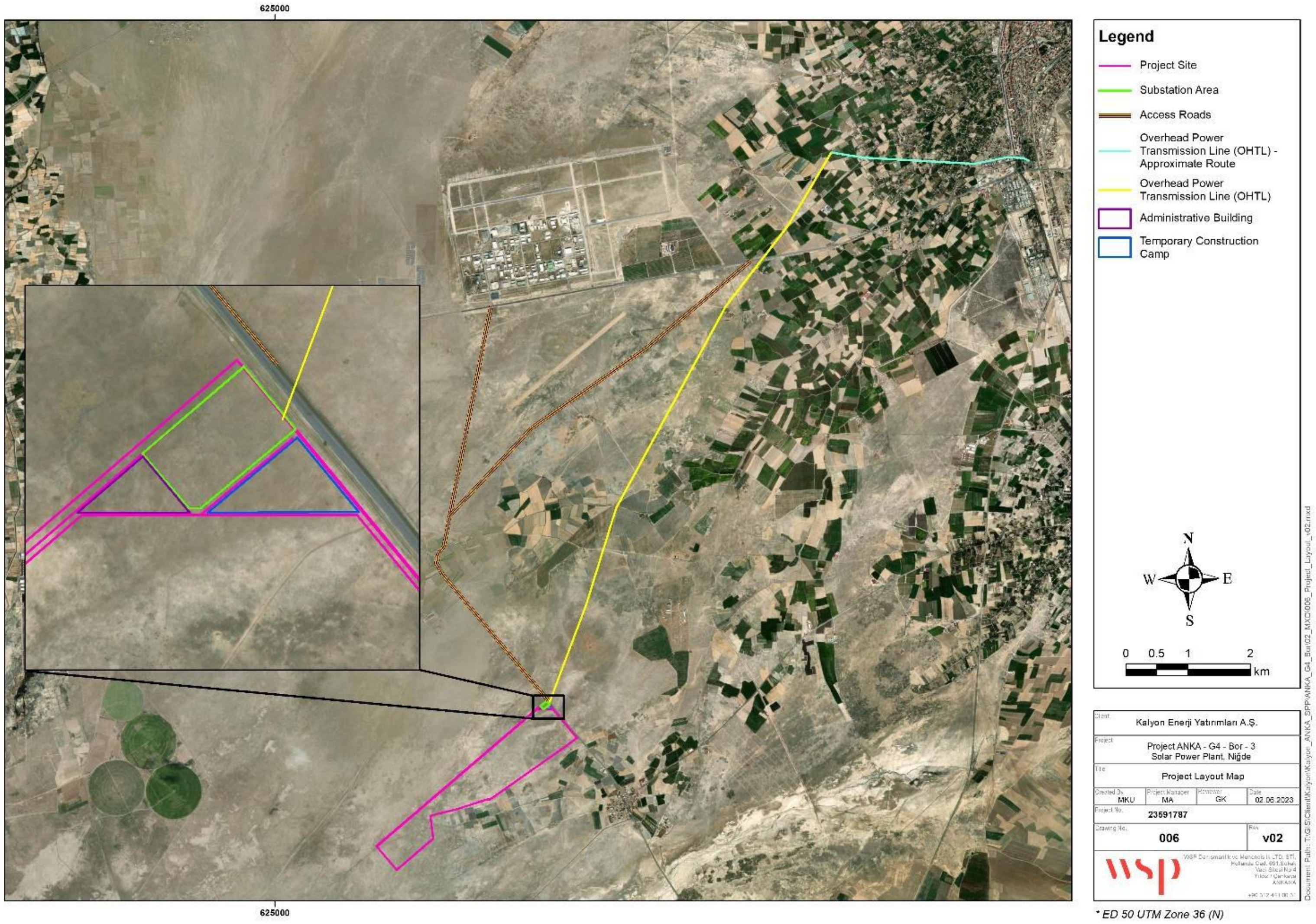


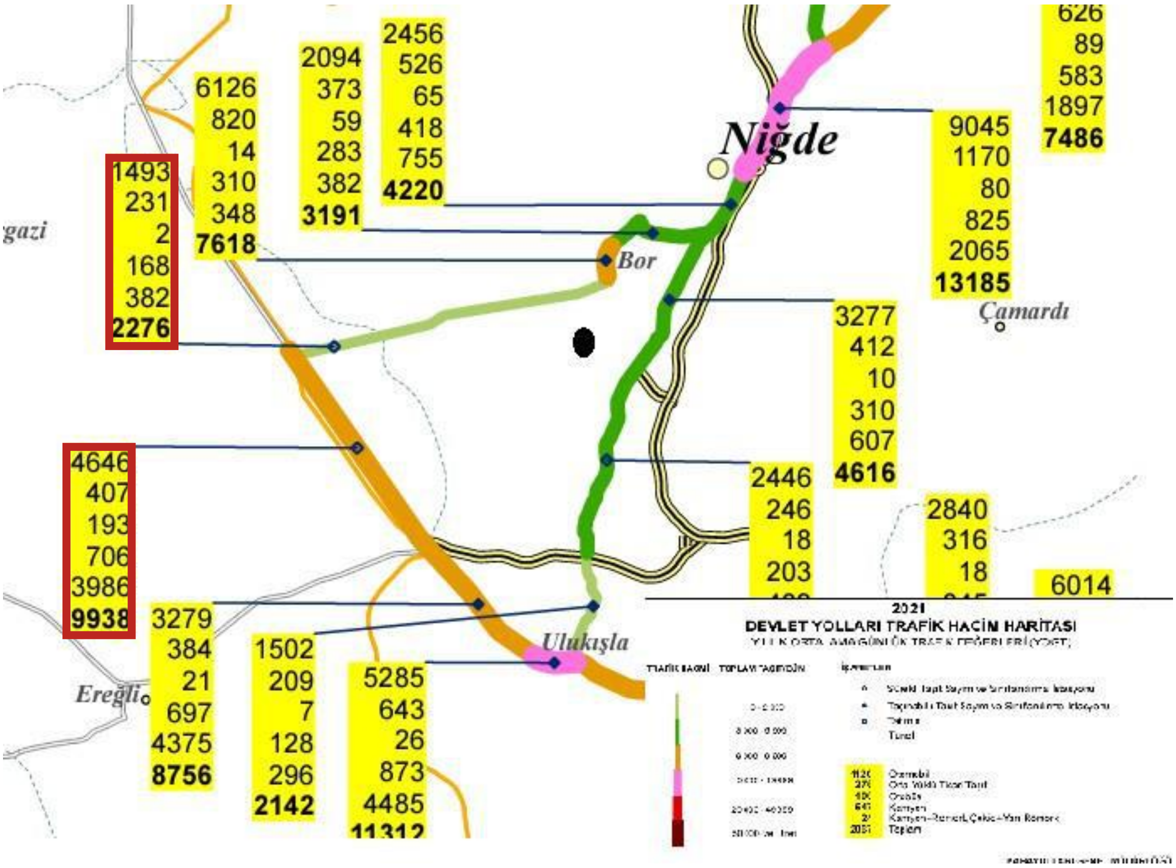
Figure 6-24: Existing Access Roads to the Highways

General Directorate of Highways publishes "Traffic and Access Information" report periodically and this report contains annual average daily traffic values and transport information according to traffic segments of motorways and state roads. Latest issue of this report was published in 2021. The traffic volumes of the nearby highways are given in Table 6-30 and Figure 6-25

Table 6-30: The Annual Average Daily Traffic Data of Nearby Highways

Roadway	Car	Medium- Duty Commercial Vehicle	Bus	Truck	Truck+Trailer +Tow Truck + Side Trailer	Total
D330	1493	231	2	168	382	2276
E90	4646	407	193	706	3986	9938

Source:https://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Istatistikler/TrafikveUlasimBilgileri/21TrafikUlasimBilgileri.pdf



Source:https://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Istatistikler/TrafikveUlasimBilgileri/21TrafikUlasimBilgileri.pdf

Figure 6-25: Traffic Volume Map

Sensitivity Assessment

Sensitivity features	Supported by	Sensitivity value
Schools and residential areas in the vicinity The existing roads will be used for access to the site Other ongoing projects (under construction and planning stage) around the Project site	Primary and secondary data	Medium-High

6.2 Social Components

Social Impact Assessment (SIA) was produced in accordance with the standards and the requirements of the International Finance Corporation (IFC). The general methodology adopted by WSP for SIA Studies has been designed to be analytical and transparent and to allow for semi-quantitative analysis of the impacts on the various social components. This methodology is based on the consideration that projects can generate both negative and positive impacts whose magnitude can be evaluated considering the different characteristics of the project activities and the environmental and social context. This methodology overall translates into the work steps described in the following sections.

The outcomes of social field studies were linked to analyses of potential impacts on social receptors. In addition, stakeholder engagement is integrated into the entire process, helping guide the baseline data gathering and a proportional impact assessment.

The objectives of SIA are:

a) Identification and assessment of any potentially significant existing and future adverse social impacts associated with the proposed Projects,

b) Assessment of compliance with applicable national legal requirements and international standards/requirements,

c) Determination of the measures needed to prevent, minimize, and mitigate the adverse impacts; and

d) Identification of potential social opportunities, including those that would improve the environmental and social sustainability of the Project and the associated current operations.

6.2.1 Determination of Project Area of Influence

The area of influence (AoI) is the zone that may be influenced by a project. Understanding the AoI is an essential requirement for a SIA. Following that, the social baseline must focus on the AoI, although the baseline may have a broader focus, depending on the nature and impact of the project.

According to the Guidance Note 1 Assessment and Management of Environmental and Social Risks and Impacts of IFC (2012), where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts were be identified in the context of the project's area of influence. This area of influence encompasses, as appropriate:

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; impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.

(ii) 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[11].

[11]

(iii) Cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

In short, the AoI should include all project related structures and ancillary facilities (owned or managed) by the client and subcontractors and the associated activities strongly dependent on the project. In addition, areas and communities directly impacted upon by the proposed project and ancillary facilities form part of the AoI. Cumulative impacts and potential unintended, but predictable, project consequences should also be considered in the delineation of the AoI. From a social viewpoint, the AoI perspective is also influenced by direct and induced socio-economic influences (including relocation, livelihood, health, and safety aspects), spatial implications, intrusion impacts and stakeholder typology. Considering the key issues that emerged from the stakeholder engagement process and the associated effects, a spatial focus appears[12]. Please refer to Figure 6-26 in this regard.

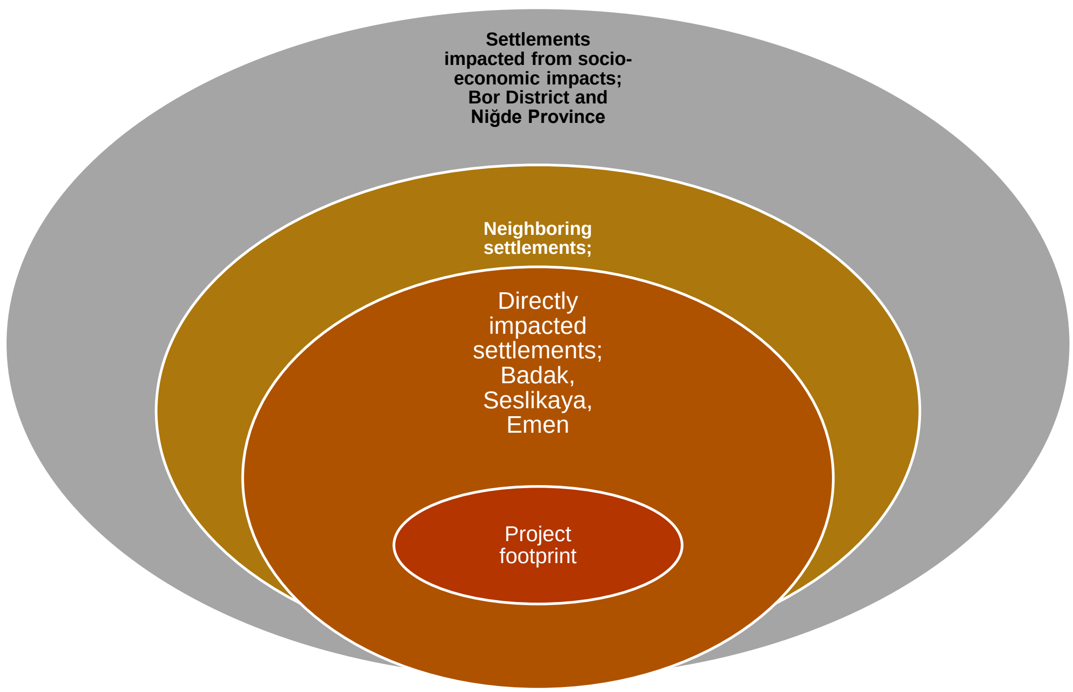


Figure 6-26: Project Area of Influence for G4-Bor-3 SPP, Bor District, Niğde Province

The nearest settlements to located in the social area of influence for each Project that will be developed for ANKA Project is presented the figure above.

The social Area of Influence map is provided in Figure 6-27: Social Area of Influence.

[12] This focus included the construction, operational and closure phases of the Project.

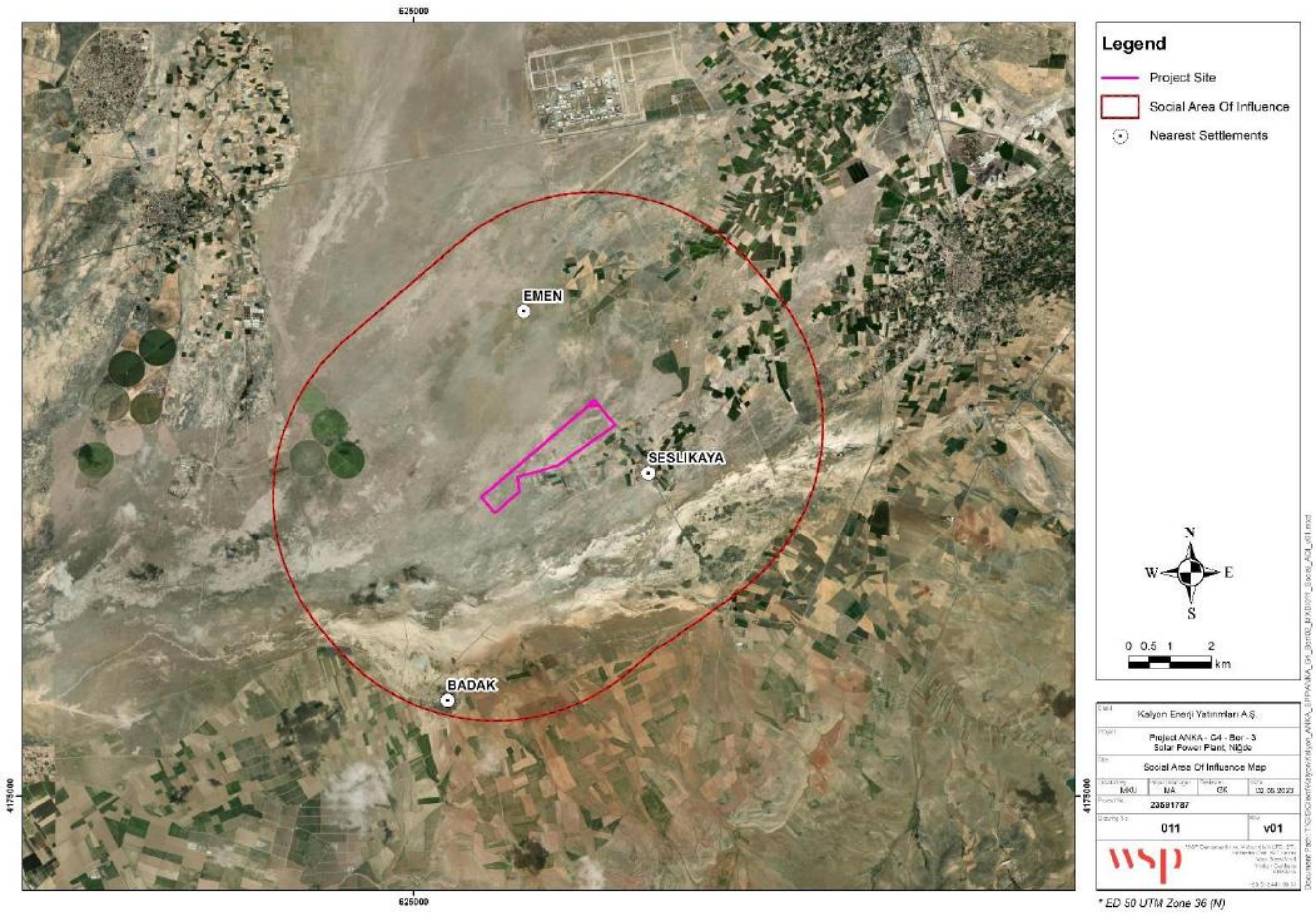


Figure 6-27: Social Area of Influence

6.2.1.1 Desktop Study (Secondary Data)

Secondary Data was be obtained from National institutions (ministries, research institutes, universities, national and local censuses, ministries, web-based published reports, assessment reports of local and national NGOs and Project specific documents such as EIA and ESIA reports. Outputs of the secondary data analysis helped to reach a common understanding about the Project. Secondary data was obtained but not limited to through the following institutional websites:

- Niğde Governorship
- Niğde Municipality
- Turkish Statistical Institution,
- Niğde Provincial Directorate of Environment and Urbanization and Climate Change
- Niğde Directorate of Agriculture and Forestry
- Development Agencies.

6.2.1.2 Field Surveys (Primary Data)

The aim of this survey is to determine the socio-economic status of each settlement inclusive of population, migration and reasons for migration, ethnic composition, age distributions, social facilities (schools, mosques, etc.) in the settlement, education level, local conflicts and problems, livelihoods and main income generation activities, economic production in the settlement, land use, services and infrastructure, ecosystem services, vulnerable groups and perceptions of project impacts.

According to preliminary analysis and desktop studies:

- Three settlements were determined for Bor-3 SPP namely: Emen, Seslikaya and Badak villages.

Community level surveys were be performed with the mukhtars or opinion leaders of the villages/neighborhoods.

The household survey comprised the following items:

- Level of information on the planned solar power plant project,
- Mechanisms of access to information,
- Major complaints about ongoing Projects in the region,
- Socio-economic features of the households, general conditions of houses,
- Livelihoods and main income-generating activities,
- Educational skills of household members that can be used in the construction and operation stages of the Project,
- Perceived Project impacts and recommendations.

The questionnaire included a section on the discussion of the impacts of the Project and other on-going and planned projects in the region, in order to identify cumulative social impacts. Sampling was applied for the village Table below shows the calculation methodology for the determination of the sample size.

According to the preliminary data, there are approximately 231 households in the Niğde Project impact area. With the sample determination formulation developed by WSP in Excel, it was planned to interview 70 households in Niğde with a margin error of 5% within a 90% confidence interval and 10% sampling. The sample calculation formulation is presented in the tables below.

Table 6-31: Sample Size for G4-Bor-3 Solar Power Plant, Niğde

X=Z score (level of accuracy based on confidence level) 90% = 1.645 95% = 1.960 99% = 2.576	1,645	97,4169
P = population proportion usually 50 %. That means no bias in expected results	10,00%	

% Margin of error (m): Typically, 5% =0.05	5,00%	
Total Target Population Number	231	
AS= sample size for known population **AS=(S)/1+((S-1)/population)**		**70**

Details of the household surveys held in the Bor District is presented in Table 6-32.

Table 6-32: Approximate Number of Household Surveys in G4-Bor-3 Solar Power Plant, Niğde

Name of The Village	Total Population	Estimated Numbers of Households (Average HH Size for the District is 2.85)	Sample Size	Surveyed HHs	Community Level Surveys (CLS) conducted
Seslikaya	161	56	50%	10	1
Emen	130	46	34%	12	1
Badak	368	129	13%	14	1
TOTAL	**659**	231	35%	36	3

It should be noted that the sample size for the social survey was determined according to the TURKSTAT data; however, during the social field study, it has been observed that the actual population figures are lower than the official data, although the social team did their best to reach the calculated sample size, the total number of surveys conducted is 39, with 36 households surveys and 3 community level surveys.

6.2.1.2.1 Focus Group Discussions (FGD)

FGDs have been designed to engage with specific segments of the community that might require special attention in consultation, e.g., women, youth, elderly, vulnerable people, beekeepers etc. FGDs was used as an effective way to bring together people with similar features to discuss a specific concern/impact related to the Project.

As a result of the desktop review of current Project women only FGDs were conducted.

6.2.1.2.2 Site Observations

In addition to the above-mentioned consultation methods, site observations used by the social experts to analyse current practices at the Site, especially on land use, visual impacts, interactions between Client and local communities, management of complaints and current labour conditions.

6.2.2 Administrative Structure

Turkey is subdivided into 81 provinces. Each province is further divided into districts, and each district is divided into villages or neighborhoods according to the respective rural or urban setting, population figures and their connection to the Metropolitan Municipalities. The provincial administrative structure consists of provincial governors, special provincial administrations, municipalities, while the district level administrative structure consist of district governors and district municipalities and villages/neighborhoods are the sub administrative units of the districts. The following sections describe the details and responsibilities of these administrative structures. Figure 6-28 presents the administrative structure as found in the AoI.

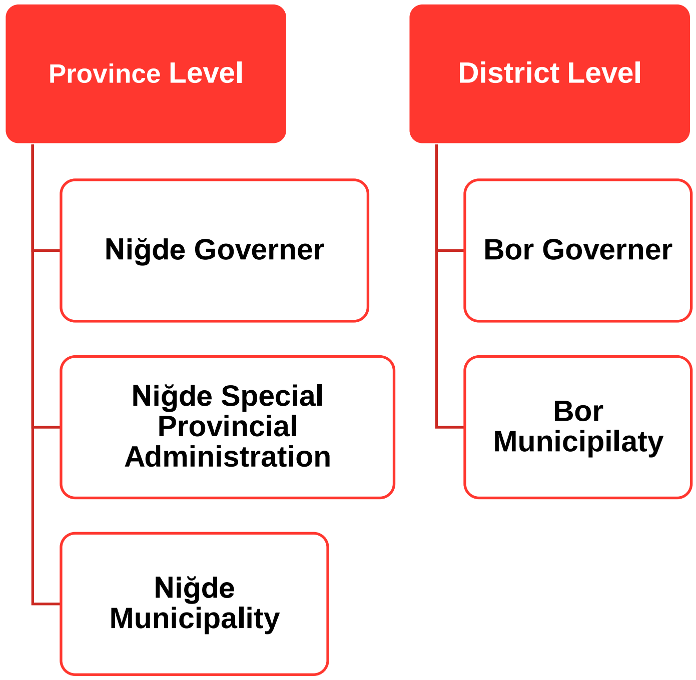


Figure 6-28: Administrative Structure

In reference to Figure 6-28, the following sections expand on the administrative structure.

Provincial Governors

The Governor of a province represents the Turkey Central Administration (central government) at a provincial level. The Governor is appointed by the Council of Ministers with the approval of the President and reports to the Ministry of Interior. The Governor of Niğde represents the province.

In compliance with the Law number 5442, the responsibilities of the governors as follows:

- To ensure the security of the citizens and the public order,
- To guarantee the coordination and cooperation of different government and non-governmental organisations and institutions,
- To declare and implement legislation and governmental decrees,
- To supervise all provincial public institutions and organizations,
- To collect taxes and other state revenues,
- To preside over official ceremonies as a chief representative of the state,
- To contact consuls and accept their applications and visits,
- To prevent offences by using the police and gendarmerie forces due to their security related power,

- Taking security measures in civil airports, ports and border gates in order to provide border and coast safety,
- Appealing for help from military forces directly in the case of security threatening event which are not able to be prevented by law enforcement forces originally under their authority,
- Being the head of the social assistance and solidarity foundations of the province,
- To be the head of the investment monitoring and coordinating unit which operates for the purpose of monitoring and coordinating public investments and public services of provincial organizations under the authority of the governor,
- Having hierarchical authority over different ministries civil servants who provide public services in the province,
- To permit judicial investigations concerning the formal roles and duties of the civil servants and municipal staffs.

Special provincial administrations

In Turkey, special provincial administrations (SPAs) function at a provincial level. SPAs also have a municipal function in the rural areas. The SPA work towards reducing poverty and improving physical and socio-economic infrastructures, particularly in rural villages.

SPAs provide a broad range of services. The SPAs are in charge of the construction and maintenance of the physical infrastructures for education, healthcare, and sports. The SPAs have a strong community development focus. The emphasis is on preventative health and social services, as well as contributing to the development of industry and trade sectors, including agriculture.

The AoI is mainly composed of rural settlements. The Niğde Provincial Administration's focus is on these villages.

Municipalities

Municipalities are represented in the respective provincial and district capitals, and in communities with at least 5,000 inhabitants. Approximately 93% of the population of Turkey live within municipal boundaries.

Municipalities prepare master plans and detailed development plans, authorize construction permits, control works and operate the territory of the municipality. Municipalities are responsible for the development of urban infrastructure and provide various services. These services include waste disposal, security, fire, emergency aid, relief, ambulance, traffic, cemeteries, parks and green areas, housing, culture and artworks and maintenance of education facilities.

Villages

Mukhtars represent the village. Mukhtars are elected by villagers through local elections held once every five years. The village, as a public legal entity, has full administrative and financial autonomy. Village administration consists of a Mukhtar, an executive committee, and a village association. The state pays every village Mukhtar a salary approximately equal to the minimum wage for the public services. The Mukhtar discharges functions such as identifying the poor and the provision of assistance, renewing voter registers, informing the relevant agencies of problems and failures in education, health, security, and sanitation.

6.2.3 Population and Demography

6.2.3.1 Introduction

The Project is located in the Bor district of the Niğde province. Population and demography are the key components to have a good understanding of the characteristics of a community. Information on demographic profiles at the provincial and district levels was obtained from secondary resources. The demographic information of the villages was collected through the community-level surveys held with the Mukhtars.

6.2.3.2 Province and District Level

According to TURKSTAT data of 2022, the total population of Niğde is 365,419. The male population of Niğde is 182,822, while the female population is 182,597. The average household size of the province is 3.04, with a net migration rate of 0.38. There are 6 districts and 131 villages in Niğde.

Please refer to the tables below for the main population indicators of Niğde.

Table 6-33: Population Distribution of the Niğde province

Niğde	Population Indicators
Total Population	365,419
Male population	182,822
Female population	182,597
Net migration rate	0.38
Population growth rate	4.65
Population Density (person/km^2)	49.9

Source: TURKSTAT, 2022

As of 2022, the annual population growth rate of Niğde is determined as 4.65 in thousands, while it is 7.74 in thousands for the Bor District. This rate is 7.05 for Türkiye in general, which means Niğde has slower population growth compared to Türkiye, whereas Bor has a higher population growth rate compared to both Niğde and Türkiye.

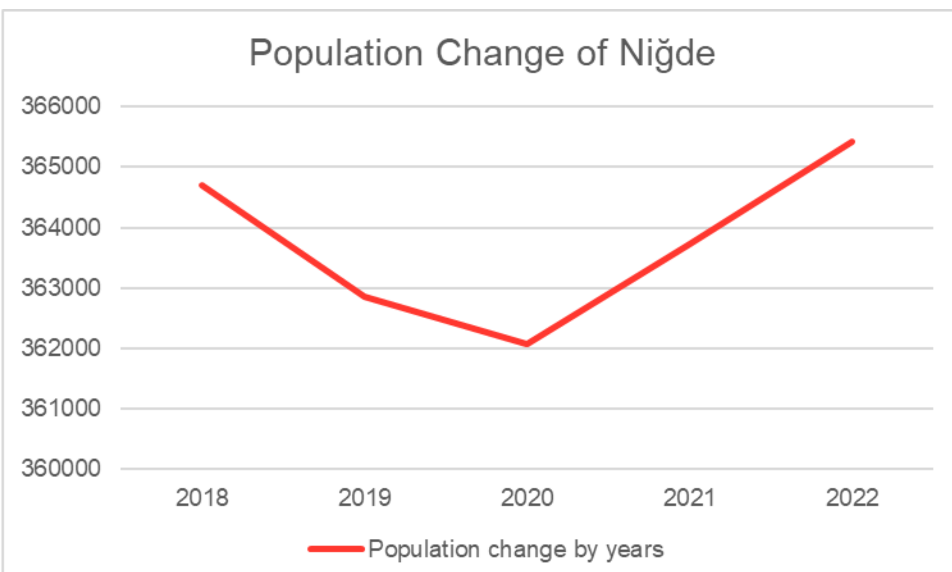


Figure 6-29: Population change of Niğde in the last 5 years

The trends in the population change of Niğde in the last five years are given in Figure 6 3. There were no significant changes in Niğde's population in the last five years. The population has decreased by 3000 persons between 2018 and 2020, and then started to increase gradually.

Table 6-34, shows the population distribution by districts of Niğde. By analyzing data for 2022, it is seen that Merkez District, the central district of Niğde, is the most populous district in the province, followed by the Bor District, in which the Project area is located.

Table 6-34: Population Figures of Districts of Niğde as of 2022

District	Population	Male Population (%)	Female Population (%)	Urban Population (%)	Rural Population (%)	Population Density (person/km²)
Altunhisar	11,558	51.0	49.0	27.5	72.5	19.9
Bor	60,948	50.0	50.0	68.9	31.1	42
Çamardı	11,495	49.0	51.0	29.7	70.3	9.5
Çiftlik	25,642	52.0	48.0	17.4	82.6	56.6
Merkez	236,793	50.0	50.0	72.0	28.0	32.3
Ulukışla	18,983	51.0	49.0	30.0	70.0	12.6

Source: TURKSTAT, 2022

Table 6-35 presents the key information on the Bor district. 60,948 people are living in the Bor district, in which the total male and female population is equal. Bor has 23 villages and 32 neighborhoods within its district borders.

Table 6-35: Bor District Population Information

Bor	Number
Total population	60,948
Total male population	30,289
Total female population	30,659
Number of villages within district borders	23
Number of neighborhoods within district borders	32

Source: TURKSTAT, 2022

The change in the Bor population in the last five years is given in the Figure 6-30.

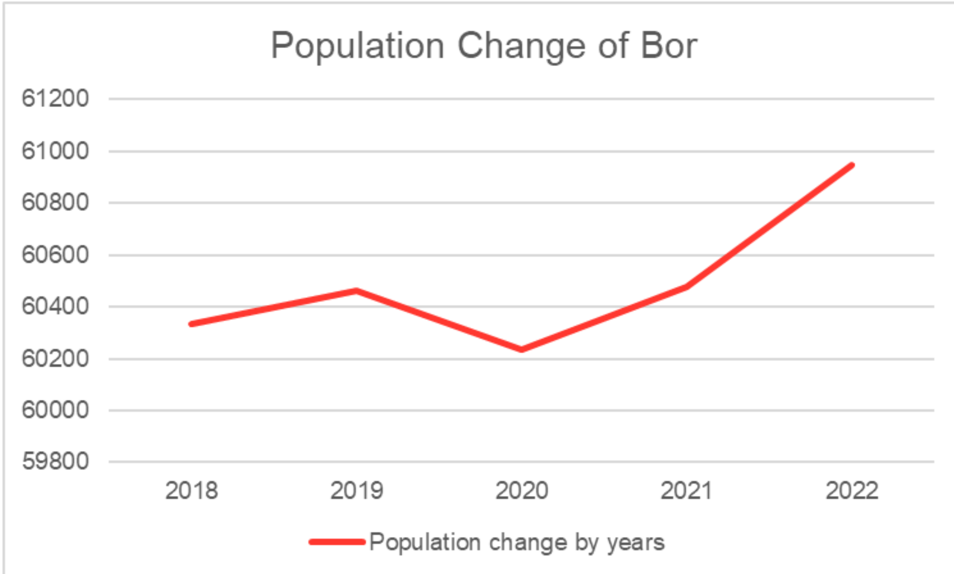


Figure 6-30: Population change of Bor in the last 5 years

There was a slight decrease in the population between 2019 and 2020; the population has been increasing since then.

Age and Gender Distribution

The tables below present the age distribution of the population of the Niğde province and the Bor district.

The age distribution of the Niğde population in numbers and by percentage is given in Table 6-36.

Table 6-36: Age Distribution of Niğde Population, as of 2022

Age Group	Population	Population by percentage (%)
0-4	23,748	6.5
5-9	28,321	7.75
10-14	28,893	8
15-19	30,169	8.25
20-24	31,777	8.7
25-29	25,824	7.06
30-34	23,840	6.52
35-39	24,742	6.77
40-44	25,874	7.1

Age Group	Population	Population by percentage (%)
45-49	23,272	6.36
50-54	21,981	6.01
55-59	20,598	5.63
60-64	16,909	4.62
65+	39,471	11

Source: TURKSTAT, 2022

In Niğde, the population aged 65 and older is the largest group compared to others, while the population aged between 60-64 is the least populous age group.. Apart from that, younger generations aged between 0-4 to 20-24 are also predominant in the area compared to middle-aged population.

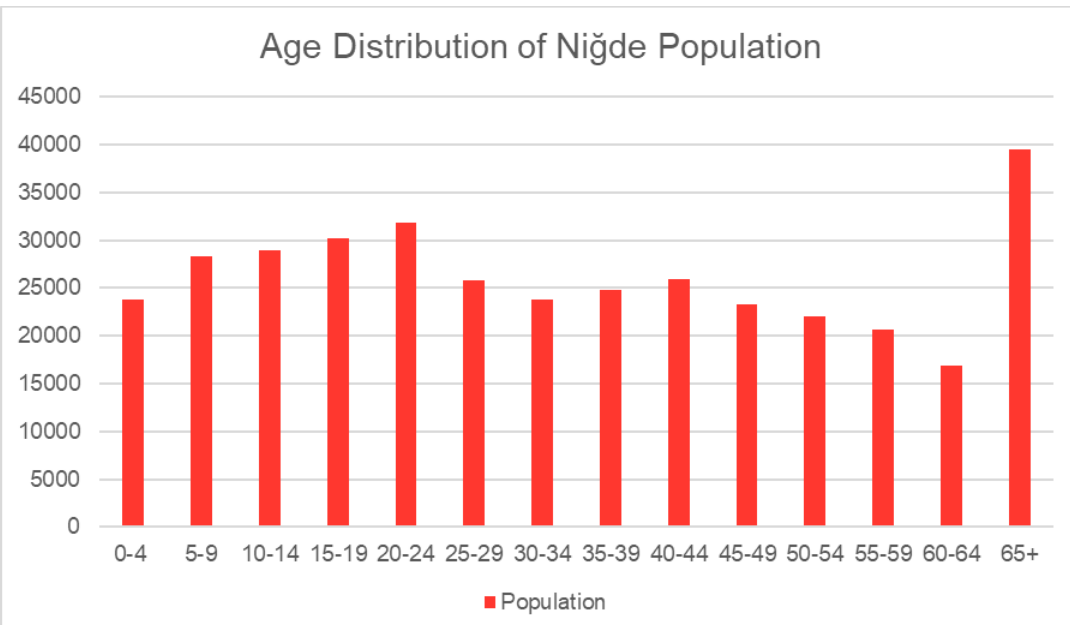


Figure 6-31: Age Distribution of Niğde Population

The age distribution of the Bor population in numbers and by percentage is given in Table 6-37.

Table 6-37: Age distribution of Bor population, as of 2022

Age Group	Population	Population by percentage (%)
0-4	3,566	5.85
5-9	4,361	7.15

Age Group	Population	Population by percentage (%)
10-14	4,576	7.5
15-19	4,634	7.6
20-24	4,738	7.77
25-29	3,944	6.47
30-34	3,721	6.1
35-39	3,879	6.37
40-44	4,126	6.77
45-49	3,932	6.45
50-54	3,962	6.5
55-59	3,758	6.17
60-64	3,464	5.7
65+	8,287	13.6

The population aged 65 and older has the highest proportion in the Bor district. Apart from that, the distribution of remaining age groups in the Bor district are similar (see Figure 6-32).

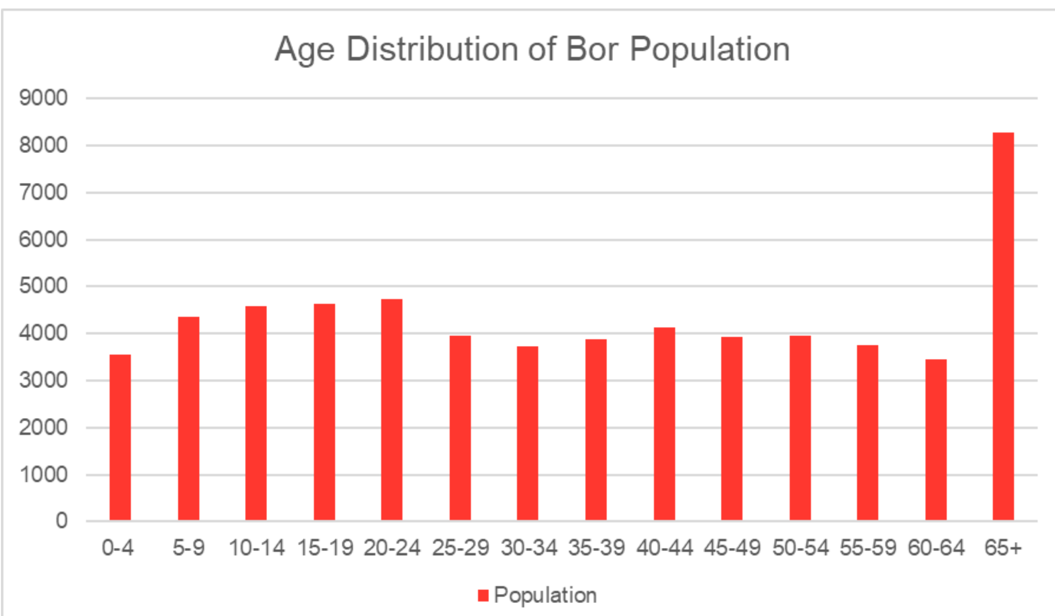
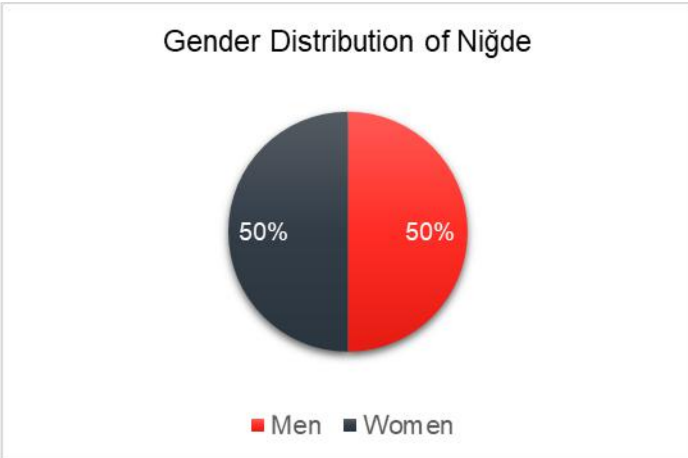


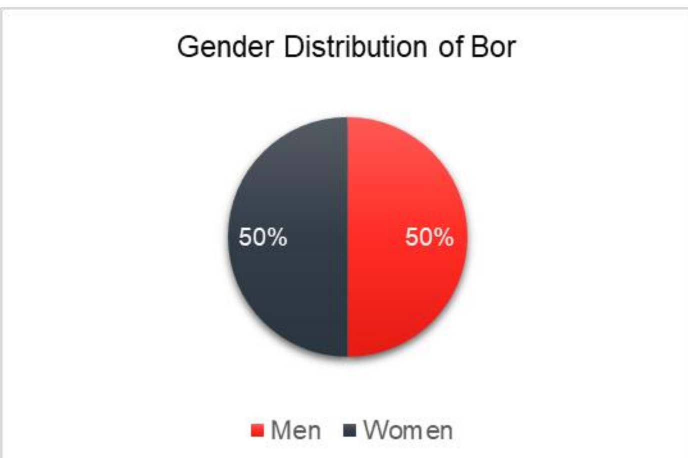
Figure 6-32: Age Distribution of Bor Population

The distributions of population by gender in Niğde and Bor are presented in the Figure 6-33 and Figure 6-34.



- In Niğde, as of 2022, the female and male populations have an equal population distribution.

Figure 6-33: Gender distribution of Niğde population



- Bor district shows similar tendency as Niğde population—as of 2022, the female and male populations have an equal distribution.

Figure 6-34: Gender distribution of Bor population

6.2.3.3 Village Level

The total population and the number of households in the settlements collected through the Community Level Surveys (CLS) are presented in Table 6-38.

Table 6-38: Total population and number of households of the villages

Province	District	Neighbourhood	Total Population	Number of Households
Niğde	**Bor**	Emen	170	35
		Seslikaya	80	20
		Badak	390	110

Seasonal Change

According to the results of the CLS, it has been observed that there is seasonal population change only in the Seslikaya village. Mostly, people are coming from the city in the summer season to their summer houses. In addition, there are 5 households seasonally coming to Seslikaya for horse breeding. Seasonal change in population of the villages is presented in Table 6-39.

Table 6-39: Seasonal population change in the villages in the last five years

Province	District	Village	Additional Population	Additional number of households	Reason of seasonal population change
Niğde	**Bor**	Emen	0	0	
		Seslikaya	40	At least 5	Summer season for horse breeding
		Badak	0	0	

Migration

During the CLSs, it has been observed that certain villages have experienced a change in the population in the last five years.

- In Emen, the middle-aged population have abandoned animal husbandry (mainly sheep and goat breeding).

Besides those who switch to cattle breeding, some people sold their animals and migrated to cities for better job opportunities.. It is stated that people switched from sheep and goat breeding to cattle breeding in the past years because cattle maintenance is easier since they do not need to be grazed in the lands.

- In Seslikaya, there is no notable population change in the last five years.
- In Badak, there has been a population increase in the village in the late years. People are coming from cities to rural areas to buy land and engage with agriculture/horticulture for household consumption.

The reasons for the population change in the settlements and the target migration group are presented in the table below.

Table 6-40: Population change in the V/N in the last five years

Province	District	Village	Change	Reason of population change	Target population group of change
Niğde	**Bor**	Emen	↓	Giving up animal husbandry	Middle aged population
		Seslikaya	Same		
		Badak	↑	People migrating to rural areas from cities to buy lands and do agriculture/horticulture	Middle-aged population

Province	District	Village	Change	Reason of population change	Target population group of change
				for household consumption	

6.2.4 Land issues

6.2.4.1 Introduction

Land Use Patterns allows to understand what type of activities are performed on land and what forms of tenure are common in the AoI. Aim of this section is to reflect existing land use, including residential areas, existing industry, agricultural areas of Niğde and Bor specifically. The information provided in this section was gathered through the available secondary data, GIS studies, in-depth interviews with the Mukhtar and official correspondence from General Directorate of Land Registry and Cadaster.

6.2.4.2 Province and District Level

Land use patterns

The total land use area in Niğde Province is 703,966 hectares. The central district of Niğde is the largest district in terms of surface area. The latest information available on land use of Niğde is based on the 2018 data of CORINE Land Use Classification System. The distribution of land use of Niğde according to the latest data available is provided in the Figure 6-35.

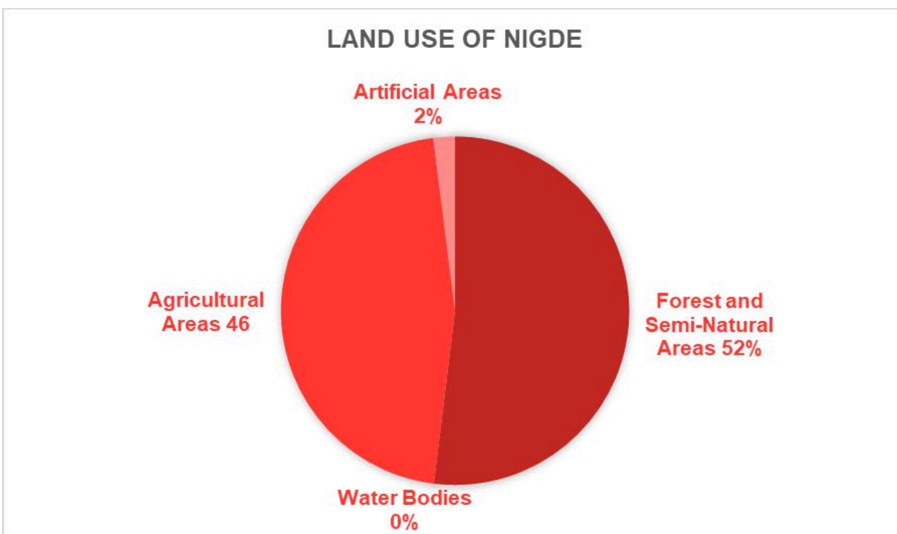


Figure 6-35: Land use of Niğde

In Niğde, forest, semi-natural, and agricultural areas comprise almost all the land. Water Bodies comprise 0.17% of the total land.

According to the 2018 data from the CORINE Land Use Classification System, Bor's land use distribution is provided in the figure below.

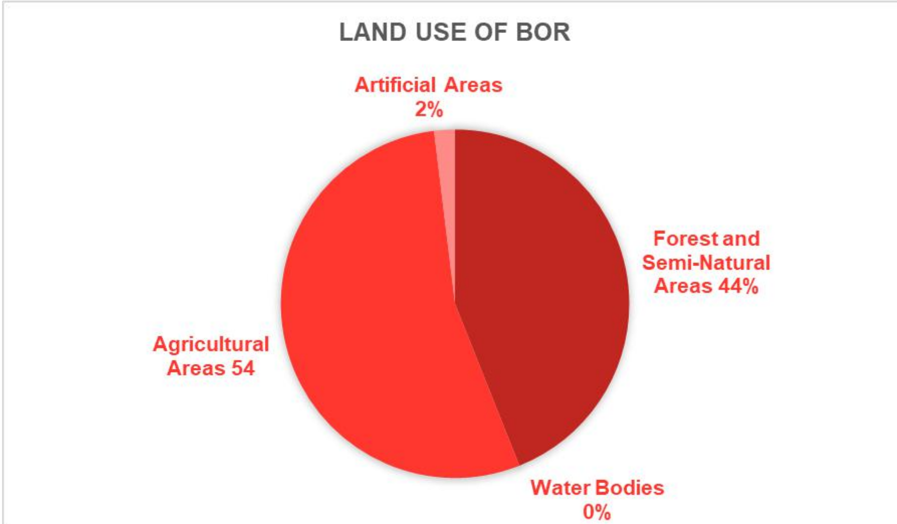


Figure 6-36: Land use of Bor

In Bor, agricultural areas make up most of the land, indicating agriculture's predominance.

Please refer to the Table 6-41 for the detailed land type of the Niğde province.

Table 6-41: Land Types of Niğde

Layer	Area (ha)	Percent (%)
Sparse Plant Areas	174,790.20	24.16
Natural Grasslands	128,527.15	17.76
Unirrigated Arable Lands	120,577.84	16.67
Continuously Irrigated Areas	71,086.74	9.83
Mixed Agricultural Fields with Natural Vegetation	61,007.60	8.43
Bare Cliff	33,471.08	4.63
Pasture Lands	32,848.89	4.54
Plant Exchange Areas	31,196.99	4.31
Irrigated Mixed Agricultural Fields	17,282.68	2.39
Unirrigated Mixed Agricultural Lands	12,749.97	1.76
Irrigated Fruit Areas	10,757.82	1.49
Non-Continuous Settlements	6,658.56	0.92
Vineyards	5,632.22	0.78
Coniferous Forests	4,898.73	0.68

Layer	Area (ha)	Percent (%)
Non-Continuous Rural Settlements	2,485.14	0.34
Mineral Extraction Sites	1,654.55	0.23
Broad Leaf Forests	1,452.17	0.20
Industrial and Commercial Units	1,377.94	0.19
Construction Sites	1,246.15	0.17
Mixed Forests	1,172.18	0.16
Marshes	798.14	0.11
Highways, Railways and Related Fields	598.13	0.08
Water Bodies	504.01	0.07
Unirrigated Fruit Fields	441.01	0.06
Continuous City Structure	248.52	0.03
Waterways	52.32	0.01

Source: (Niğde Land Use, 2018)

The total land use area in the Bor district is 152,209 hectares, with 2,931 hectares of settlement area. About all of the Bor district is composed of forest and semi-natural areas (54%) and agricultural lands (44%). The detailed land distribution of the district is given in the table below.

Table 6-42: Land Distribution of Bor District

Layer	Area (ha)	Percent (%)
Sparse Plant Areas	38,828.02	25.51
Unirrigated Arable Lands	35,962.91	23.63
Natural Grasslands	25,645.95	16.85
Pasture Lands	16,076.57	10.56
Continuously Irrigated Areas	13,649.72	8.97
Mixed Agricultural Fields with Natural Vegetation	6,773.14	4.45
Irrigated Mixed Agricultural Fields	3,767.12	2.47
Vineyards	2,262.34	1.49
Irrigated Fruit Areas	2,239.63	1.47
Plant Exchange Areas	2,195.64	1.44

Layer	Area (ha)	Percent (%)
Unirrigated Mixed Agricultural Lands	1,606.38	1.06
Discontinued Rural Settlements	995.63	0.65
Non-Continuous Settlements	904.25	0.59
Industrial and Commercial Units	356.66	0.23
Mineral Extraction Sites	343.68	0.23
Highways, Railways and Related Fields	190.42	0.13
Bare Cliff	144.83	0.10
Construction Sites	140.84	0.09
Unirrigated Fruit Fields	127.07	0.08

Source: (Niğde Land Use, 2018)

6.2.4.3 Village Level

The project area is located 26.5 km by bird flight from Niğde city center and 13.3 km by bird flight from Bor town center. It is 1.41 km away from Seslikaya neighborhood, which is the closest sensitive building.

Within the scope of the project, 5 m of health protection band has been determined within the EIA area of 201.6 ha, and the determined health protection band will also be used as the building approach distance in zoning plans.

The Project area is classified as IV. class lands and determined as treasury land. In the parcels of pasture quality within the borders of Niğde-Bor Energy Specialized Industrial Zone where the project site is located, with the letter dated 01.06.2018 and numbered 7112 of the Niğde Governorship Revenue Office National Real Estate Directorate, a change in qualification was made, and its registration was carried out in the name of the treasury. In this context, the entire project area remains within the treasury land.

6.2.5 Economy and Livelihoods

6.2.5.1 Introduction

This section of the report represents primary and secondary economic activities, ecosystem service usage, employment trends, and issues related to economy and livelihoods of the AoI. The data presented in this section is gathered by the reports of TURKSTAT and Turkish Employment Agency, in addition to the Community Level Surveys and Household Surveys. Economy and employment are key social components to understand the livelihood conditions of the local community and of the economic trends that are occurring. In this section, economy, and employment trends of the Niğde province and the Bor district are presented.

6.2.5.2 Province and District Level

Economic activities and sectors

The economy of Niğde is based on agriculture—70% of the active population lives on agriculture. Besides agricultural production, leather industry is another main economic activity in the province. Especially in the Bor district, agriculture and leather industry are two primary sectors that mark the economic structure.

Table 6-43: Land shares in total agricultural land of Bor

Land	Share in total agricultural land (decares)	Percentage
Agricultural fields	4,962,720	86.4%
Fruit land	50,220	8.8%
Vegetable land	13,310	2.3%

Source: (Bor Municipality, 2022)

According to The Bor Municipality 2022 Activity Report (Bor Municipality, 2022), the ratios of agricultural products in agricultural lands are as follows:

- Wheat: 123,000 decares 49.9%
- Barley: 75,000 decares 30.4%
- Rye: 173,770 decares 5.6%
- Sugar beet: 11,940 decares 4.9%
- Grain Corn: 3,440 decares with 1.4%
- Silage Corn: 3,150 decares with 1.25%

Fruit production is also widespread in Niğde and Bor. Apple is the main product that mark up the fruit production of the district. The ratios of fruit crops are as follows:

- Apple: 40,950 decares 81.5%
- Apricot: 2,150 decares 4.3%
- Pear, Cherry, Walnut etc. 14.2 %

The ratios of vegetable crops in the district are as follows:

- Cabbage: 5,240 decare 39.4%
- Melon: 2,640 decares 19.8%
- Tomato: 1,190 decares 8.9%
- Vineyard Land: 14,000 decares 2.5%.

Besides agriculture and leather industry, animal husbandry is an important source of income in the Bor district. The number of bovines, sheeps, goats, egg poultry businesses, and beehives in the Bor district are given in Table 6-44.

Table 6-44: Number of animals in the Bor district

District	Bovines	Sheeps	Goats	Egg Poultry Business	Beehives
Bor	48,088	124,596	12,032	214,464	16,715

Source: (Bor Municipality, 2022)

Employment

As of 2022, the labour force participation rate of TR71(Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir) Region for the population aged 15 and higher is 49.9%, and the employment rate is 45.2% whereas the unemployment rate of TR71 region is 9.4% (TURKSTAT, 2022).

Table 6-45: TR71 (Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir) Labour Force Indicators

TR71	Total	Male	Female
Labour force participation rate (%)	49.9	70.3	30.6
Employment rate (%)	45.2	64.7	26.8
Unemployment rate (%)	9.4	8	12.3

Source: TURKSTAT, 2022

Gender inequality in employment and labour force participation in Niğde is apparent since there is a big difference in the rates for the male and female populations. This inequality might indicate and reinforce the predominance of the existing male-breadwinner-female-homemaker model of households.

6.2.5.3 Village Level

Information on the economic structure of the villages in the Project area is presented in this section. The main components of the economic system are average household income, main economic sectors, animal husbandry and agricultural production. The data on these components are obtained through the surveys.

Average household income in villages and changes in income in the last five years and the reasons behind the change are provided in the table below.

Table 6-46: Average household income

Province	District	V/N	Average household income (TRY)	Changes in income in the last five years	Reasons of change
Niğde	**Bor**	Emen	10,000-15,000	Same	There have been increases in wages and product prices, but disposable income remains the same due to high inflation and living costs.
		Seslikaya	10,000	Same	There have been increases in wages and product prices, but disposable income remains the same due to high inflation and living costs.

Province	District	V/N	Average household income (TRY)	Changes in income in the last five years	Reasons of change
		Badak	10,000	Same	There have been increases in wages and product prices, but disposable income remains the same due to high inflation and living costs.

The monthly minimum wage in Türkiye, as of May 2023, is determined as 8,506 TRY[13]. The average household income in the villages of the AoI is 10,000 TRY monthly. While the monthly wages increase in Türkiye generally, considering the high inflation rates and increased prices, there has been no increase in purchasing power. In fact, the purchasing power has been acutely decreasing in Türkiye in the latest years.

Economic activities

The primary, secondary and tertiary income sources of the settlements located in the Area of Influence of the Project are given in Table 6-47.

Table 6-47: Income sources of the villages of the AoI

Province	District	V/N	Primary Income Source	Secondary Income Source	Tertiary Income Source
Niğde	**Bor**	Emen	Animal husbandry	Agricultural production	Retirement pension
		Seslikaya	Agricultural labour (daily work)	Agricultural production	Retirement pension
		Badak	Animal husbandry	Agricultural production	Retirement pension

In all three villages, people engage in agricultural production and most people are retired at the same time. In Emen and Badak, animal husbandry is the primary income source. It is stated that people switched from sheep and goat breeding to cattle breeding in the past years since cattle do not need to be grazed in the lands. Hence, cattle breeding as animal husbandry is dominant. In Seslikaya, most people work as daily agricultural workers and

[13] By time of the social field study, the monthly minimum wage in Türkiye was 8,506. On 20 June 2023, the monthly minimum wage is determined as 11,402 TRY.

live on daily allowances. There are also 4 Afghan households residing in Seslikaya. One of these families came to the village to work as a shepherd and the other families are the relatives of this family.

As of August 2023, 1 family became o Turkish citizen. Currently none of the families are working as shepherd or agricultural worker and they are engaged with small size cattle breeding.

Occupational Distribution

The occupational distribution of the population of the villages located in the Area of Influence of the Project are given in the table below.

Table 6-48: The distribution of V/N population by occupation

Province	District	V/N	Farmer (%)	Salaried employee (%)	Retired (%)	Business owner (%)	Daily worker (%)	Unemployed (%)
Niğde	**Bor**	Emen	50	10	30	0	5	5
		Seslikaya	0	8	46	0	46	0
		Badak	60	5	30	0	3	2

A considerable proportion of the population is retired in all villages. In Emen and Badak, the majority are farmers working in their own agricultural lands, while most people work as casual workers in agriculture in Seslilkaya.

Whether there are changes in job opportunities in the villages in the last five years were asked during social field study. The answers are presented in the table below.

Table 6-49: Changes in job opportunities in the V/Ns in the last five years

Province	District	V/N	Change	Reasons of change
Niğde	**Bor**	Emen	↓	Decline in animal husbandry (sheep and goat breeding)
		Seslikaya	↑	Increased beet production
		Badak	↓	Decline in animal husbandry (sheep and goat breeding

In Emen and Badak villages, people stated that they either sold their sheep and goats or switched to cattle breeding. Such changes in the livestock sector are due to insufficient grazing lands because of drought in the past years and the easiness of the maintenance of cattle breeding. In Seslikaya, increased beet production brought job opportunities.

Animal Husbandry

Animal husbandry is one of the primary economic sectors in the villages. Poultry is common for almost all households for household consumption. People still do sheep and goat breeding; however, it is stated that the people who still do animal husbandry switched to cattle breeding. One reason is that cattle do not need grazing, so their maintenance is more manageable than sheep and goats. Another reason is that in the past years, drought in the lands resulted in the loss of grazing areas, which means there are no sufficient grazing lands for sheep and goat breeding.

The numbers of animals in the villages are provided in the table below.

Table 6-50: The numbers of animals for animal husbandry in the V/Ns

Province	District	V/N	Number of cattles	Number of sheep and goats	Number of poultry	Number of beehives
Niğde	**Bor**	Emen	300	1500	150	0
		Seslikaya	120	1000	200	0
		Badak	800	2000	500	0

Agricultural Production

The primary economic sector in the Bor district is agricultural production. The annual number of agricultural products produced in the villages are presented in the table below.

Table 6-51: The number of agricultural products produced in the V/Ns annually (tonne)

Province	District	V/N	Wheat	Barley	Sugar Beet	Corn	Clover
Niğde	**Bor**	Emen[14]	Unknown	Unknown	Unknown	Unknown	Unknown
		Seslikaya	2,000	2,000	5,000	7,000	Unknown
		Badak	500	Unknown	4,000	6	5

Ecosystem Service Usage

Ecosystem services can be used for income sources, household consumption, and hobby purposes. Details of the ecosystem usage for each settlement located in the AoI is provided in the table below.

[14] The Mukhtar of the Emen village does not know the production amounts of the agricultural products; therefore, the products are noted as unknown when there are no available data.

Table 6-52: Ecosystem service usage in the V/Ns

District	V/Ns	River (Existence, Usage, Fish Type, İrrigation Usage, Household numbers using for irrigation)					Forest (Existence, Usage Purpose, Wood Picking, Income from Wood Picking, Wood Picking for Household Consumption)					Plant picking (thyme, mushroom, etc.) (Existence, Using for income sources, Using for household consumption)			Hunting (Existence, Hunting for household consumption, Animals)			Picnic area (Existence)	Cultural area (Existence, Detail)		Spring water (Existence, Number of households using)		Well water (Existence, Usage Purpose, Number of households using)			Pasture lands (Existence, Usage Purpose, Number of households using)		
Bor	**Emen**	No	-	-	-	-	No	-	-	-	-	No	-	-	No	-	-	No	Yes	Archaological area / ~2.5 km to the Project Area / out of the impact area of the Project and away from access roads to the Project area	No	-	Yes	Drinking, irrigation, potable water	All	Yes	-	70
	Seslikaya	No	-	-	-	-	No	-	-	-	-	No	-	-	Yes	5	Duck, rabbit	No	No	-	No	-	Yes	Drinking, irrigation	All	Yes	Grazing	10
	Badak	No	-	-	-	-	No	-	-	-	-	No	-	-	No	-	-	No	No	-	No	-	Yes	-	All	Yes	-	-

6.2.6 Vulnerable Groups

6.2.6.1 Introduction

This section of the report represents vulnerable groups in the AoI including province and settlement level. The Mukhtars were asked to identify vulnerable groups in their villages. The existence of vulnerable groups and services specially provided to these groups are given in this section.

6.2.6.2 Province and District Level

Social assistance and solidarity foundations linked with the Provincial Governorship provide support to vulnerable groups at the provincial level. Every district in Niğde has a Social Assistance and Solidarity Foundation (SYDV) affiliated with The Ministry of Family and Social Services established to meet the needs of vulnerable groups and people in need. The list of social assistance and solidarity foundations in the Niğde province are as follows:

- Altunhisar Social Assistance and Solidarity Foundation (SYDV)
- Merkez Social Assistance and Solidarity Foundation (SYDV)
- Bor Social Assistance and Solidarity Foundation (SYDV)
- Çamardı Social Assistance and Solidarity Foundation (SYDV)
- Çiftlik Social Assistance and Solidarity Foundation (SYDV)
- Ulukışla Social Assistance and Solidarity Foundation (SYDV)

In addition to social assistance and solidarity foundations, there are also social services centres in every district responsible for the supply and maintenance of social services.

Children and Elderly Population

While age does not create vulnerability by itself, certain problems experienced commonly by a particular group of people due to their age create social vulnerability. In this case, older adults may be considered a vulnerable group regarding physical, social, economic, and environmental factors. It is observed that the majority of the population within the Project impact area is older adults. Considering the relatively lower education levels of the older population and their difficulties in adapting to the changes arising from the Project, this group is considered as a vulnerable group.

In the provincial level, city municipalities carry out various projects in order to provide social services to older population. For example, within the scope of the "Şefkat Çınarları Projesi (Compassion Plane Trees Project)" carried out by the Municipality of Niğde, the needs of people over the age of 65 in need of help will be met with mobile teams to be formed. The Municipality carries out the project under the Niğde Governorate's coordination and is supported by the Ministry of Family and Social Services Elderly Support Program (YADES).

In cities, assisted living is one of the services provided by public and private institutions. Assisted living is a centre that provides a social life where older adults, who have difficulty sustaining their lives above a certain age, are cared for 24 hours a day and life. In Niğde, there are only one public institution that provide assisted living for older adults. *The Ahmet Kuddusi Care and Rehabilitation Center for Older Adults* is located in the Bor district and affiliated with The Ministry of Family and Social Services Niğde Provincial Directorate.

When it comes to children as a vulnerable group, The United Nations Convention on the Rights of the Child (UNCRC) recognizes children's special vulnerability, emphasizing the need to provide special care and protection to children based on their physical and mental immaturity (OECD, Changing the Odds for Vulnerable Children: Building Opportunities and Resilience, 2019).

There are only 1 Children's Homes as a public institution located in the central district of Niğde, affiliated with The Ministry of Family and Social Services Niğde Provincial Directorate.

People with disabilities

Metropolitan and district municipalities provide social services for people with disabilities. All municipalities have a unit or directorate responsible for social services provided for vulnerable groups. The type and the scope of these social services vary according to the different numbers and needs of people with disabilities living in the provinces and districts.

There is no provincial-level data on the population of people with disabilities living in Niğde. In Niğde, there are 2 institutions affiliated with The Ministry of Family and Social Services Niğde Provincial Directorate that provide special care for people with disabilities. These institutions are as follows:

- Niğde Barrier-Free Living Care, Rehabilitation and Family Counseling Centre
- Altunhisar People with Mental Disabilities Rehabilitation Centre

The Bor Municipality has 6 service units. The Directorate of Culture and Social Affairs is responsible for Social Assistance Services.

Unemployed people and people living in poverty

According to the Labour Market Research Niğde Province 2022 Result Report by Turkish Employment Agency, as of September 2022, the number of registered unemployed people in Niğde is 16,584. 53% of this number consisted of women, and the unemployment rate of young people aged 18-24 is 28.8 per cent (Turkish Employment Agency, 2022). It can be said that the number of registered unemployed people has increased compared to the 2021 number of 14,091 (Turkish Employment Agency, 2021). However, the percentage of unemployed younger population has decreased from 39.6% in 2021 to 28.8% in 2022 despite the increased number of registered unemployed people.

As of January 2023, the poverty line is determined as 30,379 TRY, and the hunger threshold is 8,782 TRY. The persistent at-risk-of-poverty rate, calculated using four-year panel data, includes individuals who have been poor at 60% of equivalent household disposable median income in the last year and for at least two of the previous three years. According to 2021 Income and Living Conditions Survey Regional Results, the persistent at-risk-of-poverty rate increased by 0.1 percentage points compared to the previous year and became 13.8% in Turkey (TURKSTAT, 2022). TR71 Region (Aksaray, Kırıkkale, Kırşehir, Nevşehir, Niğde) has the ratio of relative at-risk-of-poverty-rate between 8.0% and 10.9% (TURKSTAT, 2022).

6.2.6.3 Village and Neighbourhood Level

The number of individuals identified as vulnerable in the villages through the HHS is presented in the table below

Table 6-53: Vulnerable groups in the V/Ns

<table>
<tr><th>District</th><th>Settlement</th><th>Illiterate</th><th>Cannot speak Turkish</th><th>Seasonal worker</th><th>Mobile beekeeper</th><th>Afghan Residents</th><th>Woman headed households</th><th>Living with social aid</th><th>At education age but not involved in education</th><th>Bedridden Patients</th><th>Living alone over 70 years old</th><th>People with physical disabilities</th><th>People with mental disabilities</th><th>Earthquake victims</th><th>Persons engaged in unauthorized agricultural activities on public lands</th><th>Persons with unauthorized structures on public lands (house, workplace, barn, hut, etc.)</th></tr>
<tr><td rowspan="3">Bor</td><td>Emen</td><td>1</td><td>0</td><td>5</td><td>0</td><td>0</td><td>3</td><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>6</td></tr>
<tr><td>Seslikaya</td><td>5</td><td>0</td><td>35</td><td>0</td><td>4 households (approximately 20 people in total and 5 of them became Turkish citizen)</td><td>6</td><td>5</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>2 households (temporary)</td><td>2</td><td>0</td></tr>
<tr><td>Badak</td><td>2</td><td>0</td><td>15</td><td>0</td><td>0</td><td>7</td><td>4</td><td>0</td><td>2</td><td>0</td><td>1</td><td>0</td><td>20 people (temporary)</td><td colspan="2">20</td></tr>
</table>

6.2.7 Education

6.2.7.1 Introduction

This section provides baseline information on the Project impact area, including education facilities and personnel, quality of the education, literacy levels, access to higher education and local challenges. Baseline information is presented from the provincial to the Project impact level. The secondary sources and the Ministry of Education's Reports are used for the provincial and district level data and primary information is used for the village level education baseline.

6.2.7.2 Province and District Level

Education facilities and personnel

According to the National Education Statistics Formal Education 2021/2022 data by the Ministry of National Education, there are 568 schools, 80,303 students, 5,583 teachers and 4,385 classrooms in Niğde. The selected education indicators of the province are presented in the table below.

Table 6-54: Formal Education Indicators of Niğde

2021-2022 Academic Year	Public	Private
Total Number of Students	78,135	2,168
Total Number of Teachers	5,345	238
Total Number of Schools	533	35
Total Number of Classrooms	4,175	210
Number of Schools with Boarding Houses	31	0
Number of Boarding Students	4,171	0
Preschool		
Number of Students	6,631	865
Number of Teachers	382	59
Number of Schools	191	22
Number of Classrooms	349	76
Number of Students Falling to Schools	35	39
Number of Students Falling to Teachers	17	15
Number of Students Falling on The Classroom[15]	19	11
Primary school		
Number of Students	22,209	417
Number of Teachers	1,404	51

[15] Since primary and lower secondary school students can study in the same school and use the same class, the number of students per classroom is calculated jointly.

2021-2022 Academic Year	Public	Private
Number of Schools	161	4
Number of Classrooms	1,385	37
Number of Students Falling to Schools	138	104
Number of Students Falling to Teachers	16	8
Number of Students Falling on The Classroom	16	11
Lower Secondary School		
Number of Students	22,080	402
Number of Teachers	1,892	50
Number of Schools	125	3
Number of Classrooms	1,385	37
Number of Students Falling to Schools	177	134
Number of Students Falling to Teachers	12	8
Number of Students Falling on The Classroom	16	11
General Secondary Education (High School)		
Number of Students	19,722	484
Number of Teachers	970	78
Number of Schools	30	6
Number of Classrooms	613	50
Number of Students Falling to Schools	657	80
Number of Students Falling to Teachers	20	6
Number of Students Falling on The Classroom	32	10
Vocational and Technical Secondary Education		
Number of Students	7,493	0
Number of Teachers	697	0
Number of Schools	26	0
Number of Classrooms	398	0
Number of Students Falling to Schools	288	0
Number of Students Falling to Teachers	11	0
Number of Students Falling on The Classroom	19	0

2021-2022 Academic Year	Public	Private
Special Education	**Public + Private**	
Number of Students (Primary School)	106	
Number of Students (Lower Secondary School)	69	
Number of Allocated Classrooms (Lower Secondary School)	27	
Number of Allocated Classrooms (Primary School)	52	
Transporting and Transported Education (Primary+Lower Secondary School)	**Public + Private**	
Number of Transporting Central Schools	52	
Number of Transported Schools and Transported Settlement Places without a School	53	
Number of Total Transported Primary School Students	355	
Number of Total Transported Lower Secondary School Students	829	
Transporting and Transported Education (Upper Secondary Education)	**Public + Private**	
Number of Transporting Central Schools	38	
Number of Transported Students (Upper Secondary Education)	1,405	

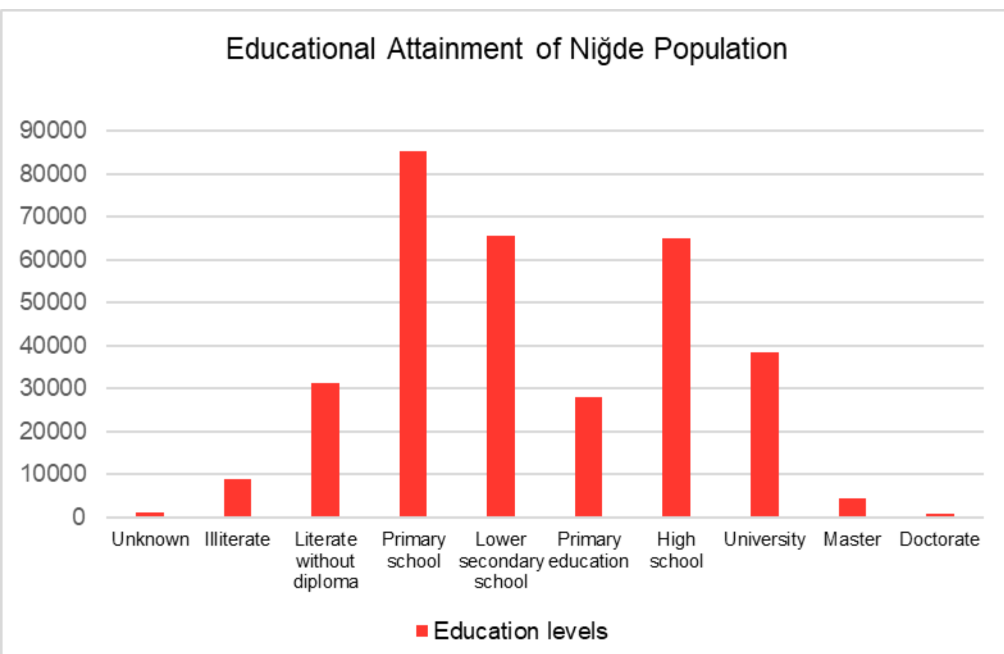
Source: The Ministry of National Education, 2022

Quality of education

No information and data are available on the quality of education at the district and province levels. There are international statistics available on the quality of education comparing different countries. Turkey ranks 36 among 41 OECD countries according to the OECD Better Life Index (OECD, 2022).

Literacy and education levels

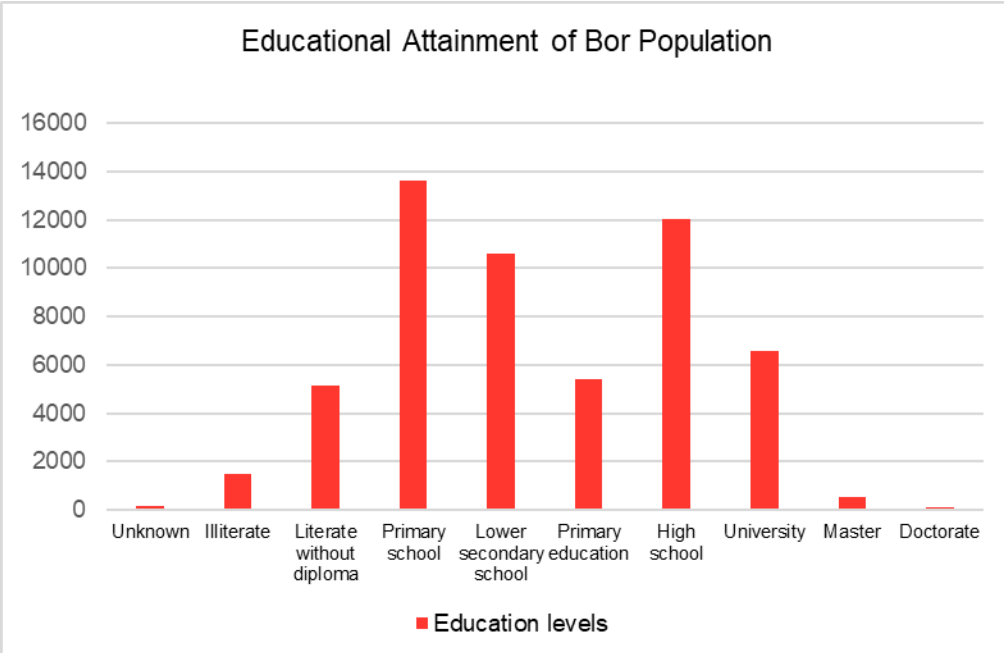
The proportion of both province and district population by literacy and educational levels are presented in the figures and tables below.



- In Niğde, primary school graduates are the largest group of people in the province. Similar to the primary school graduates, lower secondary school and high school graduates are also high.

Figure 6-37: Educational Attainment of Niğde Population

Source: (TURKSTAT, Population and Housing Census, 2022)



- Bor has a similar picture to Niğde in terms of the educational attainment of the district population. While primary school graduates are the highest in numbers, lower secondary school and high school graduates are also high.

Figure 6-38: Educational Attainment of Bor Population

Source: (TURKSTAT, Population and Housing Census, 2022)

Access to higher education

Niğde Ömer Halisdemir University is the only university in the Niğde province. The total number of students as of June 2023 is 24,714, and the total number of academics is 1,001. Established in 1992, the university has 14 faculties, 1 state conservatory, 4 institutes, and 6 vocational schools of higher education. There are 101 undergraduate and 105 graduate programs at the university. Bor Vocational School and Bor Halil Zöhre Ataman Vocational School are two vocational schools located in the AoI, Bor district.

6.2.7.3 Village and Neighborhood Level

Education facilities and personnel

The existence of schools in the villages/ were asked to Mukhtars during the field study. The schools and their proximity to the V/Ns are presented in the table below.

Table 6-55: Schools in the V/Ns

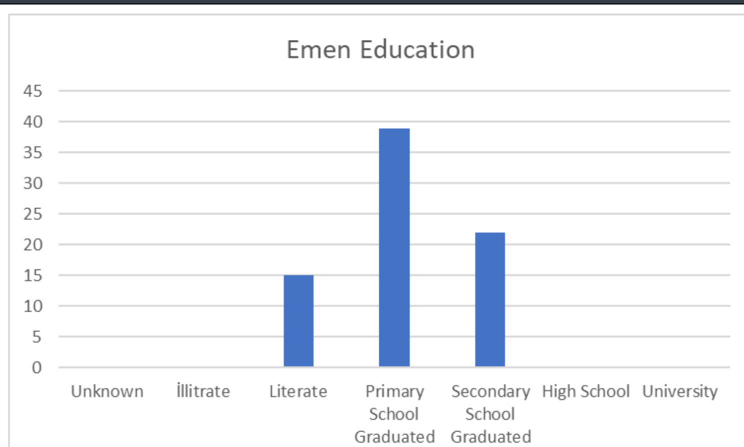
District	V/N	Does V/N have a preschool?	Nearest school and proximity	Does V/N have a primary school?	Nearest school and proximity	Does V/N have a lower secondary school?	Nearest school and proximity	Does V/N have a secondary school (high school)?	Nearest school and proximity
Bor	**Emen**	No	Bor – 13 km	No	Bor – 13 km	No	Bor – 13 km	No	Bor – 13 km
	Seslikaya	No	Kemerhisar – 9 km	No	Kemerhisar – 9 km	No	Kemerhisar – 9 km	No	Bor – 18 km
	Badak	Yes		Yes		No	Kemerhisar – 19 km Bor – 23 km	No	Kemerhisar – 19 km Bor – 23 km

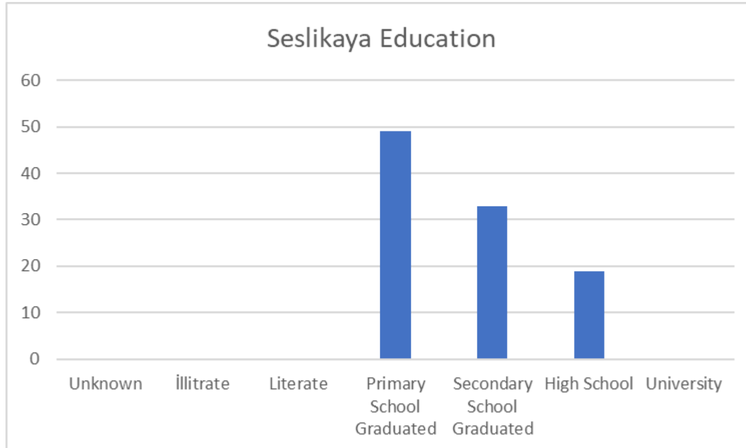
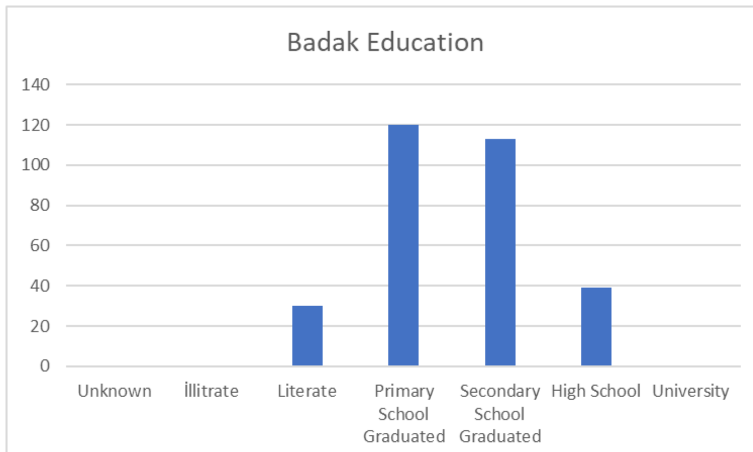
Transported education is the education carried out in villages with low populations and dispersed settlements by the daily transportation of students within the scope of compulsory education to central schools in larger settlements such as districts and provinces (The Ministry of National Education, 2022). As in the majority of villages in Türkiye, there is transported education in the villages of Emen, Seslikaya and Badak since the student numbers are lower compared to the neighbourhoods in the city centre.

Education Levels

Education levels of the village population was gathered from both the TURKSTAT data and the Mukhtars provided in the table below.

Table 6-56: Education levels of the V/N population

District	V/N	Education Levels
Bor	Emen	

District	V/N	Education Levels
	Seslikaya	
	Badak	

Source: (TURKSTAT, Population and Housing Census, 2022)

6.2.8 Health

6.2.8.1 Introduction

Health issues and facilities aim at identifying the main health determinants in the AoI, the presence of health structures and the level of service provided to local communities. This section aims to provide information on health indicators of Niğde, Bor, and the local Area of Influence. The baseline information presented in this section has been gathered from household surveys, key informant interviews and relevant secondary data.

6.2.8.2 Province and District Level

Healthcare facilities and personnel

According to the Provincial Heath Directorate of Niğde, 12 institutions provide health services in Niğde. The city has 5 State Hospitals, 1 Private Hospital, 1 Oral and Dental Health Centre, 2 Dialysis Centres, 1 Medical Centre, 1 Physical Therapy and Rehabilitation Training and Research Hospital and 1 Training and Research Hospital. The total number of beds in the province is 928. A total of 3,331 health personnel work in Niğde and there are 1.3 doctors per thousand people.

Some selected health-related statistics of Niğde Province are presented in Table 6-57.

Table 6-57: Health Indicators of Niğde

Health Indicators	Quantity
Number of Hospitals	8
Number of Bed	928
Number of Hospital Bed per 10,000 Population	25.5
Number of Qualified Bed	598
Number of Intensive Care Unit Bed	137
Proportion of Qualified Bed[16]	75.6
Intensive Care Unit Bed per 10,000 Population	3.8
Number of Family Medicine Unit	127
Population per Family Medicine Unit	2,864

Source: (General Directorate of Health Service & General Directorate of Public Health, 2020)

There are two hospitals located in the Bor district:

- Bor State Hospital
- Bor Physical Therapy and Rehabilitation Training and Research Hospital

6.2.8.3 Village Level

During the social field study, the quality of the healthcare services was questioned at the local level. It was informed that there are no primary healthcare units in Emen, Seslikaya and Badak. Doctors make visits to the villages in every 15 days. Yet, doctors' visits are insufficient since such service is only available for a few days a month.

6.2.9 Utilities, infrastructure, and services

6.2.9.1 Introduction

This section provides baseline information on infrastructure and services in the Project impact area, including housing, water sources, wastewater and sanitation, electricity, heating source, waste disposal, fire services, police service, telecommunication, transportation and public space and recreation. Infrastructure and services are key social components that allow having an understanding of the type of infrastructures present in the AoI, of the access for local communities and of the level of services provided. Baseline information is presented on Niğde and Bor district located in the AoI through the information gathered through the secondary and the primary data.

[16] Intensive care unit beds are not included.

6.2.9.2 Province and District Level

Housing

The data for the building permit statistics of the Niğde Province according to Building Permit Statistics, I. Quarter: January-March (2023) is presented in the table below.

Table 6-58: Data for the Building Permit Statistics of the Niğde Province

Number of Buildings by Building License	Number of Flats by Building License	Total floor area According to Building License (m^2)	Number of Buildings by Occupancy Permit	Number of Flats by Occupancy Permit	Total floor area According to the Occupancy Permit
227	255	43,307	203	312	155,650

Source: (TURKSTAT, Building Permit Statistics, I. Quarter: January-March, 2023)

Other detailed data about the housing of the Niğde province is also presented in the tables below.

Table 6-59: Number of Households by Ownership Status of Housing Unit

Province	Number of households residing in dwellings	Owner (%)	Tenant (%)	Other (%)	Unknown
Niğde	112,323	71.1	18.9	9.0	1.0

Source: Turkish Statistical Institute, 2021

Table 6-60: Number of Households by Number of Rooms in the Housing Unit

Province	Number of households residing in dwellings	Average number of rooms in dwellings	Number of Rooms (%)			
			1-2	**3**	**4**	**5+**
Niğde	112,323	3.6	7.0	33.4	52.7	6.9

Source: Turkish Statistical Institute, 2021

Water sources (drinking, utility, irrigation)

The water sources are divided into surface water and groundwater. Streams, natural lakes, ponds and reservoirs are surface waters. According to the Environmental Status Reports, some selected stream data of Niğde province is presented in the table below.

Table 6-61: Rivers of Niğde Province

Stream Name	Provincial Boundaries in Length (km)	Flowrate (m^3/sec)	Tributary Stream
Tabakhane Stream	27	1.258	
Uzandı Stream	20	0.145	
Ören Stream	18	0.152	
Ömerli Stream	17	0.690	
Murtaza Water	12	0.180	

Stream Name	Provincial Boundaries in Length (km)	Flowrate (m^3/sec)	Tributary Stream
Uluağaç Stream	22	0.155	
Kovalık Stream	10	0.129	
Melendiz Creek	33.4	1.875	Uluırmak
Karapınar Stream	29	0.446	Kızılırmak
Ecemiş Creek	30	7.887	Seyhan
Çakıt Water	36	7.038	Seyhan

Source: Niğde Province Environmental Status Report, 2021

According to the Niğde Province 2021 Year Environmental Status Report (2022), all the drinking water supply to Bor District Center is provided from underground sources and currently, 13 wells are active in the district where all drinking water is taken from.

In Niğde, there are 2 Organized Industrial Zones: Niğde Organized Industrial Zone and Boron Mixed Organized Industrial Zone. The areas where the industry spreads in the Niğde province are generally Niğde Organized Industrial Zone, Boron Mixed Organized Industrial Zone, Niğde Central Ata Industry, and small industrial enterprises.

Organized industrial zones use groundwater as the water source. In industrial sites, mains water system is used, and wastewater is connected to sewerage systems.

Wastewater and Sanitation

Niğde province sewerage network is collected by the main collector line, and after the treatment process at the Municipal Wastewater Treatment Plant in Sarıköprü, Bucakçayır, it is given to Akkaya dam for agricultural irrigation purposes. (Niğde Province 2021 Environmental Status Report, 2022).

In the one unit belonging to Niğde Organized Industrial Zone, located within the boundaries of the Merkez District of the province, there is a (Physical-Biological) wastewater treatment plant. Within the borders of Bor District, there is 1 (Physical-Biological-Chemical) wastewater treatment plant belonging to the Boron Mixed Organized Industrial Zone. The amount of discharged wastewater from Niğde OSB is approximately 766,500 m^3/year, and that of discharged wastewater from Bor Mixed OIZ is about 548,000 m^3/year (Niğde Province 2021 Environmental Status Report, 2022).

Niğde province sewerage network is collected with the main collector line, treated in the Municipal Wastewater Treatment Plant in Sarıköprü, Bucakçayır and connected to Akkaya dam for agricultural irrigation purposes after the treatment process.

Table 62: Wastewater Recovery and Reuse in Niğde in 2020

WASTEWATER DISPOSAL AFTER TREATMENT							
Amount of wastewater discharged to receiving bodies (m^3/year)	Amount of wastewater discharged to sewerage system (m^3/year)	Municipal Reuse (m^3/year)	Agricultural Reuse (m^3/year)	Industrial Reuse (m^3/year)	Environmental/Ecological Reuse (m^3/year)	Water Supply to Another Facility (m^3/year)	Total (m^3/year)
13,786,330	40,470	0	0	227,480	0	0	14,054,280

Source: (Ministry of Environment, Urbanization and Climate Change, 2021)

The infrastructure data for wastewater, drinking water, potable water, and sanitation of the Niğde province as of 2020 are presented in the tables below.

Table 6-63: The Infrastructure Data for Wastewater and Sanitation of Niğde Province

The number of wastewater treatment plants	The ratio of Municipal Population Provided with Wastewater Treatment Service to Total Municipal Population (%)	Daily wastewater treatment amount per person (L/cap.day)	The ratio of Municipal Population Provided with Sewage Service to Total Municipal Population (%)
9	67.1	144	87

Source: Turkish Statistical Institute, 2020

Table 6-64: The Infrastructure Data for Drinking and Potable Water and Sanitation of the Niğde province

The number of drinking and potable water treatment plants	The ratio of Municipal Population Provided with Drinking and Potable Water Network to Total Municipal Population (%)	Total Amount of Water Drawn for Drinking and Potable Water Network (Thousand M3/Year)	The ratio of Municipal Population Provided with Drinking and Potable Water Treatment Services to Total Municipal Population (%)	The amount of Water Treated in Drinking and Potable Water Treatment Plants (Thousand M^3/Year)
1	99	23,320	12	3,942

Source: Turkish Statistical Institute, 2020

Electricity

Turkey Electricity Distribution Inc. (TEDAŞ) is the state economic enterprise responsible for the distribution and retail sale of electrical energy in Turkey. TEDAŞ consists of a central organization and a provincial organization.

TEDAŞ provincial organization was privatized by dividing it into 21 regional electricity distribution companies. For the Niğde Province, the supply and the distribution company is MERAM Electricity Distribution Inc. Co. (MEDAŞ).

MERAM Electricity Distribution Inc. Co. provides 8.5 billion kWh of electricity distribution service to its 1.5 million subscribers in 6 provinces and 65 districts, 331 towns, 1,379 villages and 512 (village-affiliated) plateaus, including Konya, Aksaray, Niğde, Kırşehir, Nevşehir and Karaman.

The total electricity consumption is 1,256,217 megawatt-hour (MWh), and the total electricity consumption per capita is 3,470 kilowatt-hours (Kwh) in the Niğde province (TURKSTAT, Energy Statistics, 2020).

Heating source

According to the Natural Gas Sector Report for 2022 of the Energy Market Regulatory Authority, in 2022 the national natural gas consumption amount was 53,521.06 million standard cubic meters (Sm^3) in Türkiye.

In 2022, 120.37 million Sm^3 of pipe gas, 0.033 million Sm^3 of liquefied natural gas (LNG), 2.8 million Sm^3 of Compressed Natural Gas (CNG), and a total of 123.2 million Sm^3 of natural gas were consumed in Niğde (Energy Market Regulatory Agency, 2022).

Waste disposal

Solid wastes in the Niğde province are transferred to the Solid Waste Landfill facility in Hıdırlık locality, which is 7 km from the centre of the city. 3 lots are ready for use in the facility area, and 1st Lot is currently used in the facility area.

The number of waste treatment facilities in Niğde province as of 2021 is presented in the table below.

Table 6-65: Waste Management Facilities in Niğde

Facility Type	Number
Solid Waste Disposal Facilities (Municipal)	1
Licensed Packaging Waste Collection, Separation and Recovery Facilities	3
Hazardous Waste Recovery Facilities	7
Waste Oil Recovery Facilities	2
Waste Vegetable Oil Recovery Facilities	1
Waste Battery and Accumulator Recovery Facilities	0
End-of-Life Tire Recovery Facilities	1
Medical Waste Sterilization Facilities	1
Non-Hazardous Waste Recovery Facilities	18
Waste Electrical and Electronic Goods Processing Plants	5
Mine Waste Disposal Facilities	1
Excavated Soil, Construction and Demolition Waste Storage/Recycling Facility	0

Source: (Provincial Directorate of Environment, Urbanization and Climate Change, 2022)

Fire service

According to the Laws of Municipalities, it is the duty of municipalities to establish fire organizations. Under this law, Municipality of Niğde and district municipalities has fire organizations. According to the Niğde Municipality 2021 Year Activity Report, the Niğde Fire Department intervened a total of 1236 incidents in 2021, including 547 fires, 101 traffic accidents, 397 live rescue, and 24 natural events.

The services provided by the Niğde Fire Department are as follows:

- Fire Fighting Service (Workplace, Housing, Vehicle, Factory, Warehouse, Stubble, Workshop fires etc.),
- Rescue Service (Response to incidents requiring rescue),
- Rescue in traffic accidents (The trapped casualty is rescued as quickly as possible and handed over to the medical teams),
- Rescue of all living beings (trapped animals such as cats, dogs, birds, etc.)
- Supporting all kinds of search and rescue in the field, above water and underwater
- First Aid Service
- Protection
- Response to floods (Water discharge, rescue, etc.) service
- Support service to rescue efforts in natural disasters and extraordinary situations.

Police

In Turkey, internal security is carried out by the general directorate of security and the police force affiliated with it. There is Niğde Provincial Police Department, and Bor District Police Department. In addition, there are gendarmerie stations affiliated to the gendarmerie general command in areas outside the jurisdiction of the police, which is in service as Bor District Gendarmerie Command in the Bor district.

Telecommunications

Turkish Telecommunication Anonymous Company (Türk Telekom) was established by the state to provide telecommunication services to Turkey. It provides services in broadband internet, fixed telephone, mobile and digital TV broadcasts. Niğde is also provided with the same services. In addition to Türk Telekom, Turkcell and Vodafone Türkiye are the other two main telecommunication companies that provide services in Türkiye.

Transport (incl. accidents) and road infrastructure (port and harbours, airport)

Highway

Niğde is affiliated with the 6th Regional Directorate of Highways, which has a coverage area of 52,560 km^2 and includes Kayseri, Kırşehir, Nevşehir, Niğde and Yozgat provinces within its borders and parts of Konya, Aksaray, Sivas, Kırıkkale, Malatya and Adana. According to the website of the 6th Regional Directorate of the General Directorate of Highways, 135 km motorway, 213 km state road, 245 km provincial road, and a total of 593 km of road are within the region of responsibility of the 6th Regional Directorate of Highways. The population of the TR71 region is 1,630,050. There are 51 people per km^2, and 72 vehicles per km^2. The number of registered vehicles within the borders of the region is 725,000.

Table 6-66: Road Network in Niğde Province

Road Network by Surface Type (km)								
	Asphalt Roads			Parquet	Stabilize	Soil	Other Roads	Network Length
	Asphalt Concrete	Surface Coating	Total					
Motorway	135	-	135	-	-	-	-	135
State Road	112	101	213	-	-	-	-	213
Provincial Road	53	192	245	-	-	-	-	245
Total	300	293	593	-	-	-	-	593

Source: (General Directorate of Highways, 2023)

Railway

Ulukışla - Boğazköprü Railway is 171,813 km long railway line, which is a conventional freight and passenger train route connecting the Konya - Yenice railway and the Ankara - Kars railway. Signalisation and electrification of Boğazköprü-Ulukışla-Yenice railway line was done between 2011-2016.

Airway

There are no airports in Niğde. Erkilet Airport in the Kayseri province is used for transportation to Niğde. The distance from Erkilet Airport to Niğde city centre is 125 km, and to Bor district is 150 km. According to the Republic of Turkey Ministry of Transport and Infrastructure, Erkilet Airport has 3000×45 m runway, 2 taxiways, 1 apron with 9 aircraft capacity, and a 22,000 m^2 terminal building. The domestic terminal has 3,000,000 passenger/year capacity. International flights are also available from Erkilet Airport. The international terminal has 2,500,000 passenger/year capacity.

Public space and recreation

According to the latest data of Turkish Statistical Institute (Library and Museum Statistics, 2021), in Niğde as of 2021 there are:

- 1 theatre with a total of 369 seats
- 5 cinema halls with a total of 439 seats
- 16 Public libraries with a total of 174,134 books inside
- 1 museum affiliated with the Ministry of Culture and Tourism with a total of 21,007 artifacts
- 0 private museums
- 2 ruins

According to the Niğde Province 2021 Year Environmental Status Report (2022) there are two national parks in the Çamardı district of Niğde, which are Aladağlar National Park and Demirkazık Wildlife Development Area.

6.2.9.3 Village Level

The existence and sufficiency of infrastructure, utilities, and services in the settlements derived from the results of the Community Level Surveys are presented in the table below.

Table 6-67: Infrastructure, utilities and services in the V/N

District	V/N	Electricity		Drinking water		Potable water		Irrigation water		Sewage system		Heating source		Waste disposal		Telecommunication services		Internet		Roads		Health units		School		Mosque		Cemetery		Transportation	
Bor	Emen	Yes	S	Yes	S	Yes	S	Yes	S	Yes	S	Stove	S	Yes	S	Yes	S	Yes	S	Yes	IN	No	IN	No	IN	Yes	IN	Yes	S	No	S
	Seslikaya	Yes	IN	Yes	IN	Yes	IN	Yes	IN	Yes	S	Stove	S	Yes	S	Yes	S	Yes	S	Yes	S	No	IN	No	IN	Yes	S	Yes	S	No	S
	Badak	Yes	IN	Yes	IN	Yes	IN	Yes	IN	Yes	S	Stove	S	Yes	S	Yes	IN	Yes	S	Yes	S	No	IN	Yes	S	Yes	S	Yes	S	No	S

*S: Sufficient; IN: Insufficient

Emen

- There are problems related to traffic and road in the village. The roads are narrow and not capable of carrying heavy vehicles. When construction vehicles pass, they damage roads. Also, due to the lack of speed limit control, vehicles pass fast through the roads, killing animals (sheep and chicken) and putting human and animal life in danger.
- Following such issues, certain mitigation measures have been implemented. Kalyon has set a 30 km speed limit for construction vehicles. Complaints regarding the traffic and high speed of heavy vehicles in the settlements are also followed up. Irrigation on the roads is being done by Kalyon to prevent dust. Road improvements and damage control are also being followed and made by Kalyon. Following mitigation and monitoring measures to be implemented by Kalyon for the Project are provided in the Impact Assessment.
- There are no health units in the village; doctors make visits once a month.
- The mosque minaret was destroyed during the 6 February 2023 earthquake. The villagers collected money for the repair but still need financial sponsorship.
- There are public transportation services from the village to the city centre and other villages. However, since most locals have cars, they currently do not face problems regarding transportation.
- The students in the village go to school via transported education. There are 20 students in the village in total. However, there is no transported education provided for preschool students.

Seslikaya

- There are not enough pasture lands for grazing. Seslikaya villagers share pasture lands in the Badak village.
- The village face problems due to sandstorms.
- There are electricity cuts 2-3 times a week.
- There are no health units in the village; doctors make visits once a month.
- There are public transportation services from the village to the city centre and other villages. However, since most locals have cars, they currently do not face problems regarding transportation.

Badak

- There are not enough pasture lands for grazing. Badak villagers share their lands with Seslikaya villagers.
- The villagers use well water for drinking and potable water and irrigation. The well water capacity is not enough for the summer period. Also, well water has become salty in the latest years, which reduces water quality.
- Due to the rises in animal feed prices, the villagers face financial problems—most have credit debts.
- There are telecommunication problems in the village.
- There are no health units in the village; doctors make visits once a month before, but they do not currently. The nearest health unit to the village is in Kemerihisar, which is 19 km away.

6.2.10 Cultural Heritage

The project impact area for cultural heritage is defined as project footprint (including access roads). Impacts (if any) on cultural heritage may only occur in the Project footprint (including access roads) because of the overlapping of the Project components with archaeological heritages.

The official correspondences about cultural heritage assets are conducted during local EIA studies. A site walkover is conducted by the archeological experts of Kayseri Regional Directorate of Cultural Heritage and Museums in August 2022. Accordingly, within the project area,

- There are no surface findings in and around the project area,
- there is **no** area defined as "Cultural Properties", "Natural Assets", "Site" and "Conservation Area" in the 1st, 2nd, 3rd and 5th sub-paragraphs of sub-paragraph (a) titled "Definitions" of the first paragraph of Article 3 of the Law on the Protection of Cultural and Natural Properties and the areas determined and registered pursuant to the same Law and the relevant articles of the Law No. 3386 dated 17/6/1987 (Law on the Amendment of Some Articles of the Law No. 2863 on the Protection of Cultural and Natural Heritage and the Addition of Certain Articles to this Law)
- There are **no** cultural, historical and natural areas that have been given the status of "Cultural Heritage" and "Natural Heritage", which have been taken under protection by the Ministry of Culture in accordance with the 1st and 2nd articles of the "Convention on the Protection of the World Cultural and Natural Heritage".

Sensitivity assessment

Sensitivity features	Supported by	Sensitivity value
Absence of archaeological heritage in the AoI	Official Letters	Low

6.2.11 Visual Aesthetics

Visual aesthetics represent the visual appeal, the perception of beauty and therefore the likability of a subject. In this case the areas interested by the Project is referred, and visual aesthetic parameters are used as important indicators of the visual quality of these areas.

The project area and its surrounding are consisting of pastureland and village settlements. There are 2 neighbourhoods within 2 km of Project area, namely Seslikaya and Emen Neighbourhoods. The general aesthetic state of Project area and its surroundings ranges from natural to modified. In order to determine baseline visual view of the visual receptors, 5 viewpoint is selected (see Table 6-68 and Figure 6-39). The pictures from these areas were taken towards to Project area (see Figure 6-40 - Figure 6-44)

Table 6-68: Selected Viewpoints

No	Description	Distance to the Project Area
1	Construction area	~1000 m
2	Nearest Residential Area in Seslikaya Neighbourhood	~600 m
3	Nearest Residential Area in Emen Neighbourhood	~2000 m
4	Barn (Seslikaya Neighbourhood)	~80 m
5	Residential Area	~250 m

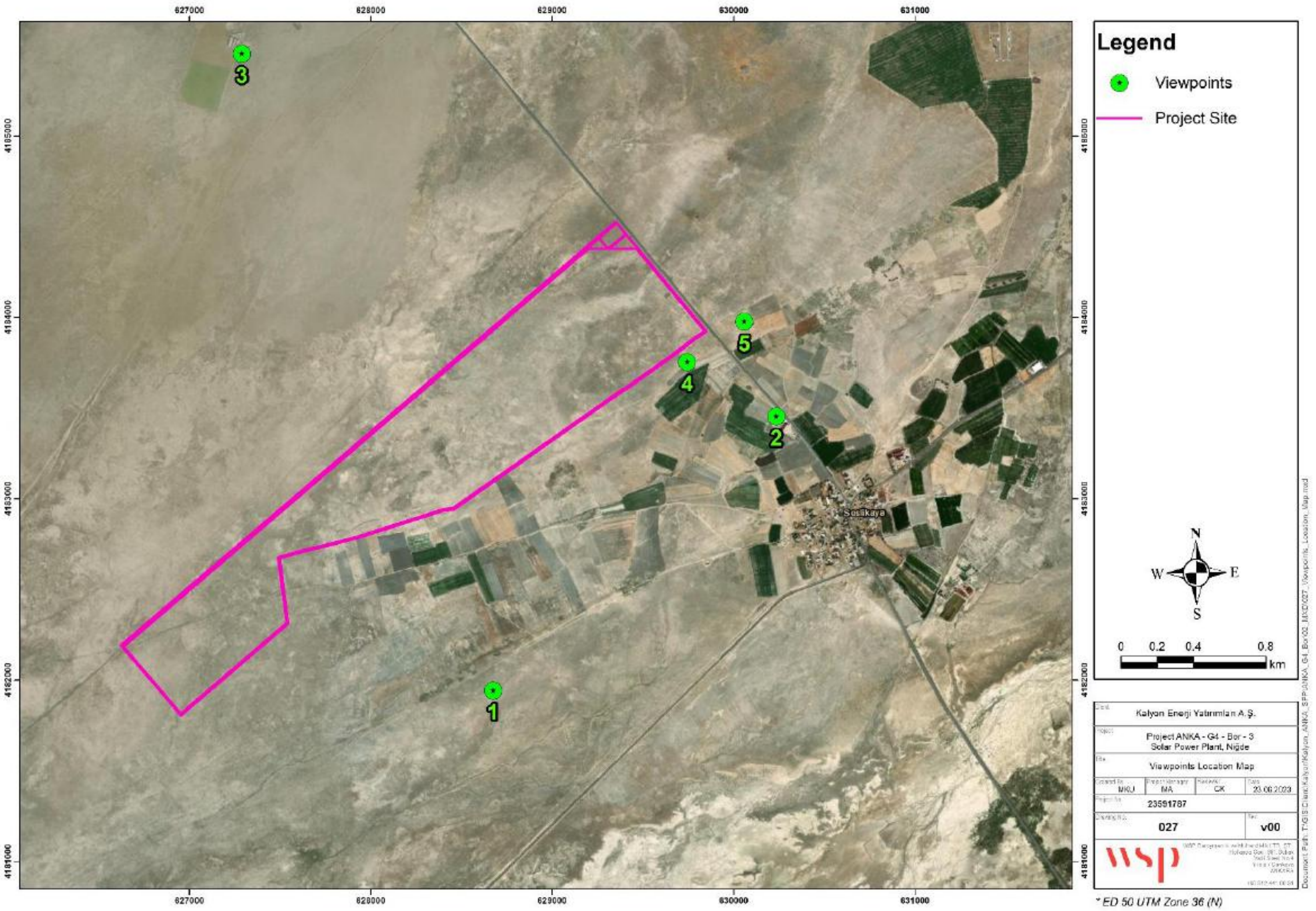


Figure 6-39: Selected Viewpoints

Figure 6-40: Project area View from Viewpoint 1

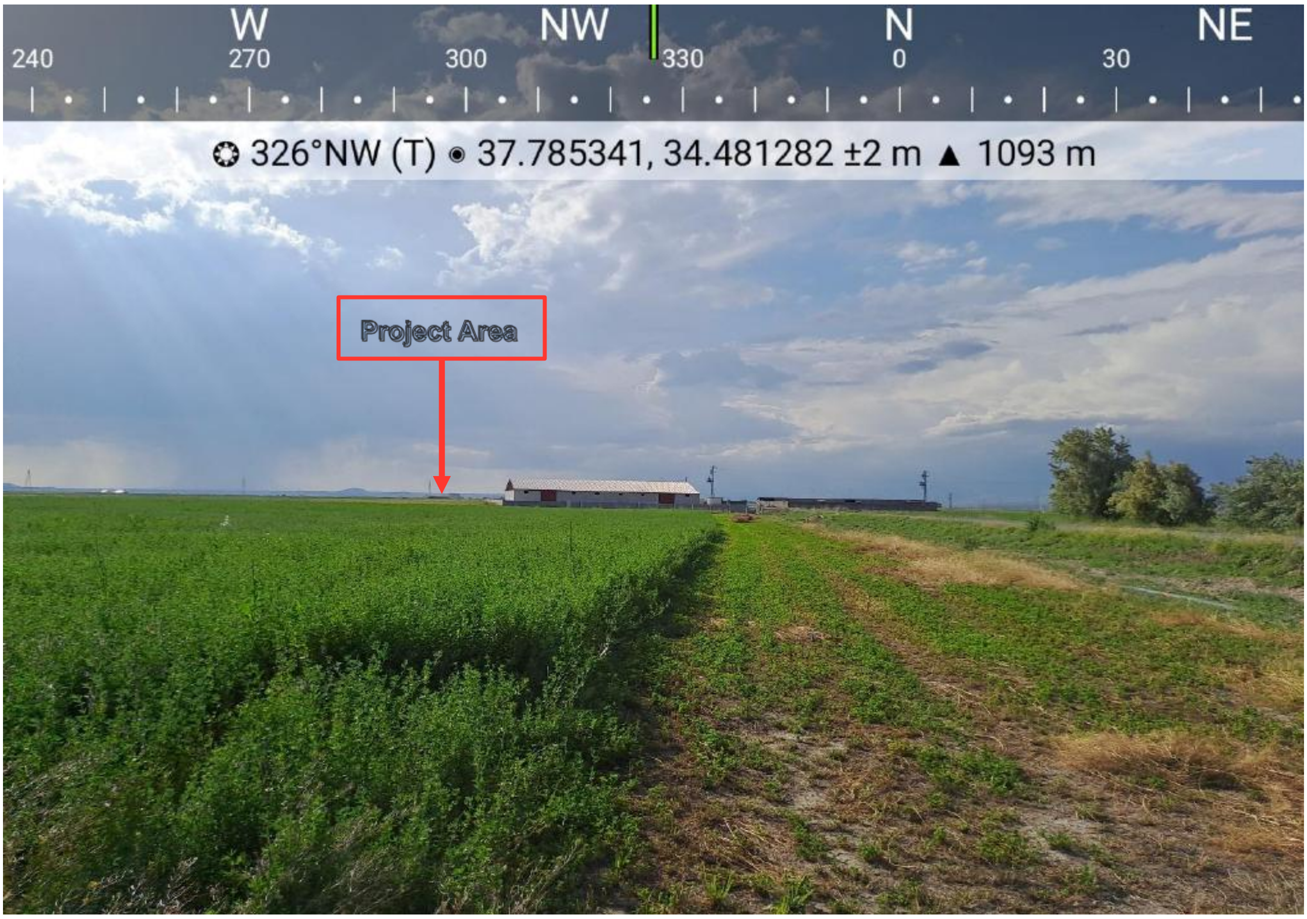


Figure 6-41: Project area View from Viewpoint 2

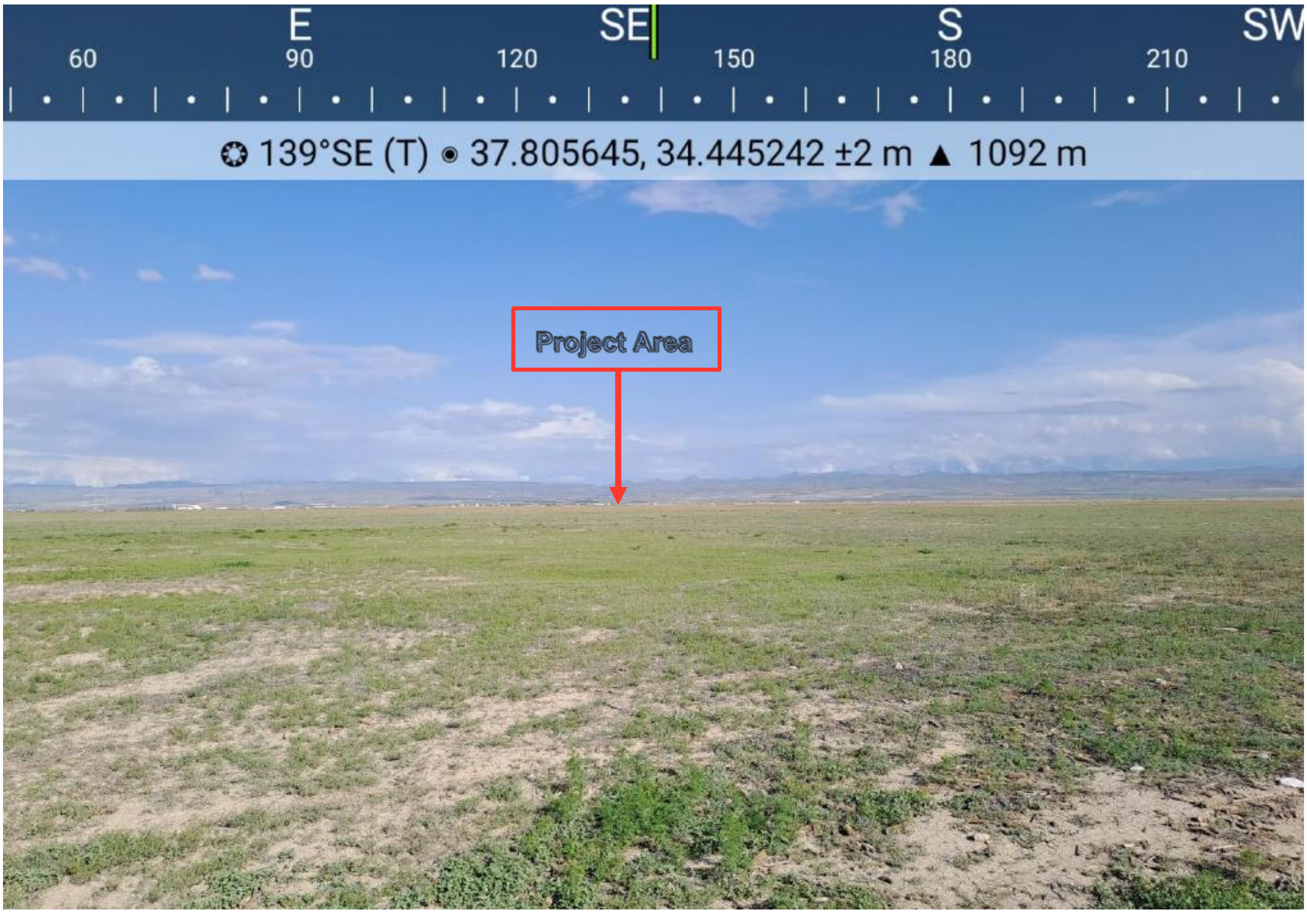


Figure 6-42: Project area View from Viewpoint 3

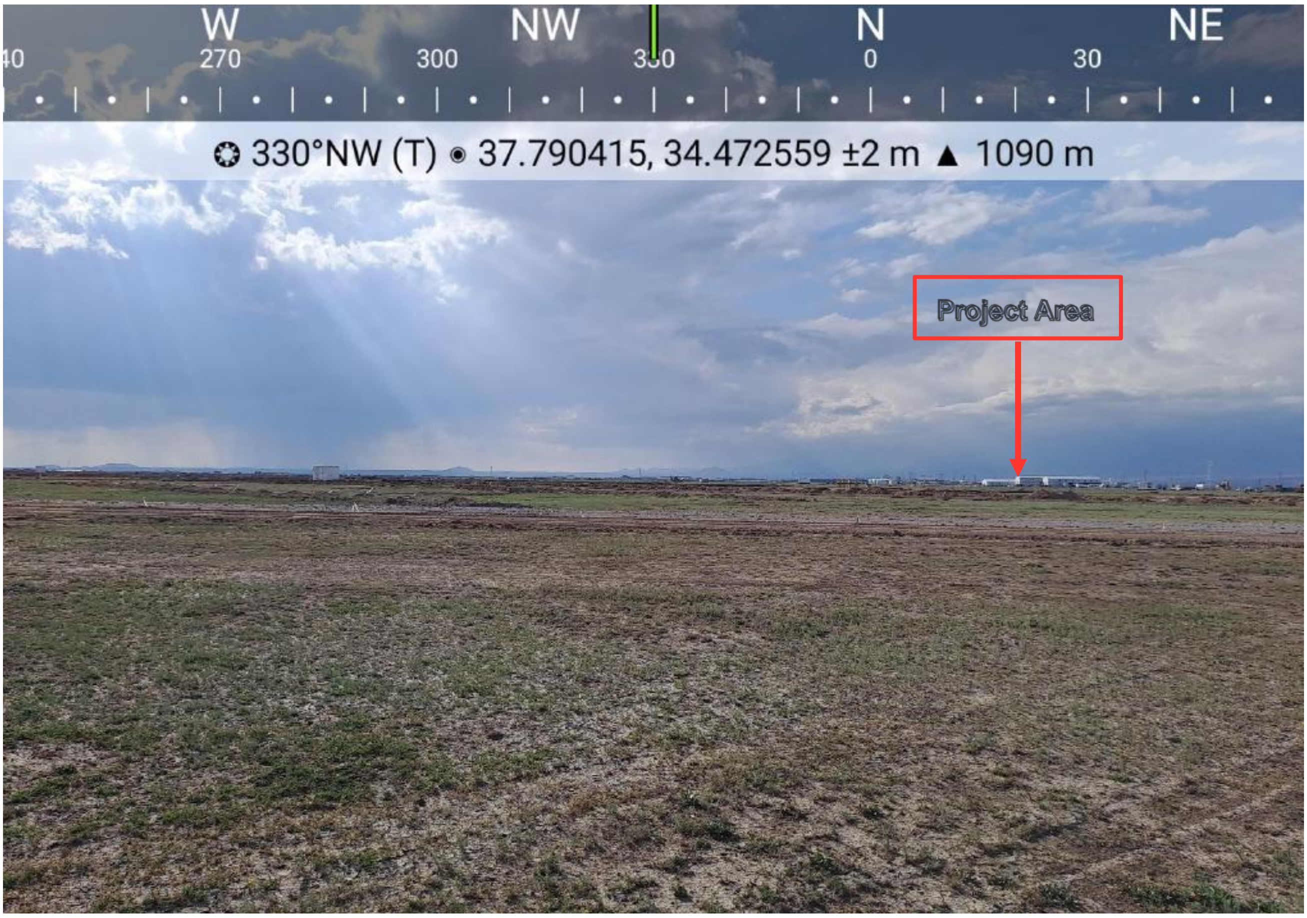


Figure 6-43: Project area View from Viewpoint 4

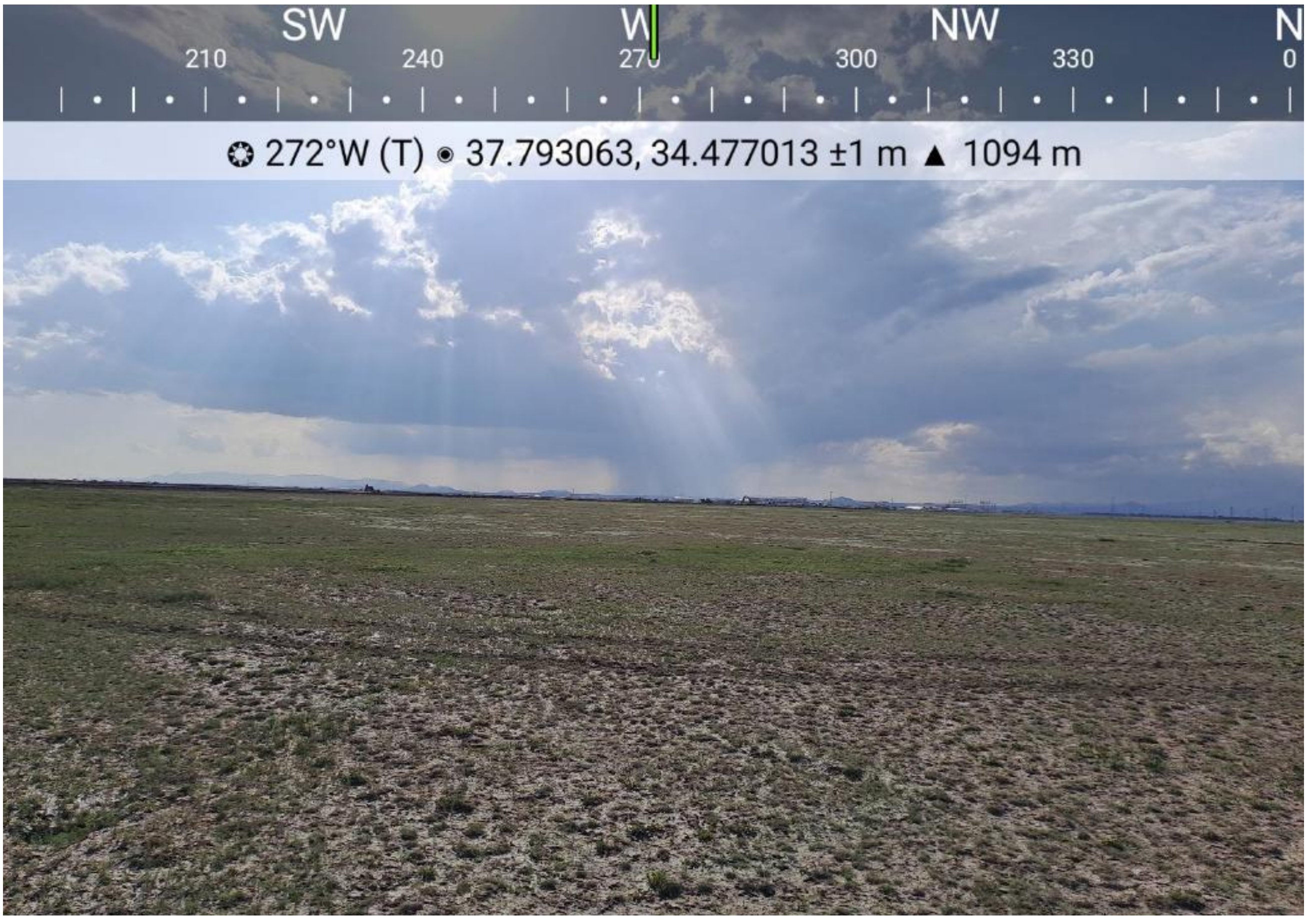


Figure 6-44: Project area View from Viewpoint 5

Sensitivity Assessment

The table below summarizes the analysis of sensitivity related to the Visual Aesthetics component.

Sensitivity features	Supported by	Sensitivity value
Presence of two settlement within 2 km of Project Area. Absence of areas of touristic interest within the visual zone of visual influence. Presence of roads and volume of traffic within the visual zone of visual influence.	Primary and Secondary data	Medium-Low

6.3 Biological Components

6.3.1 Study areas

Two types of study areas were identified for the assessment. A wider Regional Study Area was identified and considered during the initial literature review to assess the species and habitats potentially occurring within the vicinity of the project Area, while an Area of Influence more focused on the project area was identified for future detailed studies. These areas are described below.

6.3.1.1 Regional Study Area (RSA)

The biodiversity Regional Study Area (RSA) is a broad area surrounding the project containing a geographically distinct assemblage of species, natural communities, and environmental conditions. For the baseline, the RSA allows the use of a literature review to determine the species and habitats potentially occurring within and in the vicinity of the project.

For this Project the RSA identified based bio-geographic characteristics corresponds to the **"Central Anatolian Steppes and Woodlands - PA0410"** terrestrial ecoregion which is considered part of the broader "Temperate Broadleaf & Mixed Forests" category (Olson et al., 2001[17]) (Figure 6-45).

[17] Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V. N., Underwood, E. C., D'Amico, J. A., Itoua, I., Strand, H. E., Morrison, J. C., Loucks, C. J., Allnutt, T. F., Ricketts, T. H., Kura, Y., Lamoreux, J. F., Wettengel, W. W., Hedao, P., Kassem, K. R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51(11):933-938.

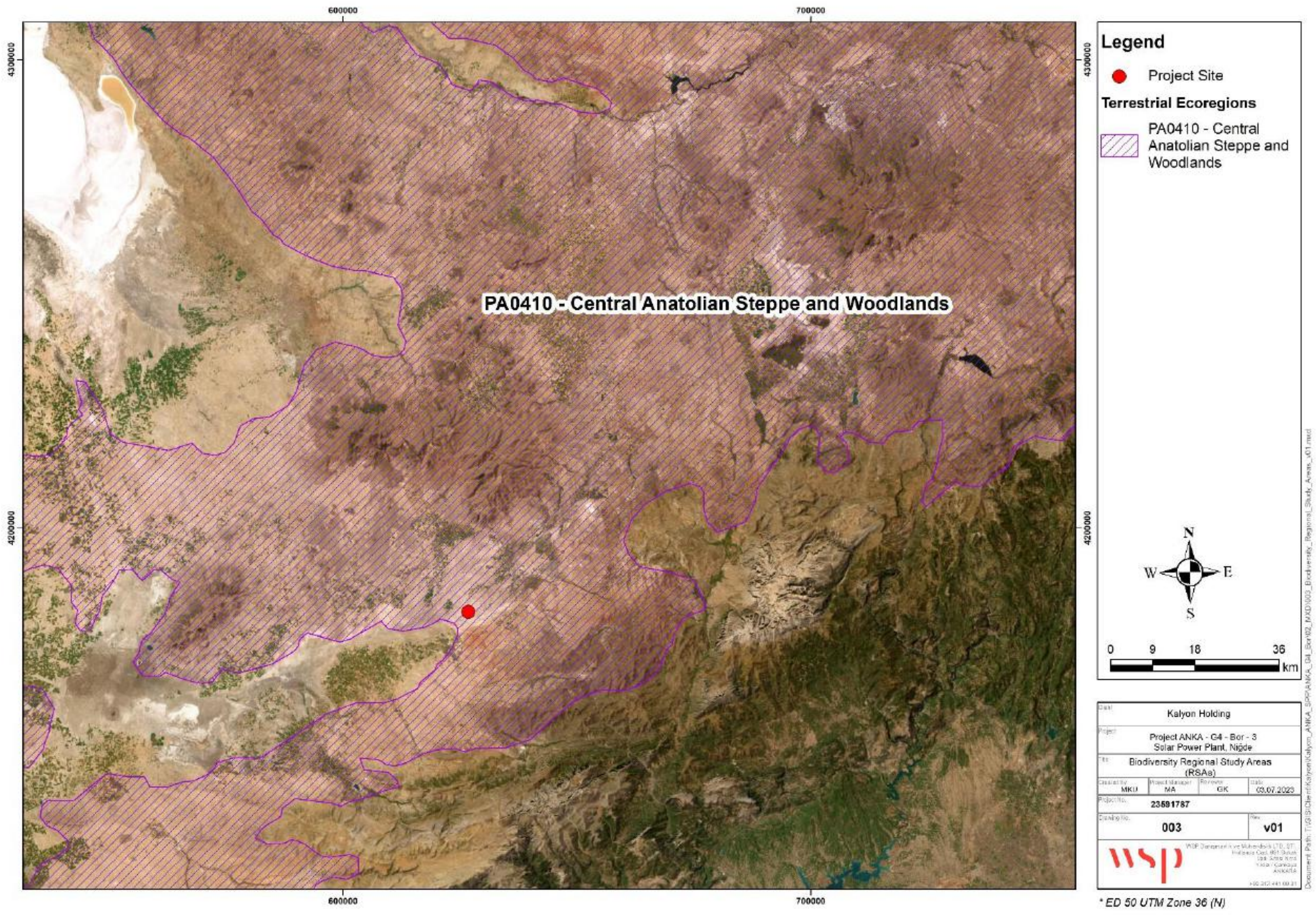


Figure 6-45: Biodiversity Regional Study Area (RSA)

6.3.1.2 Area of Influence (AoI)

The Area of Influence (AoI) (i.e., the area beyond which no detectable effects on biodiversity are expected) was designed as a 1 km buffer around the side of the project. This buffer is considered as the limits beyond which no detectable effects on biodiversity are expected. The AoI also includes an appropriate area to support the design of a Biodiversity Management Plan.

The AoI covers about 1.373,41 ha within the provinces of Niğde.

The Project biodiversiy AoI is illustrated in Figure 6-46.Biodiversity terrestrial area of influence (AoI)below. The biodiversity AoI is included in the wider RSA.

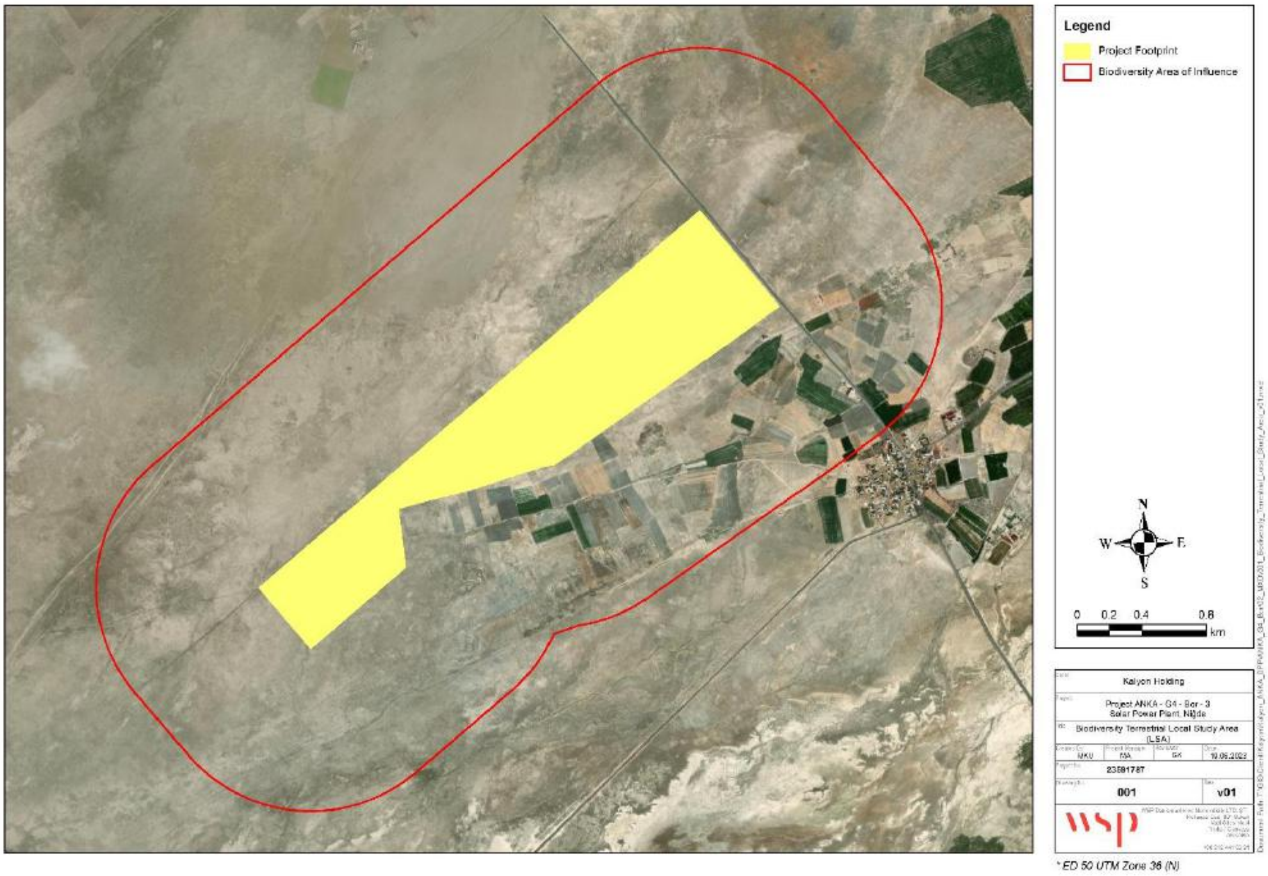


Figure 6-46: Biodiversity terrestrial area of influence (AoI)

6.3.2 Methodology

6.3.2.1 Desktop studies

The literature review focused on the terrestrial RSA in order to document available data on terrestrial and freshwater species and habitats of conservation concern, including local and global distribution, conservation status, ecological niche, phenology, life cycle etc. Scientific literature and official web sites were considered in order to give an overview of the biodiversity sensitive elements potentially present in the area. In addition, previous reports prepared for the Project were taken into consideration.

The literature review, previous studies and web sources considered are chronologically listed below.

- Previous studies
  - G4-BOR-3 Solar Power Plant (140 MWp /100 MWe, 201,6 ha) Project – Local EIA report (include Ecosystem Assessment Report), 2022
  - Biodiversity Monitoring Report for Winter Period, Kalyon Enerji internal report. 2023.
  - Pre-construction Biological Monitoring Report- Çınar Engineering Consulting Inc.-2023.
- Scientific publications and other official publications used for desktop analysis.

  - Abell, Robin, et al. "Freshwater ecoregions of the world: a new map of biogeographic units for freshwater biodiversity conservation." *BioScience* 58.5 (2008): 403-414.
  - Baytop, T. (1994). Turkiye Bitki Adları Sozlugu (Turkish Dictionary for Plant Names). Ataturk Kultur, Dil ve Tarih Yuksek Kurumu, Turkiye Dil Kurumu Yayınları: 578: Ankara.
  - Byfield A. Ataay S. Ozhatay N., 2010. Important Plant Areas in Turkey: 122 Key Turkish Botanical Sites. WWF Türkiye, Istanbul.
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- Web sources:
  - Birdlife International (http://www.birdlife.org/)
  - Doğa dernegi (https://www.dogadernegi.org/)
  - European Environment Agency (https://eunis.eea.europa.eu/index.jsp)
  - European Environment Agency (https://eunis.eea.europa.eu/index.jsp)
  - Freshwater Ecoregions of the World (http://www.feow.org/)
  - Invasive Species specialist Group (IUCN) (http://issg.org)
  - IUCN World Database on Protected Areas (https://www.iucn.org/theme/protected-areas/our-work/parks-achieving-quality-and-effectiveness/world-database-protected-areas-wdpa)
  - IUCN Red List of Threatened Species (https://www.iucnredlist.org)
  - World Database of Key Biodiversity Areas (http://www.keybiodiversityareas.org/site/mapsearch)
  - World Database on Protected Areas (http://www.protectedplanet.net/)
  - WWF database for ecoregions and biomes (https://www.worldwildlife.org/)
  - Turkish Plants Data Service (TÜBİVES) - Version 2.0 BETA (http://194.27.225.161/yasin/tubives/index.php)
  - Bizimbitkiller.org.tr, Nezahat Gokyigit Botanical Garden Service (https://bizimbitkiler.org.tr/yeni/demos/technical/)

6.3.2.2 Field studies

Field surveys were conducted on first of June 2023 according to the work instructions drawn up following the gap analysis in the scoping report with the objective of describing the status of the biodiversity within the area interested by the project. Thus, the field studies were conducted on the following components:

- terrestrial flora and habitats;
- terrestrial fauna.

For each of these components the field methodology is described below.

Previous filed studies were also conducted in 2022 for the preparation of the Local EIA on both components mentioned above. The findings of these studies were also used in the preparation of a list of the species present or potentially present within the AoI.

6.3.2.2.1 Terrestrial Flora and Habitat survey

Field studies on the terrestrial flora and habitats were carried out in 7 different sampling points (SPs) within the AoI on first of June 2023 by the expert botanist Prof. Dr. Hayri Duman of University of Gazi (Faculty of Science, Dpt. Biology).

Each sampling point was selected in order to include different habitats and, so, to identify the flora and vegetation structure of the project area and potential critical flora species or habitats. Areas consisting of natural habitats and critical species were given priority sampling points selection.

During the field work, a 400 sqm minimum area per station was examined in detail to directly identify flora species and habitats, also collecting field notes, GPS coordinates (WGS84 UTM Zone 36S) and photographic documentation.

A list of flora species observed and identified was compiled at each sampling point. In the absence of a Global IUCN assessment (e.g. Not Evaluated NE, or Data Deficient DD), the species status was defined by taking into account the threat categories provided in the local assessments (e.g. Red Data Book for Turkish Plants) re-evaluated by the local expert (Prof. Dr. Hayri Duman) based on the latest available information on the species distribution and IUCN 2001 criteria. The main habitat types were described and categorized according to the EUNIS classification system, with regards to the definition of Natural Habitats and Modified Habitats (IFC 2019, PS 6).

The 7 sampling stations with their relative coordinates are given in Table 6-69, while their location is shown in Figure 6-47.

Previous filed studies were also conducted in July 2022 for the preparation of the Local EIA. Flora species and habitats were recognized both directly in the field and through the collection of some specimen later identified thanks to the use of *Flora of Turkey and East Aegen Islands*[18] piece of work.

Table 6-69: Terrestrial flora and habitats, sampling points and coordinates

Field ID	Coordinates (Meters, WGS84 UTM Zone 36S)	
	Longitude	Latitude
SP1	627278 E	4181475 N
SP2	626928 E	4181657 N
SP3	626363 E	4181766 N
SP4	627112 E	4181967 N
SP5	628339 E	4183125 N
SP6	629268 E	4183654 N
SP7	629860 E	4184434 N

[18] Davis, P.H. (ed.). (1965-1988) Flora of Turkey and the East Aegean Islands, vol. 1-10, Edinburgh Univ. Press: Edinburgh.

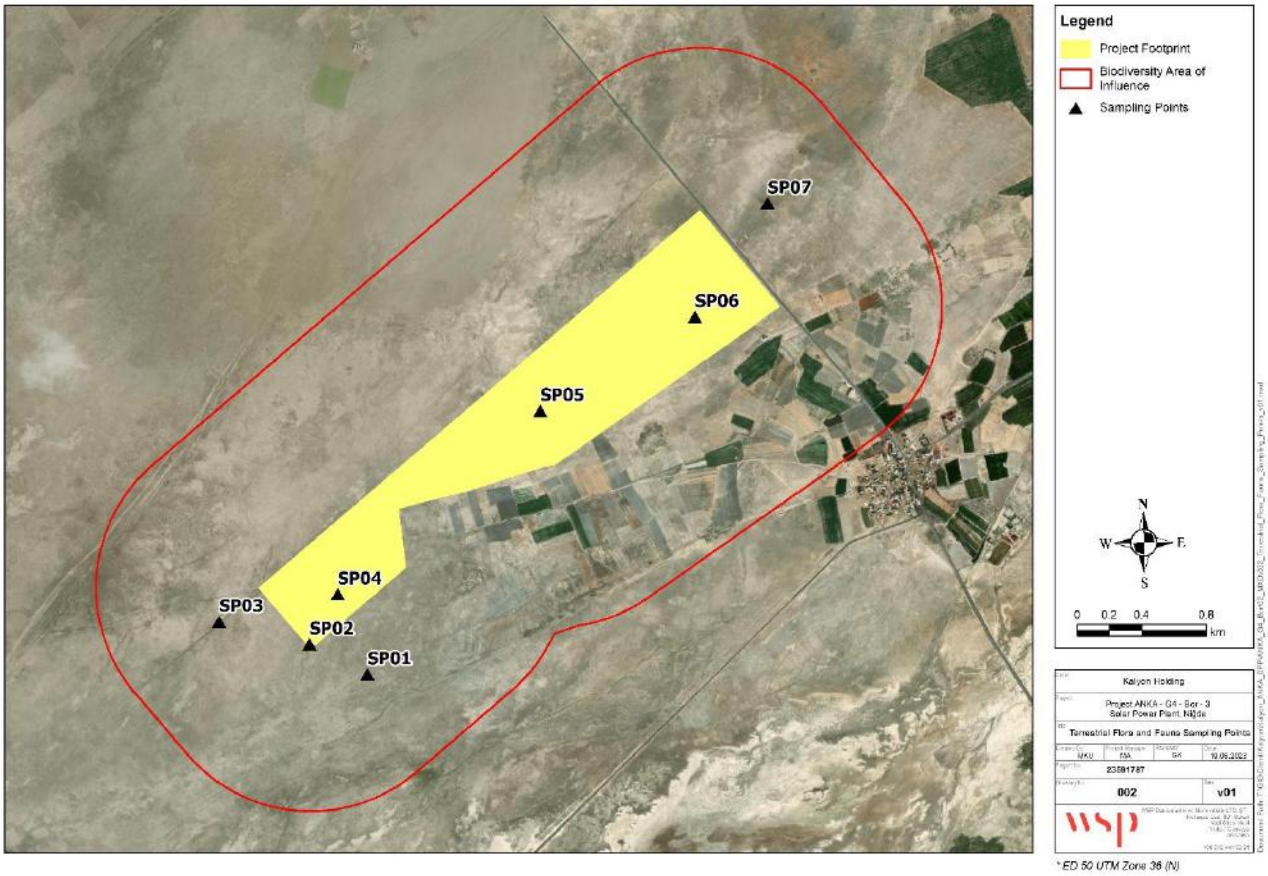

Figure 6-47: Terrestrial flora, fauna and habitats sampling points during June 2023 surveys

6.3.2.2.2 Terrestrial fauna survey

Field studies on terrestrial fauna were performed within the AoI by expert zoologists and Asst. Prof. Şafak Bulut and on first of June 2023.

Walk over surveys were carried out in the vicinity of four sampling points and along two linear transects targeting all habitat types within the project site for the presence of any endemic or globally/locally threatened terrestrial fauna species (amphibians, reptiles, birds and mammals).

During the field study, each sampling point and transect was surveyed based on direct observations and indirect signs, such as tracks, burrows, scats, droppings, calls and sings. The observations were performed with the aid of a binocular (Nikon Aculon 16x50) and a camera (Sony A7RIV body with a Sony 200-600 mm lens).

A list of encountered fauna species and/or sign of their presence was compiled. GPS coordinates were recorded for each sampling point and linear transect: their location is shown in the Figure 6-47.

6.3.2.3 Habitat mapping

Habitat types were identified and mapped in the entire Area of Influence (AoI) at a fine scale (1:10.000) according to EUNIS classification based on satellite image and literature information, including Corine Land Cover.

The procedure used for the habitat mapping was as follows:

1. A general land cover map was created using the Corine Land Cover 2018 v.2020_20u1 available on the Copernicus website.

2. The CORINE Land Cover classes were converted into EUNIS Habitat using the highest possible definition level (level 3 at least) by analyzing appropriate satellite imagery and taking into consideration available previous studies performed in the area;

3. The results of flora and habitats surveys conducted in June 2022 flora were used to validate the EUNIS habitat mapping;

4. EUNIS habitat types were then categorized into modified or natural habitats according to PS6 (IFC, 2012).

6.3.3 Results

6.3.3.1 Landscape overview

The Project AoI is located at an elevation of approximately 1060 m a.s.l. within the "**Central Anatolian Steppes and Woodlands**" **(PA0410)** terrestrial ecoregion (Olson et al., 2001)[19], which is part of the broader biome category "Temperate Broadleaf and Mixed Forests". This ecoregion covers Central Türkiye, bounded by the Pontic Mountains in the north and the Taurus Mountains in the south (Figure 6-45). Its vegetation is characterized by natural and semi-natural steppes and grasslands.

In general, the steppes ecosystem is known as an area with high biodiversity (Wilson et al., 2012)20 . Anatolian steppes are of great importance in terms of biodiversity and for endemic plant and animal species. Phytogeographically, this area belongs to the large Irano-Turanian floristic region (Zohary, 1973; Takhtajan, 1986; Irano-Anatolian subregion)[21] , which is very different in terms of climate, flora and vegetation from the other parts of Türkiye. Many birds are typical of these steppe habitats, including steppe eagle (*Aquila nipalensis*), saker falcon (*Falco cherrug*), little bustard (*Tetrax tetrax*), sociable lapwing (*Vanellus gregarious*), and the globally threatened great bustard (*Otis tarda*). The ecoregion's salt lakes and freshwater wetlands are also home to large populations of water birds, including resident and breeding birds as well as winter migrants. Although very rich in terms of biodiversity, steppe ecosystems in Türkiye are largely ignored in favor of forests, both in the protected area network and as a target by conservation organizations. Due to the lack of protection and recognition, steppe ecosystems in Türkiye are threatened by overgrazing, habitat loss due to conversion into arable land or forestry plantation.

The Project AoI is not located within the boundaries of a legally protected area. However, the AoI falls within the boundaries of the Ereğli Plain Key Biodiversity Area (KBA) and Important Bird Area (IBA). Another internationally recognized areas of importance for biodiversity situated within 15 km from the AoI is Hasan Mountains Key Biodiversity Area (KBA), Important Plant Area (IPA) and an Important Bird Area (IBA) (Figure 6-48). Akkaya Pond Key Biodiversity Area (KBA) is also located at about 18 km northeastern of the AoI.

[19] Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V. N., Underwood, E. C., D'Amico, J. A., Itoua, I., Strand, H. E., Morrison, J. C., Loucks, C. J., Allnutt, T. F., Ricketts, T. H., Kura, Y., Lamoreux, J. F., Wettengel, W. W., Hedao, P., Kassem, K. R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51(11):933-938

[20] Wilson, J. B., Peet, R. K., Dengler, J., & Pärtel, M. (2012). Plant species richness: The world records. Journal of Vegetation Science, 23(4), 796–802.

[21] Zohary, M. (1973) Geobotanical foundations of the Middle East, 2 vols. Gustav Fischer Verlag, Stuttgart.

Takhtajan, A. (1986) Floristic regions of the world. University of California Press, Berkley/Los Angeles/London.

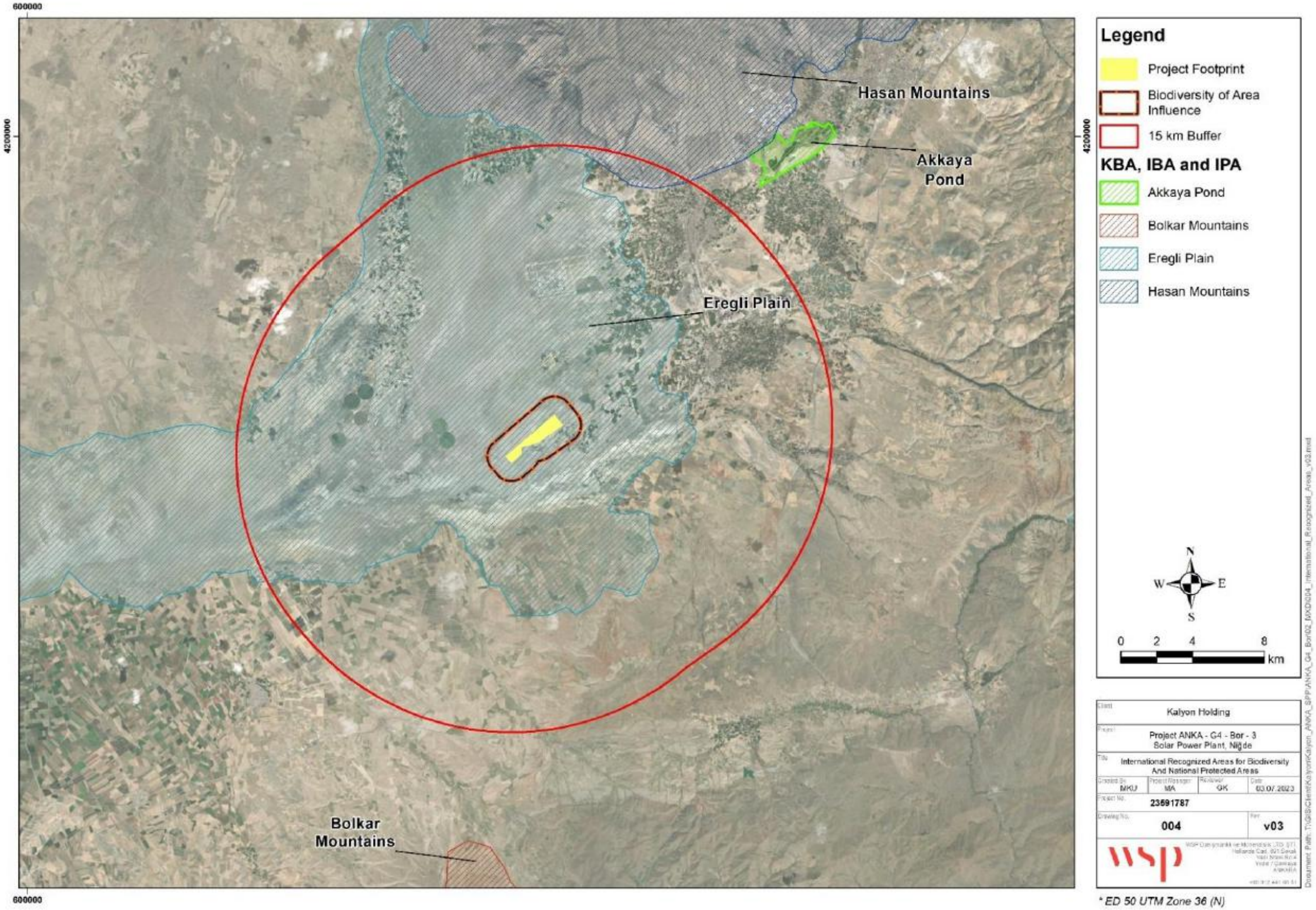

Figure 6-48: International recognized areas for biodiversity and national protected areas in the proximity (20 km) of the Project AoI

Ereğli Plain Key Biodiversity Area (KBA) and Important Bird Area (IBA)

Ereğli Marshes are located 30 km west of Ereğli town center in Konya Closed Basin. Ereğli Marshes, located in the middle of the Ereğli Lower Basin, is a wetland system bordered by Karacadağ (2025 m a.s.l.) in the north and Bolkar Mountains of the Taurus Mountains (3524 m a.s.l.) in the south and includes different habitats. Ereğli Marshes are located within the borders of Konya and Karaman provinces and are fed by waters coming from Bolkar Mountains, İvriz Stream and underground waters (Atalay, 1987). The pond built on the water resources feeding the reeds in the 1980s, the increase in agricultural water use, the Ayrancı and İvriz Dams established, put the Ereğli Reeds, the largest wetland of the Konya Closed Basin, in danger of extinction (Figure 6-49). According to the study conducted by Durduran (2010), the area covered by the reeds decreased from 51.534 hectares in 1990 to 3.682 hectares in 2000.

Akgöl to the west of the KBA has largely dried up since the second half of the 1990s. To the east, especially in the Zengen region, wide and untouched plain steppes rich in rare plants stretch. While there were once the largest reeds of Central Anatolia in the plain, today these areas have almost completely disappeared due to the dams built by the State Hydraulic Works (DSI) and the illegal use of groundwater. wetland area of KBA; consists of lakes, reeds and marsh areas. The rest of the region consists of salty plain steppes and slow plains.

The habitats in the Bor-3 SPP installation area are also plain steppes and do not contain aquatic species.

Ereğli Marshes was declared a Protected Area (SİT in Turkish) in 1992 and a Nature Conservation Area in 1995. Ereğli Plain has been declared as an ÖDA (KBA and IBA) with a nature conservation approach based on preserving all habitats necessary for the continuation of the life cycles of living species without deteriorating their natural characteristics.

The Ereğli Plain IBA covers almost the entire plain from the north of the Bolkar Mountains to the Hasan Mountain (Eken et al., 2006). Ereğli Plain IBA includes Ereğli Marshes, and the most important factor in determining this plain as IBA is Ereğli Reeds. The IBA is triggered by the presence of 19 bird species, mostly identified as breeding in the area, including near threatened species Marbled Teal (*Marmaronetta angustirostris)* and Dalmatian Pelican *(Pelecanus crispus)*

IBA has been the focus of attention of local and foreign bird watchers and researchers for years, and therefore, many bird data related to the wetland ecosystem have been collected. Birds known to still breed in the area include the little kestrel (*Falco naumanni*), the white-headed duck (*Oxyura leucocephala*), black winged stilt (*Himantopus himantopus*) and many other waterbirds. In addition, many birds in the area have become extinct or have decreased in numbers.

Animal husbandry is intensively practiced in IBA. Cattle breeding is the main source of livelihood in reed areas and ovine breeding in other areas. Dry agriculture activities are also partially carried out in the area. In the areas just outside theIBA, irrigated agriculture, especially fruit growing, is intensively practiced. Reed farming, which was once intensive in the lake, continues in small amounts today.

As a result of reduced water inputs the lake has retreated drastically, and thousands of hectares of wetland have been converted to agriculture. Further irrigation is planned. Inputs are expected to cease entirely once two new reservoirs have been constructed. Agricultural, industrial and untreated urban pollutants enter the lake via drainage channels. Lastly, Overgrazing is a significant threat to plant species in the area and wind erosion occurs in the area with the decrease in groundwater.

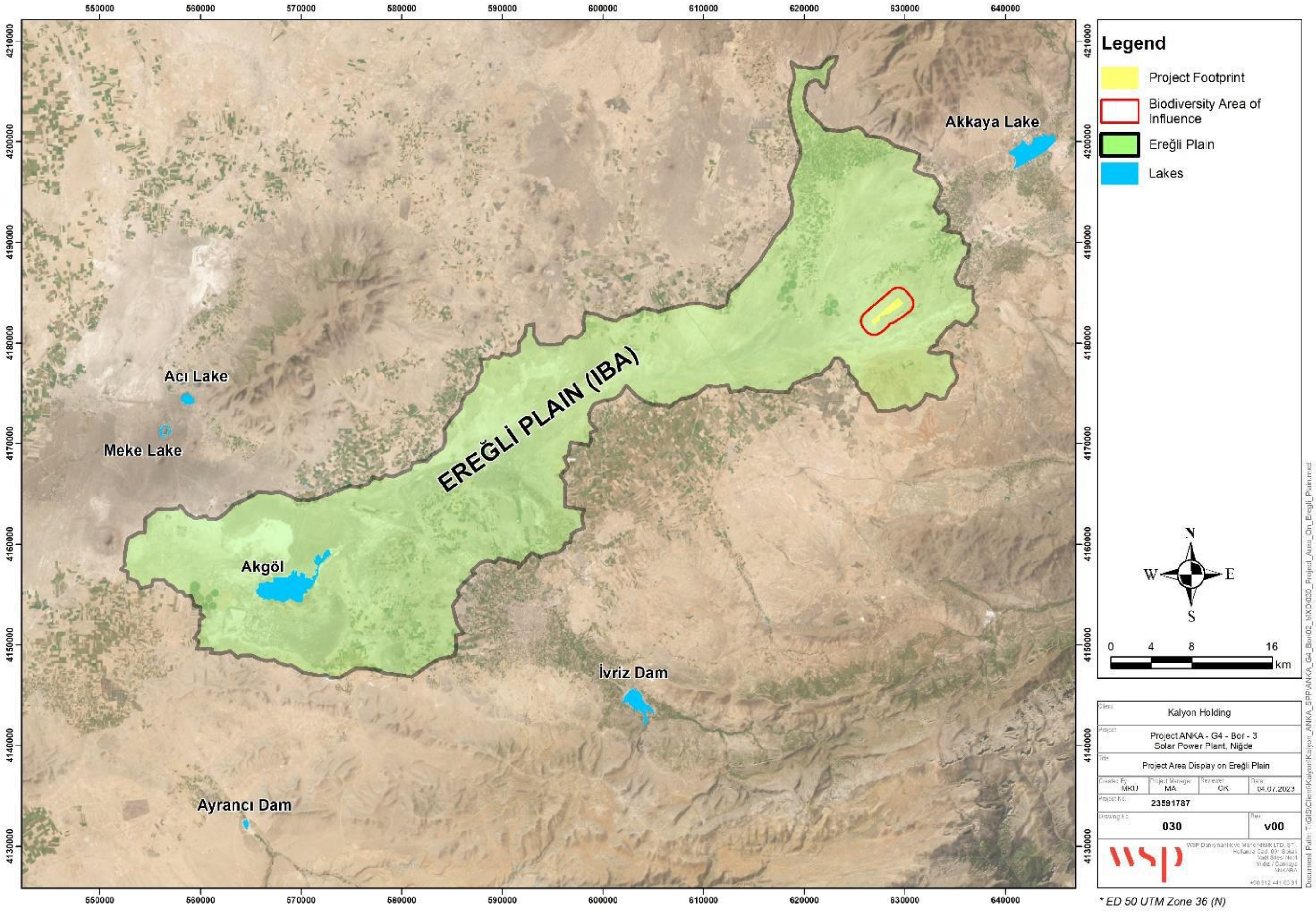

Figure 6-49: Map showing the SPP site, protected areas and lakes

6.3.3.2 Natural and Modified habitats

The Natural and Modified habitats present within the terrestrial AoI were determined based on literature review, analysis of satellite images on Google Earth and field surveys conducted in June 2023 during flora field studies.

The great majority of the habitats present within the AoI are characterized by modified habitats (47,2 %) and in particular rural industrial and commercial sites still in active use and mixed crops of market gardens and horticulture (J2.3, 27% and I1.2, 20% respectively).

The Natural habitats present in the AoI (52,8%) are mainly characterized by continental inland salt steppes which are the main natural habitats.

Natural habitats present in the AoI are characterized by medium to high anthropic disturbance levels, mainly due to pressure (grazing) on saline habitat and the related continuous losses of habitat.

The continental inland salt steppes (E 6.2) are characterized by the presence of a few endemic species (flora and fauna) and it is also the most sensitive to anthropic disturbance. This habitat type is mainly concentrated in the AoI.

The habitat map of the AoI according to EUNIS habitat classification system is available in Figure 6-50 and the calculations are presented in Table 6-70. A brief description for each EUNIS natural habitat identified in the area is reported below.

Table 6-70: EUNIS habitat types present in the AoI

EUNIS Code	EUNIS Habitat Type	Total AoI	
		ha	%
Natural habitat			
E6.2	Continental Inland Salt Steppes	725,04	52,8
	Subtotal	725,04	52,8
Modified habitat			
I1.2	Mixed Crops of Market Gardens and Horticulture	267,94	20
J2.1	Scattered Residential Buildings	3,10	0,2
J2.3	Rural Industrial and Commercial Sites Still in Active Use	377,33	27
	Subtotal	648,37	47,2
	Total	1373,41	100

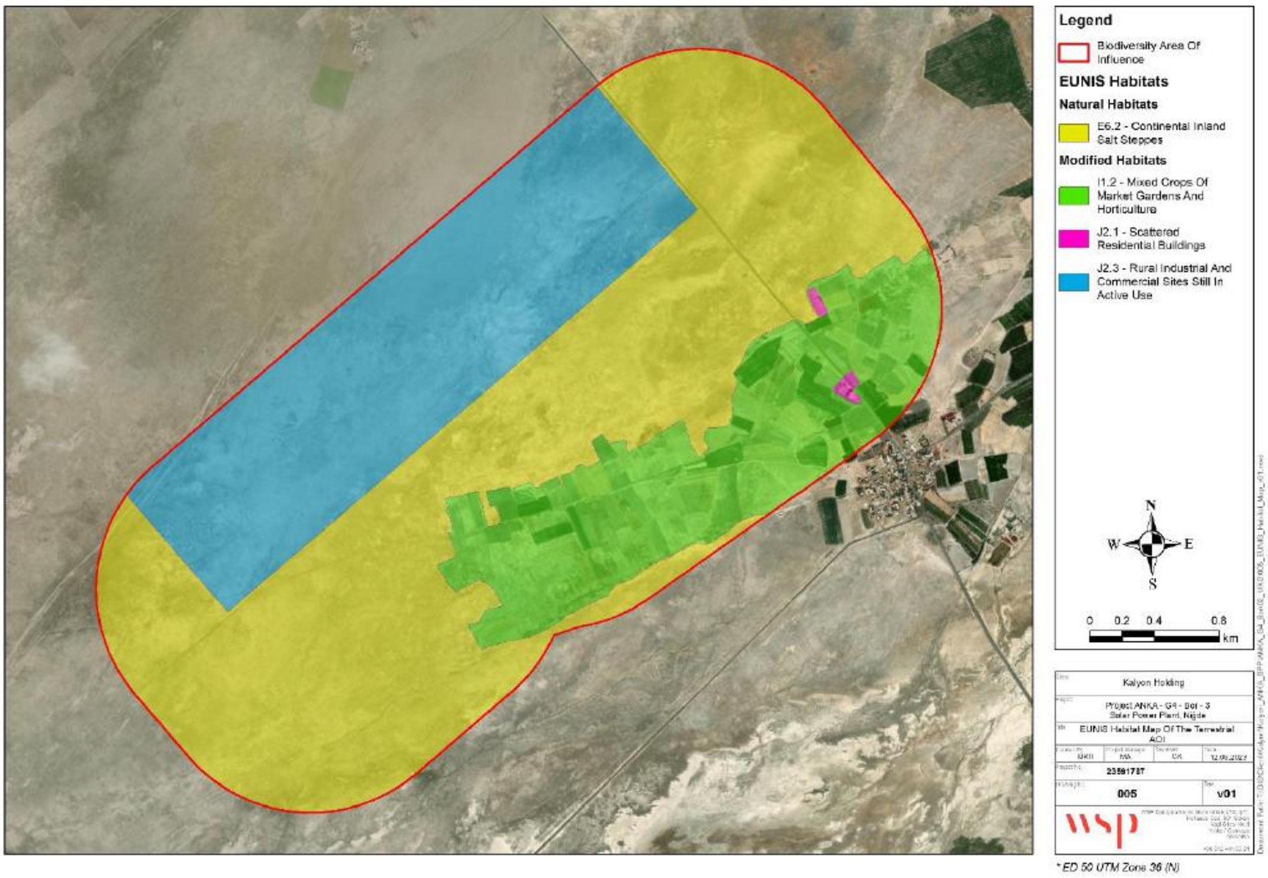

Figure 6-50: EUNIS habitat map of the terrestrial AoI

E6.2 Continental inland salt steppes

Salt steppes and their associated salt-tolerant herbaceous communities outside the Mediterranean zone (Figure 6-51). In Europe they are found in the substeppe and steppe zones eastwards from the Hungarian Plain. This habitat represents salty steppe habitats in Türkiye, especially in the Central Anatolia region. The characteristic species of the habitat are *Limonium lilacinum, Limonium iconicum, Taraxacum farinosum, Puccinellia koeieana, Aeluropus littoralis, Frankenia hirsuta, Suaeda* sp., *Halimione verrucifera, Camporosma monspeliaca, Bolboschoenus maritimus.*

Figure 6-51: continental inland salt steppes (E6.2) identified in the AoI, photograph taken from SP2

6.3.3.3 Flora species

Based on literature review and field work conducted by Prof. Dr.Hayri Duman on the 1st of June 2023, 28 flora species were identified as present in the AoI. A list of flora species potentially present based on literature was not prepared since information regarding flora obtained from literature was considered to be incomplete or not fully reliable.

The species of conservation concern are 3 and are listed in Table 6-71 below. The complete list of species is available in Appendix D.

According to the National Red List (Turkish Red Data Book of Plants – T-RDB) re-evaluated by the local expert (Prof. Dr. Hayri Duman) based on the latest available information on the species distribution and IUCN 2001 criteria, *Gypsophila oblanceolata* (Figure 6-52) and *Petrosimonia triandra* (Figure 6-52) are classified as Vulnerable (VU), while *Onopordum davisii* (Figure 6-53) is classified as Near Threatened (NT). These three species are also considered as Regional Endemic species. These three species are also considered as Regional Endemic species. All the other species are considered as Least Concern (LC).

Also, seven widespread endemic plant species were identified from the area. These are *Anthemis fumariifolia, Taraxacum farinosum, Puccinellia koeieana* subsp. *anatolica, Limonium lilacinum, Scorzonera hieracifolia, Limonium iconicum* and *Astragalus mesogitanus* and they are also distributed Central Anatolia, especially salt steppes.

Table 6-71: Flora species of conservation concern present within the AoI.

Family	Species	Global IUCN Status	National IUCN status	End./ RR	Station code	Lit./ Obs.
Amaranthaceae	*Petrosimonia triandra*	NE	VU	Regional Endemic	SP6, SP7	O 2023
Asteraceae	*Onopordum davisii*	NE	NT	Regional Endemic	SP1, SP2, SP3, SP4, SP5, SP6, SP7	O 2023
Caryophyllaceae	*Gypsophila oblanceolata*	NE	VU	Regional Endemic	SP2, SP3, SP4, SP5, SP6, SP7	O 2023

Figure 6-52: *Onopordum davisii* (left side) and *Gypsophila oblanceolata* (right side) within the AoI

Figure 6-53: *Petrosimonia nigdeensis* within the AoI

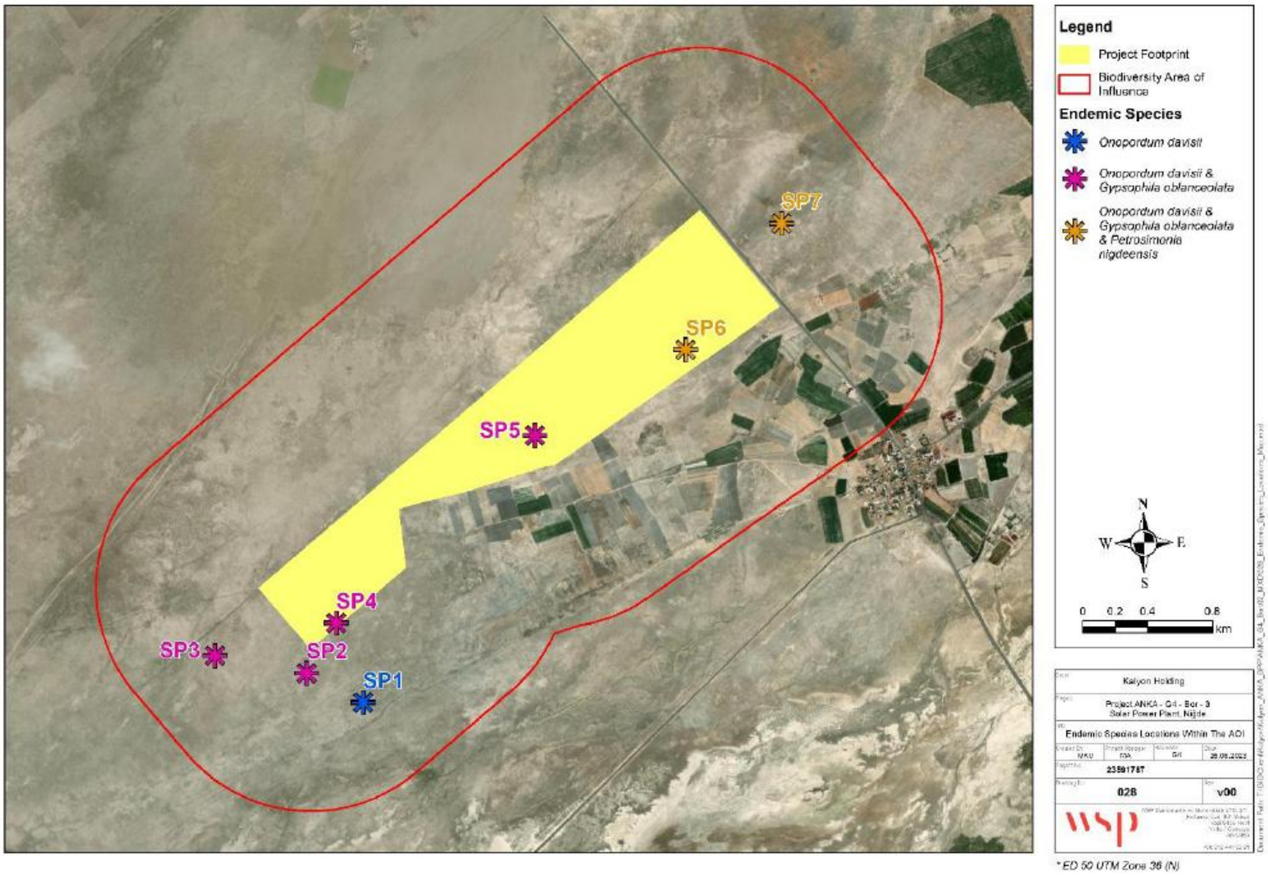

Figure 6-54: Location of the sampling points (SP) where flora species of conservation concern were observed within the AoI

Fauna species

The fauna species observed or potentially present within the AoI include 106 vertebrate species of which 3 amphibians, 9 reptiles, 47 mammals (of which 13 bats) and 47 birds.

Among the fauna species identified as present or potentially present within the AoI, 1 reptile species (*Testudo graeca*) is classified as Vulnerable (VU), while 2 bird species (*Aquila nipalensis* and *Falco cherrug*) are classified as Endangered (EN) and two other bird species (*Aquila heliaca* and *Otis tarda*) are classified as VU. In addition, 1 mammal species (*Vormela peregusna*) is classified as Vulnerable (VU), 5 mammal species (*Barbastella barbastellus*, *Lutra lutra*, *Mesocricetus brandti*, *Miniopterus pallidus* and *Spermophilus xanthoprymnus*) are classified as Near Threatened (NT) and two species (*Microtus anatolicus* and *Nannospalax xanthodon*) are classified as Data Deficient (DD), according to Global IUCN Red List assessment.

6.3.3.3.1 Amphibians

According to literature review and field study, 3 amphibian species were determined as potentially present in the terrestrial AoI.

Two species (*Bufotes variabilis* and *Bufotes sitibundus*) are classified as Data Deficient (DD), while the third one (*Pelophylax ridibundus*) is classified as Least Concern (LC) according to the Global IUCN Red List assessment. No endemic species were identified. The complete list of the amphibian species potentially present is reported in the Table 6-72 below and in Appendix D.

None of the listed species was observed during the field survey.

Table 6-72: Amphibian species present or potentially present within the AoI.

Order	Species	English Name	IUCN Global	End./RR	Obs./Lit.*
Anura	*Bufotes variabilis*	Varying Toad	DD	-	L
Anura	*Bufotes sitibundus*	European Green Toad	DD	-	L
Anura	*Pelophylax ridibundus*	Marsh Frog	LC	-	L

6.3.3.3.2 Reptiles

According to literature review and fieldworks, 9 species were determined as present or potentially present in the AoI.

Testudo graeca is classified as Vulnerable (VU) according to IUCN Global Red List assessment, while all the other species are classified as Least Concern (LC). No endemic or restricted range species were identified.

The list of reptile species potentially present in the Project AoI is reported in Table 6-73 below and in Appendix D. None of the listed species was observed during the field survey.

Table 6-73: Reptile species present or potentially present within the AoI.

Order	Species	English Name	IUCN Global	End./RR	Obs./Lit.*
Squamata	*Elaphe sauromates*	Eastern Four-Lined Ratsnake	LC	-	L
Squamata	*Heremites vittatus*	Bridled Mabuya	LC	-	L

Order	Species	English Name	IUCN Global	End./RR	Obs./Lit.*
Squamata	*Mediodactylus kotschyi*	Mediterranean Thin-toed gecko	LC	-	L
Squamata	*Natrix tessellata*	Dice Snake	LC	-	L
Squamata	*Ophisops elegans*	Snake-eyed Lizard	LC	-	L
Squamata	*Parvilacerta parva*	Dwarf Lizard	LC	-	L
Squamata	*Platyceps najadum*	Dahl's Whip Snake	LC	-	L
Squamata	*Stellagama stellio*	Roughtail Rock Agama	LC	-	L
Testudines	*Testudo graeca*	Common Tortoise	VU	-	L

6.3.3.3.3 Birds

Türkiye is crossed by the Black Sea/Mediterranean flyway, a major global flyway for migratory land and water birds[22]. This important flyway is divided into three major migratory routes through Türkiye. The Project Site is located just north of the main migration route and south of the secondary migration route (Figure 6-55). Cranes, pelicans, storks and raptors pass through the main migration route. Some aquatic birds continue their migration by following the lakes region.

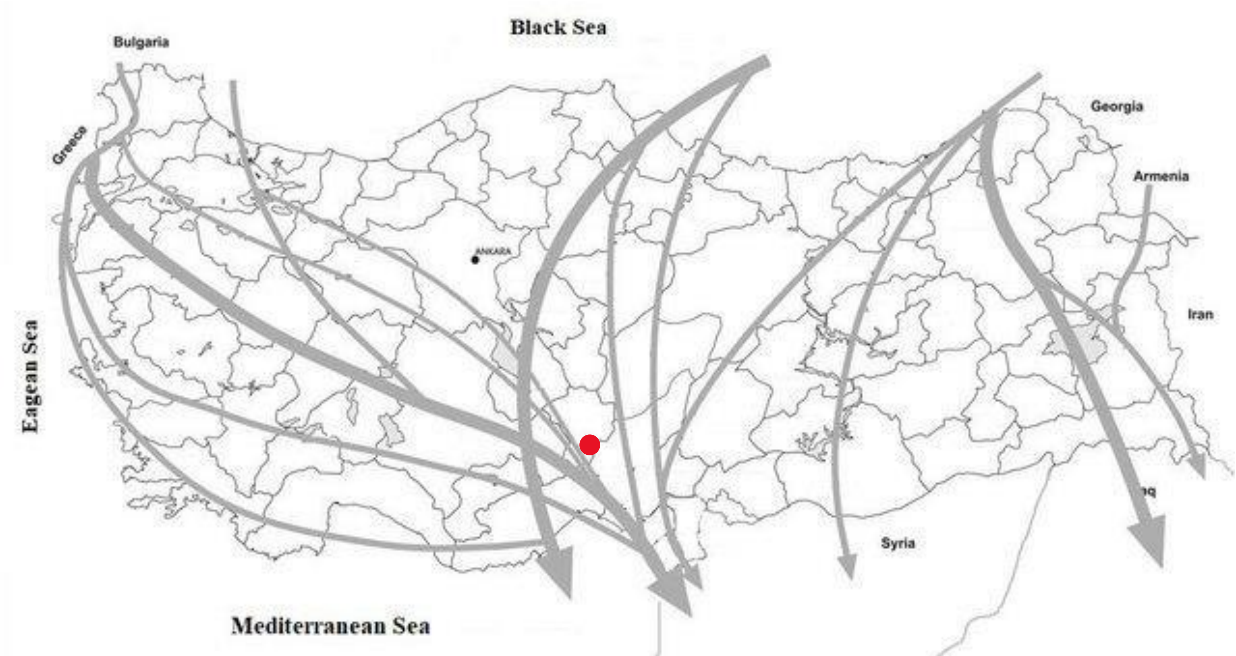

Figure 6-55: Bird Migratory Route in Türkiye and location of the project site (Source: Hacioğlu,et al. 2017)

During the field surveys conducted on June 1st, no migratory birds were observed directly crossing the AoI, despite the migration period.

A total of 47 bird species were identified as potentially present within the AoI and its vicinity, while a total of 32 species were observed during the field survey.

[22] http://datazone.birdlife.org/home

According to the Global IUCN Red List, 3 species (*Aquila nipalensis, Falco cherrug* and *Neophron percnopterus*) are classified as Endangered (EN), 2 species (*Aquila heliaca and Otis tarda*) are classified as Vulnerable (VU), and 3 species (*Aegypius monachus*, *Circus macrourus* and *Vanellus vanellus*) are classified as Near Threatened (NT). All the remaining potentially present species are classified as Least Concern (LC). No endemic species have been identified.

Also, *Aquila nipalensis* is known to breed in a region close to the area according to expert judgement.

Bird identified species of conservation interest are reported in the Table 6-74 below, while the complete list of the species is reported in Appendix D.

Table 6-74: Bird species of conservation concern present or potentially present within the AoI.

Order	Species	English Name	IUCN Global	Phenology	IBA Trigger	Obs./ Lit.
Accipitriformes	*Aegypius monachus*	Cinereous Vulture	NT	Extant (non-breeding)		O
Accipitriformes	*Aquila heliaca*	Imperial Eagle	VU	Extant (non-breeding)		L
Accipitriformes	*Aquila nipalensis*	Steppe Eagle	EN	Extant (non-breeding)		L
Accipitriformes	*Circus macrourus*	Pallid Harrier	NT	Extant (non-breeding)		L
Charadriiformes	*Vanellus vanellus*	Northern Lapwing	NT	Extant (non-breeding)		L
Falconiformes	*Falco cherrug*	Saker Falcon	EN	Extant (non-breeding)		L
Otidiformes	*Otis tarda*	Great Bustard	VU	Native resident		L
Accipitridae	*Neophron percnopterus*	Egyptian Vulture	EN	Native resident		L

6.3.3.3.4 Mammals

According to literature review and fieldworks, 47 species were determined as present or potentially present in the terrestrial AoI. However, the presence of only 9 species were confirmed based on signs of presence or direct observations.

According to the Global IUCN Red List, 1 species (*Vormela peregusna*) is classified as Vulnerable (VU), 5 species (*Barbastella barbastellus*, *Lutra lutra*, *Mesocricetus brandti*, *Miniopterus pallidus* and *Spermophilus xanthoprymnus*) are classified as Near Threatened (NT) and two species (*Microtus anatolicus* and *Nannospalax xanthodon*) are classified as Data Deficient (DD). All remaining mammal species are classified as Least Concern (LC). In addition, *Microtus anatolicus* was identified as a species restricted to Turkey, with a distributional range restricted to central and south west Anatolia.

During the field surveys, many *Spermophilus xanthophyrmnus* burrows was observed within the AoI (Figure 6-56). It is in all regions within the project area of 200 hectares. It is probable that there are 10 individuals per hectare according to the literature and observation data.

The list of the mammal species classified as Near Threatened or Vulnerable is reported in Table 6-75 while the complete list of the mammal species identified as potentially present is reported in Appendix D.

Table 6-75: Mammal species of conservation concern present or potentially present within the AoI.

Order	Species	English Name	IUCN Global Status	End./ RR.	Obs./ Lit.
Chiroptera	*Barbastella barbastellus*	Western Barbastelle	NT	-	L
Carnivora	*Lutra lutra*	Eurasian Otter	NT	-	L
Rodentia	*Mesocricetus brandti*	Brandt's Hamster	NT	-	O 2023
Rodentia	*Microtus anatolicus*	Anatolian Vole	DD	RR	O 2023
Chiroptera	*Miniopterus pallidus*	Pale Bent-wing Bat	NT	-	L
Rodentia	*Spermophilus xanthophyrmnus*	Anatolian Ground Squirrel	NT	-	O 2023
Carnivora	*Vormela peregusna*	European Marbled Polecat	VU	-	O 2023

Figure 6-56: Spermophilus xanthoprymnus burrows observed within the AoI

Figure 6-57: *Spermophilus xanthoprymnus* observed within the AoI

6.3.4 Critical Habitat Assessment

A screening based on available information was conducted to identify the potential presence of Critical Habitats (CHs) within the AoI according to IFC Performance Standard 6 (PS6).

6.3.4.1 Criterion 1: Habitat of significant importance to Critically Endangered and/or Endangered species

The presence of species having Endangered (EN) or Critically Endangered (CR) conservation status according to global IUCN criteria was considered. In the absence of a Global IUCN assessment (e.g. Not Evaluated NE, or Data Deficient DD), the species status was defined by taking into account the threat categories provided in the local assessments (e.g. Red Data Book for Turkish Plants) re-evaluated by the local expert (Prof. Hayri Duman) based on the latest available information on the species distribution and IUCN 2001 criteria.

As a result, 3 species were identified as potentially triggering CH based on this criterion. These species include:

- 3 bird species:
  - Steppe Eagle (*Aquila nipalensis*, EN);
  - Saker Falcon *(Falco cherrug,* EN*)*;
  - Egyptian Vulture (*Neophron percnopterus*, EN)

These three species were not observed within the AoI during the field survey performed in June 2023 and they are considered to be potentially present based on literature review.

In order to assess the importance of the AoI for the selected species, the following thresholds were applied (Guidance Note 6, GN72, IFC 2019):

a) areas that support globally important concentrations of an IUCN Red-listed EN or CR species (> 0.5% of the global population AND >5 reproductive units of a CR or EN species);

b) areas that support globally important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN70(a);

c) as appropriate, areas containing nationally/regionally important concentrations of an IUCN Red-listed EN or CR species.

The Criterion 1a thresholds were applied on all fauna species having EN or CR conservation status according to global IUCN criteria or local assessments.

All the Vulnerable species listed as potentially present have a wide distribution range, therefore it is excluded that they could meet the thresholds for Criterion 1b: “Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72”.

No areas containing nationally/regionally important concentrations of an IUCN Red-listed EN or CR species was identified within or around the study area, therefore criterion 1c was not applied.

In order to apply the thresholds identified in Criterion 1a an “Ecologically Appropriate Area of Analysis” (EAAA) and the Extent of Occurrence (EOO) have been identified for each species. The EAAA was identified as corresponding to Ereğli Plain Key Biodiversity Area (KBA) and Important Bird Area (IBA), in which the AoI completely falls within (Figure 6-58). The extent of the thus defined EAAA is 1,294 km^2. The EOO was obtained from literature (BirdLife) for the three species.

The results of the critical habitat assessment for Criterion 1 are detailed in Table 6-76. However, **no species triggering or potentially triggering CH were identified based on this criterion.**

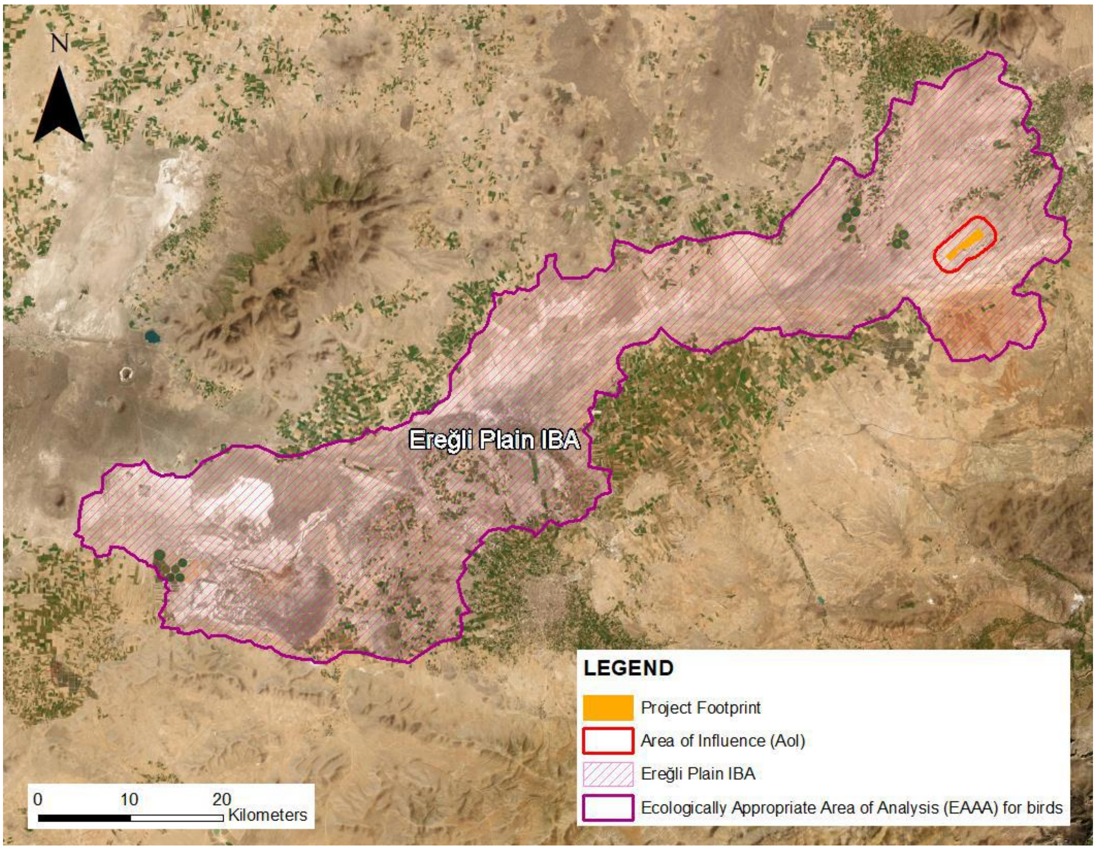

Figure 6-58: Ecologically Appropriate Area of Analysis (EAAA) for bird species

Table 6-76: Screening of fauna species potentially triggering Critical Habitat according to Criterion 1 (IFC, 2019)

Taxon	Species	Common name	Global IUCN Status	National IUCN status	End./ RR	Lit./ Obs.	EOO (km^2)	0.5% of EOO (km^2)	EAAA (km^2)	EAAA is ≥ 0.5% of EOO	Critical Habitat
Bird	*Aquila nipalensis*	Steppe Eagle	EN	-	-	L	47,500,000	237,500	1,294	No	-
	Falco cherrug	Saker Falcon	EN	-	-	L	43,200,000	216,000	1,294	No	-
	Neophron percnopterus	Egyptian Vulture	EN	-	-	L	58,000,000	290,000	1,294	No	-

6.3.4.2 Criterion 2: Habitats of significant importance to endemic or geographically restricted species

According to criterion 2 (Guidance Note 6, GN74, IFC 2019), the presence of endemic or Restricted Range species (EOO less than 50,000 km^2 for terrestrial vertebrates and plants) was considered.

Only one mammal species was identified as potentially triggering CH according to Criterion 2:

- Anatolian Vole (*Microtus anatolicus*, DD, Restricted Range)

To assess the importance of the AoI for this species, the following threshold was applied (Guidance Note 6, GN75, IFC 2019):

a) areas that regularly hold ≥ 10% of the global population size AND ≥ 10 reproductive units of a species.

Since a numerical estimation of the global population of the species does not exist, an ecologically appropriate area of analysis (EAAA) has been identified to determine the presence of critical habitat for the species. The EAAA was identified as corresponding to Ereğli Plain Key Biodiversity Area (KBA) and Important Bird Area (IBA), in which the AoI completely falls. The extent of the thus defined EAAA is 1,294 km^2, same as for birds (Figure 6-58).

The EOO of *Microtus anatolicus* obtained from literature (IUCN, 2023[23]) appeared to be completely outside of the AoI. However, the species was observed within the AoI during field studies performed on the 1st of June 2023 by local experts. Since the AoI is entirely included within the Ereğli Plain KBA, which is considered as an ecologically homogeneous area, the species is then considered as potentially distributed within the entire KBA. Therefore, the EOO of the species was calculated as the sum of the EOO known from literature and the extent of the Ereğli Plain KBA. Thus, the species results to have a disjunct distribution range, whose total extent is 43,903 km^2 (Figure 6-59).

The EAAA was then compared with the calculated EOO to identify if that area could potentially support the following threshold: "a) areas that regularly hold ≥10% of the global population size AND ≥ 10 reproductive units of a species" according to Criterion 2a. The results of the critical habitat screening are detailed below.

Since the EAAA is < 10% of the calculated EOO, the species did not result to trigger CH according to Criterion 2. Therefore, **no species potentially triggering CH based on this criterion were identified.**

[23] The IUCN Red List of Threatened Species – Source: https://www.iucnredlist.org/species/136237/137237409.

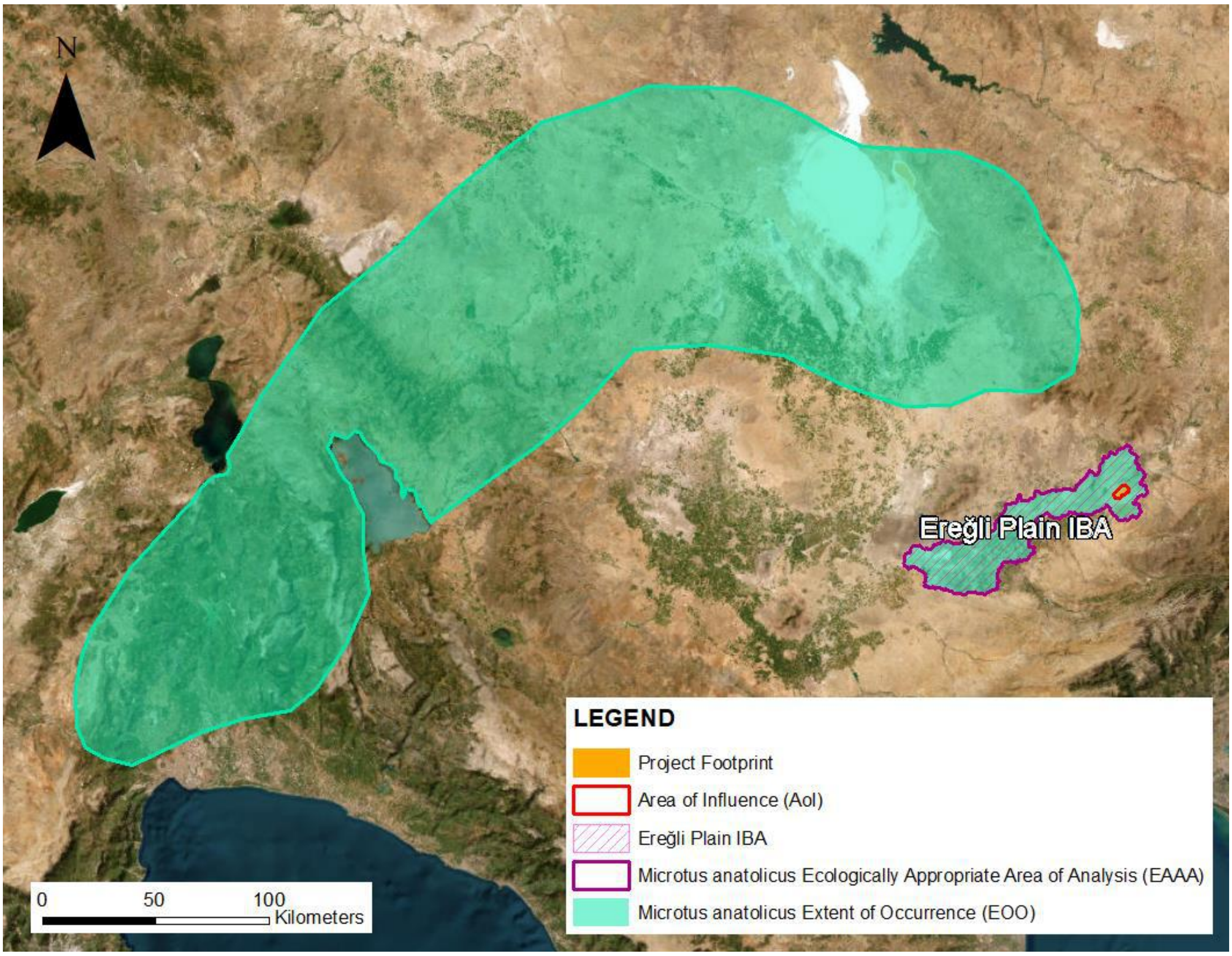

Figure 6-59: *Microtus anatolicus* Extent of Occurrence (EOO) and Ecologically Appropriate Area of Analysis (EAAA)

6.3.4.3 Criterion 3: Habitats supporting globally significant migratory or congregatory species

The presence of Key Biodiversity Areas (KBAs) and Important Bird Areas (IBAs) identified for congregatory species and of Wetlands of International Importance designated under criteria 5 or 6 of the Ramsar Convention was considered. In addition, the presence of migratory and congregatory species was also considered.

All migratory/congregatory bird species triggering Ereğli Plain IBA were assessed according to Criterion 3a threshold: “areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species’ lifecycle”.

Estimates of the global population for the assessed bird species were obtained from literature (BirdLife). Since in most of the cases the global population estimate was presented as a range with a lower and an upper limit, using a precautional approach the lower limit was considered for the calculation. For example, for *Ardeola ralloides* the global population is estimated at 370,000-780,000 individuals (BirdLife International, 2023a[24]), therefore for the purpose of the Critical Habitat Assessment the lower limit of 370,000 was considered.

Estimates of populations of the bird within the Ereğli Plain IBA (also EAAA) were equally obtained from literature. In this case, still using a precautional approach, the upper limit of the reported range of estimation

[24] BirdLife International (2023a). Species factsheet: Ardeola ralloides. Downloaded from http://datazone.birdlife.org/species/factsheet/squacco-heron-ardeola-ralloides on 30/06/2023.

of the local population was considered. For example, for *Ardeola ralloides* the population at site is estimated to include 30-50 breeding pairs, therefore for the purpose of the Critical Habitat Assessment the upper limit of 50 breeding pairs was considered (BirdLife International, 2023b[25]).

It is important to highlight that estimates available on BirdLife are quite outdated (from 1986 to 1998). Considering the high level of threat and very unfavourable conservation status of the IBA due to water capitation and diversion since the second half of the 1990s, that caused the contraction of wetland habitats, it is likely that these numbers are today considerably reduced. Therefore, the assessment is extremely conservative.

The population at site estimates were then compared with the global population estimates, in order to identify if the IBA could potentially meet Criterion 3 threshold: if the population at site estimate is ≥ 1% of the global population estimate, then the area is defined as potentially triggering Critical Habitat (GN78, IFC 2019). The results of the CH screening are discussed below and reported in Table 6-77.

As a result of the screening, 3 bird species were identified as potentially triggering CH according to Criterion 3a in the EAAA. These species are the Pigmy Cormorant (*Microcarbo pygmaeus*), the White-headed Duck (*Oxyura leucocephala*), and the Ruddy Shelduck (*Tadorna ferruginea*).

It is important to highlight that all these species are aquatic species, and their presence as breeding, wintering and/or passage species is strictly connected with the presence of open water habitats. These habitats are not present within the AoI or its vicinities and, within the Ereğli Plain IBA (also the EAAA) they are found exclusively in its south western portion, at about 60 km form the Project AoI and in correspondence of the Akgöl and Düden Lakes (Figure 6-58).

Therefore, it can be concluded that **no Critical Habitat is expected to be present in the AoI according to this criterion**.

[25] BirdLife International (2023b) Important Bird Area factsheet: Ereğli Plain. Downloaded from **http://datazone.birdlife.org/site/factsheet/749** on 04/07/2023.

Table 6-77: Screening of migratory and congregatory species potentially triggering Critical Habitat according to Criterion 3a (IFC, 2019)

Species	Common name	Global IUCN Status	Lit./ Obs.	Global population (individuals)	1% of the global pop. (individuals)	Estimated Ereğli Plain IBA pop. (individuals)	Status in the IBA	Congregatory/ Migratory	IBA pop. is ≥ 1%of global pop.	Critical Habitat
Ardeola ralloides	Squacco Heron	LC	L	370,000-780,000	3,700	100	Breeding	Congregatory/ Migrant	No	-
Charadrius leschenaultii	Greater Sandplover	LC	O	150,000-340,000	1,500	300	Breeding	Congregatory/ Migrant	No	-
Falco naumanni	Lesser Kestrel	LC	O	80,000-134,000	800	70	Breeding	Congregatory/ Migrant	No	-
Glareola pratincola	Collared Pratincole	LC	L	160,000-600,000	1,600	100	Breeding	Congregatory/ Migrant	No	-
Grus grus	Common Crane	LC	L	491,000-503,000	4,910	6	Breeding	Congregatory/ Migrant	No	-
						253	Wintering		No	-
Himantopus himantopus	Black-winged Stilt	LC	L	450,000-780,000	4,500	600	Breeding	Congregatory/ Migrant	No	-
Mareca strepera	Gadwall Mareca	LC	L	4,300,000-4,900,000	43,000	40	Breeding	Congregatory/ Migrant	No	-
Marmaronetta angustirostris	Marbled Teal	NT	L	10,000-42,000	100	10	Breeding	Congregatory/ Migrant	No	-
Microcarbo pygmaeus	Pygmy Cormorant	LC	L	48,000-137,000	480	1,200	Breeding	Congregatory/ Migrant	Yes	CH
Netta rufina	Red-crested Pochard	LC	L	420,000-600,000	4,200	1,000	Breeding	Congregatory/ Migrant	No	-
Oxyura leucocephala	White-headed Duck	EN	L	5300-8700	53	494	Passage	Congregatory/ Migrant	Yes	CH
						100	Breeding		Yes	

Species	Common name	Global IUCN Status	Lit./ Obs.	Global population (individuals)	1% of the global pop. (individuals)	Estimated Ereğli Plain IBA pop. (individuals)	Status in the IBA	Congregatory/ Migratory	IBA pop. is ≥ 1%of global pop.	Critical Habitat
Pelecanus crispus	Dalmatian Pelican	NT	L	11,400-13,400	114	62	Non-Breeding	Congregatory/ Migrant	No	-
Pelecanus onocrotalus	Great White Pelican	LC	L	265,000-295,000	2,650	40	Breeding	Congregatory/ Migrant	No	-
						1,000	Passage		No	-
Phoenicopterus roseus	Greater Flamingo	LC	L	550,000-680,000	5,500	600	Breeding	Congregatory/ Migrant	No	-
Platalea leucorodia	Eurasian Spoonbill	LC	L	63,000-65,000	630	40	Breeding	Congregatory/ Migrant	No	-
						250	Non-Breeding		No	-
Plegadis falcinellus	Glossy Ibis	LC	L	230,000-2,220,000	2,300	100	Breeding	Congregatory/ Migrant	No	-
Sternula albifrons	Little Tern	LC	L	190,000-410,000	1,900	120	Breeding	Congregatory/ Migrant	No	-
Tadorna ferruginea	Ruddy Shelduck	LC	L	170,000-220,000	1,700	3,016	Wintering	Congregatory/ Migrant	Yes	CH
Vanellus spinosus	Spur-winged Lapwing	LC	L	130,000-800,000	1,300	40	Breeding	Congregatory/ Migrant	No	-

6.3.4.4 Criterion 4: Highly threatened and/or unique ecosystems

Ecosystems that are at risk of significantly decreasing in area or quality, have a small spatial extent, and/or contain concentrations of biome-restricted species were considered for this criterion.

The Criterion 4 application (GN79, IFC 2019) foresees the use the “Red List of Ecosystems (RLE)” where formal IUCN assessments have been conducted. However, no evaluation was performed in Turkey as shown in the IUCN RLE Database[26]. Therefore, this system cannot be used at present. Instead, the “European Red List of Habitats” (Janssen *et al.*, 2016[27]) was used to identify threatened Ecosystems.

The “European Red List of Habitats” (European Union, 2016) is the result of an extensive and thorough assessment carried out by Alterra and IUCN with the support of a wide range of experts across Europe. Criteria and categories applied in the European Red List of Habitats to the EUNIS habitat types are based on a protocol proposed in a feasibility study (Rodwell *et al*. 2013)[28], combined with elements of the IUCN Red List of Ecosystems approach for ecosystem risk assessment (Keith *et al*. 2013[29], IUCN 2016). The categories applied to the EUNIS habitat types are analogous to those of the IUCN Red List of Threatened Species. In particular, the CR or EN categories include habitats that are at risk of significantly decreasing in quantity (area or distribution) and/or biotic/abiotic quality, and/or have a small spatial extent, and/or contain concentrations of biome-restricted species and are therefore considered to be at very high risk of collapse.

Only one natural habitat type was identified within the AoI, EUNIS habitat “E6.2 – Continental inland salt steppe”. This habitat is classified as Vulnerable (VU) according to the European Red List of Habitats (Janssen *et al.*, 2016[15]).

No habitats classified as Endangered (EN) or Critically Endangered (CR) were identified. Therefore, **no Critical Habitat is expected to be present in the AoI according to this criterion.**

6.3.4.5 Criterion 5: Areas associated with key evolutionary processes

This criterion includes presence of areas with landscape features that might be associated with evolutionary processes or species populations that are especially distinct and may be of special conservation concern given their distinct evolutionary history was considered.

The study area is not known to contain landscape features that may influence evolutionary processes, giving rise to regional configurations of species and ecological properties. In fact, no species and/or subpopulations of species is characterized by a particular level of isolation, spatial heterogeneity, and wealth of environmental gradients or edaphic interfaces. Moreover, the area is not considered to be of demonstrated importance as to climate change adaptation or as biological corridor. These considerations suggest that the study area does not support any key evolutionary process.Therefore, **no Critical Habitat is expected to be present in the AoI according to this criterion**.

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[26] http://assessments.iucnrle.org/

[27] Janssen J., Rodwell J., García C. M., Gubbay S., Haynes T., Nieto A., Sanders N., Landucci F., Loidi J., Ssymank A., Tahvanainen T., Valderrabano M., Acosta A., Aronsson M., Arts G., Attorre F., Bergmeier E., Bijlsma, R. J., Bioret F., Gubbay S. (2016). European Red List of Habitats Part 2. Terrestrial and freshwater habitats. 10.2779/091372.

[28] Rodwell, J.S., Janssen, J.A.M., Gubbay, S. and Schaminée, J.H.J. (2013). Red List Assessment of European Habitat Types. A feasibility study. Report for the European Commission, DG Environment, Brussels.

[29] Keith, D.A., Rodríguez, J.P., Rodríguez-Clark, K.M., Nicholson, E., Aapala, K., Alonso, A., Asmussen, M., Bachman, S., Bassett, A., Barrow, E.G., Benson, J.S., Bishop, M.J., Bonifacio, R., Brooks, T.M., Burgman, M.A., Comer, P., Comín, F.A., Essl, F., Faber-Langendoen, D., Fairweather, P.G., Holdaway, R.J., Jennings, M., Kingsford, R.T., Lester, R.E., Mac Nally, R., McCarthy, M.A., Moat, J., Nicholson, E., Oliveira-Miranda, M.A., Pisanu, P., Poulin, B., Riecken, U., Spalding, M.D. and Zambrano-Martínez, S. (2013). Scientific Foundations for an IUCN Red List of Ecosystems. PLoS ONE 8(5): e62111. http://dx.doi.org/10.1371/journal.pone.0062111

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7.0 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

7.1 Physical Components

7.1.1 Air Quality

Based on the information collected for the definition of the baseline air quality (see Chapter 6/ section6.2.1.2), the physical component *Air Quality* was assigned a **Medium-high** value of sensitivity. The AoI is considered to be sensitive for the following reasons:

- The close presence of communities, vulnerable targets, and sensitive ecological receptors potentially exposed to air emissions
- Other ongoing projects (under construction and planning stage) around the Project area.

7.1.1.1 Construction phase

7.1.1.1.1 Impact factors

Heavy construction is a source of dust emissions that may have substantial temporary impact on local air quality. Emissions during the construction activities are associated with land clearing, ground excavation, cut and fill operations as well as camp site operations. Dust emissions often vary substantially over different phases of the construction process. The impact factors originated from the Project activities potentially affecting air quality during construction phase are listed in Table 7-1.

Table 7-1: Project actions and related impact factors potentially affecting air quality during construction phase

Project actions	Impact factors
General engineering/construction works (i.e. land clearing, ground excavation, cut and fill operations, camp site operations)	Emissions of particulate matter Gaseous emissions from vehicles and construction equipment Gaseous emission from the boilers
Material transportation	Emissions of particulate matter Gaseous emissions from vehicles and construction equipment

Impacts potentially affecting this component are assessed here below for the construction phase.

- **Emissions of particulate matter**

Dust emissions from land preparation activities (including land clearing, ground excavation, cut and fill operations) are estimated using the emissions factors given in the Annex 12 of the Regulation on Control of Industrial Air Pollution (see below in Table 7-2). Uncontrolled emission factors represent the situations where activities are carried out without taking any mitigation measures. On the other hand, the controlled factors stand for the cases where activities are carried out with measures in place such sprinkling, keeping materials moist, loading and unloading without skidding, etc.

Table 7-2: Emission Factors used in Dust Emission Estimation

Source of emission	Emission factors		Emission Factor Unit
	Uncontrolled Conditions	Controlled Conditions	
Excavation	0.025	0.0125	kg/ton
Loading	0.010	0.005	kg/ton
Unloading	0.010	0.005	kg/ton
Storage	5.8	2.9	kg/ha.day
Transportation (total distance)	0.7	0.35	kg/km-vehicle

Land preparation activities and corresponding dust emissions are calculated based on the following assumptions on excavation amounts, bulk density of soil, duration of earth works, size of the area on which activities will take place, working hours per day, capacity of each truck, etc. The calculation of dust emissions is presented in the following table. Considering that the project activities will follow the proposed mitigation measures, dust emissions are calculated based on the controlled condition emission factors.

Dust emission due to excavation, loading and unloading are calculated based on the following formula:

$$\text{Dust Emission}\left(\frac{\text{kg}}{\text{h}}\right) = \text{Emission Factor}\left(\frac{\text{kg}}{\text{ton}}\right)\text{x Production Amount}\left(\frac{\text{m}^3}{\text{h}}\right)\text{x Bulk Density of Soil}\left(\frac{\text{ton}}{\text{m}^3}\right)$$

where:

$$\textit{Production Amount}\ (\text{m}^3) = \frac{\text{Excavation/Loading/Unloading Amount }(\text{m}^3)}{\text{Duration of works (days)} \ * \ \text{Working hours per day (h/day)}}$$

Dust emission due to transportation are calculated based on the following formula:

$$\text{Dust Emission}\left(\frac{\text{kg}}{\text{h}}\right) = \text{Emission Factor}\left(\frac{\text{kg}}{\text{km}-\text{vehicle}}\right)\text{x Distance}\left(\frac{\text{km}}{\text{vehicle}}\right)\text{x Number of vehicles}\left(\frac{\text{vehicle}}{\text{h}}\right)$$

Table 7-3: Dust Emission Estimation – Cable Trench Excavation

Dust Emission due to excavation works:	
Excavation amount	34,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of excavated soil	34,000 m^3 x 1.80 ton/m^3 = 61,200 ton
Duration of earth works	240 days
Daily working time (2 shifts)	16 h/day

Hourly excavation amount	61,200 ton / (240 days x 16 h/day) = 15.94 ton/h
Dust emission due to excavation (under controlled conditions)	15.94 ton/h x 0.0125 kg/ton = **0.19 kg/h**
Dust Emission due to unloading of backfill material:	
Backfilling amount	34,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of backfilling material	34,000 m^3 x 1.80 ton/m^3 = 61,200 ton
Duration of earth works	240 days
Daily working time (2 shifts)	16 h/day
Hourly backfilling amount	61,200 ton / (240 days x 16 h/day) = 15.94 ton/h
Dust emission due to unloading of backfill (under controlled conditions)	15.94 ton/h x 0.005 kg/ton = **0.07 kg/h**

Table 7-4: Dust Emission Estimation – Access Road Construction

Dust Emission due to excavation works:	
Excavation amount	34,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of excavated soil	34,000 m^3 x 1.80 ton/m^3 = 61,200 ton
Duration of earth works	240 days
Daily working time (2 shifts)	16 h/day
Hourly excavation amount	61,200 ton / (240 days x 16 h/day) = 15.94 ton/h
Dust emission due to excavation (under controlled conditions)	15.94 ton/h x 0.0125 kg/ton = **0.19 kg/h**
Dust Emission due to unloading of backfill material:	
Backfilling amount	19,500 m^3
Bulk density of soil	1.80 ton/m^3
Mass of backfilling material	19,500 m^3 x 1.80 ton/m^3 = 35,100 ton
Duration of earth works	240 days

Daily working time (2 shifts)	16 h/day
Hourly backfilling amount	35,100 ton / (240 days x 16 h/day) = 9.15 ton/h
Dust emission due to unloading of backfill (under controlled conditions)	9.15 ton/h x 0.005 kg/ton = **0.04 kg/h**
Dust Emission due to loading of excess excavated soil to trucks:	
Excess Excavation amount	14,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of Excess Excavation material	14,000 m^3 x 1.80 ton/m^3 = 25,200 ton
Duration of earth works	240 days
Daily working time (2 shifts)	16 h/day
Hourly amount	25,200 ton / (240 days x 16 h/day) = 6.56 ton/h
Dust emission due to loading of material (under controlled conditions)	6.56 ton/h x 0.005 kg/ton = **0.03 kg/h**
Dust Emission due to transportation of excess excavated material:	
Average transport distance within the project area	1000 m (one way)
Truck carrying capacity	30 tons/vehicle
Frequency of transports	(6.56 ton/h) / (30 ton/vehicle) = 0.21 vehicle / h
Dust emission due to transportation (under controlled conditions)	0.21 vehicle/h x 0.35 kg/km-vehicle x (2 km (round trip)) = **0.14 kg/h**

Table 7-5: Dust Emission Estimation – Inverter, switchyard and administration building construction

Dust Emission due to excavation works:	
Excavation amount	2,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of excavated soil	2,000 m^3 x 1.80 ton/m^3 = 3,600 ton
Duration of earth works	240 days
Daily working time (2 shifts)	16 h/day
Hourly excavation amount	3,600 ton / (240 days x 16 h/day) = 0.93 ton/h

Dust emission due to excavation (under controlled conditions)	0.93 ton/h x 0.0125 kg/ton = **0.01 kg/h**
Dust Emission due to unloading of backfill material:	
Backfilling amount	1,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of backfilling material	1,000 m^3 x 1.80 ton/m^3 = 1,800 ton
Duration of earth works	240 days
Daily working time (2 shifts)	16 h/day
Hourly backfilling amount	1,800 ton / (240 days x 16 h/day) = 0.47 ton/h
Dust emission due to unloading of backfill (under controlled conditions)	0.47 ton/h x 0.005 kg/ton = **0.002 kg/h**
Dust Emission due to loading of excess excavated soil to trucks:	
Excess Excavation amount	1,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of Excess Excavation material	1,000 m^3 x 1.80 ton/m^3 = 1,800 ton
Duration of earth works	240 days
Daily working time (2 shifts)	16 h/day
Hourly amount	1,800 ton / (240 days x 16 h/day) = 0.47 ton/h
Dust emission due to loading of material (under controlled conditions)	0.47 ton/h x 0.005 kg/ton = **0.002 kg/h**
Dust Emission due to transportation of excess excavated material:	
Average transport distance within the project area	1000 m (one way)
Truck carrying capacity	30 tons/vehicle
Frequency of transports	(0.47 ton/h) / (30 ton/vehicle) = 0.02 vehicle / h
Dust emission due to transportation (under controlled conditions)	0.02 vehicle/h x 0.35 kg/km-vehicle x (2 km (round trip)) = **0.014 kg/h**

The total amount of dust to be emerged from the construction activities are calculated as 0.625 kg/h which is below the threshold value for the air emission dispersion modelling requirement defined by the Turkish Regulation (i.e. 1 kg/h threshold value for area source defined in Table 2.1 in Annex-2 of the SKHKKY). Therefore, possible impacts on air quality has been assessed without using software models.

On the other hand, two other SPP projects adjacent to the Project area, namely G4-Bor-1 Solar Power Plant Project to be realized by Smart GES Enerji Üretim A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş., will be constructed. The construction schedule of these projects provided by Client is given in Table 7-6.

Table 7-6: Construction Schedules of the projects nearby

Name of the Project	Oct. 22	Nov. 22	Dec. 22	Jan. 23	Feb. 23	Mar. 23	Apr. 23	May 23	Jun. 23	Jul. 23	Aug. 23	Sep. 23	Oct. 23	Nov. 23	Dec. 23
G4-Bor-1															
G4-Bor-2															
The Project (G4-Bor-3)															

As it can be seen from the Table 7-6,

- Construction of the G4-Bor-2 Project has been started before the baseline measurements, which were conducted in January 2023. Therefore, the air quality impact of the G4-Bor-2 Project is already included in the baseline measurements, which are below the regulatory limit values.
- Construction of the G4-Bor-3 Project is started in March 2023
- Construction of the G4-Bor-1 Project will be started in mid- August 2023
- The construction schedule of the three projects will overlap only in second half of the August 2023.
- As of the end of the August 2023, impacts on air quality will be similar to impacts between the March-July 2023.

Gaseous emissions from vehicles and construction equipment

Gaseous emissions originated from the exhaust emissions due to fuel combustion in operation of the heavy-duty vehicles are calculated by using the Emission Standards Reference Guide published by USEPA. According to this guide, the major gaseous pollutants emitted from these types of vehicles are nitrogen oxides (NO_x), carbon monoxide (CO) and non-methane hydrocarbons (NMHC) (see Table 7-7).

Table 7-7: USEPA Emission Standards for Nonroad Compression-Ignition Engines [1]

Rated Power (kW)	NMHC (g/kW-hour)	NOx (g/kW-hour)	PM (g/kW-hour)	CO (g/kW-hour)
kW < 8	-	-	0.4	8.0

[1] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OA05.pdf

Rated Power (kW)	NMHC (g/kW-hour)	NOx (g/kW-hour)	PM (g/kW-hour)	CO (g/kW-hour)
8 ≤ kW < 19	-	-	0.4	6.6
19 ≤ kW < 37	-	-	0.03	5.5
37 ≤ kW < 56	-	-	0.03	5.0
56 ≤ kW < 75	0.19	0.4	0.02	5.0
75 ≤ kW < 130	0.19	0.4	0.02	5.0
130 ≤ kW < 225	0.19	0.4	0.02	3.5
225 ≤ kW < 450	0.19	0.4	0.02	3.5
450 ≤ kW < 560	0.19	0.4	0.02	3.5
560 ≤ kW < 900	0.19	3.5	0.04	3.5
kW > 900	0.19	3.5	0.04	3.5

As per information provided by the Client, the construction works will be carried out simultaneously in different locations of the project area. During calculation of the gaseous emissions caused by the construction machinery, it is assumed that all machines and equipment will work simultaneously to represent worst-case scenario emissions.

The amount of gaseous pollutants calculated by using emission factors are presented in Table 7-8 and Table 7-9.

Table 7-8: Pollutant Emissions Originated from the Each Construction Equipment

Construction Equipment	Number of Equipment	Rated Power* (kW)	Parameter	Emission (kg/hour)
Generator	8	50	NMHC	0.076
			NOX	0.160
			PM	0.008
			CO	1.400
Pile Driver	6	35	NMHC	0.040
			NOX	0.084
			PM	0.004
			CO	0.735
Backhoe Loader	5	150	NMHC	0.143
			NOX	0.300

Construction Equipment	Number of Equipment	Rated Power* (kW)	Parameter	Emission (kg/hour)
			PM	0.015
			CO	2.625
Loader	1	150	NMHC	0.029
			NOX	0.060
			PM	0.003
			CO	0.525
Excavator	4	161	NMHC	0.122
			NOX	0.258
			PM	0.013
			CO	2.254
Grader	1	135	NMHC	0.026
			NOX	0.054
			PM	0.003
			CO	0.473
Truck	6	210	NMHC	0.239
			NOX	0.504
			PM	0.025
			CO	4.410
Water Truck	2	164	NMHC	0.062
			NOX	0.131
			PM	0.007
			CO	1.148
Cylinder	2	110	NMHC	0.042
			NOX	0.088
			PM	0.004
			CO	1.100
Telehandler	1	55	NMHC	0.010
			NOX	0.022
			PM	0.001
			CO	0.193
Lowbed	1	172	NMHC	0.033
			NOX	0.069

Construction Equipment	Number of Equipment	Rated Power* (kW)	Parameter	Emission (kg/hour)
			PM	0.003
			CO	0.602
Crane	1	244	NMHC	0.046
			NOX	0.098
			PM	0.005
			CO	0.854

* *Values of similar projects were referenced.*

Table 7-9: Total Pollutant Emissions Originated from the Construction Equipment

Parameter	Total Calculated Emission (kg/hour)	Threshold Value Defining Modelling Study Requirement by the Turkish Regulation (kg/hour)
NMHC	0.868	3
NOX	1.827	4
PM	0.091	1
CO	16.318	50

Since the amount of each pollutant emission originated from the construction equipment is below the threshold value for the air emission dispersion modelling requirement defined by the Turkish Regulation (Table 2.1 in Annex-2 of the SKHKKY), air quality modelling study was not conducted for these pollutants.

- **Gaseous emission from the boilers**

During construction period, heating and hot water needs will be provided by Liquefied Natural Gas (LNG) heating center composed of 2 boilers having 10,000 m^3 volume and 1500 kW capacity in camp sites. Accordingly,

Hourly energy output = 1500 kWh x 3.6 MJ/kWh = 5,400 MJ

The emissions from the boilers area calculated as per the emission factors defined by European Environment Agency, EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019 for small combustion plants.

Table 7-10: Emission factors and emissions for the LNG boilers

Pollutant	Emission factor*	Calculation	Emissions (kg/h)	Threshold Value for the Air Emission Dispersion Modelling Requirement from the stacks(kg/h) **
NOx	42 g/GJ	=42 g/GJ x 5400 MJ x 1GJ/1000 MJ x 1 kg/1000 g	0.23	40
CO	22 g/GJ	=22 g/GJ x 5400 MJ x 1GJ/1000 MJ x 1 kg/1000 g	0.11	500
SOx	0.30 g/GJ	=0.30 g/GJ x 5400 MJ x 1GJ/1000 MJ x 1 kg/1000 g	0.0016	60
PM10	0.20 g/GJ	=0.20 g/GJ x 5400 MJ x 1GJ/1000 MJ x 1 kg/1000 g	0.0011	10

* EMEP/EEA Air Pollutant Emission Inventory Guidebook 2019, 1.A.4.a.i, 1.A.4.b.i, 1.A.4.c.i, 1.A.5.a Small Combustion, Table 3.16
** Table 2.1 in Annex-2 of the SKHKKY

The total amount of pollutants to be emerged from the construction activities are calculated as below the threshold value for the air emission dispersion modelling requirement defined by the Turkish Regulation. Therefore, impacts on air quality have been assessed without using software models.

7.1.1.1.2 Mitigation measures

In order to reduce the air emissions from the construction machinery and equipment, the following actions will be implemented during the construction phase:

- Use of water spraying at construction sites and transportation routes, especially in hot-dry seasons and in windy conditions,
- Loads in all trucks transporting dust-generating materials will be sprayed with water to suppress dust (keeping the material moist),
- Ensure loading and unloading without skidding,
- Use of water suppression for control of loose materials on paved or unpaved road surfaces
- Completed earthworks will be sealed - as soon as reasonably practicable after completion;
- In case alternative roads are present, construction traffic will avoid passing through the settlements. If unavoidable, necessary measures (i.e., speed limits) will be taken to prevent/minimise transportation related emissions and inform the communities about the activities and schedule;
- Enforce speed limits and reduce vehicle movements and idling on site;

- Trucks carrying fine material (excavation soil or fine material, etc.) to the site or from the site will be covered with tarpaulin to prevent dust emissions;
- Lighting of fire and burning of materials in will be prohibited;
- Activities will be conducted trying to use the minimum required number of means at the same time,
- Transportation distances will be minimized where possible,
- vehicle engines and other machinery will be kept turned on only if necessary, avoiding any unnecessary emission;
- machinery and equipment will be periodically checked and maintained to ensure their good working condition;
- all equipment and machinery must be maintained for compliance with standards and technical regulations for the protection of the environment and have appropriate certifications;
- Emergency generator working hours will be recorded and necessary emission measurements will be conducted in case of exceeding 500 working hours in a year. Monthly operating hours of the previous year and the records regarding the amount of gas/fuel consumed in emergency situations and the frequency of the emergency (year/day) will be reported to Provincial Directorate of Ministry of Environment, Urbanization and Climate Change (MoEUCC) until January 31 of each year.
- Exhaust gas emission arising from the engine land vehicles in traffic will comply with the Regulation on Control of Exhaust Gas Emissions. Vehicles will be subjected to appropriate routine maintenance programs and emission measurements as required by the regulation. The use of vehicles that do not comply with the emission limits will not be permitted until such vehicles will be serviced and re-tested. Emission measurements of heating centers in the construction camps (if any) will be conducted according to Regulation on Control of Air Pollution from Heating if the thermal power is below 1000 kW and Regulation on Control of Industrial Air Pollution if the thermal power is above 1000 kW
- Keep stockpiles for the shortest possible time;
- Consider the prevailing wind direction when siting stockpiles to reduce the likelihood of affecting sensitive receptors;
- Slow down or cease the dust generating work under strong winds, such as reducing work activities or using water spray to reduce dust dispersion.
- Minimize material handling and avoid double handling;
- Where dust levels may still cause a nuisance (despite measures above), water or other control measures may be required as additional measures to control dust.
- electric small-scale mechanization and technical tools will be used when available and feasible;
- Provide PPE to workers on site, such as dust masks where dust levels are likely to be excessive;
- During the second half of the August 2023,
  - additional dust water suppression methods will be applied, such as increasing the water spraying
  - minimize the number of the vehicles in this period as much as possible.

7.1.1.1.3 Residual impacts

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible to low negative impact** is expected on the air quality due to construction activities.

Table 7-11: Residual impact assessment matrix for the air quality during construction phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Emissions of particulate matter	Duration:	Short	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Gaseous emissions from vehicles and construction equipment	Duration:	Short	Medium-high	Short-term	**Low**	Low	**Low**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Gaseous emission from the boilers	Duration:	Short	Medium-high	Short-term	**Low**	Low	**Low**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					

7.1.1.1.4 Monitoring measures

The following monitoring measures shall be implemented to assess the real impacts of the Project on the air quality during the construction and verify the effectiveness of the mitigation measures.

- Monitoring PM10 levels by quarterly measurements;
- Regular (daily) visual monitoring to ensure that the dust mitigation measures are in place;
- Routine maintenance program will be set-up and maintenance records will be kept for all vehicles, machinery/equipment;
- Periodic inspection of subcontractors to ensure that all vehicles, construction machinery used on site evidence regular maintenance schedule in line with regulatory requirements;
- Maintaining a logbook by recording any exceptional incidents that cause extra dust or gas emissions, either on- or offsite, and the action taken to resolve the situation in the log book; and
- Air quality monitoring of PM_{10} at the closest sensitive receptors in case of grievance.

7.1.1.2 Operation Phase

7.1.1.2.1 Impact factors

The impact factor of the Project activities potentially affecting air quality during operation phase is listed in Table 7-19.

Table 7-12: Project Actions and Related Impact Factors During Operation Phase

Project actions	Impact factors
Plant/infrastructure operation	Emission of gaseous pollutants from the vehicles

The impact factor identified above is described below and assessed in the matrix that follows.

- **Emission of gaseous pollutants from the vehicles**

During the operation phase of the Project, only emission to be caused by the Project related activities are the exhaust emissions from the cars used by the operation personnel. During operation phase, total 23 personnel will be employed, and the vehicle traffic will be mainly from the maintenance works and staff shuttles/cars entering and leaving the Project Area.

7.1.1.2.2 Mitigation measures

In order to reduce the air emissions from the operation machinery and equipment, the following actions will be implemented during the operation phase:

- vehicle engines and other machinery will be kept turned on only if necessary, avoiding any unnecessary emission;
- vehicles will be periodically checked and maintained to ensure their good working condition;
- activities will be conducted trying to use the minimum required number of means at the same time;

7.1.1.2.3 Residual impacts

Based on the baseline conditions of the assessed component, the project characteristics, and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible negative impact** is expected on the air quality due to operation activities.

Table 7-13: Residual impact assessment matrix for the air quality during operation phase

<table>
<tr><th>Impact Factor</th><th colspan="2">Impact Factor Features</th><th>Component Sensitivity</th><th>Impact Reversibility</th><th>Impact Value</th><th>Mitigation effectiveness</th><th>Residual impact value</th></tr>
<tr><td rowspan="4">Emission of gaseous pollutants from the vehicles</td><td>Duration:</td><td>Very long</td><td rowspan="4">Medium-high</td><td rowspan="4">Short-term</td><td rowspan="4">Low</td><td rowspan="4">Medium</td><td rowspan="4">Negligible</td></tr>
<tr><td>Frequency:</td><td>Frequent</td></tr>
<tr><td>Geo. Extent:</td><td>Local</td></tr>
<tr><td>Intensity:</td><td>Negligible</td></tr>
</table>

7.1.1.2.4 Monitoring measures

The following monitoring measures shall be implemented to assess the true effects of the Project on the air quality during the operation period

- Routine maintenance program will be set-up and maintenance records will be kept for all vehicles, machinery/equipment;
- Maintaining a logbook by recording any exceptional incidents that cause extra dust or gas emissions, either on- or offsite, and the action taken to resolve the situation in the logbook; and

7.1.1.3 Decommissioning Phase

The activities during the decommissioning phase are likely to be similar to the construction phase hence the impacts will be similar to impacts of construction activities. Based on that, a new impact is not expected during the decommissioning phase of the Project, other than those listed in the construction phase. Noise and Vibration Based on the information collected for the definition of the baseline (see Chapter 6.1.4), the physical component *Noise* was assigned a **Medium** value of sensitivity for the following reasons:

- High noise levels in the AoI;
- Close presence of communities, vulnerable targets and sensitive ecological receptors potentially exposed to noise and vibration emissions; and
- Other ongoing projects (under construction and planning stage) around the Project site.

7.1.1.4 Noise Baseline Summary

In order to determine the baseline noise levels around the Project area, 7 representative background noise measurement locations have been determined. Between January 12^{th} – 15^{th}, 2023, ambient noise levels were measured during a 48-hours period at each location in line with TS 9798 (ISO 1996–2) and TS 9315 (ISO 1996–1) standards. The noise measurement campaign was carried out by Çınar Laboratory which is an accredited company by the Ministry of Environment, Urbanization and Climate Change for noise measurements.

The baseline noise measurement results are presented in the noise baseline section of this ESIA (see Chapter 6/ section 6.1.4). The noise measurement results are compared with both IFC noise standards and Turkish Regulatory noise limit values. In this respect, it is observed that baseline noise levels are below the IFC and Turkish Regulatory noise limits.

7.1.1.5 Noise Modelling Methodology

A noise modelling software "SoundPLAN Essential 5.0"[1] was applied to determine the predicted noise levels that would potentially occur during the construction phase of the Project. Information about the noise levels of vehicles and equipment, identified as noise sources to be used by the Project, was obtained from the noise modelling software program's library.

During the modelling studies for the construction phase of the Project, below steps were followed:

1) As a first step of modelling studies, the elevation model that directly affects the noise distribution of the natural terrain is created. In the meantime, elevation contours with 10 m intervals on the topographic map were digitized and loaded into the program. Interpolation of elevation contours was performed in the program and natural elevation data of the Project area and its surroundings were obtained to be used in the model. After the elevations are digitalized, Temporary DGM (Digitalized Ground Model) is generated.
2) At the second step, the humidity, temperature, and air pressure data of the Project area were introduced to the model.
3) At the third step, the noise sources identified for the study area were introduced to the model together with their noise levels (dBA).
4) At the fourth step, the determined receptors have also been digitized in the model.

[1] https://www.soundplan.eu/en/software/soundplanessential/

5) At the fifth step, ground effect, which is another important parameter for the noise distribution, was also digitalized in the model. Ground effect varies between 0 to 1, where 0 corresponds to hard, reflective surfaces and 1 corresponds to soft, absorptive surfaces.

6) Finally, the modelling process has been initiated by determining a calculation area that will include all the noise sources and sensitive receptors in the study area. For the worst-case scenario simulation, all the noise sources are assumed to work at the same time and at the distances identified before. As a result of the model runs, noise levels in the defined receptors and grid noise maps for the study area are obtained.

The Noise Model assumptions and approaches are listed below:

- Noise model was developed by using equipment type and amount, and noise levels which is defined in the below sections;
- The Project area humidity is taken as 58.5%, temperature as 11.2°C and air pressure as 879.6 hPa by assuming a general average for region as described in Section 6.1.2;
- The ground effect was taken as 0.8 according to the rurality & urbanity intensity of the Project area; and
- The model is set considering the worst-case scenario, which represents the situation where all of the noise sources are operating at the same time with maximum capacity.

For the worst-case scenario simulation, modeled noise levels were cumulatively assessed by considering the highest baseline noise levels measured, and the cumulative noise values were compared with the Project standards.

7.1.1.6 Construction Phase

7.1.1.6.1 Impact factors

The impact factor from the Project activities potentially affecting ambient noise during construction phase is listed in Table 7-14.

Table 7-14: Project Actions and Related Impact Factors During Construction Phase

Project actions	Impact factors
General engineering/construction works	Emission of noise
Material transportation	Emission of noise

The impact factor identified above is described below and assessed in the matrix that follows.

- **Emission of noise**

Increase in ambient noise levels are expected due to operation of generators, heavy machinery, equipment etc. during:

- General engineering/construction works; and
- Material transportation.

In this section, the environmental noise generated by the machinery and equipment to be used in the infrastructure and superstructure construction, is evaluated cumulatively and conservatively for the purpose of displaying the worst-case scenario during the construction phase of the Project. However, it should be noted that no construction activity will take place during the night-time.

The list of equipment and machinery that will be used during the construction of the whole Project are provided by the Client and presented in Table 7-15. The noise levels of these equipment/machine were obtained from the library of SoundPlan Essential 5.0 and were introduced to the model. The given equipment/machine list represents all the equipment that will be used in the construction works which will be carried out simultaneously in different parts of the Project area.

In the context of the worst-case scenario approach, it has been accepted that the machines and equipment used in the construction activities are working simultaneously, in a collective way and at maximum sound power levels.

Table 7-15: Construction Machine/Equipment List

Equipment / Vehicle	Number	Sound Power (Lw)*
Generator	8	102
Pile Driver	6	132
Backhoe Loader	5	116
Loader	1	116
Excavator	4	112
Grader	1	119
Truck	6	123
Water Truck	2	123
Cylinder	2	118
Telehandler	1	104
Lowbed	1	123
Crane	1	105

*Noise levels of the machine/equipment are obtained from the library of Sound Plan Essential 5.0.

The calculated noise levels at the chosen receptors, where baseline noise measurements were conducted, the cumulative results and the comparison of the results with the IFC standards and Turkish limit values are presented in Table 7-16. Detailed breakdown of the cumulative results of the assessed receptors are given below:

- IFC day-time noise standard is exceeded at locations N-5, N-6 and N-7;
- Turkish day-time noise regulatory limit value is exceeded at location N-6;
- Turkish evening-time noise regulatory limit value is exceeded at locations N-5 and N-6.

The daytime grid noise map obtained for the construction phase is presented in the Figure 7-1 below.

Table 7-16: Modelled Construction Noise Levels and Baseline Noise Levels at the Receptors during the Construction Phase of the Project

Measurement Point	Measurement Location					Modelled Noise Levels (originated from Project activities) (dBA)					The Baseline Noise Levels (dBA)*					Modelled Noise Level + The Ambient Noise Level (dBA)					Difference Between Ambient and Modelled Noise Levels (dBA)				
	Province	District	Village / Neighborhood	Receptor Type	Distance to the Project Area (m)	IFC		Turkish			IFC		Turkish			IFC		Turkish			IFC		Turkish		
						Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)	Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)	Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)	Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)
N-1	Niğde	Bor	Bağdüz	Residential	8,500	0.0	0.0	0.0	0.0	0.0	54.4	43.0	55.0	49.9	42.6	54.4	43.0	55.0	49.9	42.6	0.0	0.0	0.0	0.0	0.0
N-2	Niğde	Bor	Bentkavak	Residential	7,750	0.0	0.0	0.0	0.0	0.0	53.5	44.9	55.9	50.1	45.0	53.5	44.9	55.9	50.1	45.0	0.0	0.0	0.0	0.0	0.0
N-3	Niğde	Bor	Bentkavak	Residential	6,800	0.0	0.0	0.0	0.0	0.0	50.2	36.7	51.1	42.7	36.7	50.2	36.7	51.1	42.7	36.7	0.0	0.0	0.0	0.0	0.0
N-4	Niğde	Bor	Bentkavak	Residential	3,700	42.1	0.0	42.1	42.1	0.0	48.1	44.3	48.8	43.9	44.6	49.1	44.3	49.6	46.1	44.6	1.0	0.0	0.8	2.2	0.0
N-5	Niğde	Bor	Seslikaya	Residential	230	62.3	0.0	62.3	62.3	0.0	48.1	41.7	48.8	43.9	42.1	62.5	41.7	62.5	62.4	42.1	14.4	0.0	13.7	18.5	0.0
N-6	Niğde	Bor	Seslikaya	Residential	75	66.9	0.0	66.9	66.9	0.0	53.1	44.3	53.0	52.8	44.4	67.1	44.3	67.1	67.1	44.4	14.0	0.0	14.1	14.3	0.0
N-7	Niğde	Bor	Seslikaya	Residential	1,200	57.3	0.0	57.3	57.3	0.0	52.4	41.3	51.5	53.3	36.8	58.5	41.3	58.3	58.8	36.8	6.1	0.0	6.8	5.5	0.0
IFC Noise Standards[1,2]	Residential; institutional; educational areas					**55**	**45**	-	-	-	**55**	**45**	-	-	-	**55**	**45**	-	-	-	**3**	**3**	-	-	-
Turkish Noise Limit Values[3,4]	Industrial facilities, transportation sources					-	-	**65**	**60**	**55**	-	-	**65**	**60**	**55**	-	-	**65**	**60**	**55**	-	-	-	-	-

Notes:

* For the worst-case scenario simulation, modelled noise levels were cumulatively assessed and compared with the highest baseline value.
[1] IFC Environmental, Health, and Safety (EHS) Guidelines General EHS Guidelines: Environmental - Noise Management;
[2] IFC Guidelines provide noise standards for two-time intervals in 24 hours: day (07:00 to 22:00), and night (22:00 to 07:00).
[3] Regulation on Control of Environmental Noise;
[4] Regulation on Control of Environmental Noise provides noise standards for three-time intervals in 24 hours: day (07:00 to 19:00), evening (19:00 to 23:00) and night (23:00 to 07:00).

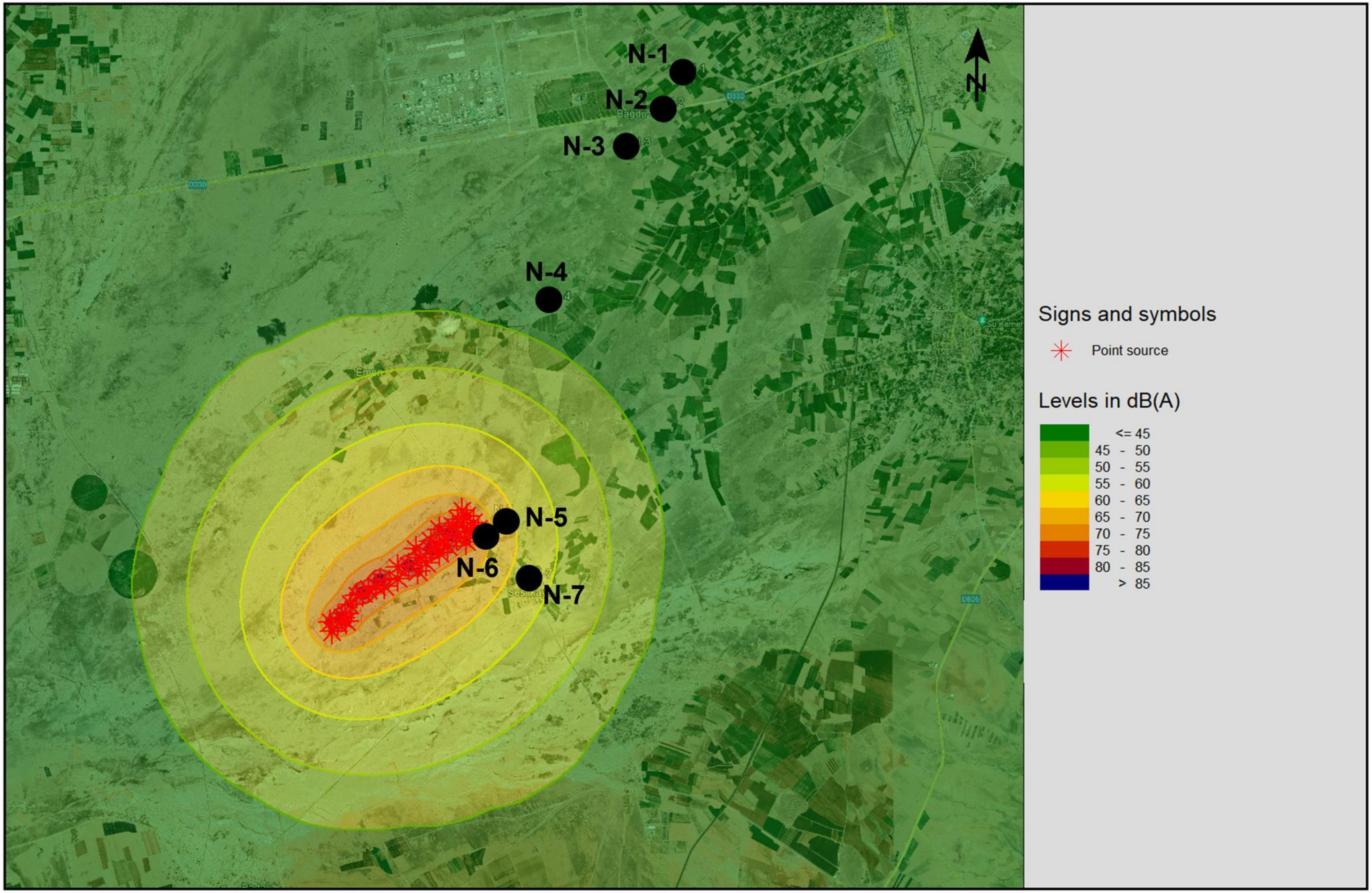

Figure 7-1: Daytime Grid Noise Map for the Construction Phase of the Project

Apart from the Project, two other SPP projects adjacent to the Project area, namely G4-Bor-1 Solar Power Plant Project to be realized by Smart GES Enerji Üretim A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş., will be constructed. While the construction of G4-Bor-2 Solar Power Plant Project has been initiated prior to the background noise level measurements, construction of G4-Bor-1 Solar Power Plant Project has not been initiated yet. Based on that, baseline noise measurements already cover the noise emissions generated from the construction of G4-Bor-2 Solar Power Plant Project.

In order to display the cumulative impacts of the construction of the Project and constructions of the other two SPPs, a cumulative noise modelling study is conducted. Due to similarities between projects in terms of both area and construction technologies, number of machinery and equipment to be used in the infrastructure and superstructure constructions are assumed identical with the Project. The noise levels of these equipment/machine were obtained from the library of SoundPlan Essential 5.0 and were introduced to the model.

In the context of the worst-case scenario approach, it has been accepted that the machines and equipment used in the construction activities are working simultaneously, in a collective way and at maximum sound power levels.

The calculated noise levels at the chosen receptors, where baseline noise measurements were conducted, the cumulative results and the comparison of the results with the IFC standards and Turkish limit values are presented in Table 7-17. Detailed breakdown of the cumulative results of the assessed receptors are given below:

- IFC day-time noise standard is exceeded at locations N-5, N-6 and N-7;
- Turkish day-time noise regulatory limit value is exceeded at location N-6; and
- Turkish evening-time noise regulatory limit value is exceeded at locations N-5 and N-6.

The daytime grid noise map obtained for the cumulative construction phase activities is presented in the Figure 7-2 below.

Table 7-17: Modelled Cumulative Construction Noise Levels and Baseline Noise Levels at the Receptors

Measurement Point	Measurement Location					Modelled Noise Levels (originated from cumulative construction activities) (dBA)					The Baseline Noise Levels (dBA)*,**					Modelled Noise Level + The Ambient Noise Level (dBA)					Difference Between Ambient and Modelled Sound Levels (dBA)				
	Province	District	Village / Neighborhood	Receptor Type	Distance to the Project Area (m)	IFC		Turkish			IFC		Turkish			IFC		Turkish			IFC		Turkish		
						Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)	Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)	Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)	Day (07-22)	Night (22-07)	Day (07-19)	Evening (19-23)	Night (23-07)
N-1	Niğde	Bor	Bağdüz	Residential	8,500	0.0	0.0	0.0	0.0	0.0	54.4	43.0	55.0	49.9	42.6	54.4	43.0	55.0	49.9	42.6	0.0	0.0	0.0	0.0	0.0
N-2	Niğde	Bor	Bentkavak	Residential	7,750	0.0	0.0	0.0	0.0	0.0	53.5	44.9	55.9	50.1	45.0	53.5	44.9	55.9	50.1	45.0	0.0	0.0	0.0	0.0	0.0
N-3	Niğde	Bor	Bentkavak	Residential	6,800	0.0	0.0	0.0	0.0	0.0	50.2	36.7	51.1	42.7	36.7	50.2	36.7	51.1	42.7	36.7	0.0	0.0	0.0	0.0	0.0
N-4	Niğde	Bor	Bentkavak	Residential	3,700	46.2	0.0	46.2	46.2	0.0	48.1	44.3	48.8	43.9	44.6	50.3	44.3	50.7	48.2	44.6	2.2	0.0	1.9	4.3	0.0
N-5	Niğde	Bor	Seslikaya	Residential	230	63.1	0.0	63.1	63.1	0.0	48.1	41.7	48.8	43.9	42.1	63.2	41.7	63.3	63.2	42.1	15.1	0.0	14.5	19.3	0.0
N-6	Niğde	Bor	Seslikaya	Residential	75	67.4	0.0	67.4	67.4	0.0	53.1	44.3	53.0	52.8	44.4	67.6	44.3	67.6	67.5	44.4	14.5	0.0	14.6	14.7	0.0
N-7	Niğde	Bor	Seslikaya	Residential	1,200	58.3	0.0	58.3	58.3	0.0	52.4	41.3	51.5	53.3	36.8	59.3	41.3	59.1	59.5	36.8	6.9	0.0	7.6	6.2	0.0
IFC Noise Standards[1,2]	Residential; institutional; educational areas					**55**	**45**	-	-	-	**55**	**45**	-	-	-	**55**	**45**	-	-	-	**3**	**3**	-	-	-
Turkish Noise Limit Values[3,4]	Industrial facilities, transportation sources					-	-	**65**	**60**	**55**	-	-	**65**	**60**	**55**	-	-	**65**	**60**	**55**	-	-	-	-	-

Notes:
* For the worst-case scenario simulation, modelled noise levels were cumulatively assessed and compared with the highest baseline value.
** Construction of G4-Bor-2 Solar Power Plant Project has been initiated prior to the background noise measurements, therefore, baseline noise measurements already cover the noise emissions generated from the construction of G4-Bor-2 Solar Power Plant Project.
[1] IFC Environmental, Health, and Safety (EHS) Guidelines General EHS Guidelines: Environmental - Noise Management;
[2] IFC Guidelines provide noise standards for two-time intervals in 24 hours: day (07:00 to 22:00), and night (22:00 to 07:00).
[3] Regulation on Control of Environmental Noise;
[4] Regulation on Control of Environmental Noise provides noise standards for three-time intervals in 24 hours: day (07:00 to 19:00), evening (19:00 to 23:00) and night (23:00 to 07:00).

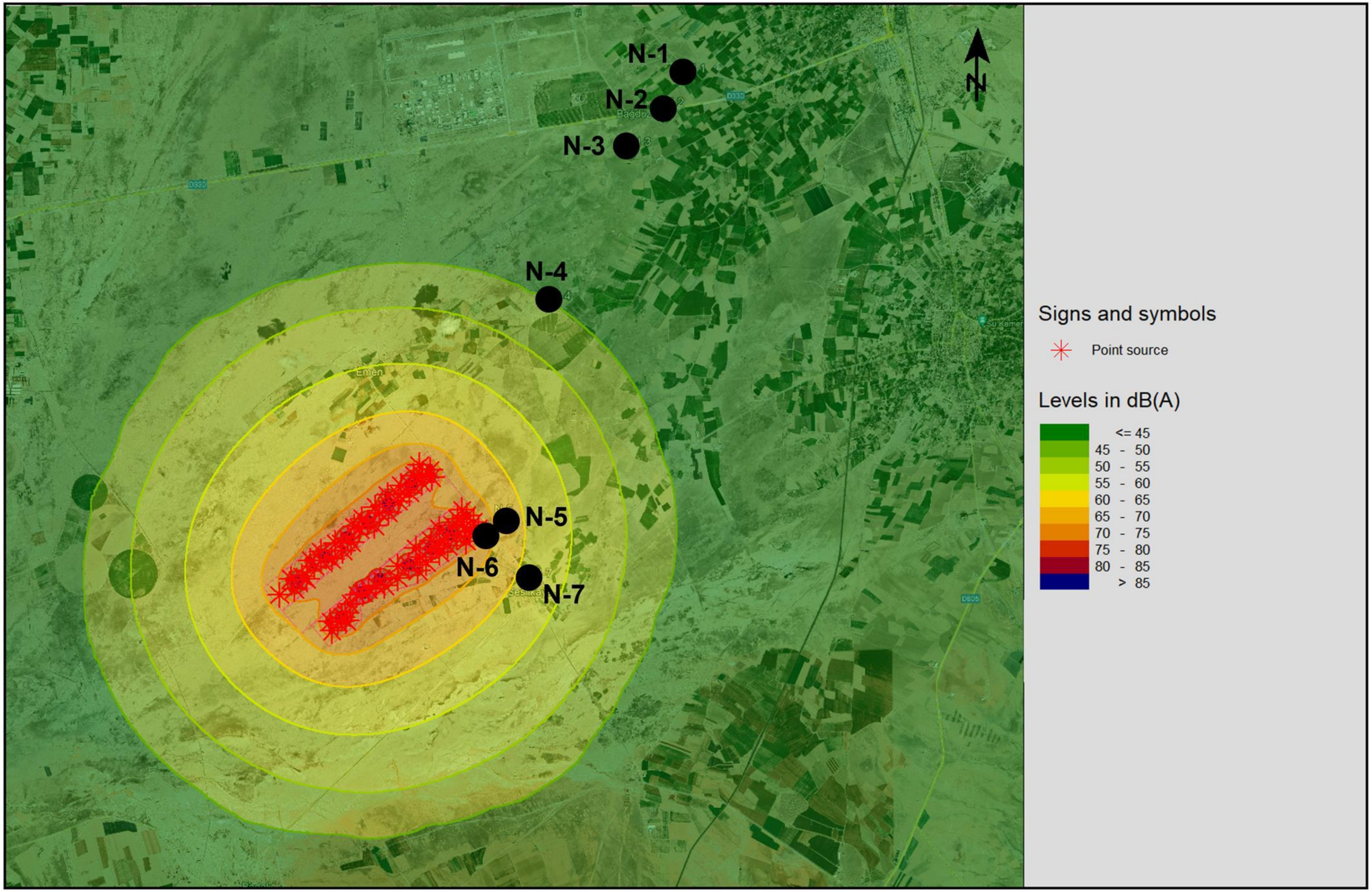

Figure 7-2: Daytime Grid Noise Map for the Cumulative Construction Phase Activities

7.1.1.6.2 Mitigation measures

The mitigation measures listed below follow the mitigation hierarchy (avoidance, minimization, rehabilitation/restoration) and will be implemented during the construction phase of the Project. It should be noted that the noise modelling studies and relevant assessments are based on the worst-case scenario assuming that all machines and equipment used in the construction activities are working simultaneously, in a collective way and at maximum sound power levels; therefore, the real increase in baseline noise levels would be much lower than the predicted values above in most of the time due to the homogeneous distribution of equipment on site.

During the construction phase, provisions of the "Regulation on Control of Environmental Noise" and "Regulation on Protection of Workers from Noise-Related Risks" will be followed with the purpose of protecting both environment and health of employees with respect to noise impacts. Accordingly, appropriate personal protective equipment and materials such as ear protector or ear plug will be provided to protect workers from noise impacts.

The following control measures will be applied where possible:

- Selection of equipment with lower sound power levels;
- Installing silencers for fans;
- Installing suitable mufflers on engine exhausts and compressor components;
- Installing acoustic enclosures for equipment casting radiating noise;
- Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas;
- Speed limit applications should be applied throughout site for the Project vehicles that will transport construction materials / equipment;
- Properly refurbished and/or new machinery, equipment and vehicles will be used to the extent possible;
- Any component of machinery or equipment, which is thought to generate excessive noise (e.g., a defective muffler, broken or loosely placed engine hood) will be discarded if said components cannot be maintained/repaired and they will be replaced as appropriate;
- Engine covers will be kept closed when the equipment is in operation to minimize noise;
- Workers will be trained in noise abatement best practices, including avoiding unnecessary operation of engines and switching off equipment when it is not required;
- Idling of construction vehicles will be avoided;
- Best management practices (e.g., selection of equipment and work methods) will be used to limit vibration impacts, particularly nuisance vibration. Heightened attention to vibration control will occur when working within 50 meters of residences and other sensitive receptors with high vibration creating equipment. Significant changes to the vibration levels can occur based on the soil conditions and the driving energy of the hammer;
- Re-locating noise sources to less sensitive areas to take advantage of distance and shielding;
- Reducing the Project traffic routing through community areas wherever possible;
- Developing a grievance mechanism to record and respond to complaints;

- Carrying out the regular maintenance of the construction equipment in order to minimize the possible high noise levels generated by the equipment;
- Performing quarterly monitoring campaigns at the baseline noise measurement locations during the construction phase; and
- If the construction phases of the Project and G4-Bor-1 Solar Power Plant Project to be realized by Smart GES Enerji Üretim A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş. overlap, Kalyon Enerji will communicate with the planned project contractors, and plan the construction activities to minimize the adverse noise impacts on receptors through measures such as scheduling of noise generating activities.

In case of any Project related noise grievance, noise measurement campaign will be carried out immediately at the area where noise related grievance is received. If monitoring results indicate that noise levels are above the defined limits, at the first stage construction schedule in order to limit the hours of operation or to limit the number of equipment to be operated simultaneously will be reviewed and revised accordingly, if possible. Secondly, if the construction schedule could not be able to be revised, noise barriers could be installed as a second option without any gaps and with a continuous minimum surface density of 10 kg/m^2 in order to minimize the transmission of sound through the barrier. Barriers should be located close to the source or to the receptor location to be effective. The exact specifications, location and number of the noise barriers will be determined if deemed necessary.

In case of any noise related grievances about the cumulative impact of projects, Kalyon Enerji will inform the other project owners and joint actions should be taken.

7.1.1.6.3 Residual impacts

The table below summarizes the impacts caused by the identified impact factor on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics, and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **low** impact is expected on the ambient noise during the construction phase.

Table 7-18: Residual Impact Assessment Matrix for the Noise During Construction Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Emission of Noise	Duration:	Short	Very high	Short-term	**Low**	Medium	**Low**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Very high					

7.1.1.6.4 Monitoring measures

During the construction phase of the Project, a monitoring program of noise at the baseline noise measurement locations and at the receptors where the defined noise limit values are exceeded, will be in place. The monitoring campaign will be conducted by 48 hours continuous noise measurements (quarterly) at the locations.

7.1.1.7 Operation Phase

7.1.1.7.1 Impact factors

The impact factor from the Project activities potentially affecting ambient noise during construction phase is listed in Table 7-19.

Table 7-19: Project Actions and Related Impact Factors During Operation Phase

Project actions	Impact factors
Plant/infrastructure operation	Emission of noise

The impact factor identified above is described below and assessed in the matrix that follows.

- **Emission of noise**

During the operation phase of the Project, inverter stations will be enclosed in prefabricated units which include inverters, step-up transformers and MV Ring Main Units. Sound pressure levels of the inverter stations are known to be around 85/75 dBA at 1m/10m in front of the enclosure and 1m above ground. 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.

7.1.1.7.2 Mitigation measures

During the operation phase of the Project, provisions of the “Regulation on Control of Environmental Noise” and “Regulation on Protection of Workers from Noise-Related Risks” will be followed with the purpose of protecting health of employees with respect to noise impacts. Accordingly, appropriate personal protective equipment and materials such as ear protector or ear plug will be provided to protect workers from noise impacts, if required. In addition, maintenance of the equipment will be made regularly to ensure high noise levels are minimized.

Although no significant impact is expected in terms of noise emissions, following measures will be implemented during the operation phase of the Project:

- In case of any noise related grievance, noise measurement campaign will be carried out immediately at the area where noise related grievance is received;
- Noise levels will be monitored at the receptors where the defined noise limit values are exceeded, at least for a year on monthly basis; and
- In cases when monitoring results indicate that noise levels are above the defined limits, then noise abatement measures will be implemented (e.g. noise barriers at the source, soundproofing, etc.).

7.1.1.7.3 Monitoring measures

During the operation phase of the Project, a monitoring program of noise at the baseline noise measurement locations and at the receptors where the defined noise limit values are exceeded, will be in place. The monitoring campaign will be conducted by 48 hours of continuous noise measurements (quarterly) at the locations. In case the measurements are below the limit values, an annual measurement will be carried out to stay on the safe side.

7.1.1.8 Decommissioning Phase

The activities during the decommissioning phase are likely to be similar to the construction phase hence the impacts will be similar to construction activities. Based on that, a new impact is not expected during the decommissioning phase of the Project, other than those listed in the construction phase

7.1.2 Soil and Subsoil

Based on the information collected for the definition of the baseline (see Chapter 6.2.1.5), the physical component *Soil and Subsoil* was assigned a **Medium-Low** value of sensitivity for the following reasons:

- Limited presence of soil with agricultural potential;

- Limited soil contamination.

7.1.2.1 Construction phase

7.1.2.1.1 Impact factors

The impact factors from the Project activities potentially affecting soil and subsoil during construction phase are listed in Table 7-20.

Table 7-20: Project actions and related impact factors potentially affecting soil and subsoil during construction phase

Project actions	Impact factors
General engineering/construction works;	Removal of soil Minor leakage of contaminants into soil Occupation of land
Material Storage	Minor leakage of contaminants into soil
Accommodation and management of the workforce	Discharge of wastewater Occupation of land

Impacts potentially affecting this component are assessed here below for the construction phase.

- **Removal of Soil**

According to the geological and geotechnical surveys and site observation there is no topsoil present in the area as the area was used for grazing purposes for many years.

Removal of soil will be realized during; earthworks (excavation, filling) to create the surface over which the Project will be constructed, trenching activities for cable laying and excavation works for the foundations of buildings (e.g., control building). No excavation waste is expected as the resulting material will be used for filling. The material needed for the construction activities, including bedding, padding, backfilling, and aggregate will be provided from third party companies which have permits/licenses in accordance with national regulations.

Removal of soil will eventually generate disturbances that will make the soil surface more vulnerable to wind and/or rain erosion. There are no natural water receptors in the Project AoI therefore no impact by surface drainage caused by soil erosion is expected.

- **Minor Leakage of Contaminants into Soil**

Minor leakage of contaminants into soil can be caused by;

  - oil and fuel leakage from vehicles and generators;
  - accidental spill of any hazardous materials that are used during the construction;
  - runoff from area where chemical, oil and fuel are temporarily stored (i.e. areas where paving and secondary containments are not present);
  - pollution caused by temporary storage of hazardous materials and/or wastes;
  - disposal of wastes, wastewater and liquid wastes;

- flooding secondary containments caused by heavy precipitation;
- accidental spill of untreated wastewater (e.g., domestic) to soil.

- **Discharge of Wastewater**

During construction phase, domestic wastewater generation due to personnel working per day is calculated as 83.90 m^3/day including offsite accommodation and construction camp. Domestic wastewater generated by personnel at the camp site will be collected by sewage infrastructure and treated in package wastewater treatment plant. The effluent of the wastewater treatment plant will be used in dust suppression/irrigation in line with the environmental permit to be secured from the Provincial Directorate of Environment, Urbanization and Climate Change as per the Regulation on Environmental Permits and Licenses. Until the package wastewater treatment plant is commissioned, wastewater has been stored in septic tanks and periodically transported to the licensed wastewater treatment plant of Karapınar Solar Power Plant during pre-construction works which is operated by Kalyon Enerji. As of July, a protocol has been signed with Niğde Bor Municipality WWTP- located 16 km from the Project area and generated wastewater will be transported to its licensed wastewater treatment plant by vacuum trucks.

No wastewater generation is expected as a result from dust suppression activities, since the water to be used for dust suppression activities is expected to evaporate.

- **Occupation of land**

Occupation of land mainly related to presence of the new facilities (such as PV panels, administrative buildings, , campsite, and switchyard) and this will increase the artificial surfaces.

7.1.2.1.2 Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- **Removal of Soil**
  - Project-specific Soil Management and Erosion Control Plan will be implemented.
  - To prevent off-site sediment movement, erosion control measures such as drainage channels will be implemented as necessary prior to the start of construction operations.
  - Wherever possible, land preparation and construction activities shall be re-scheduled during extreme weather conditions to avoid risk of erosion.
  - Dikes and drainage channels will be established to prevent loss of soil and runoff to adjacent lands around the temporary excavated material storage areas and bedding, padding, back filling and aggregate materials.
  - Subsoil removal studies will be completed in compliance with the Regulation on Control of Excavated Soil, Construction and Demolition Wastes issued on March 18, 2004 at Official Gazette no: 25406 and other international practices.
  - Subsoil loss will be minimized with appropriate equipment, plan, procedure, and schedule. Also, unnecessary soil stripping will not be carried out during construction activities to minimize disturbance to vegetation, ground species and soils.
  - Bedding, padding, backfilling, and aggregate materials will be purchased from licensed quarries.

  - Excess excavated material, -, will be disposed at licensed storage/recycling facilities as required by the Regulation on Excavation, Construction and Demolition Wastes issued on March 18, 2004 at Official Gazette no.25406. In case a licensed facility cannot be found, the Client will identify parcels, for which usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation. Environmental and social assessment studies as per Management of Change Procedure will be implemented during selection and entry to the off-site excavated material storage sites. Criteria such as selecting brownfields, that are not used for agricultural or grazing purposes and having a sufficient distance to settlement areas and will be considered in the selection of excavated material storage sites.

- **Minor Leakage of Contaminants into Soil**
  - Project-specific Pollution Prevention Plan and Waste Management Plan will be implemented to ensure that the amount of release and spills can be taken under control before reaching substantial amounts that may potentially affect the quality of soil.
  - The areas, where the hazardous materials (chemicals, liquids etc.) storage tanks located (i.e., hazardous material storage areas), will be designed and constructed to avoid potential contamination into the soil (paved areas with sufficient secondary containment, proper drainage systems, storage as per Material Safety Data Sheet (MSDS) requirements etc.). Also, the Project will comply with relevant legal and project safety requirements to avoid leakages from hazardous materials (chemicals, liquids etc.) storage facilities on-site;
  - The temporary waste storage areas will be constructed based on the requirements listed in the Regulation on Waste Management issued on April 02, 2015 Official Gazette no: 29314 and GIIP.
    - The area will be separate from the facilities and buildings, away from human traffic.
    - There will be a suitable space for the licensed vehicles to receive the wastes.
    - Storage area will have all kinds of precautions against possible fires and spills (fire extinguisher, spill kit, etc.).
    - Hazardous wastes and non-hazardous wastes will be stored separately, having different entrance doors.
    - In order to protect the compartment where hazardous waste will be stored from precipitation, the top and four sides will be covered. The compartments where non-hazardous wastes will also be covered from precipitation.
    - Storage area will be closed, the entrance door will be lockable (kept locked) and the authorized the staff will have the keys.
    - The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas.
    - Adequate drainage system will be provided to collect any leakages.
    - The floor will be covered with concrete, the edges of the floor will be raised with concrete walls/parapets for hazardous waste compartment.
    - In order for the concrete to be impermeable; cured concrete with a minimum thickness of 25 cm will be applied or the concrete to be used for this purpose will be in C30 (STS) standard. If this condition is not met, impermeability will be ensured by laying a of at least 1 mm between the concrete and the soil floor.
    - Wastes will be stored separately from each other, in tanks and containers. Labels indicating the type of waste will be placed for each type of waste.
    - Removal of wastes will be ensured inappropriate frequencies so that storage capacities at the temporary waste storage areas/storage compartments are not exceeded. Hazardous wastes

(except medical waste) will be temporarily stored at the waste storage areas for a maximum duration of 6 months and non-hazardous waste for a maximum duration of one year.

- Industrial Waste Management Plans for all temporary waste storage area established by contractors (including hazardous and non-hazardous waste) will be submitted to the relevant Provincial Directorate of MoEUCC as per the format defined by the MoEUCC.
- Temporary Waste Storage Permit will be obtained from the related Provincial Directorate of MoEUCC for temporary waste storage sites at the site generating hazardous waste of more than 1,000 kg per month.
- Hazardous Materials and Hazardous Waste Compulsory Liability Insurance will be executed as per the relevant provisions of the Regulation on Waste Management for the hazardous waste temporary storage areas/containers regardless of the amount of hazardous waste stored;
- Waste reuse/recycling/recovery/disposal agreements with the Municipality and licensed recovery/disposal -companies will be executed for the management of hazardous and non-hazardous waste.
- Official waste declarations for all waste generated will be submitted to the online system of MoEUCC, starting from January each year until the March at least.
- Waste storage out of the designated storage areas will be prohibited. Wastes generated in the interim storage areas will be transferred to the temporary storage area;
- Regular maintenance of vehicles and machinery/equipment will be undertaken to ensure that leakages of oil/fuel or any other hazardous material is prevented;
- Impervious (concrete etc.) surfaces will be designated for the refueling and maintenance of the machinery/vehicles. If it is not possible according to the nature of the Project, all refueling tankers and all heavy machinery used at the site will have drip trays, and these trays will be placed under the pipe connection points to prevent accidental leakage to the soil during refueling operations;
- Generators will be equipped with drip trays and to be checked regularly to prevent soil contamination;
- Secondary containments, ponds and drip trays will be checked regularly, especially during extreme weather conditions;
- Portable spill containment and clean-up materials (spill kits) will be made available and easily accessible at the construction site, instructions on how to use spill containment and clean-up materials will be included in the kits;
- Training on spill response, use of containment and clean-up material (spill kits) will be provided to works (including the subcontractor workers);
- In case of a spill/leakage incident on-site, contamination levels will be identified by means of sampling and analyses studies to be conducted by accredited laboratories and the results will be compared with baseline concentrations of the related parameters to plan corrective actions where necessary;
- Pumps and transmixers will be washed only at the concrete plants, concrete slurry will not be discharged into environment;
- Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan.

- **Discharge of Wastewater**
  - Project-specific Pollution Prevention Plan will be implemented for the management of sewage wastewater and implemented during the construction and operation phases of the Project.
  - , A leakproof report of the septic tanks will be ensuredand necessary measures will be taken to prevent them from deforming in extreme weather conditions;
  - No untreated wastewater discharges of any type to land will be allowed. Polluted water (if any generated as a result of accidental leakages) will be properly collected or managed to prevent the soil pollution;
  - Discharge of wastewater will be in compliance with the applicable regulatory requirements given in Appendix B.

7.1.2.1.3 Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics, and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible** is expected on the soil and subsoil during the construction phase.

Table 7-21: Residual impact assessment matrix for the soil and subsoil during construction phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Removal of Soil	Duration:	Short	Medium-low	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Project Site					
	Intensity:	Low					
Minor Leakage of Contaminants into Soil	Duration:	Short	Medium-low	Mid term	**Low**	Medium	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Project Site					
	Intensity:	Medium					
Discharge of Wastewater	Duration:	Short	Medium-low	Mid term	**Low**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Project Site					
	Intensity:	Medium					
Occupation of Land	Duration:	Short	Medium-low	Long term	**Low**	Medium	**Low**
	Frequency:	Reccurent					
	Geo. Extent:	Project Site					
	Intensity:	Medium					

7.1.2.1.4 Monitoring measures

The following monitoring measure shall be implemented to assess the true effects of the Project on the soil and subsoil during the construction and verify the effectiveness of the mitigation measures.

- Periodic site inspections will be carried out to ensure that the planned construction site boundaries are not expanded, erosion control measures are in place;
- Periodic inspections of subcontractors in order to ensure no uncontrolled dumping of excavated material;
- Periodic visual site inspection of stormwater and wastewater drainage networks, if exists and septic tanks, in order to verify their integrity and functionality;
- Periodic site inspections will be carried out and reported to identify any possible leakages;
- Periodic site inspections will be carried out in order to identify any possible damage in the hazardous materials storage areas and waste storage areas;
- Trainings on spill response, use of containment and clean-up material for the workers (including the subcontractors' workers) will be recorded;
- Periodic site inspections will be carried out to ensure adequate amount of spill-response material such as spill-kits and metal trays will be present at the site and in each heavy machinery and records will be kept;
- Routine maintenance program will be set-up and maintenance records will be kept for all vehicles and machinery/equipment;
- Licenses and permits of quarries and excavation material storage/recycling facilities will be recorded;
- Waste management practices of the subcontractors will be monitored by means of document review (e.g. permits, waste recycling/disposal agreements) and visual checks at the work sites.

7.1.2.2 Operation phase

7.1.2.2.1 Impact factors

The impact factors from the Project activities potentially affecting soil and subsoil during operation phase are listed in Table 7-22.

Table 7-22: Project actions and related impact factors potentially affecting soil and subsoil during operation phase

Project actions	Impact factors
Plant/infrastructure operation	Minor Leakage of Contaminants into Soil Discharge of wastewater Occupation of land

- **Minor Leakage of Contaminants into Soil**

Minor leakage of contaminants into soil can be caused by;

- oil and fuel leakage from vehicles, generators and transformer;
- accidental spill of any hazardous materials that are used during the operation;
- runoff from area where chemical, oil and fuel are temporarily stored (i.e. areas where paving and secondary containments are not present);
- pollution caused by temporary storage of hazardous materials and/or wastes;
- disposal of wastes, wastewater and liquid wastes;

  - flooding of secondary containments caused by heavy precipitation;
  - accidental spill of untreated wastewater (e.g., domestic, industrial) to soil.

- **<u>Discharge of Wastewater</u>**

During operation phase, domestic wastewater generation due to personnel working per day is calculated as 5.24 m^3/day. Domestic wastewater generated by personnel will be collected by sewage infrastructure and stored in septic tanks and periodically transported to a licensed wastewater treatment plant. -

There are two alternative cleaning methods for cleaning PV panels: dry cleaning, where no water is required, and wet cleaning, where water is required for cyclical cleaning during certain months of the year. According to the experience gained from other projects operated by Kalyon Enerji, there has been no need for panel cleaning in the first three years. If panel cleaning with wet cleaning method is required, no chemical or hazardous material will be used during cleaning.

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

- **<u>Occupation of land</u>**

Occupation of land mainly related to presence of the new facilities (such as PV panels, administrative buildings,and switchyard) and this will increase the artificial surfaces.

7.1.2.2.2 Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- **<u>Minor Leakage of Contaminants into Soil</u>**
  - Project-specific Pollution Prevention Plan and Waste Management Plan will be implemented to ensure that the amount of release and spills can be taken under control before reaching substantial amounts that may potentially affect the quality of soil.
  - The areas, where the hazardous materials (chemicals, liquids etc.) storage tanks located (i.e., hazardous material storage areas), will be designed and constructed to avoid potential contamination into the soil (paved areas with sufficient secondary containment, proper drainage systems, storage as per Material Safety Data Sheet (MSDS) requirements etc.). Also, the Project will comply with relevant legal and project safety requirements to avoid leakages from hazardous materials (chemicals, liquids etc.) storage facilities on-site;
  - The temporary waste storage areas will be constructed based on the requirements listed in the Regulation on Waste Management issued on April 02, 2015 Official Gazette no: 29314 and GIIP.
    - The area will be separate from the facilities and buildings, away from human traffic.
    - There will be a suitable space for the licensed vehicles to receive the wastes.
    - Storage area will have all kinds of precautions against possible fires and spills (fire extinguisher, spill kits, etc.).
    - Hazardous wastes and non-hazardous wastes will be stored separately, having different entrance doors.
    - In order to protect the compartment where hazardous waste will be stored from precipitation, the top and four sides will be covered. The compartments where non-hazardous wastes will also be covered from precipitation.

  - Storage area will be closed, the entrance door will be lockable (kept locked) and the authorized the staff will have the keys.
  - The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas.
  - Adequate drainage system will be provided to collect any leakages.
  - The floor will be covered with concrete, the edges of the floor will be raised with concrete walls/parapets for hazardous waste compartment.
  - In order for the concrete to be impermeable; cured concrete with a minimum thickness of 25 cm will be applied or the concrete to be used for this purpose will be in C30 (STS) standard. If this condition is not met, impermeability will be ensured by laying a membrane of at least 1 mm between the concrete and the soil floor.
  - Wastes will be stored separately from each other, in tanks and containers. Labels indicating the type of waste will be placed for each type of waste.
  - Removal of wastes will be ensured in appropriate frequencies so that storage capacities at the temporary waste storage areas/storage compartments are not exceeded. Hazardous wastes (except medical waste) will be temporarily stored at the waste storage areas for a maximum duration of 6 months and non-hazardous waste for a maximum duration of one year.

- Industrial Waste Management Plans for all temporary waste storage area established by contractors (including hazardous and non-hazardous waste) will be submitted to the relevant Provincial Directorate of MoEUCC as per the format defined by the MoEUCC.

- Temporary Waste Storage Permit will be obtained from the related Provincial Directorate of MoEUCC for temporary waste storage sites at the site generating hazardous waste of more than 1,000 kg per month.

- Hazardous Materials and Hazardous Waste Compulsory Liability Insurance will be executed as per the relevant provisions of the Regulation on Waste Management for the hazardous waste temporary storage areas/containers regardless of the amount of hazardous waste stored;

- As per the Circular entitled ‘COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials’;
  - Masks, gloves and other personal hygiene material wastes generated at the offices, dormitories and work sites will be collected separately.
  - Waste bins will be placed at the entrances and exits of the office buildings, dormitories, cafeterias and at common areas across the accommodation facilities and work sites.
  - The waste bins will be labelled explicitly.
  - Waste bags will not be mixed with other wastes and the waste bags will be transported to a designated temporary storage area by securing them in a second bag via tightly closing.
  - The wastes will be kept at designated temporary storage areas out of reach of other people and animals for at least 72 hours and then will be delivered to the municipality to be managed under ‘other’ domestic waste category.
  - The temporary waste storage areas will be kept closed at all times and secured appropriately.
  - The wastes generated in potential site quarantine/isolation units and at the site infirmaries will be managed as ‘medical waste’ and wastes generated from these areas will not be mixed with other wastes.

- Waste reuse/recycling/recovery/disposal agreements with the Municipality and licensed recovery/disposal firms will be executed for the management of hazardous and non-hazardous waste.

  - Official waste declarations for all waste generated will be submitted to the online system of MoEUCC, starting from January each year until the March at least.
  - Waste storage out of the designated storage areas will be prohibited. Wastes generated in the interim storage areas will be transferred to the temporary storage area;
  - Regular maintenance of vehicles and machinery/equipment will be undertaken to ensure that leakages of oil/fuel or any other hazardous material is prevented;
  - Impervious (concrete etc.) surfaces will be designated for the refueling and maintenance of the machinery/vehicles. If it is not possible according to the nature of the Project, all refueling tankers and all heavy machinery used at the facility will have drip trays, and these trays will be placed under the pipe connection points to prevent accidental leakage to the soil during refueling operations;
  - Generators and any equipment containing chemicals will be placed in localised bunded & kerbed areas for containment of drainage, spillages and leaks in order to minimise contaminated water routed to the drains;
  - Secondary containments, ponds and drip trays will be checked regularly, especially during extreme weather conditions;
  - Portable spill containment and clean-up materials (spill kits) will be made available and easily accessible at the facility, instructions on how to use spill containment and clean-up materials will be included in the kits;
  - Training on spill response, use of containment and clean-up material (spill kits) will be provided to works;
  - In case of a spill/leakage incident on-site, contamination levels will be identified by means of sampling and analyses studies to be conducted by accredited laboratories and the results will be compared with baseline concentrations of the related parameters to plan corrective actions where necessary;
  - Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan.

- **Discharge of Wastewater**
  - Project-specific Pollution Prevention Plan will be implemented for the management of sewage wastewater and backwash wastewater resulting from potable water treatment plant and implemented during the operation phase of the Project.
  - A leakproof of the septic tanks will be ensured , and necessary measures will be taken to prevent them from deforming in extreme weather conditions;
  - No untreated wastewater discharges of any type to land will be allowed. Polluted water (if any generated as a result of accidental leakages) will be properly collected or managed to prevent the soil pollution;

7.1.2.2.3 Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics, and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible impact** is expected on the soil and subsoil during the operation phase.

Table 7-23: Residual impact assessment matrix for the soil and subsoil during operation phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Minor Leakage of Contaminants into Soil	Duration:	Very long	Medium-low	Mid term	**Low**	Medium high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Project Site					
	Intensity:	Medium					
Discharge of Wastewater	Duration:	Short	Medium-low	Mid term	**Low**	Medium	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Occupation of Land	Duration:	Very long	Medium-low	Long term	**Medium**	Medium	**Low**
	Frequency:	Frequent					
	Geo. Extent:	Project Site					
	Intensity:	Medium					

7.1.2.2.4 Monitoring measures

The following monitoring measure shall be implemented to assess the true effects of the Project on the soil and subsoil during the construction and verify the effectiveness of the mitigation measures.

- Periodic site inspections will be carried out to ensure that the drains are free of sediments and accumulation of sediments at the sediment traps does not prevent the run-off flow;
- Periodic visual site inspection of stormwater and wastewater drainage networks and septic tanks, in order to verify their integrity and functionality;
- Periodic site inspections will be carried out and reported to identify any possible leakages;
- Periodic site inspections will be carried out in order to identify any possible damage in the hazardous materials storage areas and waste storage areas;
- Trainings on spill response, use of containment and clean-up material for the workers (including the subcontractors' workers) will be recorded;
- Periodic site inspections will be carried out to ensure adequate amount of spill-response material such as spill-kits and metal trays will be present at the site and in each heavy machinery and records will be kept;
- Routine maintenance programme will be set-up and maintenance records will be kept for all vehicles and machinery/equipment.

7.1.2.3 Decommissioning phase

The activities during the decommissioning phase are likely to be similar to the construction phase hence the impacts will be similar to construction activities. The same considerations described for soil and subsoil during the construction phase would be applicable to the decommissioning phase for the pollutant emissions to the soil and waste generation. Wastewater will be kept in septic tanks and transferred to licensed facilities therefore, no wastewater discharge is anticipated during decommissioning phase, hence there will be no impact due to decommissioning activities.

7.1.3 Hydrology and Surface Water

Based on the information collected in the baseline (see Chapter 6.1.7), the physical component Hydrology and Surface Water Quality was assigned as **negligible** value of sensitivity due to the absence of surface water bodies in AoI, water/sediment pollution and presence of hydrological changes in sub-catchments of creeks in the AoI.

7.1.3.1 Construction Phase

7.1.3.1.1 Impact factors

The impact factors from the Project activities potentially affecting hydrology and surface water during construction phase are listed in Table 7-24.

Table 7-24: Project actions and related impact factors potentially affecting hydrology and surface water during construction phase

Project actions	Impact factors
General engineering/construction works;	Surface water pollution
Accommodation and management of the workforce	Discharge of wastewater

Impacts potentially affecting this component are assessed here below for the construction phase.

Surface water pollution

If not properly managed, the temporary storage of waste and/or hazardous materials from construction activities could result in the release of contaminants to the surface/ground. Leakages of contaminants into the water would be mainly expected to occur due to runoff from areas in the proximity of freshwater bodies that have experienced:

- Oil and fuel leakage from vehicles and generators;
- Accidental spills of any hazardous materials that are used during the construction;
- Runoff from areas where chemicals, oil and fuel are temporarily stored (i.e. areas where paving and secondary containments are not present);
- Pollution caused by temporary storage of hazardous materials and/or wastes;
- Disposal of wastes and wastewater;
- Accidental spill of wastewater.

Chemical contamination of freshwater could have a variety of adverse effects on the quality of surface water, depending on the contaminant and its concentration. The accidental spillage of cement and fuel, oils, and lubricants can have significant water quality consequences for watercourses, aquatic ecology, and downstream users. Also, if the surface water is contaminated, the groundwater can quickly become polluted.

Despite the potential for even severe impacts, this factor is predicted to be infrequent at best, and of a low intensity,and therefore spills, leakages, and accidental discharges would have to originate from the Project footprint or the associated facilities which are generally located at a certain distance from the nearby water bodies.

Discharge of wastewater/water

As water demand per capita is estimated as 228 L/person day based on 2020 data of TUIK (Turkish Statistical Institute) Municipal Water Statistics, total water demand during the construction phase was estimated as 83.90 m^3 per day, considering that all the domestic water to be used by the Project personnel will be converted to domestic wastewater.

Wastewaters, which will be generated at the construction sites and camps sites due to water consumption of the personnel, will be collected by sewage infrastructure and treated in package wastewater treatment plant. The effluent of the wastewater treatment plant will be used in dust suppression/irrigation in line with the environmental permit to be secured from the Provincial Directorate of Environment, Urbanization and Climate Change as per the Regulation on Environmental Permits and Licenses. Until the package wastewater treatment plant is commissioned, wastewater has been stored in septic tanks and periodically transported to the licensed wastewater treatment plant of Karapınar Solar Power Plant during pre-construction works which is operated by Kalyon Enerji. As of July 2023, a protocol was signed with Niğde Bor Municipality WWTP located 5 km from the Project area and generated wastewater will be transported to its licensed wastewater treatment plant by vacuum trucks.

No wastewater generation is expected from dust suppression activities, since the water to be used for dust suppression activities is expected to evaporate.

Wastewater generation from construction accommodations may impact surface water quality. All wastewater from these compounds poses a risk to the water environment if not treated prior to discharge (either by on-site treatment or removal for disposal via the local sewage network, if available).

7.1.3.1.2 Mitigation Measures

The mitigation measures related to hydrology and surface water quality for the construction phase are as follows:

- The project will comply with safety requirements to avoid leakages from hazardous chemicals/materials and liquids (diesel fuel, oil etc.) stored on-site.
- The areas where the diesel/fuel storage tanks are located (can be named hazardous material storage areas), will be designed and constructed to avoid potential contamination of the soil (paved areas with sufficient secondary containment, proper drainage systems, collection ponds etc.).
- The temporary waste storage areas will be constructed based on the requirements listed in “Regulation on Regular Storage of Wastes” issued on *Official Gazette* No:27533, Dated: 26/03/2010 (Amended: OG-24/06/2022-31876) and “Regulation on Waste Management” issued on *Official Gazette*, Dated: 02/04/2015, No: 29314 (Amended: OG-23/03/2017-30016).
- - –Considering the flooding risk, the following engineering studies were taken into account during the project design phase.
    - By adding the reinforced concrete structure under the fences, the safety of the work site improved by increasing the height of the security fence, and the site was protected from flood and surface water.
    - The foundation of the inverter station was raised 60 cm from the ground level against the risk of water rising.
    - The infrastructure of the inverter station is designed in such a way that the surface and storm water infiltration will be prevented andwater is collected in the water collection -pit -constructed -on the ground level of the station and discharged with the help of a pump.

- The manhole cover located at the entrance of the foundation of the inverter station is manufactured as leakproof.
- Waterproofing is provided with XPS Board and Membrane insulation materials inside the concrete foundation.

- Bor Plain is the accumulation area of surface waters flowing from the north, northeast, east, southeast, and south, and the waters running off in rainy periods increase water levels in both vadose and phreatic zones. For this reason, it should be taken into consideration during the construction phase and appropriate solutions such as drainage channels or dewatering activities should be considered against possible water level increases during the design..
- The General Directorate of State Hydraulic Works (DSI), and General Directorate of Water Management (SYGM) will be consulted regarding hydrological studies and surface water quality and any additional studies will be conducted upon their opinions prior to the construction phase based on the opinions of these institutions.
- Safe Fueling and Gasoline Handling Guidelines will be developed in the construction areas. No fueling of vehicles or equipment will take place within excavated areas. If heavy equipment cannot be moved to appropriate fueling points, an impervious surface (such as a drip-tray) will be used for refueling this equipment to prevent accidental releases to groundwater aquifers.
- Hazardous materials will not be stored in excavated areas and all handling of all hazardous materials will be in accordance with the Control of Substances Hazardous to Health Procedure. These procedures will be in line with Environmental, Health, and Safety (EHS) Guidelines: Environmental Hazardous Material Management (IFC, 2007).
- Management of the construction site during periods of heavy rainfall will be considered. Exposed surfaces and stored materials will be covered if necessary to reduce the erosion of sediments into surface waters.
- Treated domestic wastewater would be reused for local watering of vegetation, dust control or as a fire-fighting reserve in accordance with the standards defined in the Wastewater Treatment Plants Technical Procedures Communique if it is deemed feasible. In case wastewater reuse would be decided to be applied, a wastewater reuse plan will be prepared during the construction phase describing which types of wastewater are suitable for each reuse application and effective control measures will be implemented to prevent misuse of reused water.
- The specific items in the management plans will address the measures below related to surface water and protection:
  - Design and management of spoil and soil storage areas and opening stores of construction materials to control sediment loss into runoff by minimizing the length and angle of slopes.
  - Schemes to prevent new ground surface eruptions from rainfall erosion or to avoid construction activities during periods of heavy rainfall.
  - Diversion of external ‘clean’ runoff around the construction area to prevent mixing of ‘clean’ and ‘dirty’ runoff and reduce the size of the required sediment basins.
  - Conveyance of all 'dirty' runoff to the proposed sediment basins.
  - Establishment of barrier fences and/or markings to determine the extent of the structure/work area that may be damaged.

- Limitation of exposure to the soil and the minimum amount of deterioration required for the construction.
- Covering and protection of degraded fertile ground with soil, vegetation, mulch or erosion-resistant material.
- Collection and management of polluted water (if any generated by accidental leakages) in order to prevent mixing with any water body.
- Protection of existing drainage and irrigation channels, sediment barriers, green areas, protection strips, such as drains, and drainage and erosion control pits by taking appropriate measures.
- Collection and settlement of drainage from excavations to remove suspended materials prior to discharge in accordance with required permits. Construction of local perimeter drains around working areas to collect suspended runoff and direct it to a system of settlement basins before discharge following required permits, where practicable.
- Regular inspection and maintenance of all structures and facilities to ensure proper and efficient operation, especially after heavy rainfall. Removing sediment deposits and disposing of them either by spreading them on site (if uncontaminated) or at a suitably licensed facility.
- Training workers (including subcontractor workers) on spill response, use of containment and clean-up materials (spill kits).

7.1.3.1.3 Residual Impacts

The residual impact following the above-mentioned mitigation measures during the construction phase is presented in the following table (Table 7-25). Based on the baseline conditions of the assessed components, the Project characteristics, and actions, as well as the proper implementation of the mitigation measures proposed above, **negligible negative impact** is expected on hydrology and surface water quality during the construction phase.

Table 7-25: Impact Assessment Matrix for Hydrology and Surface Water Quality During Construction Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Surface Water Pollution	Duration:	Very long	Low	Mid term	**Negligible**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Discharge of Water/Wastewater	Duration:	Short	Low	Mid term	**Negligible**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.1.3.1.4 Monitoring

The monitoring program to be used for surface water quality will be based on site-specific risk assessments as well as specific guidelines for surface water quality standards. The monitoring program framework will be as follows:

- Drainage outfalls will routinely be tested as well as during repair activities at ecologically vulnerable locations as well as the upgradient of surface water resources. Test frequency will be determined based on the flow discharge characteristics and the downgradient receptor sensitivity (e.g., ecological and/or water resources).
- Assessment of surface water runoff and flooding conditions after heavy rainfall events for efficiency of water conveyance systems will be implemented.
- To ensure the measures listed above are in place (like concrete pavement in storage areas, collection pond underneath, gravel spread to unpaved areas etc.), design checks will be undertaken.
- Routine site inspections will be carried out for dust suppression activities as well as any possible leakages, and these inspections should be recorded.
- Periodic site inspections will be carried out to identify any possible damage in the hazardous materials storage areas and waste storage areas.
- Routine site inspections will be carried out to ensure an adequate amount of spill-response material such as spill-kits and metal trays will be present at the site and in each heavy machinery and records will be kept.
- Trainings on spill response, use of containment and clean-up materials for the workers (including the subcontractors' workers) will be recorded.

7.1.3.2 Operation Phase

7.1.3.2.1 Impact factors

Impacts during the operation phase are likely to be the same as during the construction phase, therefore the activities will be similar to construction activities related to the following ***impact factors***:

- Surface water pollution,
- Discharge of wastewater/water, and
- Wash water for PV panels

Project actions in the operation phase are similar to those in the construction phase, including:

- Wastewater generation, disposal of waste derived from operation (domestic wastes, hazardous wastes from maintenance works), and accidental spills, which are detailed in the previous section (construction phase),
- Disposal of wastewater
- Presence of the facilities

The impact factors from the Project activities potentially affecting hydrology and surface water during operation phase are listed in Table 7-26.

Table 7-26: Project actions and related impact factors potentially affecting hydrology and surface water during operation phase

Project actions	Impact factors
Plant/infrastructure operation	Surface water pollution Discharge of wastewater/water Wash water for PV panels

All the impact factors identified above are assessed below for the operation phase.

<u>Surface water pollution</u>

The details related to this Project impact are detailed in the previous section (construction phase).

<u>Discharge of Wastewater/Water</u>

As water demand per capita is estimated as 228 L/person day based on 2020 data of TUIK (Turkish Statistical Institute) Municipal Water Statistics, total water demand during the construction phase was estimated as 83.90 m^3 per day, considering that all the domestic water to be used by the Project personnel will be converted to domestic wastewater.

Domestic wastewater generated by personnel will be collected by sewage infrastructure and stored in septic tanks and periodically transported to a licensed wastewater treatment plant.

The details related to this Project impact are detailed in the previous section (construction phase).

<u>Wash Water</u>

Any wash water utilized for the internal cleaning of vessels and equipment will be disposed to appropriate locations depending on contamination i.e., open drains or other appropriate drains with removal facilities using a vacuum tanker or other portable vacuum collection system.

There are two alternative cleaning methods for cleaning PV panels: dry cleaning, where no water is required, and wet cleaning, where water is required for cyclical cleaning during certain months of the year. According to the experience gained from other projects operated by Kalyon Enerji, there has been no need for panel cleaning in the first three years. With wet cleaning, no chemicals or hazardous materials will be used during panel cleaning.

No wastewater generation is expected as a result of panel cleaning activities since the water to be used is expected to evaporate.

7.1.3.2.2 Mitigation Measures

The mitigation measures related to hydrology and surface water quality for the operation phase are as follows:

- The project will comply with safety requirements to avoid leakages from hazardous chemicals/materials and liquids stored on-site.
- The temporary waste storage areas will be constructed based on the requirements listed in “Regulation on Regular Storage of Wastes” issued on *Official Gazette* No:27533, Dated: 26/03/2010 (Amended: OG-24/06/2022-31876) and “Regulation on Waste Management” issued on *Official Gazette*, Dated: 02/04/2015, No: 29314 (Amended: OG-23/03/2017-30016).

- Leak-proof quality septic tanks will be provided for the collection of the generated domestic wastewater. Collected wastewater will either be collected by vacuum trucks and disposed of at the nearest licensed WWTP as per the agreements/protocols to be executed with the related municipalities/licensed companies or to the main campsite package WWTPs.

7.1.3.2.3 Residual Impacts

The residual impact after the application of the above-mentioned mitigation measures during the commissioning and operation phase is presented in the following table (Table 7-27).

Table 7-27: Impact Assessment Matrix for Hydrology and Surface Water Quality During Operation Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Surface Water Pollution	Duration:	Very long	Low	Mid term	**Negligible**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Discharge of Water/Wastewater	Duration:	Very long	Low	Mid term	**Low**	High	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Negligible					
Wash Water	Duration:	Short	Low	Short-term	**Negligible**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Project Site					
	Intensity:	Negligible					

7.1.3.2.4 Monitoring

The monitoring program to be used for surface water quality will be based on site-specific risk assessments as well as specific guidelines for surface water quality standards. The monitoring program framework will be as follows:

- Drainage outfalls will routinely be tested as well as during repair activities at ecologically vulnerable locations as well as the upgradient of surface water resources. Test frequency will be determined based on the flow discharge characteristics and the downgradient receptor sensitivity (e.g., ecological and/or water resources).
- Assessment of surface water runoff and flooding conditions after heavy rainfall events for efficiency of water conveyance systems will be implemented.
- Periodic site inspections will be carried out to identify any possible damage in the hazardous materials storage areas and waste storage areas.
- Routine site inspections will be carried out to ensure an adequate amount of spill-response material such as spill-kits and metal trays will be present at the site and in each heavy machinery and records will be kept.

- Trainings on spill response, use of containment and clean-up materials for the workers (including the subcontractors' workers) will be recorded.

7.1.3.3 Decommissioning Phase

The decommissioning phase will have similar impacts to the construction and operation phases, so the activities will be the same. The same considerations described for this component during the construction phase would be applicable to the decommissioning phase.

In general, decommissioning activities would comprise the removal of the plants and the associated facilities. Also, the structures' foundations would be removed. The site is expected to be restored for future use. Decommissioning of infrastructure could have a **positive impact** if the natural state of the land is recovered.

7.1.4 Hydrogeology and Groundwater

Based on the information collected in the baseline (see Chapter 6.1.8), the physical component Hydrology and Surface Water Quality was assigned as **low** value of sensitivity due to the absence of surface water bodies in AoI,

7.1.4.1 Construction Phase

7.1.4.1.1 Impact factors

The impact factor from Project activities potentially affecting the groundwater quality and quantity during the construction phase of the Project will mainly be originated from operations that have the potential to pollute groundwater water, either intentionally or accidentally.

Impacts on the hydrogeology and groundwater quality component during the construction phase are related to the following **impact factor**, which is groundwater pollution.

Drinking water of the personnel will be bottled water, the potable water needed for personnel needs at the construction camps will be supplied from Kemerhisar Municipality by water tankers, and the potable water needed for the personnel residing in off-site accommodation will be supplied through the municipality potable network. Moreover, the water need for dust suppression during dry periods is estimated to be 50 m^3/day and it will be supplied through the effluent of the wastewater treatment plant having advanced treatment. Additional water need will be supplied from Kemerhisar Municipality by water tankers. As a result of these actions, there will not be pressure on groundwater in terms of quantity, so it is not expected to observe impacts in terms of quantity.

The **Project actions** related to the abovementioned impact factor are the following:

- Temporary stockpiling of material
- Construction of the associated facilities
- Operation of associated facilities during construction
- Disposal of waste deriving from construction (including excavated soil)

All the impact factors identified above are assessed below for the construction phase.

The impact factors from the Project activities potentially affecting hydrogeology and groundwater during construction phase are listed in Table 7-28.

Table 7-28: Project actions and related impact factors potentially affecting hydrogeology and groundwater during construction phase

Project actions	Impact factors
General engineering/construction works;	Minor leakage to groundwater
Material Storage	Minor leakage to groundwater
Accommodation and management of the workforce	Minor leakage to groundwater

Impacts potentially affecting this component are assessed here below for the construction phase.

Minor leakage to groundwater

The possibility of contamination of aquifers in the event of intentional or accidental discharges of hazardous materials to the ground during construction, particularly in shallow overburdened areas, may increase. Aquifers may be affected by various activities involving site clearance/earthworks, and spillages/leakages from the construction plant and at refueling and storage depots located on site.

Waste derived from construction can lead to groundwater pollution if it is not properly managed. The temporary storage of waste and/or hazardous substances deriving from the construction operations, if not properly managed, could result in a release of pollutants onto the soil surface/ground. Accidental leakages from hazardous substances or machine refueling or maintenance are also potential hazards. During construction, pollution may reach groundwater through the soil if the effectiveness of the taken mitigation measures cannot be ensured. No particularly hazardous material is predicted to be used during construction; accidental spills of pollutants from machinery/vehicles would reach groundwater only if the spilt material is in large quantities and the material is spilt over a period of time.

The temporary storage of waste and/or hazardous materials from construction activities could, if not properly managed, result in the release of contaminants to the surface/ground. Accidental spills from the use of hazardous substances, refuelling or maintenance of machinery are also potential hazards. Contaminants may infiltrate through the soil to the groundwater if the effectiveness of mitigation measures cannot be ensured. No particularly hazardous materials are expected to be used during construction; accidental spills of pollutants from machinery/vehicles will only reach groundwater if the spill is large and occurs over a period.

7.1.4.1.2 Mitigation Measures

The mitigation measures related to hydrogeology and groundwater quality for the construction are as follows:

- Measures incorporated into the Project Design:
  - The General Directorate of State Hydraulic Works (Devlet Su İşleri - DSI) and General Directorate of Water Management (Su Yönetimi Genel Müdürlüğü - SYGM) will be consulted regarding hydrogeological studies and groundwater quality and any additional studies will be conducted upon their opinions prior to the construction phase.
  - In the case of drilling well(s) for water supply, drilling and well development operations will be carried out in accordance with ASTM standards. Pollutants (such as oil and fuel) originating from machinery and equipment will be prevented from mixing with groundwater. During the preparation of the area where the drilling machine can work before drilling, the possible pollutions from the excavation will be eliminated.

  - Pumping tests will be performed after drilling operations, within the scope of the necessary permits obtained from DSI. The most suitable aquifer test for wells will be determined according to ASTM D4043-17: Standard Guide for Selection of Aquifer Test Methods in Determining Hydraulic Properties by Well Techniques. Hydraulic parameters such as transmissivity and storage coefficient will be calculated according to ASTM standards. The effects of continuous discharge from wells on the groundwater flow system will be evaluated using the same data.
  - The use of groundwater resources will be subject to DSI approval. DSI will allow the drilling and use of wells for water supply in case the groundwater resource is adequate. Such approvals are based on the availability of water supply.
  - Treatment, storage, and disposal should be done according to regulatory requirements after performing the necessary analyses and obtaining relevant permits.
  - Bor Plain is the accumulation area of surface waters flowing from the north, northeast, east, southeast, and south, and the waters running off in rainy periods increase water levels in both vadose and phreatic zones. For this reason, it should be taken into consideration during the construction phase and appropriate solutions such as drainage channels or dewatering activities should be considered against possible water level increases during the design.

General mitigation measures:

- Safe Fueling and Gasoline Handling Guidelines will be developed in the construction areas. No fueling of vehicles or equipment will take place within excavated areas. If heavy equipment cannot be moved to appropriate fueling points, an impervious surface (such as a drip-tray) will be used for refueling this equipment to prevent accidental releases to groundwater aquifers.
- Hazardous materials will not be stored in excavated areas and all handling of all hazardous materials will be in accordance with the Control of Substances Hazardous to Health Procedure. These procedures will be in line with Environmental, Health, and Safety (EHS) Guidelines: Environmental Hazardous Material Management (IFC, 2007). As an example, secondary containment structures will consist of berms, dikes, or walls capable of containing the larger 110 percent of the largest tank or 25 percent of the combined tank volumes in areas where hazardous materials are handled (e.g., fuel stores and loading areas, concrete mixing, hazardous material stores) to prevent hazardous materials entering the site drainage.
- An Emergency Response Plan (ERP) will be developed in line with Environmental, Health, and Safety (EHS) Guidelines: General EHS guidelines (IFC, 2007) for handling spills of hazardous materials including fuels that will be handled during construction works.
- The specific items in the management plans will address the measures below related to groundwater and protection:
  - Preventing the discharge of untreated wastewater, residues or other waste into groundwater or surface water.
  - Controlling and avoiding wastewater flows from any field activities (i.e., excavations, and vehicle/equipment washing).
  - Collecting and managing contaminated water (if any generated as a result of accidental leakages) in order to prevent mixing with any water body and topsoil/soil pollution.
  - Assuring the maintenance of vehicles and equipment (if necessary) in designated areas with impermeable surfaces (concrete floors, etc.) and if necessary, secondary containment systems.

- Making portable spill containment and clean-up materials (spill kits) available and easily accessible at the construction site, including instructions on how to use spill containment and clean-up materials.
- Training workers (including subcontractor workers) on spill response, use of containment and clean-up materials (spill kits).
- Providing adequate and properly maintained tanks, paved ground, spill containment materials and proper secondary containment systems with sufficient volume for fuel/oil storage and for the storage of other fluids and hazardous substances to prevent loss to the soil.

7.1.4.1.3 Residual Impacts

The residual impact on the hydrogeology and groundwater quality component after the application of the abovementioned mitigation measures during the construction phase is presented in the following table (Table 7-29).

Table 7-29: Impact Evaluation Matrix for Hydrogeology and Groundwater Quality Component During Construction Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Minor leakage to groundwater	Duration:	Very long	Low	Long term	**Low**	High	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					

7.1.4.1.4 Monitoring

Construction period monitoring measures are as follows:

- The monitoring of groundwater resources will be based on guidelines developed following hydrogeological investigations. The guideline will be based on the Guidance on Groundwater Monitoring, Common Implementation Strategy for the Water Framework Directive (2000/60/EC) and will include the following items:
  - Identification of existing extraction wells (irrigation, domestic and public use) within the zone of influence,
  - Periodic monitoring of groundwater quantity and quality during the construction period,
  - Periodic monitoring of groundwater discharge locations (stream or lake monitoring) and the operation period,
  - Periodic monitoring of groundwater levels to assess seasonal variability.
- Groundwater monitoring in terms of both quality and quantity will continue at the groundwater monitoring locations given in previous sections of the report (see Section 6.1.8) during the construction and operation phases. Groundwater monitoring will be seasonal. Using monitoring data, trends will be analysed. The data should be reviewed periodically (at least on an annual basis) by Kalyon Enerji and/or an independent supervisor to establish current site conditions and to detect any trends in groundwater quality or levels. If significant trends are observed, then potential causes should be investigated, and corrective measures should be taken, as necessary. During monitoring, the groundwater levels will be monitored continuously

by either manual dip meters or internal transmitters and the monitoring and sampling operations at the monitoring wells based on the EIA commitments will be conducted by an independent company or an accredited laboratory by the MoEUCC in Türkiye.

- Design checks, to ensure the measures listed above are in place (like concrete pavement in storage areas, collection pond underneath etc.) and, will be undertaken.
- The provided training on spill response, use of containment and clean-up material for the workers (including the subcontractors' workers) will be recorded.
- Routine site inspections will be carried out to ensure an adequate amount of spill-response material such as spill-kits and metal trays will be present at the site and in each heavy machinery and records will be kept.
- A routine maintenance programme will be set up and maintenance records will be kept for all vehicles and machinery/equipment.
- By using appropriate sealing mechanisms (enclosed conveyance of the exploited groundwater to settlement structures), potential chemicals will not come into contact with the exploited groundwater. Discharges will be periodically tested to meet Turkish and international standards (e.g. IFC General EHS Guidelines, EU standards).

7.1.4.2 Operation Phase

7.1.4.2.1 Impact factors

Impacts on this component during the commissioning and operation phase will be the same as during the construction phase and are related to the following ***impact factors:***

- Changes in the local hydrogeology, and
- Groundwater pollution.

Impacts could be due to the following ***project actions***:

- Groundwater exploitation (demand for freshwater)
- Presence of facilities

The impact factors from the Project activities potentially affecting hydrogeology and groundwater during operation phase are listed in Table 7-30.

Table 7-30: Project actions and related impact factors potentially affecting hydrogeology and groundwater during operation phase

Project actions	Impact factors
Plant/infrastructure operation	Changes in the Local Hydrogeology Minor leakage to groundwater

Impacts potentially affecting this component are assessed here below for the construction phase.

All the impact factors identified above are assessed below for the operation phase.

Changes in the Local Hydrogeology

During the operation phase, water will be needed not only for workers as potable water but also for operational activities such as panel cleaning. Despite the fact that the drinking water of the personnel will be bottled water, it is planned to use the groundwater for the supply of potable water. In addition, if the wet cleaning method is required in the following years of operation for the panel cleaning, the amount of water required per cleaning will be 520 m^3 according to the assumption that 4 tons per MWp will be required. However, according to the experience gained from other projects operated by Kalyon Enerji, there has been no need for panel cleaning in the first three years.

For these purposes, a well will be drilled in the Industrial Specialized Zone declared for YEKA Projects and a pipeline will be constructed to the Project Area within the jurisdiction of the Special Provincial Directorate of Administration of Niğde for the supply of potable water needed for personnel and utility purposes during the operation phase by the managing company of the Industrial Specialized Zone. As per Industrial Zones Law No:4737 installation of the infrastructure is under the responsibility of the managing company of the Industrial Specialized Zone. Therefore, the well and the water pipeline are not considered as associated facilities.

As the continuous discharge of groundwater from the well will be a new boundary condition in the groundwater flow system, it is expected that the groundwater flow regime will change.

Minor leakage to groundwater

The details related to this impact factor are also detailed in the previous section (construction phase).

7.1.4.2.2 Mitigation Measures

The mitigation measures related to hydrogeology and groundwater quality for the operation are as follows:

- The project will comply with safety requirements to avoid leakages from hazardous chemicals/materials and liquids stored on-site.
- The temporary waste storage areas will be constructed based on the requirements listed in "Regulation on Regular Storage of Wastes" issued on *Official Gazette* No:27533, Dated: 26/03/2010 (Amended: OG-24/06/2022-31876) and "Regulation on Waste Management" issued on *Official Gazette*, Dated: 02/04/2015, No: 29314 (Amended: OG-23/03/2017-30016).
- Leak-proof quality septic tanks will be provided for the collection of the generated domestic wastewater. Collected wastewater will either be collected by vacuum trucks and disposed of at the nearest licensed WWTP as per the agreements/protocols to be executed with the related municipalities/licensed companies or to the main campsite package WWTPs.

7.1.4.2.3 Residual Impacts

The residual impact on the hydrogeology and groundwater quality component after the application of the abovementioned mitigation measures during the operation phase is presented in the following table (Table 7-31).

Table 7-31: Impact Evaluation Matrix for Hydrogeology and Groundwater Quality Component During Operation Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
	Duration:	Medium	Low	Long term	**Low**	High	**Negligible**
	Frequency:	Infrequent					

Changes in the Local Hydrogeology	Geo. Extent:	Local					
	Intensity:	Low					
Minor leakage to groundwater	Duration:	Very long	Low	Long term	**Low**	Medium high	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Low					

7.1.4.2.4 Monitoring

Operation period monitoring measures are as follows:

- The monitoring of groundwater resources will be based on guidelines developed following hydrogeological investigations. The guideline will be based on the Guidance on Groundwater Monitoring, Common Implementation Strategy for the Water Framework Directive (2000/60/EC) and will include the following items:
  - Identification of existing extraction wells (irrigation, domestic and public use) within the zone of influence,
  - Periodic monitoring of groundwater quantity and quality during the construction period,
  - Periodic monitoring of groundwater discharge locations (stream or lake monitoring) and the operation period,
  - Periodic monitoring of groundwater levels to assess seasonal variability.
- Groundwater monitoring in terms of both quality and quantity will continue at the groundwater monitoring locations given in previous sections of the report (see Section 6.1.8) during the construction and operation phases. Groundwater monitoring will be seasonal. Using monitoring data, trends will be analysed. The data should be reviewed periodically (at least on an annual basis) by Kalyon Enerji and/or an independent supervisor to establish current site conditions and to detect any trends in groundwater quality or levels. If significant trends are observed, then potential causes should be investigated, and corrective measures should be taken, as necessary. During monitoring, the groundwater levels will be monitored continuously by either manual dip meters or internal transmitters and the monitoring and sampling operations at the monitoring wells based on the EIA commitments will be conducted by an independent company or an accredited laboratory by the MoEUCC in Türkiye.
- Design checks, to ensure the measures listed above are in place (like concrete pavement in storage areas, collection pond underneath etc.) and, will be undertaken.
- The provided training on spill response, use of containment and clean-up material for the workers (including the subcontractors' workers) will be recorded.
- Routine site inspections will be carried out to ensure an adequate amount of spill-response material such as spill-kits and metal trays will be present at the site and in each heavy machinery and records will be kept.
- A routine maintenance programme will be set up and maintenance records will be kept for all vehicles and machinery/equipment.
- By using appropriate sealing mechanisms (enclosed conveyance of the exploited groundwater to settlement structures), potential chemicals will not come into contact with the exploited groundwater. Discharges will be periodically tested to meet Turkish and international standards (e.g., IFC General EHS Guidelines, EU standards).

7.1.4.3 Decommissioning and Closure Phase

The impacts during the decommissioning phase are likely to be similar to the construction phase hence the activities will be similar to construction activities. The same considerations described for this component during the construction phase would be applicable to the decommissioning phase for the groundwater pollution impact factor.

7.1.5 Traffic

Based on the information collected for the definition of the baseline (see Chapter 6.1.9), the physical component *Traffic* was assigned a **Medium-High** value of sensitivity for the following reasons

- Schools and residential areas in the vicinity
- The existing roads will be used for access to the site
- Other ongoing projects (under construction and planning stage) around the Project site

7.1.5.1 Construction phase

7.1.5.1.1 Impact factors

The impact factors from the Project activities potentially affecting traffic during construction phase are listed in Table 7-32.

Table 7-32: Project actions and related impact factors potentially affecting traffic during construction phase

Project actions	Impact factors
General engineering/construction works;	Increase of traffic
Material Storage	Increase of traffic

Impacts potentially affecting this component are assessed here below for the construction phase.

- **Increase of traffic**

The activities related to the site preparation and construction works will require the movement of trucks entering and leaving the Project Area for the transportation of machinery, equipment, construction material and staff.

The number of vehicles on the D330 Road and increase in vehicles during site preparation and construction works are given in the Table 7-33.

Table 7-33: Traffic Load Increase on D330 Road during Construction Phase

Vehicle Type	The Annual Average Daily Traffic Data of D330 Road	Number of Vehicle Increase with the Project's Construction	Traffic Load Increase (%) at State Road
Car	1493	50	3.3%

Vehicle Type	The Annual Average Daily Traffic Data of D330 Road	Number of Vehicle Increase with the Project's Construction	Traffic Load Increase (%) at State Road
Medium- Duty Commercial Vehicle	231	5	2.2%
Bus	2	-	-
Truck	168	4	2.3 %
Truck+Trailer +Tow Truck + Side Trailer	382		
Total	2276	59	

Source:https://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Istatistikler/TrafikveUlasimBilgileri/21TrafikUlasimBilgileri.pdf

During the construction phase, the Project's vehicles will not be on the road at the same time. However, in the worst-case scenario, it is assumed that the vehicles will all be on the road at the same time. Based on that, approximately 3.3% increase in State Road traffic could be expected in terms of total vehicle flowrate per hour. It should be noted that since the assessment is based on the maximum traffic load increases at worst-case scenario during rush-hour, the increase in road traffic will be much lower than the values given in the table above in most of the time during a daily period.

Within this regard, expected impacts of the traffic load during the construction phase can be listed as below:

- Increase in traffic load will cause an increase in the environmental noise along the access road to the Project Site.
- Increase in traffic load, interruption of roads and limitation to traffic where existing village roads will be used, during construction activities and road closures.
- High speed of heavy vehicles and increased road traffic is a concern for local communities.
- Increased road traffic could lead to accidental wildlife losses.
- Usage of existing roads can cause damage on the roads due to heavy vehicles.

7.1.5.1.2 Mitigation measures

A Traffic Management Plan will be prepared within the scope of the Project to maintain traffic safety on the roads to be used and to prevent the risks which may outcome due to Project activities ensuring "safe site, safe vehicle and safe driver" at all times.

Following points will be considered as a minimum regarding traffic management:

- Referring to Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place:
  - to exchange information on the Project with the local community and other stakeholders; and
  - to record and respond any complaints and concerns raised by the local community members and other stakeholders.

- Considerations will be given to traffic volumes at the rush hours of the day and transportation of equipment and materials will be utilized at quieter periods to avoid increased congestion on the roads used by the local communities.
- It will be ensured that the roads will be made suitable for the heavy vehicle use by taking necessary permits and making necessary arrangements. In case of any damage on the roads, necessary maintenance works will be undertaken.
- Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility.
- At all times vehicles will be kept on designated site roads where established. Off-road driving will not be permitted other than emergency situations, or if no roads have been established yet.
- If reversing cannot be avoided at the work areas, necessary reversing procedures will be identified including installing reversing aids on vehicles, reversing sensors etc. Trained banksman will be used when reversing cannot be avoided.
- Parking areas will be designated with signs and reverse parking will be implemented for emergency situations.
- The routes to be used by pedestrians will be segregated from heavy vehicle routes where possible.
- The speed limits will be implemented.
- Seatbelts will be worn in vehicles and machinery when being operated.
- No vehicle/equipment/material will be allowed to enter work areas before obtaining approval from the security.
- Loading areas will be designed appropriately to prevent/minimize vehicle/pedestrian contact and property damages.
- All operators will be licensed/certified for the type of vehicle being driven and will undergo medical surveillance.
- Repair and maintenance of vehicles will be done by the authorized bodies.
- Fatigue and distraction procedures will be established considering the local legal requirements and the nature of the work.
- Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanism. Collaboration with local communities and responsible authorities will be ensured to improve signage, visibility, road safety conditions especially near the roads and other locations where children may be present.
- Appropriate traffic signs, signals, lights and markings will be placed at the required areas to prevent potential accidents/incidents. Barriers will be placed at the required areas to protect both human health and assets.

7.1.5.1.3 Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible** is expected on the traffic during the construction phase.

Table 7-34: Residual impact assessment matrix for the traffic during construction phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Increase of traffic	Duration:	Short	Medium-high	Short-term	**Low**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					

Monitoring measures

The following monitoring measure shall be implemented to assess the true effects of the Project on the traffic during the construction and verify the effectiveness of the mitigation measures.

- Investigation of the incidents and accidents and use of lesson's learned to improve traffic mitigations.
- Following of the licenses and medical surveillance of the operators to ensure that they are up to date.
- Monitoring condition of the roads to ensure safe driving.
- Controlling maintenance records of the vehicles to ensure regular maintenance activities take place.
- Weather forecast monitoring to ensure safety of the operators.
- Closely monitoring the compliance with speed limits to protect the health and safety of both public and employees.
- Comments and/or complaints received via grievance mechanism to improve traffic mitigations and to prevent air quality and noise impacts, if any.

Monitoring should in particular be designed to identify failure or ineffectiveness of mitigation measures in terms of road safety.

7.1.5.2 Operation phase

7.1.5.2.1 Impact factors

The impact factors from the Project activities potentially affecting traffic during operation phase are listed in Table 7-35.

Table 7-35: Project actions and related impact factors potentially affecting traffic during construction phase

Project actions	Impact factors
General engineering/construction works;	Increase of traffic

Impacts potentially affecting this component are assessed here below for the operation phase.

- **<u>Increase of traffic</u>**

During operation phase of the project, the vehicle traffic will be mainly from the maintenance works and staff shuttles/cars entering and leaving the Project Area. In this regard, expected impacts of the traffic load during the operation phase can be listed as below:

- High speed of vehicles is a concern for local communities.
- Transportation of personnel can make an effect on the load of traffic in local level
- Occupational safety risks with respect to vehicles/worker accidents

7.1.5.2.2 Mitigation measures

A Traffic Management Plan will be prepared within the scope of the Project to maintain traffic safety on the roads to be used and to prevent the risks which may outcome due to Project activities ensuring “safe site, safe vehicle and safe driver” at all times.

Following points will be considered as a minimum regarding traffic management:

- Referring to Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place:
  - to exchange information on the Project with the local community and other stakeholders; and
  - to record and respond any complaints and concerns raised by the local community members and other stakeholders.
- Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility.
- At all times vehicles will be kept on designated site roads where established. Off-road driving will not be permitted other than emergency situations, or if no roads have been established yet.
- Parking areas will be designated with signs and reverse parking will be implemented for emergency situations.
- The routes to be used by pedestrians will be segregated from vehicle routes where possible.
- The speed limits will be implemented.
- Seatbelts will be worn in vehicles and machinery when being operated.
- No vehicle/equipment/material will be allowed to enter work areas before obtaining approval from the security.
- All operators will be licensed/certified for the type of vehicle being driven and will undergo medical surveillance.
- Repair and maintenance of vehicles will be done by the authorized bodies.
- Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanism. Collaboration with local communities and responsible authorities will be ensured to improve signage, visibility, road safety conditions especially near the roads and other locations where children may be present.
- Appropriate traffic signs, signals, lights and markings will be placed at the required areas to prevent potential accidents/incidents. Barriers will be placed at the required areas to protect both human health and assets.

7.1.5.2.3 Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible** is expected on the traffic during the operation phase.

Table 7-36: Residual impact assessment matrix for the traffic during operation phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Increase of traffic	Duration:	Very long	Medium-high	Short-term	**Low**	Medium high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					

7.1.5.2.4 Monitoring measures

The following monitoring measure shall be implemented to assess the true effects of the Project on the traffic during the construction and verify the effectiveness of the mitigation measures.

- Investigation of the incidents and accidents and use of lesson's learned to improve traffic mitigations.
- Following of the licenses and medical surveillance of the operators to ensure that they are up to date.
- Monitoring condition of the roads to ensure safe driving.
- Controlling maintenance records of the vehicles to ensure regular maintenance activities take place.
- Weather forecast monitoring to ensure safety of the operators.
- Closely monitoring the compliance with speed limits to protect the health and safety of both public and employees.
- Comments and/or complaints received via grievance mechanism to improve traffic mitigations and to prevent air quality and noise impacts, if any.

Monitoring should in particular be designed to identify failure or ineffectiveness of mitigation measures in terms of road safety.

7.1.5.3 Decommissioning Phase

A new impact is not expected during the decommissioning and closure phase of the Project, other than those listed in the construction and operation phases.

7.1.6 Greenhouse Gas (GHG) Emissions

This section presents calculation and assessments of the greenhouse gas (GHG) emissions to be originated from the activities of the Project and Project's contribution to climate change.

The GHG emissions estimation methods used in this assessment generally follow internationally accepted practices for conducting Environmental Assessments. Where applicable, the Greenhouse Gas Protocol/A Corporate Accounting and Reporting Standard prepared by the World Business Council for Sustainable Development/World Resources (April 2004; hereafter referred to as the GHG Protocol) is applied. The GHG

Protocol provides guidance for preparing corporate GHG inventories, as well as sector-specific and general calculation tools that can be used for estimating GHG emissions. The GHG protocol has been adopted by the Global Reporting Initiative. The GHG Protocol introduces the concept of direct and indirect emissions and scopes for GHG emission inventory under three broad categories, as follows:

Scope 1 – Direct GHG emissions:

Carbon emissions occurring from sources that are owned or controlled by the Project (e.g., emissions from combustion in owned or controlled boilers, and vehicles, process, and fugitive emissions).

Scope 2 – Indirect GHG emissions:

Carbon emissions from the generation of purchased electricity, heat or steam consumed by the Project.

Scope 3 – Other indirect GHG emissions:

Carbon emissions which are a consequence of a company's activities but occur from sources not financially or operationally controlled by the company (e.g., emissions from waste, the extraction and production of purchased materials; and employee travel to and from work).

The GHG Protocol requires reporting of Scope 1 (direct emissions from site) and Scope 2 (emissions from on-site energy consumption) emissions only. Scope 1 and Scope 2 emissions are typically the focus of most corporate inventories, although many organizations choose to account for other activities such as employee travel and downstream emissions from waste. These sources are classified as Scope 3 (indirect) emissions and are reported optionally. Given the nature of Project operations, Scope 1 emissions will be the most significant. Accordingly, Scope 1 have been the primary focus of the GHG inventory. Additionally, Scope 2 emissions have been estimated considering the electricity consumption expected during Project life. Scope 3 emissions are not expected in significant amounts, therefore are not included in these estimations.

7.1.6.1 Legislative Framework

Climate change is a global phenomenon, which is the result of anthropogenic activities, mainly energy use, industrial processes, and land use changes. Due to its multidimensional nature, fighting climate change requires actions at different scales, e.g., international, regional, and local. This section summarizes the legislative framework regarding climate change accordingly.

7.1.6.1.1 International Standards

The main international body dealing with climate change is the United Nations Framework Convention on Climate Change (UNFCCC), adopted in 1992 Rio Earth Summit and ratified by 195 countries. UNFCCC guides countries on cooperation to fight climate change and to cope with its impacts. Currently, Ratification of Doha amendment to the Kyoto Protocol, covering 2013 – 2020 is under the focus of Türkiye, while the Paris Agreement is ratified by Türkiye and the Law on the Approval of the Paris Agreement by the Turkish Grand National Assembly entered into force after being published in the Official Gazette dated October 7th, 2021 and numbered 31621.

According to the IFC PS3, the client will consider alternatives and implement technically and financially feasible and cost-effective options to reduce project related GHG emissions during the design and operation of the Project. These options may include, but are not limited to, alternative project locations, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring.

For projects that are expected to or currently produce more than 25,000 tonnes of CO_2-equivalent annually,[2] the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary,[3] as well as indirect emissions associated with the off-site production of energy[4] used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice.[5]

According to the EP2, GHG emissions should be calculated in line with the GHG Protocol[6] to allow for aggregation and comparability across Projects, organisations and jurisdictions. Clients may use national reporting methodologies if they are consistent with the GHG Protocol. The client will quantify Scope 1 and Scope 2 Emissions.

The EPFI will require the client to report publicly on an annual basis on GHG emission levels (combined Scope 1 and Scope 2 Emissions) and GHG efficiency ratio, as appropriate, during the operational phase for Projects emitting over 100,000 tonnes of CO_2 equivalent annually. Clients will be encouraged to report publicly on Projects emitting over 25,000 tonnes. Public reporting requirements can be satisfied via host country regulatory requirements for reporting or environmental impact assessments, or voluntary reporting mechanisms such as the Carbon Disclosure Project, where such reporting includes emissions at Project level.

7.1.6.1.2 European Directives

The EU is a global leader in the fight against climate change. Since 1990 the EU has been enacting laws on GHG emissions, renewable energies, and energy efficiency. An EU-wide climate policy framework has been established, applied, and reviewed over decades. Therefore, EU legislation on climate change and GHG emissions are considered in the Project.

7.1.6.1.3 Turkish Legislation

Türkiye's climate policy is shaped by National Climate Change Strategy (2010 – 2023) and National Climate Change Action Plan (2011 – 2023). Also 11th National Development Plan for 2019 – 2023 emphasizes sustainable development and fighting against climate change in sectors generating GHG emissions. It also emphasizes emission controls in buildings and sectors such as energy, industry, agriculture, forestry and waste.

The table below lists Turkish legislation related to climate change and GHG emissions.

Table 7-37: Turkish Legislation on Climate Change and GHG Emissions

Date	Number	Title
28.12.2003	25330	Regulation on Availability of Customer Information regarding Fuel Economy and CO_2 Emissions of New Automobiles
09.10.2013	28790	Notice on Voluntary Carbon Market Project Registration
17.05.2014	29003	Regulation on Monitoring of Greenhouse Gas Emissions
22.07.2014	29068	Notice on Monitoring and Reporting Greenhouse Gas Emissions

[2] The quantification of emissions should consider all significant sources of greenhouse gas emissions, including non-energy related sources such as methane and nitrous oxide, among others.

[3] Project-induced changes in soil carbon content or above ground biomass, and project-induced decay of organic matter may contribute to direct emissions sources and shall be included in this emissions quantification where such emissions are expected to be significant.

[4] Refers to the off-site generation by others of electricity, and heating and cooling energy used in the project.

[5] Estimation methodologies are provided by the Intergovernmental Panel on Climate Change, various international organizations, and relevant host country agencies.

[6] The GHG Protocol is based on a comprehensive globally standardised framework to measure and manage GHG emissions from operations. Available from ghgprotocol.org.

Date	Number	Title
02.12.2017	30258	Notice on Validation of Greenhouse Gas Reports and Accreditation of Validator Institutions
04.01.2018	30291	Regulation on Fluorinated Greenhouse Gases

Regulation on Monitoring of Greenhouse Gas Emissions aims to define the procedures and principles on monitoring, calculating, verifying, and reporting the greenhouse gases emissions. Annex 1 of the Regulation includes the Projects that subject to this Regulation, and which should monitor, report, and verify the GHG emissions in the GHG mechanism established by MoEUCC.

Since solar power plant projects are not one of the listed Projects specified in Annex 1, the Project is not subject to this Regulation.

7.1.6.2 GHG Emission Calculation Methodology

The following sections summarize the emission calculation methods, input parameters and assumptions that are used to estimate the annual GHG emissions of the Project.

The GHG considered in the assessment include Carbon dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (N_2O). There are no Project activities which are expected to emit Sulphur hexafluoride (SF_6), Perfluorocarbons (PFCs) or Hydrofluorocarbons (HFCs), therefore, these compounds are not included in the GHG assessment.

The Project is anticipated to include sources that produce GHGs during construction, operation, and closure phases. It is assumed that more GHG sources will be present during the construction phase than the closure phase. Therefore, the assessment for construction phase is used as a representative estimation for the closure phase.

The emissions estimation methods used to quantify annual GHGs follow internationally accepted practices for conducting EIAs and, where applicable, the Regulation on Monitoring Greenhouse Gas Emissions.

GHGs have the potential to affect future climate as they contribute to the greenhouse effect by absorbing longwave radiation, emitted by the Earth, in the atmosphere, increasing temperature and changing weather patterns. There is a potential for the Project activities to release GHG emissions that could contribute incrementally to climate change.

GHG emissions are expressed as tonnes of equivalent CO_2, calculated by multiplying the annual emissions of each indicator compound by its 100-year global warming potential (GWP). A single measure is used when evaluating effects, namely the maximum annual GHG emissions resulting from the Project activities in tonnes of carbon dioxide equivalent (CO_2e). The maximum annual GHG emissions from the Project activities will put in context of the annual GHGs at both a national and global level.

The GHG Protocol provided by the World Business Council for Sustainable Development/World Resources Institute (WBCSD/WRI, 2004) outlines guidance for preparing corporate GHG emission inventories and introduces the concept of direct and indirect emissions and scopes for the inventory. Given the nature of the Project operations, the most significant emissions will be Scope 1, which are direct GHG emissions occurring from Stationary Sources (e.g., emissions from generators), Mobile Sources that are owned or controlled by the Owner (e.g., emissions from combustion in vehicles, and fugitive emissions) and blasting activities.

GHG emissions are assessed based on Project schedules and information provided by Client regarding to amounts of fuel and explosive use, number of equipment/vehicles and other potential GHG sources. Scientifically accepted and well documented emission factors from the Türkiye's National Inventory Report (NIR) released in 2023 under UNFCCC[7] are used. Where local guidance is not available then emission factors from the Intergovernmental Panel on Climate Change (IPCC), are also used. A discussion of the global warming potentials is provided by Section 7.1.6.2.1 below. Table 7-38 provides a summary of the activities for which GHG emissions are calculated.

Table 7-38: GHG Emission Sources of the Project

Phase	Source	GHG Emissions
Construction	Generators - Combustion of Diesel	Emissions from the generator
	Vehicles - Combustion of Diesel	On-site vehicle emissions, due to diesel combustion
	Camp Site Heating – Combustion of LNG	Emissions due to LNG combustion
	Electricity Consumption	Indirect emissions due to used electricity
	Loss of Carbon Sink	Reduction of carbon sink due to loss of vegetation
Operation	Electricity Consumption	Indirect emissions due to used electricity

7.1.6.2.1 Global Warming Potential

The GHG emissions are expressed as tonnes of CO_2e by multiplying the annual emissions of each GHG by its 100-GWP. The GWP of each gas represents the ability of the gas to trap heat in the atmosphere in comparison to CO_2. Emissions of CO_2, CH_4 and N_2O are converted to equivalent CO_2 (CO_2e) in the assessment of the GHG emissions.

The GWPs are taken from the United Nations Framework Convention on Climate Change reporting guidelines for the preparation of GHG inventory reports (UNFCCC, 2014), which represents the values used to prepare the national and global emissions inventories referenced in the main report. Table 7-39 provides the GWPs used in the GHG calculations.

Table 7-39: Global Warming Potentials from the Intergovernmental Panel on Climate Change

GHG Compound	GWP
CO_2	1
CH_4	25
N_2O	298

7.1.6.2.2 Scope 1: Direct GHG Emissions

The GHG Protocol provided by the World Business Council for Sustainable Development/World Resources Institute (WBCSD/WRI, 2004) outlines guidance for preparing corporate GHG emission inventories and introduces the concept of direct and indirect emissions and scopes for the inventory. Scope 1 accounts for direct GHG emissions from sources that are owned or controlled by the Project Owner.

[7] Türkiye National Inventory Report (NIR) for UNFCCC, 2023, https://unfccc.int/documents/627786

7.1.6.2.2.1 Stationary Combustion

Stationary combustion sources for the Project include diesel generators. GHG emissions from Project is determined based on the fuel consumption as provided by Kalyon Enerji.

The emission factors on an energy basis are obtained from the IPCC 2006 Guidelines (Volume 2), Chapter 2 – Stationary Combustion Table 2.2. These emission factors are presented in Table 7-40 below.

Table 7-40: Stationary Combustion - Energy-based Emission Factors and Net Calorific Value

Phase	Source	Net Calorific Value (TJ/Gg)	Reference	Emission Factor (kg GHG/TJ)			Reference
				CO_2	CH_4	N_2O	
Construction	Use of Generators - Combustion of Diesel	40.4	Turkish Notification on Monitoring and Reporting of GHG Emissions (Official Gazette Date/Number: 22.07.2014/29068), Table 5.1	74,100	3.0	0.6	IPCC 2006 guidelines, Chapter 2 – Stationary Combustion Table 2.2
Construction	Campsite Heating -Combustion of LNG	48.0		64,200	3.0	0.6	IPCC 2006 guidelines, Chapter 2 – Stationary Combustion Table 2.3

* Density of diesel oil is specified as 820 - 845 kg/m³ (15 °C) in Safety Data Sheet of Turkish Petroleum Corporation. Average of the upper and lower limit values is calculated.

The equations for calculating the volume-based emission factors for CO_2, CH_4 and N_2O are the same as those presented in following section.

7.1.6.2.2.2 Mobile Fuel Consumption

The GHG emissions from mobile equipment to be used during the construction phase of the Project, are calculated based on fuel consumption and diesel-specific emission factors on an energy basis from the IPCC 2006 Guidelines (Volume 2), Chapter 3 – Mobile Combustion Table 3.3.1 and related 2019 Refinement. These emission factors are presented in Table 7-41 below.

Table 7-41: Mobile Combustion - Energy-based Emission Factors and Net Calorific Value

Phase	Source	Net Calorific Value (TJ/Gg)	Reference	Emission Factor (kg GHG/TJ)			Reference	Fuel Density (kg/m³)*
				CO_2	CH_4	N_2O		
Construction	Vehicles - Combustion of Diesel Oil	40.4	Turkish Notification on Monitoring and Reporting of GHG Emissions (Official Gazette Date/Number: 22.07.2014/29068), Table 5.1	74,100	4.15	28.6	IPCC 2006 guidelines, Chapter 3 – Mobile Combustion Table 3.3.1	832

* Density of diesel oil is specified as 820 - 845 kg/m³ (15 °C) in Safety Data Sheet of Turkish Petroleum Corporation. Average of the upper and lower limit values is calculated.

A sample equation provided below presents the methods for calculating the volume-based emission factors (EF) for CO_2, CH_4 and N_2O:

CO2 Emission Factor:

$$EF_{CO_2}\left(\frac{kg\ CO_2}{L}\right) = \text{Energy based EF}\left(\frac{\text{t CO}_2}{\text{TJ}}\right) \times \text{Net Calorific Value}\left(\frac{\text{TJ}}{\text{kT}}\right) \times \text{Density of Diesel}\left(\frac{\text{kg}}{\text{m}^3}\right) \times \frac{1{,}000\ \text{kg CO}_2}{1\ \text{t CO}_2} \times \frac{1\ \text{kT}}{1{,}000{,}000\ \text{kg}} \times \frac{1\ m^3}{1{,}000\ \text{L}}$$

Total CO2 Emissions from Mobile Equipment:

$$E_{CO_2} = \text{Fuel Combustion}\left(\frac{\text{L}}{\text{yr}}\right) \times \text{Emission Factor}\left(\frac{\text{kg CO}_2}{\text{L}}\right) \times \frac{1\ \text{tonne}}{1{,}000\ \text{kg}}$$

7.1.6.2.3 Scope 2: Indirect GHG Emissions

Scope 2 emissions are ‘indirect’ GHG emissions associated with the Project that are a consequence of the activities of the company but occur at sources owned or controlled by another company.

Scope 2 accounts indirect GHG emissions from the generation of purchased electricity, heat or steam consumed by the company.

7.1.6.2.3.1 Electricity Consumption

The Scope 2-Indirect GHG emissions are expected to be from electricity consumption. For the emission factor of electricity consumption, Turkish National Electricity Grid Emission Factor (0.7424 t CO_2/MWh) calculated by the Turkish Ministry of Energy and Natural Resources is used. The equation for calculating the indirect GHG emissions due to the electricity purchased is given below.

$$E_{CO_2} = \sum_i E_i * EF$$

Where;

E_{CO2}: Total indirect CO_2 Emissions due to electricity consumption (t CO_2),

E_i: Use of electricity for each activity (MWh),

EF_i: National Electricity Grid Emission Factor (t CO_2/MWh),

i: Activity that consumes electricity.

7.1.6.2.4 Emissions Not Included in Scope 1 or Scope 2

7.1.6.2.4.1 Carbon Stock Change

Land use change and loss of carbon sink are the reason for indirect CO_2 emission. Due to the construction activities, the natural lands such as croplands, forestlands and grasslands are disturbed and occupied till the Project life end time. These activities result in change in carbon stock. The following formulation, referring to IPCC 2006 Guidelines Volume 4 Chapter 2, is used to calculate change in biomass stocks.

$$\Delta C_{CONVERSION} = \sum_i \{(B_{AFTER_i} - B_{BEFORE_i}) * \Delta A_{TO\_OTHERS}\} * CF$$

Where;

$\Delta C_{CONVERSION}$: initial change in biomass carbon stocks on land converted to another land category, tonnes C/year,

B_{AFTERi}: biomass stocks on land type i immediately after the conversion, tonnes d.m./ha,

$B_{BEFOREi}$: biomass stocks on land type i before the conversion, tonnes d.m./ha,

$\Delta A_{TO\_OTHERSi}$: area of land use i converted to another land use category in a certain year, ha/year,

C: carbon fraction of dry matter, tonne C/(tonnes d.m.),

i: type of land use converted to another land use category.

Table 7-42: Carbon Stock Change Values

Parameter	Values			Unit	Reference
	Forestland	Grassland	Cropland		
Annual area of Land Converted to Other Land	0.82	50.64	579.81	ha	IPCC 2006 IPCC Guidelines for National Greenhouse Gas Inventories V4 Chapter 4 -Table 4.12, Chapter 5 - Table 5.9, Chapter 6 - Table 6.4.
Biomass stocks before the conversion	100.0	13.5	2.1	tonnes dm ha^{-1}	
Biomass stocks after the conversion	0	0	0	tonnes dm ha^{-1}	
Carbon fraction of dry matter	0.5	0.5	0.5	tonnes C (tonne $dm)^{-1}$	

7.1.6.3 Impact Analysis

7.1.6.3.1 Construction Phase

Stationary Combustion Emissions

During the construction phase of the Project, Stationary Combustion GHG emissions will be generated from:

- Combustion of diesel fuel due to use of generators during construction works.
- Combustion of LNG for the campsite heating.

During the construction phase of the Project, it is planned to meet the electricity demand for the activities to be carried out by means of diesel generators until connection to the local electricity grid is completed. Diesel fuel will be the main source for the generators. The total estimated diesel consumption due to use of generators during the construction period is provided by the Client as 10,000 liters.

Heating and hot water needs for the campsite will be provided by LNG heating center composed of 2 boilers having 10,000 m^3 volume and 1500 kW capacity for 3 months within the construction period. The total LNG consumption is estimated as 638 m^3 for the construction period.[8]

Then the total Stationary Combustion GHG Emissions were calculated using the equations given in Section 7.1.7.2.2.1. The yearly GHG emissions due to Stationary Combustion were calculated as 25.7 tonne CO^2/year.

[8] It was assumed that boilers have an efficiency of 85% and LNG has a heating value of 50 MJ/kg and a density of 430 kg/m^3.

Mobile Combustion Emissions

During the construction phase of the Project, GHG emissions will be expected to occur due to the use of on-road and off-road vehicles, machinery and equipment. The primary fuel that will be used for machinery, vehicles and equipment will be diesel. The total estimated diesel consumption due to use of mobile vehicles for all the construction activities is provided by the Client as 100,000 liters. Then the total GHG Emissions from Mobile Combustion were calculated using the equations given in Section 7.1.6.2.2.2. The yearly GHG emissions due to Mobile Combustion were calculated as 278.06 tonne CO_2/year.

Electricity Consumption

During the construction phase, electricity will be utilized for construction activities. According to the information provided by the Client, electrical energy required when the connection to electricity grid is completed is estimated as 405,000 kWh. The yearly GHG emissions resulting from the electricity consumption during the construction phase was calculated as 300.67 tonne CO_2/year using the emission factor and the formula given in Section 7.1.6.2.3.1.

Carbon Stock Change

Indirect GHG emissions are expected to arise from carbon stock change due to land use change during the construction phase of the Project. Emissions resulting from land use change have been estimated by making assumptions regarding the current use of the land and the quantity of carbon estimated to be stored within it. Since land clearing does not affect below ground carbon stocks, only above ground carbon stock is taken into consideration. The project area (201.6 ha) comprises of 100% grassland. Using the equation given in 7.1.6.2.4.1, the total indirect GHG emissions due to land use change is calculated as 1,360.8 tonne CO_2/year.

Total GHG Emissions in Construction Phase

The annual GHG emissions for construction phase of the Project are presented in Table 7-43. These annual emissions are calculated for the maximum construction scenario described above. They are based on rough estimates and may significantly overestimate the actual emissions.

Table 7-43: Annual Project GHG Emissions for Construction Phase

Source	Calculated GHG (as t CO_2e/y)			Total GHG amount	
	t CO_2/y	t CH_4/y	t N_2O/y	t CO_2e/year	Percentage (%)
Stationary Sources (Generators) - Combustion of Diesel	24.90	0.0252	0.06	24.99	1.36
Stationary Sources (Campsite Heating) - Combustion of LNG	0.711	0.0008	0.0019	0.71	0.04
Vehicles - Combustion of Diesel	124.53	0.17	14.32	278.06	7.6
Electricity Consumption	300.67	-	-	300.67	16.5
Loss of Carbon Sink	1,360.8	-	-	1,360.8	74.5
TOTAL				1,965.2	100.00

The table above presents the annual emissions from the construction phase, with contribution of each source to the overall GHG emissions of the Project. Tonnes of CO_2e are calculated using the GWPs from Section 7.1.6.2.1 above.

Table 7-44: Comparison of Project GHG Emissions to National and Global Emissions

Source	Data
Project GHG Emissions (tonnes CO_2e/year) (during construction)	1,965.2
Comparison to Türkiye-wide Total (%)	0.00037%
Comparison to Global Total (%)	0.0000085%
Türkiye-wide GHG Emissions (2020)[9] (tonnes CO_2e/year)	523,897,190
UNFCCC Annex-I 2020 GHG Emissions[10] (tonnes CO_2e/year)	22,948,516,020

Table 7-44 summarizes the annual overall emissions in tonnes of CO_2e for the Project construction phase. Data for Türkiye's GHG releases are obtained from Türkiye's latest National Inventory Report (NIR for the year 2020) for UNFCCC and total of Annex-I countries GHG releases are obtained from UNFCCC GHG database for the last inventory year 2020. For the construction phase, regarding the GHG emissions, the Project's contribution to the total emissions reported for the country level and global reporting programs is not significant.

It is accepted that increased anthropogenic GHG emissions are contributing to climate change. However, the GHG emissions due to the Project represent unmeasurable increase in global GHG emissions. Country scale and GHG emission levels are anticipated to be maintained.

The combined annual emissions from the construction phase of the Project are about **1.965,2 t CO_2e per annum**. This annual value is below the 25,000 t CO2e threshold defined in IFC PS3 and Equator Principles IV. Therefore, no additional monitoring will be required.

7.1.6.3.2 Operation Phase

Electricity Consumption

During the operation phase, electricity will be utilized for operation activities. According to the information provided by the Client, the renewable electricity generated by the solar power plant (the Project) will be used for the energy demand of the operations during daytime and the electricity from the grid will be used during night-time. The electrical energy required for the operation phase of the Project is estimated with a total of 172 MWh consisting of 82 MWh/year internal consumption during daytime and 90 MWh/year external consumption during night-time. The yearly GHG emissions resulting from the electricity consumption during the operation phase was calculated as 74.5 tonne CO_2/year using the emission factors defined by the Turkish Ministry as 0.6488 tCO_2/MWh[11] and 0.7424 tCO_2/MWh with the formula given in Section 7.1.6.2.3.1. The emission factor of 0.6488 tCO_2/MWh value means that for every 1 MWh of electricity generated by a new solar or wind power plant, 0.6488 tons of CO_2 emissions will be avoided.

Total GHG Emissions in Operation Phase

The annual GHG emissions for operation phase of Project are presented in Table 7-45. These annual emissions are calculated for the estimated operation scenario described above. They are based on rough estimates and may significantly overestimate or underestimate the actual emissions.

[9] Obtained from TURKSTAT, Türkiye NIR for the year 2020

[10] Obtained from UNFCCC GHG database, https://di.unfccc.int/time_series

[11] https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru

Table 7-45: Annual Project GHG Emissions for Operational Phase

Source	Calculated GHG			Total GHG amount	
	t $CO2/y$	t $CH4/y$	t $N2O/y$	tCO_2e	Percentage
Internal Electricity Consumption (during day time)	7.7	-	-	7.7	10.3%
External Electricity Consumption (during night-time)	66.8	-	-	66.8	89.7%
TOTAL				74.5	100.00%

The table above presents the emissions from the operational phase, with the contribution to the overall GHG emissions from the Project. Tonnes of CO_2e are calculated using the GWPs from Section 7.1.6.2.1 above.

Table 7-46 summarizes the annual overall emissions in tonnes of CO_2e for the Project operational phase. Data for GHG releases from Türkiye are obtained from Türkiye's latest National Inventory Report (NIR for the year 2020) for UNFCCC and total of Annex-I countries GHG releases are obtained from UNFCCC GHG database for the last inventory year 2020. For the operational phase, the GHG emissions from the Project are an insignificant contribution to the totals reported for the country level and global reporting programs.

Table 7-46: Comparison of Project GHG Emissions to National and Global Emissions

Source	Operational
Project GHG Emissions (tonnes CO_2eq/year)	74.5
Comparison to Turkey-wide Total (%)	0.00001%
Comparison to Global Total (%)	0.0000003%
Turkey-wide GHG Emissions (2020)[12] (tonnes CO_2eq/year)	523,897,190
UNFCCC Annex-I 2020 GHG Emissions[13] (tonnes CO_2eq/year)	22,948,516,020

The combined annual emissions from the operational phase of the Project which is considered as Scope 2 emissions arising from electricity consumption are about **74.5 t CO_2e per annum**. This annual value is below the threshold defined in IFC PS3 and Equator Principles IV. Therefore, no additional monitoring will be required.

7.1.6.3.3 Decommissioning and Closure Phase

A new impact is not expected other than those listed in the construction and operation phases in the decommissioning and closure phase of the Project.

7.1.6.4 Mitigation Measures

The annual GHG emissions calculations for the construction phase of the Project are presented above. These annual emissions are based on the approximate data and preliminary estimations provided by Client. Therefore,

[12] Obtained from TURKSTAT, Türkiye NIR for UNFCCC for the year 2020

[13] Obtained from UNFCCC GHG database, https://di.unfccc.int/time_series

these calculations may be significantly underestimated or overestimated compared to the actual emissions. Considering these approximations, GHG emission calculations for construction and operation phases should be conducted again once the actual consumption amounts, and design parameters are known.

Section 7.1.6.2 describes methodology for estimation of GHG emissions originated from the Project and Section 7.1.6.3 evaluates potential contribution to global climate change. As stated above, the Project's contribution to national and global GHG emissions and climate change is not significant since both the annual and total emissions are not high compared to Turkish and Global GHG emissions. Since the annual GHG emissions for the construction phase and the operation phase of the Project are below the threshold value defined in IFC PS3 and Equator Principles IV, no further monitoring is required.

In addition, the following measures will be applied to reduce GHG emissions and increase resource efficiency as much as possible:

- The Best Available Techniques should be taken into consideration in Project design as much as possible. The applicability of the Best Available Techniques (BATs) developed within the European regulatory framework [i.e., Integrated Pollution Prevention and Control, "IPPC", BAT Reference Documents (BREFs) according to the European Directive 2010/75/EU (IED)] should be evaluated and integrated into the Project design.
- All employees will be provided climate, resource and energy efficiency awareness training.
- The most efficient equipment in terms of fuel usage and effective operation will be chosen. Maintenance of all machinery and equipment will be periodically conducted to ensure efficient fuel use and effective operation as well.
- Efficient resource and material use will be promoted through the development and implementation of a management plans to reduce direct and indirect GHG emissions due to the Project. Other aspects of resource efficiency regarding water usage are covered in Project Description and related impact assessment section.
- No idling and out-of-scope operation of the machinery and equipment will be allowed.
- Vegetation cover will not be disturbed if not necessary
- In order to reduce the GHG emissions resulting from waste disposal processes, amount of wastes generated as a result of project actions will be minimized and generated wastes will be recycled accordingly.
- During the closure phase, rehabilitation of land will help to recover lost carbon sink by converting the disturbed land to its original state as much as possible, which will act as a long-term mitigation measure.

7.1.6.5 Residual Impacts

7.1.6.5.1 Construction Phase

According to the GHG calculations for the construction phase presented in the sections above, the estimated contribution of the Project is assessed as low when compared to national and international GHG emission levels. The table below summarizes the identified impact factor involved in the construction phase of the Project.

Table 7-47: GHG Emissions Impact Matrix for Construction Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Construction Phase GHG Emissions	Duration:	Short	Medium-low	Long term	**Low**	Medium high	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	International					
	Intensity:	Low					

7.1.6.5.2 Operation Phase

According to the GHG calculations for the operation phase presented in the sections above, the estimated contribution of the Project is assessed as low when compared to national and international GHG emission levels. The table below summarizes the identified impact factor involved in the operation phase of the Project.

Table 7-48: GHG Emissions Impact Matrix for Operation Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Operation Phase GHG Emissions	Duration:	Long	Medium-low	Long term	**Low**	Medium high	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	International					
	Intensity:	Low					

7.1.6.5.3 Decommissioning and Closure Phase

A new impact is not expected other than those listed in the construction and operation phases in the decommissioning and closure phase of the Project.

7.1.6.6 Monitoring

The following table details the monitoring activities identified for reporting and verifying of GHG emissions of the Project during the construction period.

For each monitoring activity and measure/action identified, the table shows:

- The reference (or source) documents (i.e., Turkish standard, permits, IFC Performance Standards and EHS Guidelines or other GIIP);
- Frequency/timing of the measurement,
- The Key Performance Indicator (KPI), and related quantitative target (if the target consists of a regulatory limit this will also be indicated); and,
- The related responsible party for implementing the related monitoring activity.

Table 7-49: Resource Efficiency and Energy Management Monitoring Actions

Source Document	Monitoring Action/Measure Description	Frequency/Timing	-Method/Type of Parameters	Target/Acceptance Criteria	Responsible Parties
• GHG Protocol • IPCC	• Quantify the resource consumption and specifications on a periodic (i.e., monthly) basis by appropriates methods; record and aggregate data on the consumption of the following resources: 1. Generators - Diesel Oil (construction); 2. Vehicles - Diesel Oil (construction); 3. Electricity (construction and operation). 4. Camp Site Heating – Combustion of LNG (construction) Records on the data resources (such as fuel invoices that include consumption amounts) must be kept.	Monthly	• Amounts consumed 1. [L] 2. [L] 3. [L] 4. [kg] 5.	N.A.	Client / -EPC
• IFC PS3	• GHG emission levels (combined Scope 1 and Scope 2 Emissions, and, if appropriate, the GHG efficiency ratio) from the facilities owned or controlled within the physical project boundary, as well as indirect emissions associated with the off-site production of energy used by the Project will be quantified and reported publicly on annual basis during the construction phase and operation phase.	Annual	• -ESG Report	Compliance with international standards	ClientEPC
• GIIP	• Number of employees that have completed the climate, resource and energy efficiency awareness trainings will be checked.	Semi-annually	• Training records	100%	Client / EPC

Source Document	Monitoring Action/Measure Description	Frequency/Timing	-Method/Type of Parameters	Target/Acceptance Criteria	Responsible Parties
• GIIP	• Maintenance records of machinery and equipment will be checked for regular maintenance periods.	Monthly	• Maintenance records	100%	Client / -EPC
• GIIP	• Prior to any activity on site, final Project footprint will be determined.	Prior to any activity on site	• Project footprint	Decrease in land use/disruption	Client / EPC
• GIIP	• Records on waste types and corresponding amounts will be recorded.	Monthly	• Waste records	Decrease in amount of waste generated and continuous improvement	Client / -EPC
• GIIP	• Number of non-compliances with GHG emissions management measures will be recorded	Continuously	• Visual • Records • Grievances	Minimization of non-compliances and continuous improvement	Client / -EPC

7.2 Social Components

The Social Impact Assessment (SIA) presented in this chapter of the report represents both positive and adverse Project impacts that may be result by the Project actions. The development of the SIA mainly depends on the key stakeholder activities including;

- Gap Analysis site visit held in 21 March 2023,
- Review of the Project national Environmental Impact Assessment Report and other relevant Project documents,
- Social baseline and impact assessment site visit held between 10-12 May 2023.

Based on the outputs of the stakeholder engagement activities, review of the available Project documents and expert judgement, SIA was developed considering the construction, operation and decommissioning impacts by providing the mitigation measures for the adverse impacts and enhancement measures for the positive impacts.

Please refer Chapter-5 for the impact assessment methodology developed by WSP Türkiye for the physical and social impacts.

7.2.1 Profile of the Participants

During the social site visit, 36 households were participated to the household survey representing 161 local people. Female participants constitute approximately 41% of the total participants. Gender distribution according to the settlements is provided in the Table below.

Table 7-50: Gender of the Participants

Village	Male	Female	Grand Total
Badak	11	4	15
Emen	5	7	12
Seslikaya	5	4	9
Grand Total	21	15	36

According to the results of the household surveys, it has been observed that majority of the participants are aged between 40-55. Age distribution of the participants according to the village is provided in the below table.

Table 7-51: Age Distribution of the participants

Age	Badak	Emen	Seslikaya	Total
19-25	0	1	0	1
26-39	3	3	1	7
40-55	9	6	5	20
56-65	3	2	2	7
65+	0	0	1	1
Total	15	12	9	36

It’s seen that, 13% of the participants do not now the Project and 80% of them are reside in the village of Badak. The awareness of Seslikaya and Emen villages are higher than the village of Badak considering their proximity to the Project area.

Table 7-52: Project Information

Row Labels	Badak	Emen	Seslikaya	Total
Yes	11	12	8	31
No	4	0	1	5
Total	15	12	9	36

The main information source of the participants are the Project employees and this information source is followed by the mukhtars.

Table 7-53: Information Source of the Participants

Row Labels	Public	Internet	District Governor	Mukhtar	Project officers	Total
Badak	4	1	0	4	2	11
Emen	6	0	0	2	4	12
Seslikaya	2	0	1	1	4	8
Total	12	1	1	7	10	31

It is recommended that the Project CLO should visit the village more often and convey the developments of the Project periodically.

During the household interviews, the participants were asked "How would you like to convey your complaints and suggestions?". In all 3 villages, most of the participants stated that they would like to convey their complaints and suggestions through institutions. In Badak village, 7 people stated that they would like to convey their complaints and suggestions through institutions, 3 people through mukhtar; in Emen village, 5 people through institutions, 4 people through mukhtar; and in Seslikaya village, all 7 participants stated that they would like to convey their complaints and suggestions through institutions.

Table 7-54: Requested Grievance Mechanism

Village	Through institutions	Through Muhktar
Badak	7	3
Emen	5	4
Seslikaya	7	-
Total	19	7

7.2.1.1 *Housing*

During the household interviews, the participants were asked to compare their current house with other houses in the neighborhood. They were asked whether their house was better, worse or average compared to other houses. In all 3 villages, most of the participants stated that their houses are average compared to other houses in the region. In Badak village, 3 of the 14 participants stated that their houses were better than the houses in the region, 2 of them stated that their houses were worse than the other houses in the region, and 9 of them stated that their houses were average. In Emen village, 2 of the 12 participants stated that their houses were better than the other houses in the region, while 10 of them stated that their houses were at an average level. In Seslikaya village, 1 of the 8 participants stated that their house was better than the other houses in the region, 2 of them stated that their houses were worse, and 5 of them stated that their houses were at an average level.

Table 7-55: House Conditions

Row Labels	Answers
Badak	
Better	3
Worse	2
Average	9
Emen	
Better	2
Average	10
Seslikaya	
Better	1
Worse	2
Average	5

In the household interviews, the participants were asked "in which months of the year do you live here". All participants in Badak and Seslikaya villages stated that they live in these villages all year round. 1 of 11 participants in Emen village stated that they live in the village during harvest time and 1 of them stated that they stay in the village between May and November. In the winter period they reside in Bor District.

Table 7-56: Permanent / Temporary Residency

Village	Residency	Frequency
Badak	Permanent	14
Emen	Summer Period	2
	Permanent	9
Seslikaya	Permanent	8

During the household interviews, participants were asked about their drinking water sources. In all 3 villages, most of the respondents stated that their drinking water source was well water. In Badak village, 2 out of 15 participants stated that the source of drinking water was the village fountain, 4 stated that it was mains water and 9 stated that it was well water. In Emen village, 1 of the 12 participants stated that the drinking water source was mains water, while 11 participants stated that it was well water. In Seslikaya village, all participants stated that the source of drinking water is well water.

Table 7-57:: Drinking Water Source

Row Labels	Frequency
Badak	
Village fountain	2
Well water	9
Tap water	4
Emen	
Well water	11
Tap water	1
Seslikaya	
Well water	9

7.2.1.2 Land Use and Livelihoods

During the household interviews, the participants were asked "what is your source of irrigation water". In all 3 villages, most of the participants stated that they obtained irrigation water from well water. In Badak village, 2 out of 15 participants stated that the source of irrigation water was the village fountain, 8 stated that it was well water, and 5 stated that they did not use irrigation water. In Emen village, 10 out of 12 participants stated that the source of irrigation water was well water, while 2 participants stated that they did not use irrigation water. In Seslikaya village, all 9 participants stated that their irrigation water source was well water.

Table 7-58: Irrigation Water Source

Water Source	Irrigation Source
Badak	
Village fountain	2
Well water	8
No irrigation	5
Emen	
Well water	10
No irrigation	2
Seslikaya	
Well water	9

During the household interviews, the respondents were asked whether they were engaged in agriculture or not. In Badak village, all 3 respondents stated that they were engaged in agriculture. In Emen village, 10 out of 12 participants stated that they were engaged in agriculture and 2 of them stated that they were not engaged in agriculture. In Seslikaya village, 6 of 7 respondents stated that they were engaged in agriculture and 1 of them stated that they were not engaged in agriculture.

Table 7-59: Agricultural Production

Row Labels		Land Cultivation
Badak	Yes	3
Emen	Yes	10
	No	2
Seslikaya	Yes	6
Seslikaya	No	1
Grand Total		22

People who stated that they were farming were asked what they planted on their land. Barley and clover are common crops cultivated in all 3 villages. Barley and clover are the main crops planted in Badak village. In Emen village, barley, wheat, tomato and clover are the main crops planted, with beetroot being the majority. In Seslikaya village, the main crops planted are barley and clover, with beetroot being the majority.

Table 7-60: Agricultural Products

Row Labels	Agricultural Products
Badak	
Barley	2
Clover	1
Emen	
Barley	2
Wheat	1
Tomatoes	1
Beet	4
Clover	2
Seslikaya	
Barley	1
Beet	4
Clover	1

The same people were asked whether there has been any change in agricultural production in the last 5 years. In Badak village, all 3 participants stated that agricultural production has decreased in the last 5 years. In Emen village, 1 out of 9 participants stated that there is no change; 5 stated that agricultural production has decreased; 3 stated that agricultural production has increased. In Seslikaya village, 1 out of 4 participants stated that there was a decrease in agricultural production in the last 5 years, while 3 stated that there was an increase.

The people who stated that there has been an increase in agricultural production in the last 5 years were asked the reason for this increase. While 2 out of 3 participants in Emen village stated that the introduction of fertilizer and pesticide use increased agricultural production, 1 participant stated that improvements in cultivation techniques increased agricultural production. In Seslikaya village, all of the participants stated that the reason for the increase in agricultural production was the improvement in cultivation techniques.

Respondents who stated that agricultural production has decreased in the last 5 years were asked about the reasons for the decrease. In Badak village, 1 of the 3 participants stated that agricultural production decreased due to low prices, 1 due to drought and 1 due to changes in agricultural activities. In Emen village, 2 out of 5 participants stated that there was a decrease in agricultural production due to drought, 1 due to the abandonment of fertilizer and pesticide use, 1 due to lack of access to water, and 1 due to plant disease crops. In Seslikaya village, there is 1 person who states that there is a decrease in agricultural production. This participant stated that the reason for the decrease was drought.

During the household interviews, the respondents were asked the question "are you engaged in animal husbandry". In Badak village, 12 out of 14 participants stated that they were engaged in animal husbandry, while 2 stated that they were not. In Emen village, 5 out of 12 participants out of 9 participants are engaged in animal husbandry, while 7 are not engaged in animal husbandry. In Seslikaya village, 5 out of 9 participants stated that they were engaged in animal husbandry, while 4 stated that they were not engaged in animal husbandry.

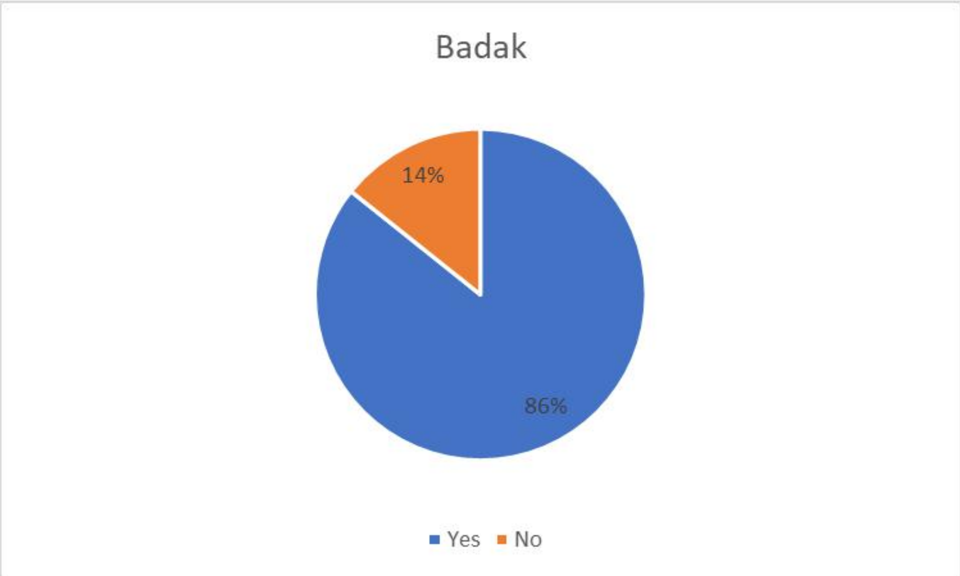

Figure 7-3: Animal Husbandry in Badak

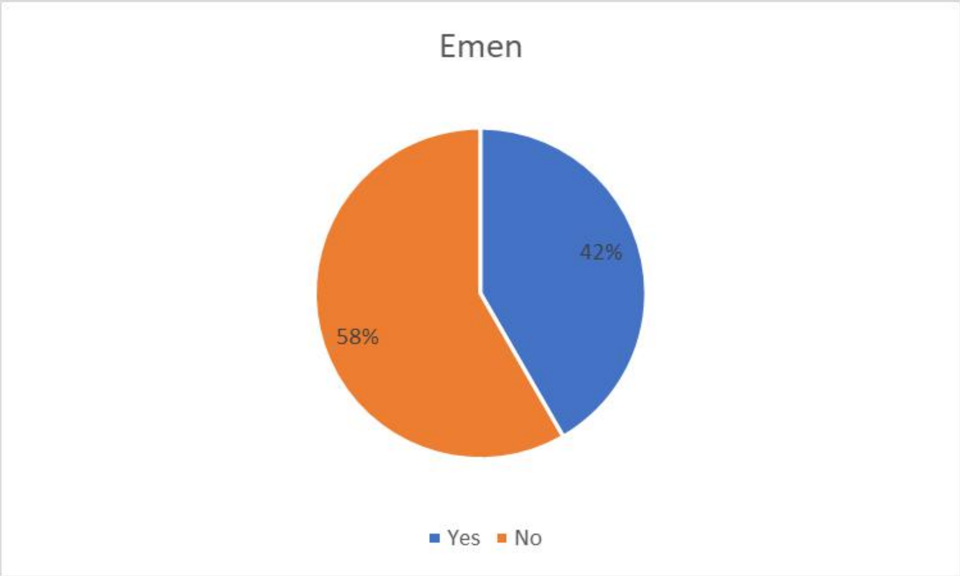

Figure 7-4 Animal Husbandry in Emen

Figure 7-5 Animal Husbandry in Seslikaya

7.2.1.3 Available Skills

During the household interviews, participants were also asked about the available skills of the people in their households. According to the answers given, 1 person stated that he/she can work as a machine operator, 1 person as an office worker, 6 people as a driver, 1 person as a technician and 2 people as a cleaner in Badak village. In Emen village, 4 people stated that they could work as driver, 1 person as technician, 2 people as cleaner, 1 person as master construction worker. In Seslikaya village, 1 person stated that they could work as a security guard, 1 person as an office worker, 3 people as a driver and 1 person as a cleaner.

7.2.1.4 Gender Aspects

In this Section, the potential implications of the Project on gender relations and gender equality in the AoI are assessed. During the social field survey, information on women's role in the settlements, educational levels, employment status, participation in the decision-making process, and land use patterns were tried to be collected. During the field study, women's focus group interviews were conducted in 2 out of 3 villages. During the women's focus group interviews, women were asked about their daily activities. According to the answers received from women, men are the ones responsible for the income of the household. Women are engaged in housework, childcare and field work. The participation rate of women in household interviews is 41%. Although most of the participants were men, the close gender distribution of the participants provides information on gender indicators.

When asked about the expected negative impacts of the project during the household interviews, differences were observed in the responses of women and men. The negative impact expected by most of the men is that the project will lead to loss of pasture area. Women, on the other hand, are particularly concerned about the project's impact on livestock breeding, the speed of construction vehicles, damage to agricultural products, and loss of pastureland. The fact that negative expectations vary according to gender is an indication that women and men have different responsibilities and priorities.

During the fieldwork, respondents were asked about the available skills of household members. In the interviews with women, most of the women stated that they could work as cleaners. Especially young women stated that they could work as secretaries and accountants. If employment is created in these areas during the project, women in the AoI will be prioritized. Women's participation in business life is important both for ensuring gender equality and for women's economic empowerment. However, most of the employment areas that are likely to be opened during the construction process of the project appeal to men. It is likely that there will be a need for professional groups such as engineers, technicians, security guards, drivers, construction workers during the construction process. The villagers will be prioritized when employment is created in these areas. However, during the interviews, it was observed that women do not have the qualifications to work in these fields and it is not possible for them to work in these fields due to gender norms. Therefore, the majority of the people to be recruited will be men.

7.2.1.5 General Outputs of the Social Surveys on the Project Impacts

Ecosystem Service Usage

In the household interviews conducted within the scope of the Project, it was stated that there are no rivers, recreation areas, shrines or forests in any settlement within the Project impact area.

In all villages, well water is used for both potable water and irrigation water.

6.7 per cent of the respondents in Badak village and 44.4 per cent of the respondents in Seslikaya village stated that the Project would affect their well water.

These impacts were reported to be water quality degradation, declining water levels, and difficulty accessing water resources.

The Badak, Emen and Seslikaya villages all have pasture areas. 53.3% of the participants in Badak village, 83.3% of the participants in Emen village and 55.6% of the participants in Seslikaya village use these pasture areas for grazing animals.

Participants who stated that the Project would have a negative impact on the pasture area were 46.7% in Badak, 25% in Emen and 77.8% in Seslikaya.

The participants suggested that the solar panels should be built as a platform on the pasture area, a new pasture area should be allocated, and the Project should be built in a less productive area as a pasture; that is, the Project location should be changed.

Hunting is only carried out in Seslikaya village, and it is stated that duck hunting is carried out. Hunting is generally done in winter months.

Perceived Positive Impacts of The Project

Employment expectation was expressed as a positive feature of the Project. This rate is 80% in Badak, 75% in Emen and 44% in Seslikaya. 6% to 17% of the villagers expect electricity to be distributed free of charge when the Project is completed.

During the field studies, it was observed that the participants did not have clear information on this issue. Their lack of knowledge about the connection of the energy to be produced to the national grid was noticeable.

There is inaccurate information about free energy supply.

The Project CLO held a pre-construction meeting in all three settlements, including the separate meetings with the female members of the residents. The demand or expectation of free electricity supply will be mentioned in the future meetings.

Perceived Adverse Impacts of The Project

When the Project's negative impacts were discussed with the participants, the most negative impact was shown as the loss of pasture areas.

The concern about the loss of pasture areas is 60% in Badak village, 50% in Emen village and 77.8% in Seslikaya village.

In parallel with the loss of pasture areas, 10 per cent of the respondents expect a negative impact on livelihoods based on animal husbandry.

Unlike other villages, the negative impacts related to the increase in village traffic and the fast travelling of construction vehicles in Emen village were expressed by the participants.

In addition to these main impacts, the increase in temperature, reflection problems caused by the panels and dust impacts likely to increase during the construction period are also stated as negative impacts of the Project.

Recommendations of The Participants

In the field study, the participants were asked for suggestions about the Project. The suggestions received are as follows:

- Informing the village about the Project
- Free distribution of electricity to the villagers
- Changing the Project area
- Ensuring employment of the village people
- Supporting for animal husbandry and agriculture
- Irrigation to prevent dust problems during construction
- Repairing of village roads and construction of speed bumps on the roads
- Developing internet infrastructures of villages

- Installing cameras in the village
- Allocation of new pasture areas to villages

In addition to these, the participants stated that they had problems using irrigation water. Since electricity is also used during irrigation, electricity bills are very high. They stated that they could not do agriculture under these conditions. As a solution to this problem, they suggested the development of water infrastructures in the villages, the establishment of water cooperatives, the construction of wells and the irrigation of lands.

They also stated that there were problems with education in the villages. Since there are no schools in the villages, the children must go to distant schools or cannot study. They suggested improving the educational opportunities in the villages.

During the fieldwork, one participant stated that he had previously worked on the SPP Project in Osmaniye. He said that greenhouse and poultry farming were carried out under the panels in the Project area there. He suggested that small cattle can be grazed in the Project area to clear the grass in the Project area in this region as well.

7.2.2 Population and Demography

According to the baseline information of the population component, the sensitivity of the villages was assessed as **High** considering the proximity to the camp site to the settlements and the possible population influx increase considering the other ongoing Projects. Total population of the village of Badak is 390, Emen is 170 and Seslikaya is determined as 80 and considering the proximity of the workers accommodation and the low population figure, Seslikaya is determined as the most vulnerable receptor for the population influx impact of the Project.

7.2.2.1 Construction phase

7.2.2.1.1 Impact factors

The main impact factor of the population increase will be the worker requirement of the Project.

Table 7-61: Project actions and related impact factors potentially affecting traffic during construction phase

Project actions	Impact factors
General engineering/construction works;	Increase of population

- **<u>Increase of population</u>**

A large proportion (approximately 368 workers, mostly unskilled and semiskilled) of the workforce will be accommodated in the construction camp that is under construction as of the date of writing this report. The camp is located inside the Project site borders (see Figure 7-6) within the borders of the Seslikaya village. The rest of the workers, (approximately 80 workers, skilled) are planned to be accommodated in rental houses and hotels in in Bor District and Niğde Province. The proximity of the nearest settlement located in the village of Seslikaya is 1.3 km.

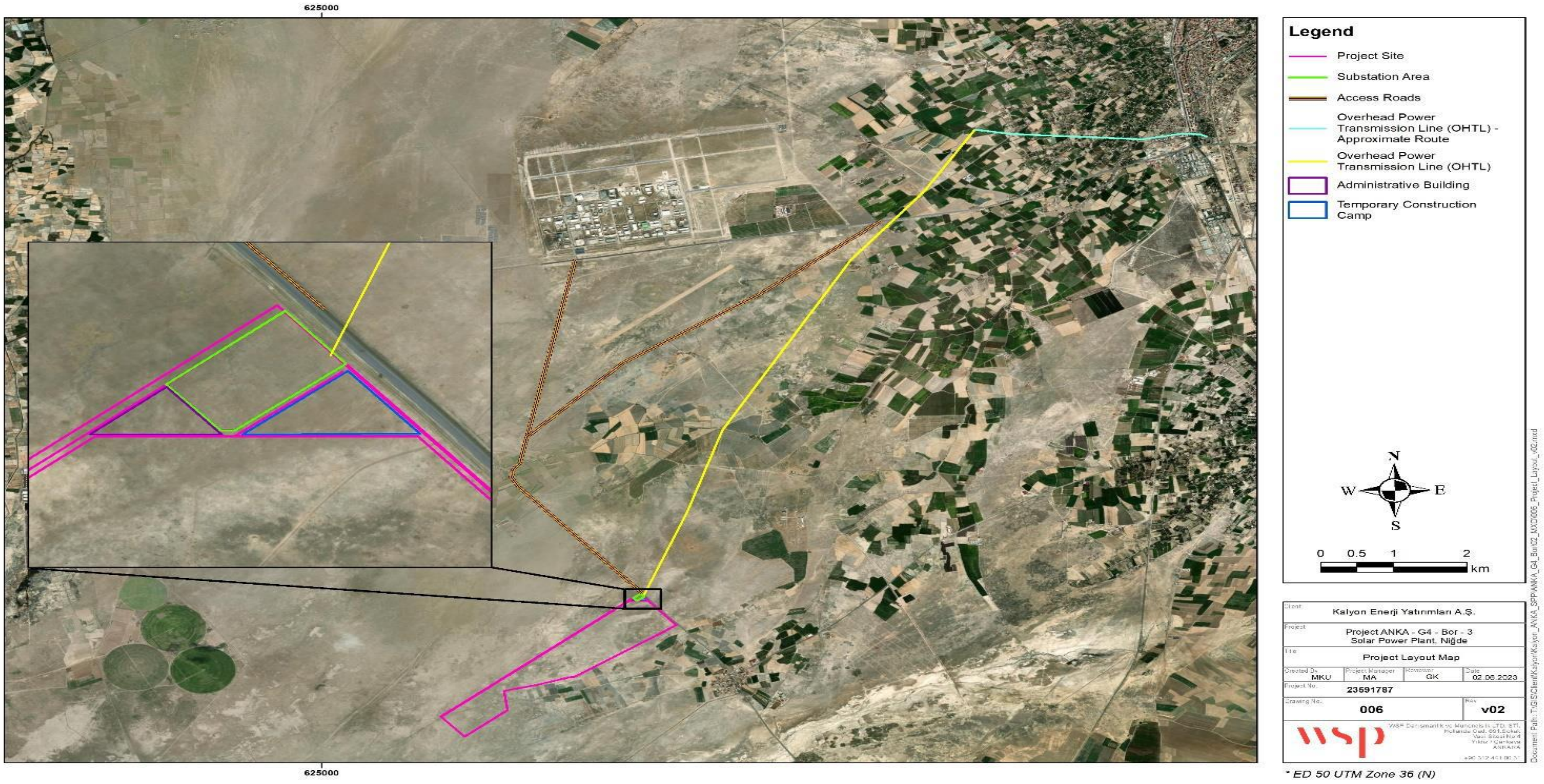

Figure 7-6: Project Layout

7.2.2.1.2 Mitigation measures

- Camp Site and Offsite Accommodation Management will be implemented.
- During the workers' accommodation design and planning process, the Annex I Checklist on Workers' Accommodation provided in the IFC - EBRD Guiding Notes on Workers' Accommodation will be followed to ensure that the document's requirements are met.
- Accommodation will be fully contained with meals, entertainment, medical clinic. By this way interaction of the workers with local communities will be prevented as much as possible. The potential negative results of the interaction with the community residents will be explained to workers via social induction/trainings. Workers will not need to go into communities and if they pass through communities to get to the site at the beginning and end of their shift, they will be discouraged from interacting negatively with community residents.
- Priority for the employment opportunities will be given to local residents where applicable,
- Workers' accommodations will be designed in compliance with the processes and standards of the IFC and the EBRD (2009), and the basic needs of the workers will be provided within the borders of the accommodation to limit the interaction of the workers with the local communities to prevent the pressure on the local utilities and the services,
- In case of the recruitment of workers outside the local area, cultural awareness training will be provided to workers to prevent any cultural conflicts,
- Employee Code of Conduct will be prepared and applied,
- The mukhtars of the villages will be informed about the construction of the workers' accommodation, and the workers that will be accommodated in the camps will be registered in the village system,
- A grievance mechanism will be applied to record any gender-based complaints, and necessary measures will be taken accordingly.

7.2.2.1.3 Residual impacts

The impact of the Project in the construction phase on the population is assessed as negative and short term-term. Considering the closeness of the workers' accommodations to the Seslikaya Village the frequency of the impact is assessed as frequent. The geographical extent of the population influx impact will be limited to the closest residential areas proximity to Seslikaya Village and transportation route in the village of Emen, and the impact will be local. The impact will occur at the local level, and the intensity of the impact is assessed as medium. The receptor sensitivity is assessed as medium-high. The reversibility of the impact is short-mid-term since, after the construction phase, camps will be removed from the AoI. The impact value of the population increase is assessed as medium and after the implementation of the mitigation measures, the residual impact will remain at low.

The impact evaluation of the Project on the population in the construction phase is provided in the table below.

Table 7-62: Residual Impact Assessment Matrix for Population and Demography During Construction Phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Population	Duration:	Short	Medium-high	Short-mid-term	**Medium**	Medium high	**Low**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	High					

Monitoring measures

Monitoring activities will be performed on the following issues to ensure the implementation and effectiveness of the proposed mitigation measures,

- Community grievances registers by the grievance mechanism to be formed for the Project,
- Stakeholder Engagement and consultation registers and records by the Stakeholder Engagement Plan to be produced for the Project,
- Percentages of the local employees (which will be a performance indicator for ESMS to be prepared for the Project),
- Population figures of the settlements according to TURKSAT data

7.2.2.2 Operation phase

7.2.2.2.1 Impact factors

The main impact factor of the population increase during the operation phase of the project will be the worker requirement of the Project for the plant operation phase of the Project. It is planned to employ 23 people during the operation of the Project.

Table 7-63: Project actions and related impact factors potentially affecting population increase during operation phase

Project actions	Impact factors
Plant/infrastructure operation	Increase of population

- **Increase of population**

Operation phase of the Project will require small number of workers and they will use the administrative buildings of the Project located in the borders of the Project site. There will no accommodation at the facility during operation phase. The interaction of the operation phase workers will be limited with the local communities.

7.2.2.2.2 Mitigation measures

- Priority for the employment opportunities will be given to local residents where applicable,
- In case of the recruitment of workers outside the local area, cultural awareness training will be provided to workers to prevent any cultural conflicts,
- Employee Code of Conduct will be prepared and applied,

- A grievance mechanism will be applied to record any gender-based complaints, and necessary measures will be taken accordingly.

7.2.2.2.3 Residual impacts

The operational activities may cause very long-term population increase mostly at the Project site (operation phase workers limited with 23 person). The intensity of the impact will be negligible. The reversibility of the impact will be long-term, and the impact will occur during the operation period.

The impact assessment of the Project on the population in the operation phase is provided in the table below.

Table 7-64: Residual Impact Assessment Matrix for Population and Demography During Operation Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Population	Duration:	Very long	Low	Long term	**Low**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Project Site					
	Intensity:	Negligible					

Monitoring measures

Monitoring activities will be performed on the following issues to ensure the implementation and effectiveness of the proposed mitigation measures,

- Community grievances registers by the grievance mechanism to be formed for the Project,
- Stakeholder Engagement and consultation registers and records by the Stakeholder Engagement Plan to be produced for the Project,
- Percentages of the local employees (which will be a performance indicator for ESMS to be prepared for the Project),
- Population figures of the settlements according to TURKSAT data

7.2.2.2.3.1 Decommissioning and Closure Phase

Decommissioning phase activities are mainly the moving out of the workers of the Project from the local area. Impacts on the local population for the decommissioning phase are difficult to predict at this stage of the Project, as these will depend on how well the local communities would adapt to the potential population influx.

Monitoring

Monitoring activities will be performed on the following issues to ensure the implementation and effectiveness of the proposed mitigation measures,

- Community grievances registers by the grievance mechanism to be formed for the Project,
- Stakeholder Engagement and consultation registers and records by the Stakeholder Engagement Plan to be produced for the Project,

- Percentages of the local employees (which will be a performance indicator for ESMS to be prepared for the Project),
- Population figures of the settlements according to TURKSAT data

7.2.3 Economy and Employment

7.2.3.1 Construction Phase

7.2.3.1.1 Impact Factors

The construction process of the project is planned to be completed in 8 months and 368 personnel will be employed in this process. Most settlements have security guards, construction workers, drivers and a few operators, technicians and engineers. The Contractor will hire staff locally and nationally according to the skills required and the availability of the workforce in the region. Especially the young population in the villages migrate from the village to the city due to the lack of job opportunities. The Project's provision of employment opportunities can support the reduction of migration from the village to the city and the strengthening of the local economy.

In addition to the direct and indirect employment opportunities, the Project will also create economic contributions to the local economy by purchasing goods and services such as fuel needs of mobile equipment, transportation, foods, passenger automobiles to be used in the Project, electrical energy needs of the Project, maintenance and repair materials, office supplies, vehicle, travel, logistics, food, accommodation, communication, security. Due to these features, the Project will benefit the strengthening of the local economy of the region.

In addition to the positive impacts, during the field studies, it was noted that the interviewees had economic concerns due to the Project. the main sources of income in these villages are animal husbandry and agriculture. The fact that the Project will be constructed in the grazing land area worries people. Loss of grazing area will lead to a decrease in the income obtained from animal husbandry. Therefore, some of the participants think that the Project will negatively affect the local economy; therefore, the Project area should be changed.

Also, some of the participants do not find the employment created by the Project sustainable. The Project will be completed in 8 months, and they stated that it would not be enough to create 8 months of employment for the people of the region. Therefore, there are those who do not evaluate the employment of the Project positively.

7.2.3.1.2 Mitigation Measures

The Project will implement human resource policies and procedures and Labor Management Plan in compliance with the IFC PS-2 on Labour and Working Conditions. Job opportunities provided by the Project will be an essential source of income, especially for unemployed people, households living in poverty and the younger population in the AoI. The following enhancement actions will be implemented in order to improve the opportunities emerging from the Project and to enhance the positive impacts of the Project.

- The Project will implement human resource policies and procedures in compliance with the IFC PS-2 on Labour and Working Conditions. Such policies are expected to provide more predictable employment opportunities for direct and indirect employees,
- The Project will enhance local employment, and referential employment will be given to qualified local people. Hiring preference criteria will prioritize settlements directly affected by the current activities of the Project,
- Individuals whose livelihood sources are affected by the Project impacts will be given priority in the recruitment process of the Project,

- Formal and transparent recruitment process will be implemented to provide equal opportunity to the applicants,
- The mukhtars of the villages will be informed about the recruitment opportunities of the Project (announcements, banners) to reduce the requirement of the non-local labour force,
- Where applicable, vocational training will be provided to local people to maximize the local labour force,
- Before the procurement, local suppliers will be identified, and priority on purchases will be given to goods and services from local businesses,
- Capacity development will be applied, including the OHS and HR,
- Equal procurement opportunities will be provided to local small businesses through the Supplier Management Plan,
- EPC, subcontractors and suppliers will be monitored to prevent child and forced labour through Contractor Management Plan and Supplier Management Plan,
- An equal tender process will be applied,
- Equal pay for equal jobs will be provided to the local and non-local labour forces,
- Bank accounts will be provided to workers, and payments will be made via these bank accounts,
- The Worker Grievance mechanism will be implemented.

7.2.3.1.3 Residual Impacts

The expected job opportunities emerging from the Project is a positive and short-term impact and will extend will be national in case of absence of required labour force in the local area. Job opportunities are likely to occur during the construction phase of the Project. Considering the implementation of the enhancement measures, the impact on job opportunities is depicted in the table below, and it is expected to be positive and high.

Based on the baseline conditions of the assessed component, the Project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a negligible is expected on demand for goods, materials and services.

Table 7-65: Residual Impact Assessment Matrix for Economy and Employment During Construction Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features		Impact Value	Mitigation effectiveness	Residual impact value
Demand for workforce	Duration:	Short	Medium-high	Reversibility:	Short-mid-term	**Medium**	High	**High**
	Frequency:	Frequent						
	Geo. Extent:	National						
	Intensity:	High						
Demand for goods, materials and services	Duration:	Short	Low	Reversibility:	Short-mid-term	**Negligible**	Medium-low	**Negligible**
	Frequency:	Frequent						
	Geo. Extent:	National						
	Intensity:	Medium						

7.2.3.1.4 Monitoring Measures

- Employment agreements made with contractors and subcontractors,
- Training Records (training materials, participant list, training planning, photos), which will be performance indicators for ESMS, to be prepared for the Project,
- Employment records (contracts, employee register), which will be performance indicators for ESMS, to be prepared for the Project,
- Grievance Records in accordance with the grievance mechanism to be produced for the Project.

7.2.3.2 Operation Phase

7.2.3.2.1 Impact Factors

Among renewable energy sources, solar energy is the energy type with the highest potential. Turkey, which has a high solar energy potential due to its location, has an average annual total sunshine duration of 2,640 hours (daily total 7.2 hours) and an average total radiation intensity of 1,311 kWh/m²-year (daily total 3.6 kWh/m²). Considering the possibility of providing uninterrupted energy with energy transmission, the Project is expected to have substantial contribution to national economy of Türkiye.

As for the employment opportunities, the Project will not be able to provide the same number of recruitments during the operation period and the number of people to be recruited will be much lower than during the construction phase.

7.2.3.2.2 Mitigation Measures

- To contribute to regional and global energy security,
- To be a regional trade center in energy,
- To consider social and environmental impacts in the context of sustainable development in every phase of the energy chain

7.2.3.2.3 Residual Impacts

Increased energy production will be a benefit to the national economy. The impact of benefit to national economy positive impact with very high sensitivity. The impact is, long term and national. Overall impact is assessed to be very high.

Table 7-66: Project Actions and Related Impact Factors Potentially Affecting Economy During Operation Phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Benefit to national economy	Duration:	Very long	Very high	Long term	**Very High**	Medium high	**Very High**
	Frequency:	Frequent					
	Geo. Extent:	National					
	Intensity:	Very high					

7.2.3.2.4 Monitoring Measures

- Project will disclose the annual energy production information on their website.

7.2.3.3 Decommissioning Phase

Decommissioning of the Project will result in retrenchment of Project workers however it is not expected to lead to an increase in unemployment at the local level since the operation phase of the Project will not require high number of employees.

7.2.4 Labour and Working Conditions

The impact assessment of labour and working conditions is considered together for both the construction and operation phases, as similar consequences can arise as well as same mitigation measures will be applied for both phases of the Project. Within the scope of the Project, 368 employees will work during the construction phase and 23 employees will work in the operational phase. The social component *Labour and Working Conditions* was assigned a **high** value of sensitivity which may cause direct and negative consequences if not managed properly

7.2.4.1.1 Construction and Operation Phases Impact factors

The impact factors from the Project activities potentially affecting Labour and Working Conditions in construction and operation phases are listed in the following table.

Table 7-67: Project actions and related impact factors potentially affecting labour and working conditions during the construction and operation phases.

Project actions	Impact factors
All project actions during the construction and operation phases	Labour and working conditions

- **<u>Labor and Working Conditions</u>**

Labour Management Plan and HR Policies recruitment procedures will aim to provide Positive opportunities for employment of local workforce to the extent possible considering unskilled, semi-skilled and skilled workforce, and giving priority to vulnerable persons. Priority will be placed on hiring skilled, semi-skilled and unskilled labour from Badak, Emen and Seslikaya village then Bor district, Niğde Province. All workers are required to provide criminal record, Social Security Institution service breakdown, place of residence, family declaration, and health checks.

The recruitment processes will be transparent, public, and non-discriminatory, providing equal opportunities with respect to ethnicity, religion, language, gender and sexual orientation. The Contractors will provide information on the recruitment process, with particular emphasis on informing local communities of employment opportunities through different channels such as headmen and local associations.

All workers will have freedom to join an association and union in compliance with Turkish Labour Law,

The Client will follow Turkish law, while applying equal opportunities to women in all other branches where law does not prohibit women workers. Further measures will remain and Non-Discrimination and put in place to encourage female participation in non-employee workforce, such as Positive Equal Opportunity providing specific training where required, enabling flexibility and job-sharing opportunities for women with children to participate.

The minimum age for the employment will be 18.

Forced labour will be prohibited by ensuring full compliance with national legislation and the provisions of relevant conventions and other international standards. These measures will be reflected in the Project's Employment Policy Document.

The ILO standards ratified by Turkey will be applied.

The Client will be responsible of monitoring of the contractors' and supply chain companies.

It should be noted that the Project will not cause retrenchment of existing personnel, but collective dismissal of the construction personnel will be required, after the completion of the construction phase. However, contract of limited duration will be used, and the workers will be informed on the duration of their work.

7.2.4.1.2 Mitigation Measures

- The accommodation of the workers will be clean and safe, and it will meet the basic needs of workers, providing minimum amounts of space for each worker; sanitary, laundry and cooking facilities. Overcrowding will be avoided.
- Heating, air-conditioning, and ventilation will be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.
- Drinking water to be provided to Project workforce and water to be supplied to food preparation, washing and bathing areas will meet the requirements of the Turkish Regulation Concerning Water Intended for Human Consumption.
- Adequate lavatory facilities (toilets, urinals, washbasins, and showers) will be provided for the number of people expected to work in the facility and allowances will make for indicating whether the toilet facility is "In Use" or "Vacant". Toilet facilities will also be provided with adequate supplies of hot and cold running water, soap, and hand drying devices.
- First aid and medical facilities as well as provisions for safety against potential hazards (fire, etc.) will be provided at the camp sites.
- Domestic wastewater and waste to be produced at camp sites will be properly managed and disposed of in line with the requirements of Waste Management Plan.
- Workers who accommodate in the camps will be made aware of any rules governing the accommodation.
- Project's Grievance Mechanism will provide means to the Project personnel to lodge their complaints. The Client will ensure that the workers are informed of the grievance mechanism at the time of recruitment and make it easily accessible to them.
- The following plans will be implemented:
    - Camp Management Plan and Offsite Accommodation Management Plan
    - Community Health and Safety Plan.
    - Security Management Plan
    - Labor Management Plan

- Provide and implement a grievance mechanism for employees and any suppliers.
- Ensure employees and any suppliers have access to human resources policies.
- Ensure employees are aware of their rights to join local trade unions.
- Undertake independent audits and inspections.
- The Client will implement Human Resources policy which observes wage standards, working hour regulation, freedom of association and staff encouragement. The policy will also eliminate child and forced labour, discrimination on the basis of religion, language, gender or social status, bullying and harassment.
- Workers will be provided with information including, but not be limited to, entitlement to wages, hours of work, overtime arrangements and overtime compensation, and any benefits (such as leave for illness, maternity / paternity, or holiday).
- All workers will be able to join trade unions of their choice and have the right to collective bargaining.
- Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand their rights prior to any employment contract to be signed.
- Wages, benefits and conditions of work offered will be comparable to those offered by equivalent employers in Niğde and same sector.
- The Project and all contractors will put in place a formal worker grievance mechanism.

7.2.4.1.3 Monitoring Measures

- The following monitoring measure shall be implemented to assess the true effects of the project on Labour and working conditions during the construction and operation phases and verify the effectiveness of the mitigation measures.
- Employment agreements made with contractors and subcontractors,
- Training Records (training materials, participant list, training planning, photos),
- records (contracts, employee register,
- Incident records,
- Grievance Records,
- Collective Agreements (if any), and
- Occupational health and safety records.

7.2.4.2 Decommissioning Phase

The activities during the decommissioning phase are likely to be similar to the construction phase hence the impacts will be similar to construction activities. Based on that, a new impact is not expected during the decommissioning phase of the Project, other than those listed in the construction phase

7.2.4.2.1 Residual Impacts

The overall residual impact on labour and working conditions will be low to medium when mitigation measures are fully adopted.

Table 7-68: Project actions and related impact factors potentially affecting Labour and Working Conditions during the construction and operation phases

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Labour and working conditions related impacts	Duration:	Long	High	Short-mid-term	**High**	Medium	**Medium**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Very high					

7.2.5 Land Use (Livelihoods and Land Access Restrictions)

7.2.5.1 Construction Phase

7.2.5.1.1 Impact factors

The Project is part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor district of Niğde province on 29.09.2023. The legal status of the plot was formerly pastureland, and it was declared an industrial zone suitable for the development of a solar project: a Renewable Energy Resource Area.

The land within the Project area and the surrounding SPP Projects is owned by the government, and it is classified as Niğde-Bor Energy Specialized Industrial Zone with the decision taken in 01.06.2018 by Niğde Governorship Revenue Office National Real Estate Directorate.

Consequently, it was launched the "Competition Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy"; YEKA SPP-4 (Bor-1, Bor-2 and Bor-3) competitions were held on 08.04.2022. YEKA Right of Use Agreements were signed on 16.05.2022 with Kalyon Enerji Yatırımları A.Ş., which won the competition held by the Ministry of Energy and Natural Resources for the G4 Bor-3 region. The contract for the YEKA area was taken from Kalyon Enerji Yatırımları A.Ş. to its subsidiary, Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş., as of March 7, 2023.

Within the scope of the project, 5 m of health protection band has been determined within the EIA area of 201.6 ha, and the determined health protection band will also be used as the building approach distance in zoning plans.

The Project area is classified as IV. class lands and determined as treasury land. In the parcels of pasture quality within the borders of Niğde-Bor Energy Specialized Industrial Zone where the project site is located, with the letter dated 01.06.2018 and numbered 7112 of the Niğde Governorship Revenue Office National Real Estate Directorate, a change in qualification was made, and its registration was carried out in the name of the treasury. In this context, the entire project area remains within the treasury land.

According to the interviews held with the Mukhtar of the village of Seslikaya, approximately 10 households were using the Project area for the grazing purposes, and it was assumed that the remaining pasture lands after the development of the Project will not be enough.

Although the animal husbandry is also conducted in the village of Badak, since they quit raising sheep and goat and became to engage with raising cattle, their dependency to the pasture area is decreased considerably.

Similar in Emen village cattle raising became popular and dependency to the pasture lands decreased.

Table 7-69: Project actions and related impact factors potentially affecting land use during construction phase

Project actions	Impact factors
General engineering/construction works;	Occupation of land

7.2.5.1.2 Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Economic displacement impacts will be minimized during the design phase of the Project.
- Community Development Plan will be prepared and implemented to bridge the gaps between Turkish Expropriation Law and IFC PS-5.
- Vulnerable people that will be affected by the land acquisition will be determined and specific assistance will be provided including transportation and legal.
- During the recruitment process priority will be provided to people who lost their livelihoods as a result of the establishment of the Project.
- All construction works will be continuing within the borders of the designated areas and in case of an unplanned damage, loss of the affected PAPs will be compensated by the contractors.
- Community Liaison Officer will be hired and monitor the land acquisition process and collect grievances.
- Implementation of the Community Development Programs in accordance with IFC requirements to restore the livelihood loss of the residents as a result of the loss of the grazing areas.
- Grievance mechanism will be established.
- Impacts to agricultural and pasture lands will be minimized as far as possible by keeping the Project construction footprint as narrow as possible, and efficiently restoring any damaged areas.
- Any business losses will be compensated at a full replacement value.
- Any loss of or damage to crops caused by Project activities will be compensated.
- During operation it is essential that the water structures, will be regularly inspected and be periodically maintained to ensure proper conveyance of water, avoid stagnation and prevent flooding and damages.
- Hunting and collection of wild animals will be strictly prohibited within the Project area.
- A CDP will be developed and implemented and one of the main target groups will be the ecosystem users.

7.2.5.1.3 Residual Impacts

The land allocation impact will result in negative impacts. Before the implementation of the suggested mitigating measures are put into place, all impacts are expected to occur frequently. In order to properly compensate the PAPs through the implementation of Community Development Plan, the impact on occupation of pasturelands is anticipated to decrease to between medium to negligible level.

Table 7-70: Residual Impact Assessment Matrix for Resettlement and Land Acquisition During Construction Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Occupation of pasture lands	Duration:	Medium	Medium-low	Long term	**Medium**	High	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.2.5.2 Decommissioning Phase

The Project would be decommissioned once it has reached the end of its economic life after the Project's anticipated economic useful lifespan of about 30 years. The ground surface will be covered according to appropriate vegetation selection (compatible with the soil, climate and flora of the region) after the rehabilitation operations are completed. The Project site will be handed over to the Ministry of Industry and Technology after the decommissioning works. The site can convert alternative uses by local communities according to the Ministry of Industry and Technology decision.

7.2.6 Community Health and Safety

The Project may have various implications for community health and safety. The potential impacts of the Project must be assessed to identify mitigation measures accurately. In terms of community health and safety, the activities in the construction, operation and decommissioning phases of the Project were evaluated separately, the potential risks were determined, and mitigation measures were developed accordingly. Regarding community health and safety, the following topics have been identified as potential impacts of the Project and included in the social impact assessment:

- The impacts on traffic density and rise in accidents,
- Dust and degradation of air quality due to the construction activities,
- Noise due to the construction activities,
- Population increases,
- Impacts of communicable diseases and waste increase

7.2.6.1 Construction Phase

7.2.6.1.1 Impact Factors

The impact factors of the Project causing potential implications on community health and safety during the construction phase are presented in this section.

Table 7-71: Project actions and related impact factors potentially affecting community health and safety during construction phase

Project actions	Impact factors
General engineering/construction works;	Increase in traffic Emissions of particulate matter Emission of noise Increase of population influx Risk of Increasing Communicable Diseases and Waste Management Employment of Security personnel

- **Increase in Traffic**

The site preparation and construction activities will require the movement of trucks entering and leaving the Project Area to transport machinery, equipment, construction material and staff. Hence, one potential impact of the Project on community health and safety is the increase in traffic density and the possibility of a rise in accidents related to vehicle increases due to construction works during the construction phase of the Project. The nearest highways that can be used to reach the Project area are D330 Niğde-Malatya and D805 Niğde-Ulukışla highways. Within the scope of the Project, D330 will be used actively, and D805 is an alternative route. During the construction process, two trucks will make two trips a day. The trucks to be used will be located in the Project area.

Traffic-related risk factors, which threaten human health and the environment, are generally caused by driver error. However, issues regarding regular maintenance of vehicles, road design, and construction activities contribute to traffic-related risk factors. The traffic-related impacts are assessed in the Traffic section in detail as well.

The results of the social field study conducted in the villages of the Area of Influence indicate that traffic by the construction vehicles is the main anticipated impact of the Project and other ongoing projects in the AoI.

- **Emission of Particulate Matter**

Due to the construction activities on the Project site, particulate matter emission is expected due to the Project. Potential impacts in terms of emission of particulate matter are stated in the Chapter 7.1.1 Air Quality of the ESIA Report as well as in the households surveys with the local communities during the social field study.

- **Emission of Noise**

The noise that will occur during the construction phase of the Project will be caused by the equipment and vehicles that will be used starting from the preparation until the end of the construction phase.

The closest settlement to the Project site (closest sensitive structure) is Seslikaya village, located approximately 700 m bird flight southeast. According to the calculations, expected noise levels at nearest receptors are slightly higher than the relevant regulation limit value. Therefore, mitigation measures will be implemented to reduce the potential noise impact due to the Project.

- **Increase of Population Influx**

Another potential impact of the Project on community health and safety is related to the expected population influx, especially in the construction phase of the Project. Approximately 368 personnel during the construction phase of the Project. Considering the expected population influx and the insufficient infrastructure system in some of the settlements in the AoI identified in the socioeconomic baseline, mitigation measures have been defined to prevent the pressure and negative impact on infrastructure and services caused by the population influx, especially during the construction phase.

- **Risk of Increasing Communicable Diseases and Waste**

The population increase may lead to the spread of infectious and communicable diseases. After the social field study, it has found that no epidemic disease, contagious diseases, or distinctive health problems arising from environmental effects pose a threat to human health in the AoI. However, considering that many workers will be accommodated together during the construction phase of the Project and a population influx is expected from outside the local area, protection and prevention measures for both community and employee health will be implemented under the Community Health and Safety Plan throughout the Project process. As previously indicated in the socioeconomic baseline study, some settlements do not have health units, which makes these areas highly sensitive in case of a possible infectious disease. Another source of communicable diseases may be inadequate waste management due to population influx. Hence, waste management control is included in Chapter 7.X of the ESIA Report.

- **Employment of Security Personnel**

During the construction phase of the Project, security services will be needed on the Project site. According to the data obtained from the social field study, there are security personnel who obtained certification for private security living in the settlements located in the AoI. Security personnel who are already part of the community and familiar with local customs may serve as a positive and visible point of contact between the Project and the local community.

7.2.6.1.2 Mitigation Measures

Increase in Traffic

A Traffic Management Plan have been prepared within the scope of the Project to maintain traffic safety on the roads to be used and to prevent the risks which may outcome due to Project activities ensuring a "safe site, safe vehicle and safe driver" at all times. The following points will be considered as a minimum regarding traffic management:

- Referring to the Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place:
  - To exchange information on the Project with the local community and other stakeholders; and
  - To record and respond to complaints and concerns from the local community members and other stakeholders.

- Considerations will be given to traffic volumes at the rush hours of the day, and transportation of equipment and materials will be utilized at quieter periods to avoid increased congestion on the roads used by the local communities.
- It will be ensured that the roads will be made suitable for heavy vehicle use by taking necessary permits and making necessary arrangements. In case of any road damage, necessary maintenance works will be undertaken.
- Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility.
- Community Health and Safety Plan (CHSP) will be implemented,
- In case construction activities are required on the existing roads will only start after the relevant permits are obtained; all necessary precautions will be taken as signage, barrier, fence, lighting,
- Vulnerable and critical points will be identified in the Project site (including sensitive receptors such as hospitals and schools) to envisage the access routes for construction traffic,
- Construction vehicles will only operate in the defined routes; vehicles will be monitored via an In Vehicle Monitoring System,
- Cameras will be placed in appropriate places on the roads so that construction vehicles belong to different projects can be distinguished and monitored.
- At all times, vehicles will be kept on designated site roads where established. Off-road driving is prohibited except in emergencies or if no roads have been established.
- If reversing cannot be avoided in the work areas, necessary reversing procedures will be identified, including installing reversing aids on vehicles, reversing sensors etc. Trained banksman will be used when reversing cannot be avoided.
- Parking areas will be designated with signs, and reverse parking will be implemented for emergencies.
- The routes to be used by pedestrians will be segregated from heavy vehicle routes where possible.
- Appropriate traffic signs, signals, lights and markings will be placed in the required areas to prevent potential accidents/incidents. Barriers will be placed in the required areas to protect human health and assets.
- The speed limits will be implemented. Vehicle speeds will be monitored randomly through speed gun tools.
- Seatbelts will be worn in vehicles and machinery when being operated.
- No vehicle/equipment/material will be allowed to enter work areas before obtaining approval from security.
- Loading areas will be designed appropriately to prevent/minimize vehicle/pedestrian contact and property damages.
- All operators will be licensed/certified for the type of vehicle being driven and will undergo medical surveillance.
- Repair and maintenance of vehicles will be done by the authorized bodies.
- Changes in the condition of the roads will be monitored regularly, and road improvement works will be carried out, when necessary,

- Fatigue and distraction procedures will be established considering the local legal requirements and the nature of the work.
- Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanisms. Collaboration with local communities and responsible authorities will be ensured to improve signage, visibility, and road safety conditions, especially near the roads and other locations where children may be present.
- In SEP of the Project, these information-sharing methods and schedules will be defined.

Emission of Particulate Matter

- In order to minimize the particulate matter emission that will occur within the scope of the Project:
- The transportation routes to be used will be watered regularly with water sprinklers,
- The removal and laying operations of the materials will be carried out without tossing as much as possible.
- Measures defined in Chapter 7.X of the ESIA Report and Pollution Prevention Plan will be followed.

Emission of Noise

- All machines to be used under normal operating conditions will not run simultaneously,
- Monthly and annual maintenance of machinery and equipment will be done periodically,
- Measures defined in Chapter 7.X of the ESIA Report and Pollution Prevention Plan will be followed.
- Quality spare parts and lubrication products will be used.

Increase of Population Influx

Considering the expected population influx and the insufficient infrastructure system in some of the settlements in the AoI identified in the socioeconomic baseline, mitigation measures have been defined to prevent the pressure and negative impact on infrastructure and services caused by the population influx, especially during the construction phase. Certain negative impacts related to the population influx due to the Project on infrastructure and services are as follows:

- The inability of vulnerable groups to equally access social and health services due to supply-demand imbalance,
- Population influx due to the Project intensifying health services and decreasing the quality of service,
- Delays in responding to emergencies on time,
- The emergence of inadequacies due to increased demand for drugs and medical needs.

Risk of Increasing Communicable Diseases and Waste

The population increase may lead increase in communicable and infectious diseases in the Project Area of Influence. The following are the essential control measures to be implemented to avoid the spread of communicable diseases:

- Pre-employment health screening and regular medical checks of workers per Turkish regulatory requirements,
- Regular cleaning principles to be applied in the Project site,
- Community Health and Safety Management Plan should be implemented for the Project that includes medical surveillance,
- Awareness-raising on healthy lifestyles for workers and community-level training.

Waste Management

- All waste or excess material that may be remained due to the activities in the Project area will be disposed of under laws and regulations.
- Measures defined in Chapter 7.1.3 of the ESIA Report and Waste Management Plan and Pollution Prevention Plan will be followed.

Employment of Security Personnel

A Security Management Plan have been prepared in line with the national (Private Security Services Law No: 5188, 2004) and international (e.g., IFC PS4) standards within the scope of the Project to manage the security-related impacts and ensure the security of the activities, assets, work premises at the Project and avoid potential impacts on workers and the local community. The following measures will be considered as a minimum regarding security arrangements:

- Security will be provided at the Project area by third-party company or in-house security personnel with no criminal histories or history of abuse,
- Security personnel will be trained adequately in their envisaged roles and responsibilities, the use of force (and, where applicable, firearms), and appropriate conduct toward workers and affected communities and the applicable law,
- Security patrols will be done at regular intervals,
- Entry of unauthorized persons will be prevented by using appropriate tools and gadgets. Warning signs about unauthorized entry will be available at various locations at the Project crossings,
- Entry and removal of equipment/material will be controlled at the control points; the movement of equipment/material will be allowed after the approval of the relevant department,
- A grievance mechanism will be in place for the affected communities to express their concerns about the security arrangements and acts of the security personnel,
- Relevant Project officials will continuously accompany the visitors during their stay on the Project site, and all visitors will be recorded,

- All visitors will be given brochures explaining the Project area, site rules and what to do in case of emergencies,
- Personal Protective Equipment will be provided to visitors coming to the Project site,
- All areas that may be dangerous to visitors will be locked,
- All areas that pose a danger at the Project area will be marked with appropriate signs.

7.2.6.1.3 Residual Impacts

The assessment of the potential impacts caused by the identified impact factors on the component for the construction phase of the Project is provided in the table below.

Table 7-72: Residual Impact Assessment Matrix for Community Health and Safety During Construction Phase.

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Increase in Traffic	Duration:	Short	Medium	Mid term	**Medium**	Medium high	**Low**
	Frequency:	Frequent					
	Geo. Extent:	Regional					
	Intensity:	Medium					
Emission of Particulate Matter	Duration:	Short	Medium	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of Noise	Duration:	Short	Medium	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Increase of Population influx	Duration:	Short	Medium-high	Short-mid-term	**Medium**	Medium high	**Low**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Risk of Communicable diseases	Duration:	Short	Medium	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Recurrent					
	Geo. Extent:	Local					
	Intensity:	Low					
Waste management	Duration:	Short	Medium	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Recurrent					
	Geo. Extent:	Local					
	Intensity:	Low					
Employment of Security Personnel	Duration:	Short	Medium	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Recurrent					
	Geo. Extent:	Local					
	Intensity:	Low					

7.2.6.1.4 Monitoring

Increase in Traffic

The following monitoring measures shall be implemented to assess the actual impacts of the Project on the traffic during the construction phase and to verify the effectiveness of the mitigation measures:

- Keeping a record of the number of traffic-related incidents involving contractor workers, subcontractor workers and external persons,
- Investigation of the incidents and accidents and use of lessons learned to improve traffic mitigations,
- Keeping a record of and tracking Training Records of Drivers and Training Records on Community Health and Safety,
- Following of the licenses and medical surveillance of the operators to ensure they are up to date,
- Closely monitoring compliance with speed limits to protect the health and safety of both community and employees,
- Changes in the condition of the roads will be monitored regularly, and road improvement works will be carried out, when necessary,
- Keeping a record of the number of total road closures caused by the Project activities,
- Controlling maintenance records of the vehicles to ensure regular maintenance activities take place,
- Weather forecast monitoring to ensure the safety of the operators,
- Keeping a record of and tracking the traffic accident/emergency response actions,
- Keeping a record of the number of grievances related to the traffic received and the percentage of grievances resolved positively,

Monitoring should be designed to identify the failure or ineffectiveness of mitigation measures in terms of road safety.

Emission of Particulate Matter

- Please See Air Quality Chapter of the report.

Emission of Noise

- Please see Noise Chapter of the report.

Increase of Population influx

- Community grievances registers by the grievance mechanism to be formed for the Project,
- Stakeholder Engagement and consultation registers and records by the Stakeholder Engagement Plan to be produced for the Project,
- Percentages of the local employees (which will be a performance indicator for ESMS to be prepared for the Project),

- Population figures of the settlements according to TURKSAT data

Risk of Communicable diseases

- Training records on community health and safety
- Records of communicable diseases

Waste management

- Licenses and permits of quarries and excavation material storage/recycling facilities will be recorded
- Waste management practices of the subcontractors will be monitored by means of document review (e.g., permits, waste recycling/disposal agreements) and visual checks at the work sites.

Employment of Security Personnel

- Training record to the security personnel

7.2.6.2 Operation Phase

7.2.6.2.1 Impact factors

The impact factors of the Project causing potential implications on community health and safety during the operation phase are presented in this section.

Table 7-73: Project actions and related impact factors potentially affecting community health and safety during operation phase

Project actions	Impact factors
Plant/infrastructure operation	Increase in traffic

Increase in Traffic

The expected traffic impact during the construction phase of the Project due to the construction activities is anticipated to be reduced during the operation phase.

7.2.6.2.2 Mitigation Measures

A Traffic Management Plan have been prepared within the scope of the Project to maintain traffic safety on the roads to be used and to prevent the risks which may outcome due to Project activities ensuring “safe site, safe vehicle and safe driver” at all times.

Following points will be considered as a minimum regarding traffic management:

- Referring to Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place:
    - to exchange information on the Project with the local community and other stakeholders; and
    - to record and respond any complaints and concerns raised by the local community members and other stakeholders.

- Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility.
- At all times vehicles will be kept on designated site roads where established. Off-road driving will not be permitted other than emergency situations, or if no roads have been established yet.
- Parking areas will be designated with signs and reverse parking will be implemented for emergency situations.
- The routes to be used by pedestrians will be segregated from vehicle routes where possible.
- The speed limits will be implemented.
- Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanism. Collaboration with local communities and responsible authorities will be ensured to improve signage, visibility, road safety conditions especially near the roads and other locations where children may be present.
- Appropriate traffic signs, signals, lights and markings will be placed at the required areas to prevent potential accidents/incidents. Barriers will be placed at the required areas to protect both human health and assets.

7.2.6.2.3 Residual Impacts

The assessment of the potential impacts caused by the identified impact factors on the component for the operation phase of the Project is provided in the table below.

Table 74: Residual impact assessment matrix for community health and safety during the operation phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Increase of traffic	Duration:	Very long	Medium-high	Short-term	**Low**	Medium high	**Negligible**
	Frequency:	Infrequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					

7.2.6.2.4 Monitoring

- The record of the number of traffic-related incidents involving contractor workers, subcontractor workers and external persons,
- The record of the number of full road closures caused by Project activities,
- The record of the number of grievances received and percentage of grievances resolved positively,
- The record Stakeholder engagements,
- Traffic accident /emergency response actions,
- Training Records of Drivers.

7.2.6.3 Decommissioning Phase

A new impact is not expected during the decommissioning and closure phase of the Project, other than those listed in the construction and operation phases. In order to prevent new impacts, the Project Site should be effectively and permanently blocked from all access to the public until the site can be converted into a new beneficial land use based on changed conditions at the site.

7.2.7 Human Rights Impact Assessment

Human rights are a set of principles and standards which seek to promote fundamental freedoms and human dignity. According to the Office of the United Nations High Commissioner for Human Rights (OHCHR)[14]:

> Human rights are rights inherent to all human beings, whatever our nationality, place of residence, sex, national or ethnic origin, color, religion, language, or any other status. We are all equally entitled to our human rights without discrimination. These rights are all interrelated, interdependent and indivisible. (Para. 1)

This Human Rights Impact Assessment (HRIA) study was prepared for the Project by WSP Türkiye and carried out to support requirements and Good Industry Practices (GIP) in line with the requirements of Equator Principles IV (dated July 2020).

An HRIA is an instrument for examining policies, legislation and programs to identify and measure their effects on human rights. Their fundamental purpose is to help prevent adverse effects and to maximize positive effects. As such, HRIAs are an indispensable part of making human rights considerations operational in a range of legal and policy contexts.

The HRIA is a study carried out to identify and inform management decisions and actions concerning anticipated human rights-related impacts and opportunities from the Project. The HRIA is part of the Project's commitment to fulfilling its Corporate Responsibility standards, which include respect for internationally recognized human rights and implementation of the United Nationals (UN) Guiding Principles on Business and Human Rights (2011).

The methodology for the HRIA was developed and refined to ensure that it complements the Environmental and Social Impact Assessment (ESIA) and the Stakeholder Engagement Plan (SEP). The ESIA and SEP cover parallel issues and are the primary studies for impact assessment concerning land and defined social rights.

The HRIA is described in international standards aimed at securing dignity and equality for everyone. The HRIA has considered the potential impacts of the Project, which are internationally recognized human rights, including those contained in relevant international standards that Türkiye has ratified, such as the European Convention on Human Rights, the International Bill of Human Rights – meaning the Universal Declaration of Human Rights, the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights and the principles concerning fundamental rights set out in the International Labour Organization's Declaration on Fundamental Principles and Rights at Work.

[14] https://bangkok.ohchr.org/what-are-human-rights/
https://www.ohchr.org/en/human-rights/universal-declaration/

7.2.7.1 Legal Framework for Human Rights

The ESIA provides in-depth legislative framework to be adopted by the Project for all types of activities (See Chapter 2 of the ESIA). This chapter analyses the national and international requirements (specifically IFC's PSs within the scope of human rights aspect to be followed throughout the Project lifespan.

As part of the ESIA studies, Project human rights impact assessment was held to identify the mitigation methods for the potential impacts on the local communities and Project direct and indirect workers in compliance with Equator Principles IV, specifically the following clause: "The client is expected to include assessments of potential adverse Human Rights impacts and climate change risks as part of the ESIA or other Assessment, with these included in the Assessment Documentation."

National Requirements

The Constitution of the Republic of Türkiye is the fundamental legal document guaranteeing respect to human rights as stated in Article 2 of Chapter II of the Constitution:

"The Republic of Türkiye is a democratic, secular and social state governed by rule of law, within the notions of public peace, national solidarity and justice, respecting human rights, loyal to the nationalism of Atatürk, and based on the fundamental tenets set forth in the preamble."

The following national legislation and international conventional will be applicable to the Project:

- Constitution of the Republic of Türkiye
- The Law on the Human Rights and Equality Institution of Türkiye (TIHEK) (Law No. 6701, 2016)
- Labour Law (Law No. 4857, 2003) and related regulations
- Occupational Health and Safety Law (Law No. 6331, 2012) and related regulations
- Regulation on the Implementation of the Law Concerning Private Security Services

International Requirements

The following international standards will be applicable to the Project:

- International Labour Organization (ILO) conventions ratified by Türkiye
- Equator Principles 4 (2020)
- IFC Performance Standards (2012)
- The UN Guiding Principles (UNGPs) on Business and Human Rights by the UN Human Rights Council (2011)
- Guidance Note on Implementation of Human Rights Assessments under EPs (2020)
- The International Bill of Human Rights
- International Labour Organization's Declaration on Fundamental Principles and Rights at Work
- IFC Good Practice Note on Managing Contractors' E&S Performance (2017)
- IFC Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)

- IFC/European Bank for Reconstruction and Development (EBRD) Worker's Accommodation: Processes and Standards (2009)
- IFC Handbook for Addressing Project-Induced In-Migration (2009)
- IFC Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)
- IFC Introduction to Health Impact Assessment (2009)
- IFC Stakeholder Engagement Handbook: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)
- World Group Bank (WBG) General and Sector Specific Environmental, Health and Safety (EHS) Guidelines (2007)

Project Standards

- Social Impact and Human Rights Policy
- HR Policy
- Human Rights Management Plan

Human Rights Context of Türkiye

Human rights in Türkiye are protected by various international regulations, conventions treaties in addition to the national legislation. The issue of human rights became high importance during the negotiations with the European Union (EU). To prevent adverse impacts on human rights, an action plan for human rights in Türkiye was prepared by Ministry of Justice in March 2021. This plan aims that:

- **A stronger system for protection of human rights:** The Action Plan seeks to ensure the installation of a strong and accessible human rights protection system that is capable of producing results with a view to ensuring the stability of the rule of law with all of its components.
- **Strengthening judicial independence and the right to a fair trial:** The most basic feature of a fair trial is the reasoning of a decision. It is an indispensable principle for a person to know and understand which decision they are subjected to and for what reason.
- **Legal foreseeability and transparency:** When an application is submitted with an administration against one of its acts, it has to provide the individuals with a speedy and satisfactory reply; the bureaucratic red tape needs to be shortened and the cost of an act that is unlawful due to reasons originating from the part of the administration should not be placed on the individuals.
- **Protection and promotion of the freedoms of expression, association, and religion:** The Action Plan further resumes the determination to preserve and improve the diversity and pluralism originating from the common history, culture and civilization of our nation.
- **Strengthening personal liberty and security:** The Action Plan envisages certain activities aimed at ensuring application of detention as an exceptional preventative measure. In this connection, it primarily seeks to strengthen the rights of objection and defense in case of detention.

- **Safeguarding the physical and moral integrity and the private life of the individual:** Protecting the honor and dignity of individuals as their physical and moral integrity and enabling them to live as respectable citizens in the society, are the most important reasons for the existence of the State.
- **A more effective protection of the right to property:** The Action Plan addresses the inviolability of the right to property in a tone that also reminds the administration of this fact. Having the support of the political will for strengthening the right to property, the Plan also proposes solutions to the problems stemming from the practice.
- **Protecting vulnerable groups and strengthening social wealth:** Another concept that continuously develops within the human rights discipline is the rights of the youth. In addition, it is aimed to protect and strengthen human rights regarding areas such as healthy and livable environment, public health, and informatics.
- **High-level administrative and social awareness on human rights:** By keeping the awareness on human rights at a high level, it is aimed to not only strengthen but also perpetuate the sensitivity at administrative and societal spheres towards rights and freedoms.

7.2.7.2 Methodology

The Human Rights impacts of the Project may be various, and they vary according to the context, type, and scale of the Project. The content shall be tailored to the local conditions and the nature and characteristics of the Project and shall address potential risks and impacts in at least the following areas:

- **Civil and Political Rights**
  - Freedom of thought and opinion
  - Right to information
- **Labour Rights**
  - Working conditions and working hours
  - Wages
  - Non-discrimination
  - Right to form and join trade unions and the right to strike
  - Right not to be subjected to slavery, servitude or forced labour
  - Right to abstain from work
  - Right of protection for the children
  - Right to social security, including social insurance
  - Labour standards in supply chains
  - Migrant workers
  - Women employment

  - Grievance Mechanism
- **Social rights**
  - Right to an adequate standard of living and housing
  - Right to health, food, water and sanitation
  - Right to take part in cultural life
- **Vulnerability**
  - The rights of minorities
- **Community health and safety**
  - Environmental issues
  - Security issues

The **impact factors** identified during the analysis of the Project and through the definition of the Project phases and Project actions are assessed in their relevance, using a scoring system. The impact factors consist of **Duration (D)**, **Frequency (F), Geographic extent (G),** and **Intensity (I),** which are assessed in detail in Chapter 5 of ESIA Report. The following risk classification is used in the human rights impact assessment for the pre-mitigation conditions. With the implementation of the proposed mitigation measures, the risks of the human rights aspects are reduced.

Definition	Risk Classification
Human rights violation is in place and no mitigation measure can be applicable.	High
Potential risks are in place for workers and external stakeholders but can be mitigated with appropriate control measures.	Medium
The risks are in place for workers and external stakeholders at minimal level in general and can be further mitigated with additional control measures.	Low

7.2.7.3 Project Human Rights Assessment

Human rights impacts are primarily influenced by the local human rights context and the nature of a project's specific activities. In order to be consistent with the UN Guiding Principles, the full range of human rights impacts needs to be considered, including those caused or contributed to by the Project, cumulative impacts, and those directly linked to the Project, e.g., through business relationships. An adverse human rights impact occurs when an action removes or reduces the ability of an individual to realize their human rights. As articulated by the UN Guiding Principles on Business and Human Rights (2011), the human rights due diligence process focuses companies on identifying and addressing adverse impacts, which is the main focus of this Human Rights Impact Assessment. It is important to note that potential issue areas typically considered in ESIA are similar to that key to human rights, such as livelihood and labour, community health and safety, resettlement, gender, and vulnerability.

This study has been conducted to determine the levels of human rights risks and potential mitigation measures pertinent to the Project. Table 75 is formed to assess the Project-specific human rights context and determine the level of risk in terms of human rights.

Table 75: Human Rights Assessment

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
Human Resource							
Working conditions and working hours	The Turkish Labour Law sets rules for starting and ending of an employment relationship. Employment starts with an employment contract. The employment contract is not subject to any special form unless the contrary is stipulated by the Law. Workers are free to terminate their working contracts following the advance notice periods, and without an advance notice in situations of just cause identified by Labour Law Article 24. Wages may be paid in cash on a monthly basis, or more, but no less frequently. According to Labour Law Article 41, overtime work requires the employee's consent.	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	Medium	Medium	The Project will implement human resource policies and procedures in compliance with the IFC PS-2 on Labour and Working Conditions. Such policies are expected to provide more predictable employment opportunities for direct and indirect employees. A Human Resources Policy and Human Rights Management Plan will be established and implemented. The copies of relevant human resources policy and any collective agreements will be readily available to workers. Formal, and transparent recruitment process will be implemented to provide equal opportunity to the applicants. The employees will be provided with a written contract. The contracts as a minimum will include information on terms and conditions of employment, including the period of	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	It is planned to employ 368 people during the construction phase of the Project and 23 people during the operation phase. It is projected that among 368 people to be worked during construction period, 82 of the employees will be skilled, 100 of the employees will be semiskilled and 186 of the employees will be unskilled. Where possible workforce is being sourced from local communities during the Project construction phase. National requirements, ILO Conventions ratified by Türkiye and IFC PS2 will be applied both direct and contractor workers. Working hours will be planned in compliance with the Labour Law. Construction working hours are planned to be 8 hours/day and operation working hours are planned to					employment, wages, hours of work, overtime arrangements, procedures for termination of the contract and any benefits. The contract will be in the native language of the employee, and it will be clear and understandable to the employee. A copy of contract will be given to the employee. The Project will enhance local employment and referential employment will be given to qualified local people. Hiring preference criteria will priorities settlements directly affected by the current activities of the Project. Equal tender process will be applied. Before the procurement, local suppliers will be identified and if required. Capacity development will be applied including the OHS and HR. Necessary measures will be ensured for the safety and health protection of workers, including prevention of occupational risks and provision of information and training, as	

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	be in 3 shifts of 8 hours each. A large proportion (approximately 300 workers, mostly unskilled and semiskilled) of the workforce will be accommodated in the construction camp that is under construction as of June 2023. The camp is located inside the Project site. The rest (approximately 68 workers, skilled) will be accommodated in rental houses and hotels in in Bor District and Niğde Province.					well as provision of the necessary organization and means and shall ensure that these measures are adjusted taking account of changing circumstances and aim to improve existing situations. Project specific Camp Site Management Plan will be prepared and implemented within the scope of the Project in line with the IFC/EBRD's Guidance Note on Worker's Accommodation, 2009.	
Wages	The Labour Law (Law No. 4857, 2003) includes provisions on wages, their renumeration and payment conditions and stipulates that with the object of regulating the economic and social conditions of all employees working under an employment contract, either covered or uncovered	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	Medium	Medium	Payroll records of the direct and indirect workers will be controlled by Kalyon strictly. The contracts of the workers will include the information regarding to salary and annual increase. All workers will be paid equal for equal jobs.	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	by the Law, the minimum limits of wages shall be determined every two years at the latest by the related Ministry.						
Non-discrimination	Labour Law: Article 5 of the Labour Law of Türkiye regulates the ban of discrimination in employment. According to that article ‘no discrimination based on language, race, sex, gender, political opinion, philosophical belief, and religion or similar reasons is permissible in the employment relationship. The same article also serves as a base for the principle of equal pay for equal value of work by stating that “differential remuneration for similar jobs or for work of equal value is not permissible.”	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	High Medium	Medium	Human Rights Management Plan will be prepared and implemented. Equality of treatment and prohibition harassment in the workplace, commitment on continual improvement, consultation and participation of workers will be promoted. Employment decisions, such as recruitment, dismissal, promotion, will be transparent and will not be made (directly or indirectly) on the basis of personal characteristics such as sex, race, nationality, etc., but rather on the ability to do the job. The Client will ensure all forms of discrimination is prohibited by the Subcontractors and the Client itself.	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
Right to form and join trade unions and the right to strike	Unions and Collective Agreements Law No. 6356 (dated on 07.11.2012, Official Gazette No. 28460) ensures the rights of the workers to join the union and right to strike.	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Regional Intensity: Medium	Medium	Medium High	In case of the absence of the unions, workers representatives should be elected, and periodical meetings will be held with the representatives. Worker representatives should be elected by the workers themselves. The employer shall consult workers or representatives authorized by trade unions in enterprises with more than two workers' representatives or workers' representatives themselves in the absence of trade union representative to ensure the consultation and participation of workers. These measures will be implemented by the Subcontractors as well and monitoring will be done by the Client.	Low
Right not to be subjected to slavery, servitude or forced labour	Turkish Constitution: Article 18 of the Constitution states that “No one can be forced to work. Slavery is prohibited.” Employers are not allowed to take deposits of money	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	Medium	Medium High	Shift schedule of the direct and indirect workers will be strictly monitored and the annual overtime working hours will not extend 275 hours. In compliance with the article 44 of the Labour Law employee’s consent	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	from workers and retain ID Cards. However, in construction projects carried out in Türkiye, it can often be seen that overtime exceeds local standards due to the signing of a fixed-term work contract and the high turnover of employees due to the nature of the projects. In addition, work on the national day and public holidays can be required.					will be taken into consideration during the arrangements of the work on national day and public holidays. The issue of whether or not work will be done on the national day and public holidays will be decided by the collective agreement or by employment contracts. The employee's consent is required if there is no provision in the collective agreement or in employment contracts. There will not be forced labour and employees will be free to terminate their employment in accordance with national law.	
Right to abstain from work	According to Occupational Health and Safety Law No. 6331, workers have the right to leave their workstation in the event of serious, imminent and unavoidable danger.	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	Medium	Medium	In the event of serious, imminent, and unavoidable danger; workers shall leave their workstation or dangerous area and proceed to a place safety. Workers may not be placed at any disadvantage because of their action.	Low
Right of protection for the children	Labour Law No. 4857, Article 71 states that employment of children who have not reached the age of 15	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	Medium	Medium High	The minimum working age will be 18 for all direct and indirect workers. Subcontractor monitoring system will be established	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	is prohibited. However, children who have reached the age of 14 and have completed their primary education may be employed in light labour that will not hinder their physical, mental or moral development. For those who continue their education, they may only work jobs that will not prevent their school attendance.					by Kalyon to ensure that all subcontractors comply with work age limits.	
Right to social security, including social insurance	Social Insurance and General Health Insurance Act No. 5510 of 31 May 2006 determines the rights of beneficiaries and provides for general rules for the functioning of the insurance system and funding conditions. Also contains provisions on employers and workplaces, short-term and long-term insurances. All direct and indirect workers will have right	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Regional Intensity: Medium	High	Medium High	Social insurance payments of all direct and indirect workers will be strictly controlled by Kalyon. Awareness meetings will be held with the Project workers if required.	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	for social insurance and general health insurance; however, for the construction sector it is a common implementation to pay insurance on the minimum wage regardless to the salary which will create decrease on the pension payment.						
Migrant workers	During the social field study, it has been observed that, there are 3 Afghan households residing in the Seslikaya village and working as seasonal agricultural workers one of those families obtained certificate of naturalization as Turkish citizenship.	Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	Medium	Medium High	Considering OHS, working conditions and personnel rights, migrant workers will not be allowed to work unregistered in the field and monitoring studies will be carried out on this issue.	Low
Women employment	In 2021, the employment rate for women was 28% whereas it was 62.8% for men in Türkiye (TURKSTAT, 2023). In the construction sector, it is observed that female employees are	▪ Women in local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Regional Intensity: Medium	High	Medium High	Equal pay for equal work especially considerate of women employees will be implemented. The Project Company policy will not discriminate against women on the basis of their marital or reproductive status.	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	generally employed as OHS or service personnel.					Positive discrimination will be applied to female candidates during the recruitment process. Priority will be given to women if there are local procurement opportunities. The safety and needs of female staff in the Project site will be met at a high level.	
Grievance Mechanism	The fundamental legal base rights on the freedom and rights of the citizens with respect to communication, expression and dissemination of thought, and information request are guaranteed by the Constitution of the Republic of Türkiye. The Article of the Constitution on the Right of Petition, Right to Information and Appeal to Ombudsperson specifies that the citizens and foreigners resident in Türkiye, on the condition of observing	■ Local communities ■ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Low	Medium	Medium High	Project-specific Human Resources Policy and the Human Rights Management Plan will be implemented. The Worker Grievance mechanism will be established and implemented. Stakeholder Grievance Mechanism will be established and implemented. Grievance & Request Box and forms will be placed in accessible places such as mukhtars' offices for the use of local communities and all stakeholders. Grievance & Request Box and forms will be placed in accessible places at the Project site for the use of Project workers.	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	the principle of reciprocity, have the right to apply in writing to the competent authorities and to the Grand National Assembly of Türkiye with regard to the requests and complaints concerning themselves or the public. The Presidency's Communication Centre (CIMER) has been providing a centralized complaint system for Turkish citizens, legal persons and foreigners. CIMER will be available to Project stakeholders as an alternative and well-known channel for conveying their Project-related grievances and feedback directly to the state authorities. In addition, Project specific grievance mechanism both for the Project workers					All direct and indirect workers will be informed on the Project specific documents and the procedures including the grievance mechanism. An internal audit will be performed to monitor the performance of the subcontractors and the supply chain against the human rights aspects.	

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	and the stakeholders were prepared and will be implemented to raise the grievances and the feedbacks of the stakeholders.						
Labour standards in supply chains	The material needed for the construction activities, including bedding, padding, back filling and aggregate, concrete will be provided from companies in Bor district which have permits/licenses in accordance with national regulations. The origin of PV Panels is Türkiye (Kalyon PV) and will be transported by road. Polysilicon, raw material of PV panels, will be provided from Germany and United States of America. Transportation will be provided by road from Germany and by air	Workers in production in the supply chain	Duration: Short Frequency: Continuous Geo. Extent: International Intensity: Medium	Medium	Medium High	Kalyon will supply necessary products from companies/countries that comply with the international labour standards in which human rights violations are eliminated at the highest level. Supplier Management Plan which monitors the compliance with the international labour and human rights standards (IFC PS2) of the supply chain will be prepared and implemented. Kalyon will not meet Project’s material needs from suppliers where forced and child labour is being used. Kalyon will ensure the suppliers’ compliance with the codes of conduct for	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	from the United States of America. The origin of DC Combiner Box is India and will be transported by sea and road. The origin of Inverter Station is United Kingdom (Inverter) and Türkiye (Transformer and RMU), and the transportation method is by road. The origin of Substation and Switchyard is Türkiye and will be transported by road. The origin of Cable is Türkiye and will be transported by road.					suppliers based on international labour standards. All suppliers & vendors will have the responsibility to ensure the Kalyon Enerji's quality standards are achieved. This may include quality inspections by Kalyon Enerji, if deemed necessary.	
Socioeconomic and Cultural Context							
Freedom of thought and opinion	According to Article 25 of Constitution of Republic of Türkiye. Everyone has the right to freedom of thought and opinion. No one shall be compelled to reveal his thoughts and opinions for any reason or purpose,	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	Medium	Medium	A Stakeholder Engagement Plan and the Grievance mechanism will be established to provide stakeholders to express their thoughts and the opinions on the Project. Stakeholder Engagement Meetings will be inclusive (encouraging the participation of locals	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	nor shall anyone be blamed or accused on account of his thoughts and opinions.					including vulnerable groups such as women).	
Right to information	Law on the Right to Information No. 4982 (Issued on 24.10.2003, Official Gazette No. 25269) regulates the procedure and the basis of the right to information according to the principles of equality, impartiality and openness that are the necessities of a democratic and transparent government. Everyone has the right to information on the activities of public institutions and professional organizations, which qualify as public institutions.	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Regional Intensity: High	Medium	Medium	A Stakeholder Engagement Plan will be prepared for the Project and implemented in all phases of the Project. ESIA disclosure activities will be performed to inform all stakeholders of the Project impacts. During the construction and operation phases of the Project, all stakeholders will be informed about the status of the Project with various tools including the face-to-face meetings, project website, media.	Low
Right to an adequate standard of living and housing	According to the results of the social field study, there are locals who use the pastureland in the Seslikaya village for	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	High	Medium	Stakeholder Engagement Plan will be prepared and implemented. Grievance mechanism will be prepared and implemented.	Medium

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	animal grazing. These people are affected from the Project since the pastureland is under the land acquisition. In Türkiye, the acquisition and the expropriation process are held in compliance with the Pasture Regulation, which does not include the rights of the unofficial land users, vulnerable people and the livelihood restoration.					Community Development Plan will be implemented.	
Right to health, food, water and sanitation	Potential risks to local residents identified in the ESIA include traffic increase in construction, communicable diseases, construction related environmental impacts, increase resources, security aspects, etc.	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	High	Medium High	Traffic Management Plan will be prepared and implemented. Security Management Plan will be prepared and implemented. Community Health and Safety Management Plan will be prepared and implemented. Waste Management Plan will be prepared and implemented. The SPP construction area and all operational areas are to be regularly monitored for potential risks. In case of a	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
						grievance, additional measurements will be held, and the results will be shared with the local communities.	
Right to take part in cultural life	The main impact identified in the ESIA is population influx during the construction phase which may create social unrest and gender-based violence.	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	High	Medium High	Influx Management Plan will be prepared and implemented. Cultural awareness training will be provided to the workers who will be accommodated in the in the camps. Camp Site and Offsite Accommodation Management Plan and Security Management Plan will be prepared and implemented. In addition to the implementation of Stakeholder Grievance Mechanism, CLOs will have a continuous dialogue with the local communities so that if they have problems with the Project workers, it would be detected.	Low
Rights of minorities	It has been observed that there are 3 Afghan households residing in the Seslikaya village. The households living in	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Medium	High	Medium High	Cultural awareness training will be provided to the workers who will be accommodated in the in the camps.	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	the area for 10 to 15 years, so they had already formed relationships with the locals prior to the Project. During the construction phase of the Project, a workers' accommodation camp will be established in the Project site which may create impact on the daily life of the village.					Camp Site and Offsite Accommodation Management Plan and Security Management Plan will be prepared and implemented. CLOs will have a continuous dialogue with the local communities so that if they have problems with the Project workers, it would be detected. The minorities will be encouraged to effectively use the Stakeholder Grievance Mechanism.	
Environmental issues	The fundamental law in Turkish Environmental Legislation is the Environmental Law No. 2872 (Issued on 11.08.1983, Official Gazette No.18132, amended by Law No. 5491). According to Environmental Law, citizens, as well as the State, bear responsibility for the protection of the environment based on the "polluter pays" and "user pays" principles.	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: National Intensity: High	High	Medium High	Suitable and sufficient environmental management plans for waste, wastewater, noise and air quality will be established and implemented. A relationship with municipal environmental department will be established in advance and monitoring of air and noise will be done in accordance with local regulations. The SPP construction area and all operational areas are to be regularly monitored for environmental aspects. In	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	According to the Article 56 of Constitution of Republic of Türkiye Everyone has the right to live in a healthy, balanced environment. It is the duty of the state and citizens to improve the natural environment and to prevent environmental pollution. Since Türkiye is not a not party to the Aarhus and Espoo Conventions, there is no climate change legislation in place.					case of a grievance, additional measurements will be held, and the results will be shared with the local communities. Monitoring will be given high importance to ensure both Kalyon and Subcontractors comply with the international environmental and social standards. As indicated in the Contractor Management Plan of the Project, all employees including employees of contractors and subcontractors will receive general workplace orientation, site-specific workplace orientation and comprehensive training that includes environmental and social awareness and compliance training to be aligned with Project ESIA and ESMS. The training will be conducted at predefined intervals and during daily toolboxes.	
Security issues	During the construction phase of the Project, armed and/or unarmed private security	▪ Local communities ▪ Project workers	Duration: Short Frequency: Continuous Geo. Extent: Local Intensity: Low	Medium	Medium High	Before the construction, local communities will be informed about the risks of the entering the construction sites.	Low

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Effectiveness	Mitigation Measures	Risk Categorization
	personnel will be needed on the site and especially during the access to the pastureland which may create social tension between the security personnel and the local communities.					Security personnel will patrol the site area to prevent any unauthorized access onto the site. Security Management Plan will be established and implemented by Kalyon, outlining expectations around security. Conflict Management Training will be provided to armed security personnel. The grievance mechanism for the Project will capture all grievances raised in relation to security and safety issues. These will be addressed promptly, and actions will be taken.	

7.2.7.4 Human Rights Management Plan of the Project

All subcontractors will be informed about the Human Rights Management Plan of the Project and this policy will be put in the visible locations of the Project site. The plan will include the following topics at minimum:

- Incorporate respect for human rights into management, governance practices and programs as defined in the International Bill of Human Rights and the International Labour Organization's Declaration on Fundamental Principles and Rights at Work,
- Contractors, suppliers and business partners to share this commitment to human rights, including those in regard to working conditions, freedom of association, freedom of speech, collective bargaining, maximum working hours, fair wages and benefits, equal opportunity and freedom from discrimination,
- Not discriminate against any individual based on race, color, national or ethnic origin, religion, age, sex, sexual orientation, sexual minorities, religious minorities, ethnic minorities, gender identity or expression, marital status, family status, pregnancy, disability status, genetic characteristics or any other arbitrary characteristic unrelated to the individual's job performance,
- Promote diversity at all levels of the Project,
- Enhance employment, supply chain, training and community investment programmes to advance the socio-economic empowerment of women in local communities, and eliminate barriers to the advancement and fair treatment of women in workplaces,
- Respect the collective and customary rights of local communities residing near the Project construction and operation areas and ensure consultation with all relevant stakeholders is taken,
- Subscribe to the principle of informed consent when working on private land,
- Strive for continuous improvement in upholding and respecting human rights through ongoing dialogue with internal and external stakeholders,
- Continue to not engage in all forms of child labour, forced labour and modern slavery for all activities engaged and across the entire supply chain,
- When working with public or private security forces, implement a human rights and security approach consistent with the Voluntary Principles on Security and Human Rights,
- Establish confidential mechanisms to identify, receive and respond to human rights and ethical concerns from any stakeholder and in a neutral manner,
- Continually review and evaluate changing human rights conditions in the jurisdictions.
- Take action to terminate any contracts or arrangements with the contractors and suppliers if their practices and performance conflict with the requirements of the Human Rights Management Plan.

7.2.7.5 Key Performance Indicators and Monitoring

The stage of monitoring and evaluation involves subjecting the HRIA itself to assessment in order to determine the extent to which it has met its objectives and is acceptable to stakeholders. This step will also examine the extent to which the duty-bearers have incorporated the recommendations of the HRIAs during the implementation of the policy intervention and enables information-gathering about the actual impacts of the policy intervention.

Activity	Steps	Areas For Further Attention and Considerations	Frequency	Responsibility
Reporting	Share the main findings and lessons learnt of the process with the stakeholders and ensure that their views are adequately reflected in the report. Discuss possible mitigation measures and ensure these reflect preferred mitigations measures of the stakeholders. Manage expectations of the stakeholders regarding the report to avoid disappointment and frustration. Ensure that the report is available in appropriate language and shared with the stakeholders in an accessible manner, through websites, posters, leaflet etc. Ensure that the impact management plan adopted by the Project Company/Contractors is communicated to the stakeholders.	Consider using other means of engaging with the stakeholders on the HRIA report, i.e., through media such as visual aids, orally or through participatory exercises, tailored specifically to engage with the stakeholders. Consider holding separate meetings for specific groups of stakeholders to ensure that they have the opportunity to express themselves on the recommended mitigation measures. Given the extensive time it could take, set a reasonable deadline for receiving comments on the HRIA report from the stakeholders.	Biannual	▪ Kalyon Enerji ▪ Subcontractors
Supplier Social Responsibility and Labour Standards	In line with the EBRD PR2, eliminate risks related to social and labour issues, including human rights violations, forced labour, child labour, unsafe working conditions, and discrimination. The Supply Chain of the Project is provided in Chapter 1-5 of the ESIA and Table 75. Kalyon will supply necessary products from companies/countries that comply with the international labour standards in which	Ensuring supply chain's compliance with international labour standards and promoting fair labour practices. Evaluating the HSE, Quality, System, Legal and Compliance performance of the suppliers/service providers.	Continuous	▪ Kalyon Enerji

Activity	Steps	Areas For Further Attention and Considerations	Frequency	Responsibility
	human rights violations are eliminated at the highest level.			
Engagement Activities	Support the establishment of participatory monitoring mechanisms to allow the stakeholders to be continuously engaged in the follow-up to the report. Suggest regular meetings are held between the Project Company and the stakeholders.	To request ongoing feedback on impacts of the Project from the stakeholders, e.g., through internal and external grievance mechanisms. To publicly report on progress made on the implementation of the mitigation measures in an ongoing manner.	Continuous	▪ Kalyon Enerji ▪ Subcontractors
Internal and External Grievance Mechanisms	Implement Project-specific grievance mechanism both for Project workers and local communities. Encourage stakeholders' effective participation in the grievance mechanism. Provide tools in accessible places for stakeholders to raise grievances and requests.	Grievance registration and closing rates to be monitored regularly. Grievance closing percentage target/term target to be determined.	Continuous	▪ Kalyon Enerji ▪ Subcontractors

Monitoring should answer the following questions:

- What mitigating measures have been adopted by the duty-bearers to mitigate any adverse effect foreseen by the HRIA?
- Has any human rights risk and impact that the HRIA foresaw materialized? If so, who were the relevant affected stakeholders? Have the relevant duty-bearers taken measures to mitigate the adverse effects of those risks?
- Have there been major human rights risks and impacts unforeseen by the HRIA? If so, who were the relevant affected stakeholders?
- Suppose some substantial change of the policy intervention occurred after the HRIA was produced (e.g., replication of the policy in another area of the country, a major expansion of the Project, etc.). Have the relevant duty-bearers considered the recommendations of the HRIA when undertaking those changes?
- Have there been recurring grievances related to the policy intervention? If so, who were the relevant affected stakeholders?

The Human Rights Compliance Assessment[15] (HRCA), developed by the Danish Institute for Human Rights and designed to help companies detect potential human rights violations caused by the effect of their operations, runs on a database of over 350 questions and 1.000 corresponding human rights indicators, which were developed from over 80 human rights treaties and conventions. To monitor Project's compliance from a human rights perspective, HRCA can be used as a mentor to create indicators to follow up Project's activities for monitoring purposes.

Also, *Project-level community grievance mechanisms can provide helpful information to inform the monitoring of impact management measures.*

7.2.8 Cultural Heritage

Based on the information collected for the definition of the baseline (see Ch 6.2.10), the physical component *Cultural Heritage* was assigned a **Low** value of sensitivity. The sensitivity of the Project component has been assessed low for the following reasons:

- Absence of archaeological heritage in the AoI

7.2.8.1 Construction phase

7.2.8.1.1 Impact factors

The impact factors from the Project activities potentially affecting cultural heritage during construction phase are listed in Table 7-76**.**

Table 7-76: Project actions and related impact factors potentially affecting cultural heritage during construction phase

Project actions	Impact factors
General engineering/construction works	Removal of soil

Impacts potentially affecting this component are assessed here below for the construction phase.

- **Removal of Soil**

The impacts on cultural heritage may occur during the construction of the Project components especially during removal of soil. Removal of soil will be realized during; earthworks (excavation, filling) to create the surface over which the Project will be constructed, trenching activities for cable laying and excavation works for the foundations of buildings (e.g., control building). Since there are no surface cultural heritage assets, chance finds may be encountered during the excavation works and trenching activities.

7.2.8.1.2 Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- Cultural Heritage Management Plan and Chance Find Procedure, which are necessary for the management of the "chance finds", prepared in compliance with the project organization will be implemented. All operators, who are to be engaged in the soil works, and project workers should receive training related to "project requirements, protection of cultural and archaeological heritage, laws and legislations related with the archaeological and cultural heritage and cultural heritage management plan and chance find procedures".

[15] https://www.humanrights.dk/tools/human-rights-indicators-business

- In case any chance find is encountered during the construction activities, the further steps should be taken in accordance with the plans and procedures and the relevant bodies, and the Directorate of the Museum will be notified immediately. In cases where any find or information associated with archaeological potential of the site is already discovered, relevant instructions about the sensitivity of the site will be shared with all construction teams a few days before the construction activities. The construction activities will be conducted with appropriate equipment and methods. The appropriate equipment will be identified together with the directorate of the museum and the construction teams.
- Protection of site: chance find should not be moved, removed or further disturbed
- In particular, all operators and Project workers assigned to land preparation works should receive training on project requirements, protection of cultural and archaeological heritage, laws and regulations regarding archaeological and cultural heritage, Cultural Heritage Management Plan and Chance Find Procedure.

7.2.8.1.3 Residual impacts

The table below summarizes the impacts caused by the identified impact factors on the component assessed.

Based on the baseline conditions of the assessed component, the project characteristics and actions, as well as the proper implementation of the mitigation measures proposed above, a potential **negligible** is expected on the cultural heritage during the construction phase.

Table 7-77: Residual impact assessment matrix for the cultural heritage during construction phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Removal of Soil	Duration:	Short	Low	Short-mid-term	**Negligible**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Project Site					
	Intensity:	Low					

7.2.8.1.4 Monitoring measures

During construction phase of the Project, excavated areas should be monitored in case of chance finds.

7.2.8.2 Operation Phase

Considering the nature of the Project no impacts are expected on the cultural heritage component during the operation phase.

7.2.8.3 Decommissioning and Closure Phase

The impacts during the decommissioning phase are likely to be similar to the construction phase hence the activities will be similar to construction activities.

7.2.9 Visual Aesthetics

Based on the information collected for the definition of the baseline (see Ch 6.2.10), the physical component *Cultural Heritage* was assigned a **Medium-Low** value of sensitivity. The AoI is considered to be sensitive for the following reasons:

- Presence of two settlements within 2 km of Project Area.
- Absence of areas of touristic interest within the visual zone of visual influence.
- Presence of roads and volume of traffic within the visual zone of visual influence.

Methodology

- The first step of the visual impact assessment is to determine sensitive receptors and baseline conditions.
- The closest settlements to the Project components and some associated facilities were taken into account in identification of the sensitive receptors. During the field trip, sensitive receptors where access is not difficult and is possible were visited and baseline photos were taken. However, some parts of the railway line and some associated facilities could not be accessed due to unsafe road conditions at the time of site visit.
- After the determination of the viewpoints (i.e., sensitive receptors), sensitivity levels of these receptors have been determined. Sensitivity levels of the viewpoints were defined considering (i) the area of the Project components that can be visible; (ii) the number of sensitive receptors (including settlements and people around the Project Area and common areas such as school, mosque, astro pitch etc.).
- Then, impact factors of the project footprint have been determined for the construction and operation phases and impact matrix for each phase has been prepared.

Sensitive Receptors

Sensitive receptors are defined in Section 6.2.11.

7.2.9.1 Construction Phase

7.2.9.1.1 Impact factors

The impact factors from the Project activities potentially affecting visual impacts during construction phase are listed in Table 7-78.

Table 7-78: Project actions and related impact factors potentially affecting visual impact during construction phase

Project actions	Impact factors
General engineering/construction works;	Emission of particulate matter Introduction of buildings/infrastructures Emission of light

During construction works, construction machinery will be introduced to the site and dust emissions will be of concern. On the other hand, temporary and permanent structures will also be constructed during this phase of the project. During construction phase it is also expected to have light emissions around the project area. Construction vehicles, dust, and equipment will have visual impacts on viewers and general visibility (clarity of air) in the immediate vicinity of the construction site. Visual impacts during construction will be temporary.

7.2.9.1.2 Mitigation Measures

There are no industry standards or best practice guidance regarding with landscape mitigation and management within the scope of the national legislation. The proposed mitigation measures associated with the Project comprises of professional judgement.

- After the completion of construction, the areas used as construction area will be returned to their original use.
- During the construction phase, restricted hours of working will be proposed especially for built up areas. Using machinery during those hours should be avoided in residential properties.
- The housekeeping of the entire Project Area will be given importance throughout the life of the Project.
- To minimize light spillage from the site, every effort should be made to minimize the number of lights consistent with health and safety standards. In a similar way, all lights should be shielded and as much as possible pointed to the ground to avoid direct light effects on sensitive receptors around the Project Area.
- Regular monitoring of the affected people's grievances with regard to visual impacts. For this, the external grievance mechanism should be implemented properly, and all stakeholders should have access to this mechanism.
- Implementation of dust suppression during construction.

7.2.9.1.3 Residual Impacts

The residual impact following the above-mentioned mitigation measures during the construction phase is presented in the following table (Table 7-79). Based on the baseline conditions of the assessed components, the Project characteristics, and actions, as well as the proper implementation of the mitigation measures proposed above, **negligible negative impact** is expected on visual impact during the construction phase.

Table 7-79: Impact Assessment Matrix for Visual Impact During Construction Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Emission of particulate matter	Duration:	Short	Low	Short-term	**Negligible**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					
Introduction of buildings/infrastructures	Duration:	Short	Medium-low	Short-mid-term	**Low**	Medium	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Low					
Emission of light	Duration:	Short	Medium-low	Short-term	**Negligible**	Medium high	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					

7.2.9.1.4 Monitoring

Monitoring of visual impacts includes monitoring of community and stakeholders. Related grievances will be recorded and dealt with via the Grievance Mechanism, within the Project's Stakeholder Engagement Plan, continuously in construction and operation phases.

The Client will be responsible for periodically monitoring the visual and aesthetic condition of the Project facilities. Monitoring will generally be conducted during construction, routine operations and maintenance of the Project facilities. Qualified staff will visually assess the aesthetic condition of these facilities using accepted visual and aesthetic standards and take appropriate actions in consultation with the contractors or upper management if needed.

7.2.9.2 Operation Phase

7.2.9.2.1 Impact factors

The impact factors from the Project activities potentially affecting visual impacts during operation phase are listed in Table 7-80.

Table 7-80: Project actions and related impact factors potentially affecting visual impact during operation phase

Project actions	Impact factors
Plant/infrastructure operation	Introduction of buildings/infrastructures

During operation phase, permanent structures and solar panels will be present in the Project Area. The PV panels have impacts on visual aesthetics in terms of glint and glare impacts.

The glint effect is also defined as a right-angle reflection. It is formed as a result of direct reflection of sunlight on the surface of PV solar panels. Glare effect is instantaneous bright light, creating a strobe effect, which is generally perceived by medium-speed and fast-moving receivers. The glare effect is not unique to solar panels but is also seen on glass building facades.

The glare effect is defined as the continuous and excessive glint effect. Although this effect is not a direct reflection of sunlight, it occurs as a result of the reflection of the bright sky around the sun. The intensity of the glare effect is lower than the glint effect, and it is perceived by immobile receivers.

The study, "General Design Procedures for Airport-Based Solar Photovoltaic Systems[16]", conducted for the design of the solar photovoltaic systems for the airport-based solar photovoltaic systems reveals that, "*The reflection off a solar PV panel from most near normal angles is less than 3% and represents no risk to air traffic. The reflections off of the PV panel surface were found to be pretty stable until the tilt reached glancing angles, from where it started to increase substantially. This is akin to the behavior of light reflecting from a still source of water such as a pond. The refractive index of still water is 1.33 and the front glass of solar PV modules are made of standard soda lime glass, which has a refractive index of 1.50–1.52. It would thus be expected that for a given angle reflection from a PV front glass surface without any antireflecting coating is less intense than that of water. With the current progress in solar module technology and development in anti-reflection materials such as materials with an index of refraction of 1.05, it is safe to assume that solar PV module will have reflection off their surface dropped further with future technologies. However, even today with the refractive index off PV with anti-reflective coating dropping below 1.33 to 1.20–1.30, PV poses no (or presents tolerable/safe) hazards from*

[16] Anurag, Zhang, Gwamuri, Pearce, "General Design Procedures for Airport-Based Solar Photovoltaic Systems" , 2017

reflection for airport solar PV projects. It is clear that modern PV have less intense reflectivity than still surface water."

Anti-reflective is a type of coating applied to glass that is used to increase the efficiency of photovoltaic (PV) modules used in solar panels. Solar panels are designed to absorb the maximum amount of energy from sunlight. For this reason, reducing reflection is important both to increase energy efficiency and to protect public health and safety.

Anti-reflective glass coating reduces reflections on the glass surface, allowing more sunlight to be absorbed on the glass. This allows the photovoltaic cells to absorb lighter and consequently generate more electricity. Anti-reflective coating improves the efficiency of PV modules by reducing reflection on glass surfaces.

These coatings improve the optical properties of the glass by reducing reflections on the surface while increasing the transmission of sunlight, allowing glare from the glass to be reduced.

In addition, depending on the anti-reflective glass used, the coating applied can make the solar panels more resistant to outdoor conditions and provide an easy surface for cleaning. AR coated glass exhibiting hydrophobic behavior can contribute to the self-cleaning properties of the glass by preventing dust and dirt from adhering to the surface, which shades the light.

Anti-reflective coatings are usually applied to the glass surface using thin film layers or chemical vapor deposition (CVD) method.

In this project, SiO_2 coating will be used. Silica is the most widely used ARC coating material in solar panels. This coating reduces reflections by applying a thin layer of silica on the front surface of the solar panel. The coated solar panels to be used in this project:

- Anti-Reflection Coated (ARC) Glass minimizes reflection at the glass/air interface without affecting the excellent adhesion between the glass and the interlayer used for laminating photovoltaic modules.
- Low iron soda lime tempered glass used in mass production has a porous SiO_2 single layer anti-reflective coating.
- The single-sided AR coating increases the light transmittance by at least 2%.
- The silica coating also contributes to the solar panel to be more resistant to outdoor conditions. Silica extends the life of the panel by protecting the glass surface against scratches, chemical effects and weather conditions.

7.2.9.2.2 Mitigation Measures

There are no industry standards or best practice guidance regarding with landscape mitigation and management within the scope of the national legislation. The proposed mitigation measures associated with the Project comprises of professional judgement.

- The housekeeping of the entire Project Area will be given importance throughout the life of the Project.
- To minimize light spillage from the site, every effort should be made to minimize the number of lights consistent with health and safety standards. In a similar way, all lights should be shielded and as much as possible pointed to the ground to avoid direct light effects on sensitive receptors around the Project Area.

- Regular monitoring of the affected people's grievances with regard to visual impacts. For this, the external grievance mechanism should be implemented properly, and all stakeholders should have access to this mechanism.

7.2.9.2.3 Residual Impacts

The residual impact after the application of the above-mentioned mitigation measures during the operation phase is presented in the following table (Table 7-81).

Table 7-81: Impact Assessment Matrix for Visual Impact During Operation Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Introduction of buildings/infrastruc tures	Duration:	Long	Medium-low	Short-term	**Negligible**	Medium	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Low					

7.2.9.2.4 Monitoring

Monitoring of visual impacts includes monitoring of community and stakeholders. Related grievances will be recorded and dealt with via the Grievance Mechanism, within the Project's Stakeholder Engagement Plan, continuously in construction and operation phases.

Project Company will be responsible for periodically monitoring the visual and aesthetic condition of the Project facilities. Monitoring will generally be conducted during construction, routine operations and maintenance of the Project facilities. Qualified staff will visually assess the aesthetic condition of these facilities using accepted visual and aesthetic standards and take appropriate actions in consultation with the contractors or upper management if needed.

7.2.9.3 Decommissioning Phase

The decommissioning phase will have similar impacts to the construction and operation phases, so the activities will be the same. The same considerations described for this component during the construction phase would be applicable to the decommissioning phase.

In general, decommissioning activities would comprise the removal of the plants and the associated facilities. Also, the structures' foundations would be removed. The site is expected to be restored for future use. Decommissioning of infrastructure could have a **positive impact** if the natural state of the land is recovered.

7.3 Biological Components

The AoI is situated in an area characterized by balanced coexistence of Natural Habitats (53%) and Modified Habitats (47%). The Natural Habitats are entirely constituted EUNIS habitat "E6.2 - Continental Inland Salt Steppes", while the Modified Habitats are partly represented by rural industrial and commercial sites and partly by mixed crops. No Critical Habitats (CHs) were identified within the AoI, as assessed in Section 6.4.

- Although no flora or fauna species triggering or potentially triggering Critical Habitat were identified within the AoI, a list of "species of conservation concern" was defined by considering the flora and fauna species classified as Near Threatened (NT), Vulnerable (VU), Endangered (EN), or Critically Endangered (CR) at a global or regional level according to IUCN Red List of Threatened Species[17], and by also considering the locally or regionally endemic species present or potentially present within the AoI. Here is a summary of the identified "species of conservation concern":
- 3 flora species, including 2 species regionally classified as Vulnerable (*Gypsophila oblanceolata* and *Petrosimonia triandra*) and 1 species regionally classified as Near Threatened (*Onopordum davisii*). In addition, *Gypsophila oblanceolata* and *Onopordum davisii* are regionally endemic species;
- 1 reptile species, classified as Vulnerable (*Testudo graeca*);
- 8 bird species, including 3 species classified as Near Threatened (*Aegypius monachus*, *Circus macrourus* and *Vanellus vanellus*), 2 species classified as Vulnerable (*Aquila heliaca* and *Otis tarda*), and 3 species classified as Endangered (*Aquila nipalensis*, *Falco cherrug* and *Neophron percnopterus*);
- 6 mammal species, including 4 species classified as Near Threatened (*Barbastella barbastellus*, *Mesocricetus brandti*, *Miniopterus pallidus* and *Spermophilus xanthoprymnus*) and 1 species classified as Vulnerable (*Vormela peregusna*), while the Anatolian Vole (*Microtus anatolicus*) was identified as a species restricted to Turkey, with a distributional range restricted to central and southwest Anatolia.
- The Project AoI falls within the boundaries of the Ereğli Plain Key Biodiversity Area (KBA) and Important Bird Area (IBA). However, this site has been highly degraded by water abstraction and anthropic activities to the point that the area where the Project AoI is located does not support suitable habitats for the bird species identified as IBA trigger.

The sensitivity of the biodiversity component is considered to be **Medium-high** based on the characteristics summarized above.

In the present chapter potential direct and indirect impacts are considered for biodiversity features and according to their characteristics. The impact assessment for biodiversity follows the semi-quantitative method described in the ESIA Methodology in Chapter 5.0, which is very briefly summarized again here. An impact value for an impact factor affecting a biodiversity feature is calculated by summing scores for impact criteria, such as duration and intensity, and multiplying by the sensitivity of the biodiversity feature. The sensitivity scale is given in the IA Methodology Chapter and Sensitivity rankings have been provided above.

Project actions, resulting direct and indirect impact factors and biodiversity components potentially affected have been outlined in previous chapters and are explored more below. Impacts on general biodiversity, including flora fauna and habitats, are assessed in section 7.3.1 for the construction phase, in section 7.3.2 for the operation phase, and in section 7.3.3 for the decommissioning and closure phase.

Avoidance, mitigation and rehabilitation are proposed in this section according to the mitigation hierarchy principle. Monitoring measures are also proposed.

[17] The International Union for the Conservation of Nature Red List of Threatened Species – Source: https://www.iucnredlist.org/

7.3.1 Construction Phase

7.3.1.1 Impact factors

The impact factor from the Project activities potentially affecting biodiversity components during construction phase is listed in Table 7-14.

Table 7-82: Project Actions and Related Impact Factors During Construction Phase

Project actions	Impact factors
General engineering/construction works	Vegetation disturbance Emission of noise Emission of particulate matter Increase of vehicular traffic Accidental introduction and dispersal of alien species
Material transportation	Emission of noise Emission of particulate matter Increase of vehicular traffic
Material storage	Emission of particulate matter Increase of vehicular traffic

- For construction the Project footprint was considered including the areas covered by the photovoltaic (PV) panels, the permanent facilities (e.g., inverter stations, substation, administrative buildings, internal roads, etc.) and the temporary facilities (i.e., campsite and administrative building). All the impact factors above identified are described and discussed in the following assessment.

<u>Vegetation disturbance</u>

Construction activities will cause vegetation disturbance, with direct habitat loss, at least within the areas of construction of permanent and temporary facilities. In comparison, the areas where the PV panels will be arranged will experience a reduced vegetation and soil disturbance. On the contrary, the entire Project Site will be impacted by the passage of heavy machinery transporting the construction material, equipment, workers, waste, and other material. Since the Project Site is adjacent to an existing road, thus no additional access roads will be created.

Flora species present in the areas of construction of the facilities will be directly impacted by vegetation disturbance during construction works. In addition, the disturbance of vegetation will determine the destruction of suitable habitats for fauna species that use the vegetation present as food or shelter. Local fauna – and in particular the identified reptile species of conservation concern (*Testudo graeca*) and the identified mammal species of conservation concern (*Barbastella barbastellus*, *Mesocricetus brandti*, *Microtus anatolicus*, *Miniopterus pallidus*, *Spermophilus xanthoprymnus*, and *Vormela peregusna*) – could be directly impacted by the vegetation and soil disturbance activities performed during site preparation. Species characterized by low mobility (such as reptiles) may not be able to move ahead of construction. Species with a hiding strategy to escape predators might also be accidentally killed during the construction operations.

- **<u>Emission of noise</u>**

The emission of noise is expected to be of medium-high intensity during the construction phase. Construction activities such as surface levelling, transport, and temporary stockpiling of material such as the PV panels are expected to generate noise.

The emission of noise could cause indirect habitat degradation due to temporary avoidance of surrounding areas by sensitive fauna species. Noise shows its greatest effects on wildlife species which heavily rely on auditory signals for survival, therefore especially on birds and mammals. Disturbance from anthropogenic noise, for example, is known to be correlated with reduced densities of breeding birds (Reijnen et al., 1995[18]; Canaday & Rivadeneyra, 2001[19]). Anthropogenic noise is demonstrated to cause severe decreases in species richness and abundances also for insect and amphibian species (Penone et al., 2012[20]; Clauzel et al., 2013[21]). The effects of noise disturbance from human activity on wildlife are mostly perceived over short distances in a species-specific way (up to ~ 300 m, Reijnen et al., 1995[18]; Canaday and Rivadeneyra, 2001[19]). Therefore, using a precautionary approach, a 300 m buffer is considered around Project footprint during construction.

During the construction phase, most fauna species may temporarily avoid construction areas and their immediate vicinities and, according to Helldin et al. (2013[22]), this behaviour is mainly due to the increase in human activity. An impact could be expected especially during the breeding period of birds and mammals, which may be frightened by noise and might abandon their nest/mating ground.

- **Emission of particulate matter**

Construction activities such as surface levelling, temporary stockpiling of resulting material, transportation of soil and construction materials, construction of the facilities, and realization of the pavement, along with the simple crossing of heavy trucks, are expected to generate pollutants, dust and particular matter emissions.

Dust from construction activity could affect the surrounding vegetation and habitats due to the continuous and significant dust deposition. In particular, dust emissions could impact vegetation by covering leaf surface and through impacts on soil composition and structure (Farmer A.M., 1993[23]). Dust can block stomata on the leaf surface, affect photosynthesis, respiration, transpiration, and may cause leaf injury symptoms. As a result, the productivity of plants can decline. With the consequent reduction in vegetation growth, abundance and species loss.

A clear guideline value to protect vegetation from dust is not available. Airborne soil dust is typically coarse and therefore remains airborne only for short periods. United States Environmental Protection Agency (US EPA) research shows that 90% of total airborne dust returns to the earth's surface within 100 m of the emission source and over 98% within 250 m. However, under strong wind conditions, these effects could extend further.

Fauna species that depend on those habitats for food and shelter can also be indirectly affected by the habitat degradation due to dust emission in the atmosphere and its consequent deposition with the reduction of habitat suitability for terrestrial wildlife. Also, direct effects to fauna species could be through inhalation or ingestion of vegetation or soil particles.

Due to the dispersion of dust and particulate matter, which is considered highly frequent and of low intensity, the impacts are focused on and around the Project footprint, involving a geographic extent defined as local (within a 100 m buffer). The reversibility from this impact factor is considered as short/mid-term.

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[18] Reijnen M.J.S.M., Veenbaas G. & Foppen R. (1995). Predicting the effects of motorway traffic on breeding bird populations. Wageningen, IBN-DLO, 1998, 92 pp.

[19] Canaday C. & Rivadeneyra J. (2001). Initial effects of a petroleum operation on Amazonian birds: Terrestrial insectivores retreat. Biodiversity and Conservation. 10. 567-595. 10.1023/A:1016651827287.

[20] Penone C., Kerbiriou C., Julien J., Julliard R., Machon N. & Le Viol I. (2013). Urbanisation effect on Orthoptera: Which scale matters?. Insect Conservation and Diversity. 6. 319–327. 10.1111/j.1752-4598.2012.00217.x.

[21] Clauzel C., Girardet X. & Foltête J. (2013). Impact assessment of a high-speed railway line on species distribution: Application to the European tree frog (*Hyla arborea*) in Franche-Comté. Journal of environmental management. 127C. 125-134. 10.1016/j.jenvman.2013.04.018.

[22] Helldin J., Collinder P., Bengtsson D., Karlberg A. & Askling J. (2013). Assessment of traffic noise impact in important bird sites in Sweden - A practical method for the regional scale. Oecologia Australis. 17. 48-62. 10.4257/oeco.2013.1701.05.

[23] Farmer A. M., The effects of dust on vegetation — a review. (1993). Environmental Pollution, Volume 79, Issue 1, 1993, Pages 63-75, ISSN 0269-7491, https://doi.org/10.1016/0269-7491(93)90179-R. (https://www.sciencedirect.com/science/article/pii/026974919390179R)

Increase of vehicular traffic

During construction, an increase in vehicular traffic is expected within the Project footprint and in the access roads, due to the necessity of transportation of construction material, equipment, workers, waste, and other material. Increased vehicular traffic may result in direct mortality for fauna species and indirect habitat degradation. Accidental collisions with wildlife and related road kills can have a significant impact on some wildlife populations, in particular for low-mobility species, such as the identified reptile species of conservation concern (Testudo graeca) and the identified small mammal species of conservation concern (Mesocricetus brandti, Microtus anatolicus, Spermophilus xanthoprymnus, and Vormela peregusna). Animals could be attracted to roads for a variety of reasons, and traffic can have an important influence on wildlife species, their behaviour responses, and their distribution, thus on the use of space by local populations (Jacobson et al., 201624). For example, an increase in vehicular traffic could impact reptiles and other ectotherms, which use the roads to bask in the sun. Vultures, crows, foxes and other scavengers seek out roadkill and often become roadkill themselves.

- **Accidental introduction and dispersal of alien species**

Removal of natural vegetation cover and soil disturbance could facilitate the spreading of alien (non-native) and/or invasive species, accidentally introduced by cars, trucks and other heavy machinery usen during construction. Invasive alien species tend to have an advantage in disturbed ecosystems (Rejmanek & Richardson, 2013[25]), and, if they penetrate into a habitat, they can potentially change its functionality and species composition, including priority biodiversity species (Chornesky & Randall, 2003[26]). For example, the alteration in flora species community could be of particular risk for the regional endemic flora species, which were identified within the AoI by the local expert Prof. Dr. Hayri Duman during the field survey performed on the 1st of June 2023. These species are *Gypsophila oblanceolata*, *Onopordum davisii* and *Petrosimonia triandra*.

Local fauna that depends on the ecosystems impacted by invasive species could also be indirectly affected. The natural habitats within and around the Project footprint could experience a decrease in biodiversity, with a consequent trivialization (potential appearance of more dominant species) of the ecosystem.

For these reasons, using a precautionary approach, a 100 m buffer around the Project facilities is considered for this impact factor.

Habitat loss and degradation will be the most significant impact deriving from vegetation and soil disturbance. Although no clearing of natural vegetation is planned to be performed, it can be assumed that possible vegetation disturbance due to construction activities (e.g., movement of vehicles, material and workers) will negatively affect the entire Project footprint and, potentially, although with lower intensity, the entire AoI.

Vegetation and flora species, in particular the three flora species identified as species of conservation concern (*Gypsophila oblanceolata*, *Onopordum davisii*, and *Petrosimonia triandra*) will be affected at the same time by several of the above-described impact factors, first of all by vegetation and soil disturbance.

[24] Jacobson S., Bliss-Ketchum L., de Rivera C. & Smith W. (2016). A behavior-based framework for assessing barrier effects to wildlife from vehicle traffic volume. Ecosphere. 7. 1-15. 10.1002/ecs2.1345.

[25] Rejmanek M. & Richardson D. (2013). Plant Invasions and Invasibility of Plant Communities. Vegetation Ecology: Second Edition. 10.1002/9781118452592.ch13.

[26] Chornesky E. & Randall J. (2003). The Threat of Invasive Alien Species to Biological Diversity: Setting a Future Course. Annals of the Missouri Botanical Garden. 90. 67. 10.2307/3298527.

Fauna species of conservation concern sensitive to these construction impacts will be the ones characterized by a low-mobility and/or the ones whose ecological requirements are strongly connected to the soil, in particular among the species of conservation concern Common, Tortoise (*Testudo graeca*, VU), the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT). Bird species are considered to be less affected by the construction phase due to the higher mobility and the fact that the AoI could be considered only as a potential feeding/hunting ground for these species and not as a nesting site.

The effects of the potential impact factors on biodiversity, and in particular on natural habitats, are quantified and discussed below. The direct impacts on Natural and Modified habitats were assessed within the Project footprint, while the indirect impacts were assessed within a buffer of 100 m from the borders of the Project footprint and within a buffer of 300 m from the borders of the Project footprint. The areas potentially impacted are represented in Figure 7-7 and their numerical estimation is presented in Table 7-83.

Direct impacts related to vegetation disturbance will impact 15% of the total AoI. The direct impacts will be concentrated on continental inland salt steppes (E6.2 EUNIS habitat type). Since this is the only natural habitat present in the AoI, direct impacts on natural habitats will be entirely concentrated on it and they will affect 28% of this habitat within the AoI (i.e., 201.52 ha). The Project is adjacent to an existing road and no construction of other access roads is planned; therefore, further habitat destruction/degradation is expected to be minimized.

Indirect impacts in the 100 m buffer deriving from construction, such as introduction of invasive alien species, could impact a total of 7% of the AoI. Indirect impacts from construction in the 100 m buffer will be mainly on continental inland salt steppes (E6.2, 51.24 ha) and on rural industrial and commercial sites (J2.3, 34.31 ha).

Indirect impacts in the 300 m buffer deriving from construction, such as emission of noise, could impact a total of 21% of the AoI. Indirect impacts within the 300 m buffer will be mainly on continental inland salt steppes (E6.2, 131.93 ha) and on rural industrial and commercial sites (J2.3, 111.47 ha).

Table 7-83: Direct and Indirect Impacts on EUNIS Habitats calculated within the AoI for the Construction Phase

EUNIS Habitat Type	Total AoI	Footprint impact		Impact on 100 m buffer		Impact on 300 m buffer	
	ha	ha	%	ha	%	ha	%
Natural habitat							
E6.2 - Continental Inland Salt Steppes	725.03	201.52	28	51.24	7	131.93	18
Subtotal	*725.03*	*201.52*	*28*	*51.24*	*7*	*131.93*	*18*
Modified habitat							
I1.2 - Mixed Crops of Market Gardens and Horticulture	267.94	-	0	5	2	43.63	16
J2.1 - Scattered Residential Buildings	3.10	-	0	-	0	1.12	36
J2.3 - Rural Industrial and Commercial Sites Still in Active Use	377.32	-	0	34.31	9	111.47	30
Subtotal	*648.37*	-	*0*	*38.84*	*6*	*156.21*	*24*
Total	***1,373.40***	***201.52***	***15***	***90.08***	***7***	***288.15***	***21***

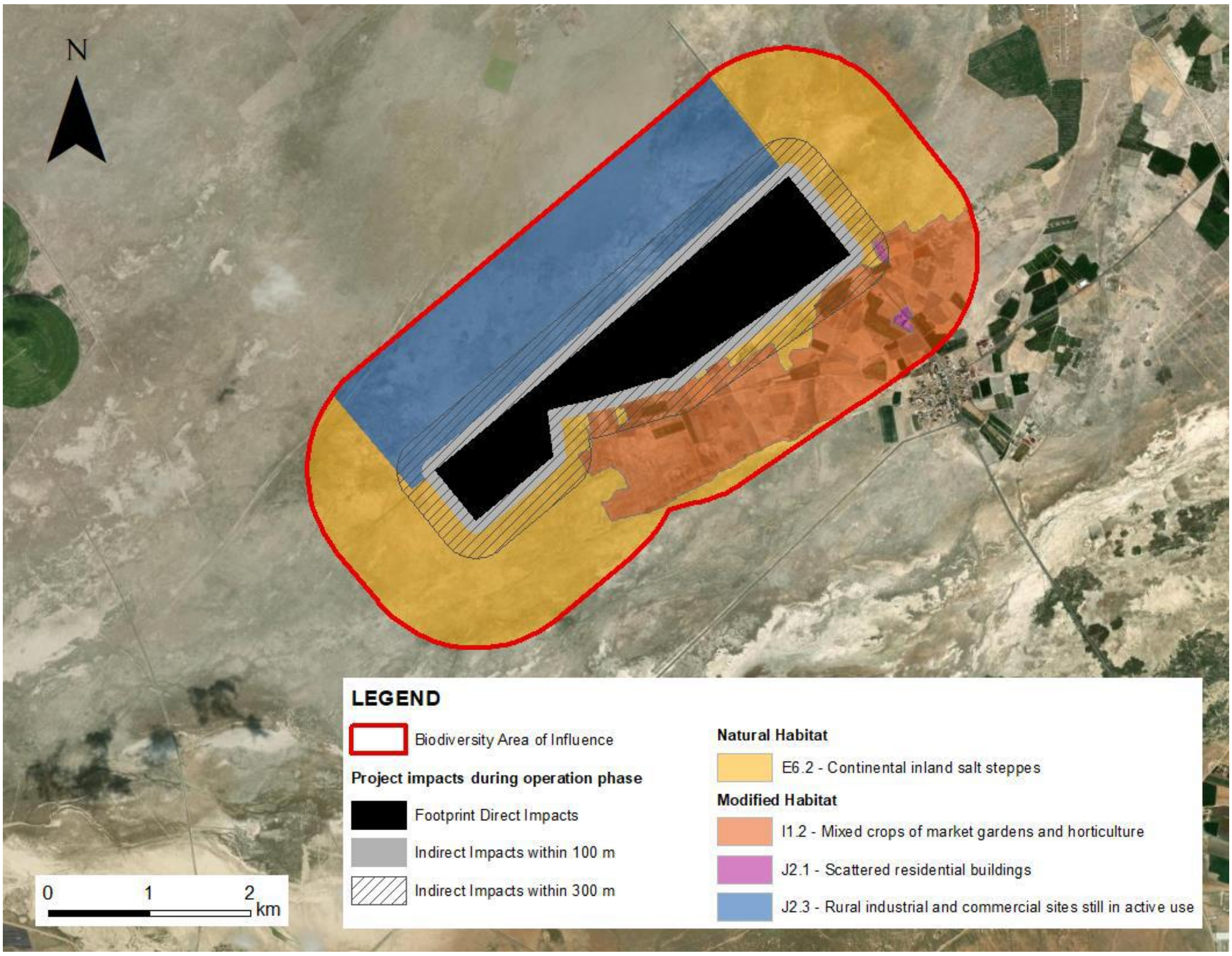

Figure 7-7: Map of the Construction Impacts on EUNIS Habitats within the AoI

7.3.1.2 Mitigation Measures

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

- **Avoidance**

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

  - minimisation of the footprint of individual facilities;
  - utilization of the existing modified habitat for placement of temporary facilities was prioritized as much as possible.

- **Minimization**

1) vegetation disturbance:

  - limiting natural vegetation disturbance to the minimum necessary during construction works. For this purpose, limits of temporary and permanent facilities will be clearly signed in order to reduce the risk of footprint creep;

- in order to minimize the mortality of wildlife species, biological surveys (pre-construction surveys) will be implemented to identify and eventually relocate fauna species. An expert wildlife ecologist will perform pre-construction surveys in the areas where temporary and permanent facilities will be located (not earlier than 7 days before). The survey will focus on fauna species with limited mobility (e.g., mammals and reptiles) that cannot move ahead of construction. If any of these species are observed, they will be collected by the ecologist and translocated to undisturbed but similar sites within the AoI.
  - Reptiles will be caught and moved to a suitable receptor site, no smaller than the capture site and containing the same habitat characteristics and prey availability, at a minimum distance of 50 m from the Project footprint during construction phase. If essential works are required in winter, when tortoise are hibernating, then the works area should be checked carefully for hibernation burrows. If a reptile is found during such works and it is hibernating, it should be carefully moved to an alternative part of the site that will remain undisturbed. If this is not possible, then the animal should be taken in to care until it can be released on site, the following spring.
  - The monitoring of the activity of the small mammal species identified as species of conservation concern, in particular of the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT) will be performed, through the use of endoscopic cameras located within their burrows. If any living specimen is observed and essential works that involve breaking ground are required in the areas where burrows are present, a gradual increase of the level of disturbance over a few days (at least 4 consecutive days) will be implemented, in order to allow for the animal to autonomously leave the burrow before it is fully excavated (e.g., day 1 machinery and equipment bought to the working area, day 2 manual excavation, day 3 mechanical excavation in the vicinity of the borrow).
- vehicle movement will be restricted to the Project Site and the existing roads that connect the construction sites with the surrounding areas. Off road driving will be prohibited in order to avoid any unnecessary disturbance of natural vegetation.

2) emission of noise:

- night works will be avoided (from 8 pm to 6 am) to reduce impacts on nocturnal fauna species;
- limiting the number and the speed of vehicle movements along the existing access roads.

3) emission of particulate matter:

- Dust deriving from construction material handling will be minimized by using covers and/or control equipment (water suppression, bag house, or cyclone) and increasing the moisture content by water spraying.
- Speed limit for all vehicles will be implemented so as not to generate dust emissions, and all trucks will be properly maintained at all times.
- Internal roads will be adequately compacted, maintained, and sprayed with water if needed, to minimize dust from vehicle movements. If water spraying is deemed insufficient, other means of surface treatment (e.g., hygroscopic media, such as calcium chloride, and soil natural–chemical binding agents) for unpaved internal roads will be implemented, by using a sprinkler system or a "water-mist cannon".

4) increase of traffic:

- install speed limits and animal crossing signs on the access roads.
- avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife.

- if fauna species are encountered employees and contractors will wait until it moves on by itself or they will ask the assistance of the Environmental technician for its safe removal and relocation in a suitable environment.
- awareness among employees and contractors working on site about the protected species/habitats potentially present in the area will be developed, in order to ensure constant monitoring and promote actions to be taken if wildlife is encountered.

5) accidental introduction and spreading of alien species:

- the use of non-native flora species, and especially of species classified as invasive alien species must be avoided during rehabilitation/restoration works.
- if the spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.

- **Rehabilitation/Restoration**

Areas cleared during construction for temporary use will be restored, as soon as possible, with the goal of producing a stable vegetative cover to minimize erosion, dust deposition and spreading of invasive alien species, and the aim of re-establish the original habitat with a positive impact on biodiversity.

Only plants that are native to the region will be used for restoration and habitat rehabilitation. Seeding and planting of grass and shrub species typical of the local flora will be implemented to ensure optimal ground cover. The use of autochthonous adult plants and/or of seeds collected at the shortest distance possible from the restoration sites will be of fundamental importance in order to maximise the success of the translocation operations (Abeli & Dixon, 2016[27]).

7.3.1.3 Residual Impacts

Considering the application of the above-mentioned mitigation" measures, the impact on biodiversity components is presented in Table 7-84 and it is expected to be **Medium.**

- The main residual impact on natural habitats could derive from vegetation disturbance and introduction and spreading of alien species, with consequent modification and possible impoverishment of the original plant species community.
- In order to monitor these impacts, monitoring measures are suggested in the following section.
-

Table 7-84: Residual Impact Assessment Matrix for Biodiversity Component during Construction Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features - Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Vegetation disturbance	Duration:	Medium	Medium-high	Long term	**High**	Medium	**Medium**
	Frequency:	Frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Emission of noise	Duration:	Medium	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					

[27] Abeli T. & Dixon K. (2016). Translocation ecology: the role of ecological sciences in plant translocation. Plant Ecology. 217. 10.1007/s11258-016-0575-z.

	Intensity:	High					
Emission of dust	Duration:	Medium	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Increase in vehicular traffic	Duration:	Medium	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Moderately frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Accidental introduction and dispersal of alien species	Duration:	Medium	Medium-high	Long term	**High**	Medium-high	**Low**
	Frequency:	Sporadic					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.3.1.4 Monitoring

The following monitoring activities are foreseen in natural habitats to ensure the implementation and effectiveness of the proposed mitigation measures:

- presence and spreading of invasive flora species within and around the construction site will be monitored at least twice a year during the vegetative season by an expert botanist. If necessary, extirpation campaign will be put in place in order to avoid the spreading of the invasive species.
- Observations of fauna species, and in particular of the identified reptile species of conservation concern (*Testudo graeca*) and of the identified terrestrial mammal species of conservation concern (*Mesocricetus brandti*, *Microtus anatolicus*, *Spermophilus xanthoprymnus*, and *Vormela peregusna*), within and around the AoI, shall be registered also with photographic documentation and signalled to the HSE responsible on site.
- accidents involving wildlife or the observation of live animal or carcasses along the access road or on the construction site will be recorded. Additional mitigation measures to discourage wildlife presence on site and avoid roadkill will be taken if needed.
-

7.3.2 Operation Phase

7.3.2.1 Impact factors

The impact factor from the Project activities potentially affecting biodiversity components during operation phase is listed in Table 7-85.

Table 7-85: Project Actions and Related Impact Factors During Operation Phase

Project actions	Impact factors
General engineering/construction works	Presence of permanent infrastructures Emission of noise Emission of light Accidental introduction and dispersal of alien species

- For operation phase, direct impacts deriving from the Project were assessed on two different types of Project footprint, the first corresponding to the areas covered by the photovoltaic panels and the second corresponding to the areas occupied by permanent facilities (e.g., inverter stations, substation, administrative buildings, internal roads, etc.). Temporary facilities (i.e., campsite and administrative building) were excluded from this assessment, as they will be rehabilitated after the construction phase. All the impact factors above identified are described and discussed in the following assessment.

- **Presence of permanent infrastructures**

The presence of permanent infrastructures (e.g., , inverter stations, substation, administrative buildings, internal roads, etc.) will cause a loss of available natural habitat during the entire operation phase, that will directly and indirectly affect habitats, flora, and fauna species. The habitat loss is calculated in Table 7-86. Habitat loss will not affect temporary facilities (i.e., campsite and administrative building), as they will be rehabilitated after the construction phase and during the operation phase.

Flora and vegetation are expected to at least partially recover during the operation phase, due to rehabilitation of the temporary facilities, but also in the areas under the PV panels. An appropriate long-term management and restoration plan should be implemented, and adequate monitoring surveys should be planned to verify the effectiveness of the restoration activities.

Another impact could be represented by the reflection of sunlight operated by the photovoltaic panels, which could attract aquatic insects and possibly birds, since these species could confuse the surface of the panels with the reflective surface of waterbodies. These sources of reflected polarized light can become ecological traps associated with reproductive failure and mortality in organisms that are attracted to them and by extension with rapid population declines or collapse, particularly for insects which lay eggs in water (Horvath *et al.*, 2010[28]).

However, literature shows that the construction of Solar Power Plants (SPPs) in desertic and steppe areas, which are often chosen because of their insolation rates and subsequent great potential for producing solar power, could determine positive effects for biodiversity, in terms of increased plant diversity and increased plant biomass (Bai *et al.*, 2022[29]; Graham *et al.*, 2021[30]; Hassanpour *et al.*, 2018[31]). The positive effects derive primarily from the shade offered by the PV panels, which determines a decrease in temperature and in increase in soil moisture in the areas under the panels, but also in the areas close to the panels. Indeed, these areas could receive shade from the panels only partially throughout the day, but biodiversity in these areas could anyway experience beneficial effects (Tanner *et al.*, 2020[32]).For these reasons, it will be important to restore the areas cleared during construction and to plan a long-term monitoring in order to assess the success of the restoration activities, which are expected to produce positive effects on local flora, fauna and habitats.

- **Emission of noise**

[28] Horvath G., Blahó M., Egri A., Kriska G., Seres, I., Robertson B. (2010). Reducing the Maladaptive Attractiveness of Solar Panels to Polarotactic Insects. Conservation biology : the journal of the Society for Conservation Biology. 24. 1644-53. 10.1111/j.1523-1739.2010.01518.x.

[29] Bai Z., Jia A., Bai Z., Qu S., Zhang M., Kong L., Sun R., Wang M. (2022). Photovoltaic panels have altered grassland plant biodiversity and soil microbial diversity. Front Microbiol. 2022 Dec 15;13:1065899. doi: 10.3389/fmicb.2022.1065899. PMID: 36590393; PMCID: PMC9797687.

[30] Graham M., Ates S., Melathopoulos A., Moldenke A., DeBano S., Best L. and Higgins C. (2021). Partial shading by solar panels delays bloom, increases floral abundance during the late-season for pollinators in a dryland, agrivoltaic ecosystem. Scientific Reports. 11. 7452. 10.1038/s41598-021-86756-4.

[31] Hassanpour E., Selker J. and Higgins C. (2018). Remarkable agrivoltaic influence on soil moisture, micrometeorology and water-use efficiency. PLOS ONE. 13. e0203256. 10.1371/journal.pone.0203256.

[32] Tanner K. E., K. A. Moore-O'Leary, I. M. Parker, B. M. Pavlik, and R. R. Hernandez. (2020). Simulated solar panels create altered microhabitats in desert landforms. Ecosphere 11(4):e03089. 10.1002/ecs2.3089.

While solar panels are largely silent, the permanent infrastructures around the SPP (i.e., tracking motors, inverters, high voltage transformers, energy storage devices) could generate noise (Kaliski *et al.*, 2020[33]). However, high levels of noise are attested only for larger commercial photovoltaic projects and noise levels up to 60 dBA do not result in negative or adverse responses to animals.

In general, fauna disturbance due to the emission of noise connected to the operation phase is expected to be minimal compared to the construction phase. In addition, fauna species are expected to habituate to the disturbance deriving from operation and maintenance activities.

Using a precautionary approach, a 300 m buffer around the footprint is considered for this impact factor.

- **Emission of light**

During operation phase, this impact factor will derive from the presence of external flashlights arranged in order to illuminate the areas surrounding some permanent facilities. Based on current information, a total number of 176 external flashlights will be located within the Project Footprint. The lamps selected will have a power of approximately 123 W, an efficiency up to 147 lm/W and a color temperature of approximately 5000 K.

Lights can have an attracting effect on night-flying wildlife, which would result being attracted towards the permanent infrastructures, with subsequent risk of collision and/or of unexpected encountering with workers. In addition, ecological light pollution can affect fauna species foraging and their reproductive behaviour, biological clocks, predator-prey interactions, movement and dispersal patterns, community structure, and interactions among and within species (Longcore & Rich, 2004[34]).

Effects are likely species-specific, based on the role ambient light plays in physiology and behaviour, and might also depend on the type of lighting used. The taxa that are more likely to be affected by light pollution are bats, nocturnal birds, and insects. Bats, depending on the species, are either attracted to lights by the presence of insects or they avoid lighted areas. Species of reptiles, amphibians, birds, bats and spiders have been shown to wait around artificial lights for prey.

Artificial lighting increases the foraging efficiency of many bat species, but it might simultaneously increase their risk of being predated. Voigt *et al.* (2018[35]) highlighted a response of migratory bats towards light that was dependent on light colour. Artificial lighting can also negatively affect nocturnal and migratory bird species (Rich & Longcore, 2006[36]). Nocturnal migratory species may be disorientated and attracted by the sky glow during the night. Fixed white lights attract more individuals than flashing or coloured ones. Insects are not only attracted to lights, but they are also more susceptible to predation around lighted areas. Artificial lighting might also undermine the evasive and defensive tactics normally used by insects.

- **Accidental introduction and dispersal of alien species**

Ongoing maintenance activities during construction could facilitate the arrival and spread of high-competitive invasive alien plant species, in addition alien species established during the construction phase, without proper measures, could further spread taking advantage of the novel environmental conditions, determined by the modified shade and water runoff regimes imposed by panels (Tanner *et al.*, 2020[32]).

Invasive alien species can potentially change functionality of ecosystems and composition of plant species community, including priority biodiversity species (Chornesky & Randall, 2003[26]). The alteration in flora species

[33] Kaliski K., Old I., Duncan E. (2020). An overview of sound from commercial photovoltaic facilities. NOISE-CON 2020, On-Line Conference, Week of November 16, 2020.

[34] Longcore T. &Rich C. (2004). Ecological light pollution. Front. Ecol. Environ. 2004; 2[4]: 191– 198.

[35] Voigt C., Rehnig K., Lindecke O., Pētersons G. (2018). Migratory bats are attracted by red light but not by warm-white light: Implications for the protection of nocturnal migrants. Ecology and Evolution. 8. 10.1002/ece3.4400.

[36] Rich C. & Longcore T. (2006). Ecological Consequences of Artificial Night Lighting. Island Press Washington, DC.

community could be of particular risk for the regional endemic flora species, which were identified within the AoI by the local expert Prof. Dr. Hayri Duman during the field survey performed on the 1st of June 2023. These species are the following: *Gypsophila oblanceolata*, *Onopordum davisii* and *Petrosimonia triandra*.

The implementation of an appropriate management and rehabilitation plan will be of fundamental importance also to minimize the impacts deriving from the introduction and dispersal of alien species. Using a precautionary approach, a 100 m buffer around the footprint is considered for this impact factor.

Habitat loss and modification will be the most significant impact deriving from presence of permanent infrastructures, including PV panels. However, flora and vegetation are expected to at least partially recover during the operation phase, due to rehabilitation of the temporary facilities, but also in the area of the PV panels. Indeed, the modified temperature and soil conditions under the PV panels and the grazing exclusion could potentially promote an increase in local species richness, diversity and biomass for the most common and generalist flora species, in comparison with the surrounding overgrazed continental salt steppe habitat (EUNIS habitat E6.2). The effect of grazing exclusion and PV panels on the three flora species identified as species of conservation concern (*Gypsophila oblanceolata*, *Onopordum davisii*, and *Petrosimonia triandra*) is less clear and will need to be monitor during this phase.

For some fauna species the presence of a fenced area occupied by permanent facilities and PV panels will create a loss of potential habitats, while for others in particular among the species of conservation concern Common, Tortoise (*Testudo graeca*, VU), the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT) the area could still be considered a suitable habitat, and in some cases the fence and the PV panels could even offer protection from grazing and from predators. The disturbance for terrestrial fauna species, and in particular to species of conservation concern, due to emission of noise and the presence of artificial lights connected to the operation phase is expected to be minimal. Terrestrial fauna species are expected to habituate to these forms of disturbance, deriving from operation and maintenance activities.

The effects of the potential impact factors on biodiversity, and in particular on natural habitats, are quantified and discussed below. The direct impacts on Natural and Modified habitats were assessed within the Project footprint, while the indirect impacts were assessed within a buffer of 100 m from the borders of the Project footprint and within a buffer of 300 m from the borders of the Project footprint. The areas potentially impacted are represented in Figure 7-8, and their numerical estimation is presented in Table 7-86.

Direct impacts deriving from the presence of other permanent infrastructures (e.g., inverter stations, substation, administrative buildings, internal roads, etc.) will impact 1% of the total AoI and will be entirely on continental inland salt steppes (E6.2 EUNIS habitat type, 8.61 ha).

Indirect impacts in the 100 m buffer deriving from operation, such as introduction and spreading of alien species, could impact a total of 17% of the AoI. Indirect impacts from operation in the 100 m buffer will be mainly on continental inland salt steppes (E6.2, 198.20 ha). Indirect impacts will affect also rural industrial and commercial sites (J2.3, 34.31 ha) and mixed crops of market gardens and horticulture (I1.2, 4.53 ha).

Indirect impacts in the 300 m buffer deriving from operation, such as noise and emission of light, could impact a total of 35% of the AoI. Indirect impacts within the 300 m buffer will be mainly on continental inland salt steppes (E6.2, 324.85 ha). Indirect impacts will affect also rural industrial and commercial sites (J2.3, 111.47 ha), mixed crops of market gardens and horticulture (I1.2, 43.63 ha) and scattered residential buildings (J2.1, 1.12 ha).

The direct impacts deriving from the presence of PV panels will impact 14% of the total AoI and will be entirely on continental inland salt steppes (E6.2 EUNIS habitat type, 191.87 ha).

Table 7-86: Direct and Indirect Impacts on EUNIS Habitats calculated within the AoI for the Operation Phase

EUNIS Habitat Type	Total AoI	PV Panels Area		Direct Impact (Permanent facility)		Impact on 100 m buffer		Impact on 300 m buffer	
	ha	ha	%	ha	%	ha	%	ha	%
Natural habitat									
E6.2 - Continental Inland Salt Steppes	725.03	191.87	26	8.61	1	198.20	27	324.85	45
Subtotal	*725.03*	*191.87*	*26*	*8.61*	*1*	*198.20*	*27*	*324.85*	*45*
Modified habitat									
I1.2 - Mixed Crops of Market Gardens and Horticulture	267.94	0.00	0	0.00	0	4.53	2	43.63	16
J2.1 - Scattered Residential Buildings	3.10	0.00	0	0.00	0	0.00	0	1.12	36
J2.3 - Rural Industrial and Commercial Sites Still in Active Use	377.32	0.00	0	0.00	0	34.31	9	111.47	30
Subtotal	*648.37*	*0.00*	*0*	*0.00*	*0*	*38.84*	*6*	*156.21*	*24*
Total	***1,373.40***	***191.87***	***14***	***8.61***	***1***	***237.04***	***17***	***481.06***	***35***

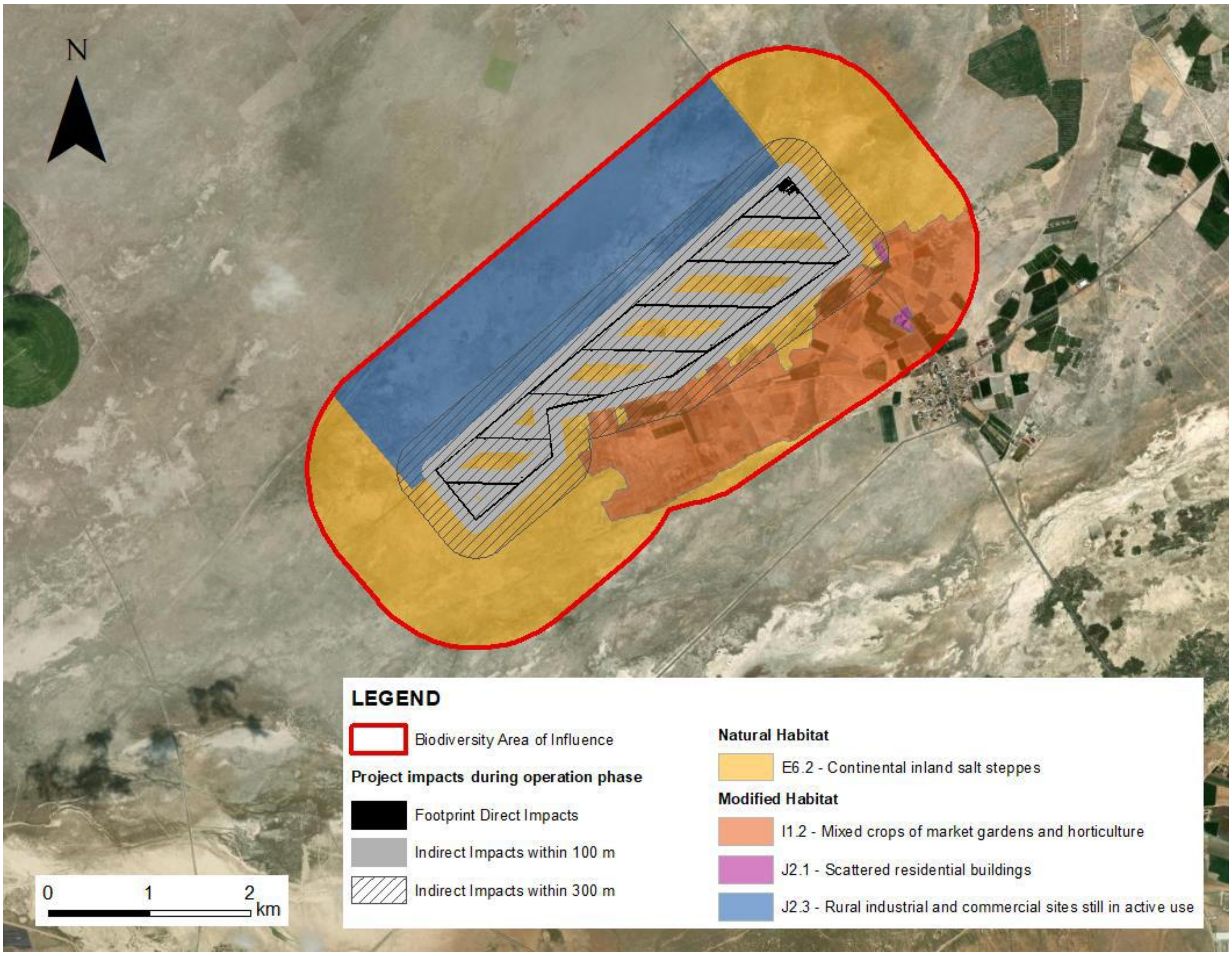

Figure 7-8: Map of the Operation Direct and Indirect Impacts from permanent facilities on EUNIS Habitats within the AoI

7.3.2.2 Mitigation Measures

The mitigation measures listed below follow the mitigation hierarchy and are proposed for the operation phase for the entire area that will be disturbed by the Project.

- **Avoidance**:

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

- minimisation of the footprint of individual facilities.
- utilization of the existing modified habitat for placement of temporary facilities was prioritized as much as possible.

- **Minimization**

1) Presence of permanent infrastructures:

- The areas occupied by the new permanent infrastructures will be fenced but modification to fencing will be made in order to minimize the barrier effect. Modifications to fencing can involve maintaining gaps between the base of the fence and the These gaps will occur at regular intervals along the fence line, with a frequency of 1 gap every 100 m. In addition, each single gap could have a height of 10 cm and a width of 1 m.

- Non-reflective coating can be applied to the panels to minimize reflection, which can attract aquatic insects and possibly birds, as it mimics reflective surfaces of waterbodies.
- Flora and fauna specific monitoring campaigns within and without the areas occupied by the new permanent infrastructures will be implemented (see section 7.3.2.4).
- vehicle movement will be restricted to the existing roads that connect the operation sites with the surrounding areas. Off road driving will be prohibited in order to avoid any unnecessary disturbance of natural vegetation.

2) Emission of noise:

No additional minimization measures are deemed necessary in addition to those included in Chapter 7.1.2.

3) Emission of light:

- it is recommended to keep the number of light sources to the minimum;
- preferred types of light in exterior lighting (e.g.: lights on site due to security reasons) applications are:
  - low pressure sodium lamps (SOX);
  - light emitting diodes (LEDs): light source of choice, emitted more directional, warmer colour temperatures (closer to 3000°K);
  - light triggered by presence detectors, and lights oriented to the ground.
- these types of lights should be avoided:
  - mercury lamps (MBF): bluish-white lamps (attract insects and tolerant bat species);
  - high pressure sodium lamps (SON): brighter pinkish-yellow lamps, used as road lighting.

4) Introduction of alien species

- the use of non-native flora species, and especially of species classified as invasive alien species must be avoided during rehabilitation/restoration works.
- if the spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.

- **Rehabilitation/Restoration:**

Areas cleared of vegetation under the PV panels will be restored, as soon as possible, with the goal of recreating the original natural habitat and possibly enhancing flora species richness and diversity. The restoration will be based on a long-term plan, with the aim of producing a stable vegetative cover to minimize erosion, dust deposition and spreading of invasive alien species.

Only plants that are native to the region will be used for restoration and habitat rehabilitation. Seeding and planting of grass and shrub species typical of the local flora will be implemented to ensure optimal ground cover. The use of autochthonous adult plants and/or of seeds collected at the shortest distance possible from the restoration sites will be of fundamental importance in order to maximise the success of the translocation operations (Abeli & Dixon, 2016[27]).

Literature shows that the construction of Solar Power Plants (SPPs) in desertic and steppe areas, which are often chosen because of their insolation rates and subsequent great potential for producing solar power, could determine positive effects for biodiversity, in terms of increased plant diversity and increased plant biomass (Bai *et al.*, 2022[37]; Graham *et al.*, 2021[38]; Hassanpour *et al.*, 2018[39]). The positive effects derive primarily from the shade offered by the PV panels, which determines a decrease in temperature and in increase in soil moisture in the areas under the panels (Tanner *et al.*, 2020[40]). There could be beneficial effects also per terrestrial fauna species, in particular for small-sized mammals, reptiles and birds, which could find protection from predators offered by the fence and the PV panels themselves.

7.3.2.3 Residual Impacts

Considering the application of the above-mentioned mitigation measures, the impact on biodiversity components is presented in Table 7-87 and it is expected to be **Low.**

- The main residual impacts could consist in the loss of natural habitat, due to the presence of new permanent infrastructures, and in the arrival and spreading of invasive alien species, which could determine a strong modification and possible impoverishment of the original plant species community.

Table 7-87: Residual Impact Assessment Matrix for Biodiversity Component during Operation Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Presence of permanent infrastructures	Duration	Long	Medium-high	Mid-term	**High**	Medium-high	**Low**
	Frequency	Continuous					
	Geo. Extent	Project site					
	Intensity	Low					
Emission of noise	Duration	Long	Medium-high	Short-term	**Low**	Medium-low	**Low**
	Frequency	Highly frequent					
	Geo. Extent	Project site					
	Intensity	Negligible					
Presence of artificial lights	Duration	Long	Medium-high	Short-term	**Low**	Medium-low	**Low**
	Frequency	Highly frequent					
	Geo. Extent	Project site					
	Intensity	Negligible					
Accidental introduction and dispersal of alien species	Duration	Long	Medium-high	Long-term	**High**	Medium-high	**Low**
	Frequency	Concentrated					
	Geo. Extent	Local					
	Intensity	Medium					

[37] Bai Z., Jia A., Bai Z., Qu S., Zhang M., Kong L., Sun R., Wang M. (2022). Photovoltaic panels have altered grassland plant biodiversity and soil microbial diversity. Front Microbiol. 2022 Dec 15;13:1065899. doi: 10.3389/fmicb.2022.1065899. PMID: 36590393; PMCID: PMC9797687.

[38] Graham M., Ates S., Melathopoulos A., Moldenke A., DeBano S., Best L. and Higgins C. (2021). Partial shading by solar panels delays bloom, increases floral abundance during the late-season for pollinators in a dryland, agrivoltaic ecosystem. Scientific Reports. 11. 7452. 10.1038/s41598-021-86756-4.

[39] Hassanpour E., Selker J. and Higgins C. (2018). Remarkable agrivoltaic influence on soil moisture, micrometeorology and water-use efficiency. PLOS ONE. 13. e0203256. 10.1371/journal.pone.0203256.

[40] Tanner K. E., K. A. Moore-O'Leary, I. M. Parker, B. M. Pavlik, and R. R. Hernandez. (2020). Simulated solar panels create altered microhabitats in desert landforms. Ecosphere 11(4):e03089. 10.1002/ecs2.3089.

7.3.2.4 Monitoring

The following monitoring activities are foreseen to ensure the implementation and effectiveness of the proposed mitigation measures:

- a floristic and vegetational monitoring will be performed in the areas located under the photovoltaic panels where plant translocation and restoration activities have been conducted, in order to assess the success of such activities in enhancing species richness and diversity and in rehabilitating the original natural habitat. This monitoring will also investigate the presence and abundance of the flora species identified as species of conservation concern (*Gypsophila oblanceolata*, *Onopordum davisii*, and *Petrosimonia triandra*). This monitoring will be conducted once per year during the vegetative season by an expert botanist and for at least 3 years after the end of construction and during the operation phase.
- presence and spreading of invasive flora species in the areas under the photovoltaic panels will be monitored at least twice a year during the vegetative season by an expert botanist and for at least 3 years. If necessary, extirpation campaign will be put in place in order to avoid the spreading of the invasive species.
- a terrestrial fauna monitoring, in particular focusing on the identified reptile species of conservation concern (*Testudo graeca*) and on the identified terrestrial mammal species of conservation concern (*Mesocricetus brandti*, *Microtus anatolicus*, *Spermophilus xanthoprymnus*, and *Vormela peregusna*), will be performed at the end of construction in the areas located under the photovoltaic panels, in order to assess the possible beneficial effects offered by solar panels in offering protection to these animals from their predators, therefore possibly enhancing the local fauna species richness and abundance. This monitoring will be conducted at least once a year for at least 3 years by a terrestrial fauna expert.
- accidents involving wildlife or the observation of live animal or carcasses along the permanent access roads or in the areas occupied by permanent infrastructures will be recorded. Additional mitigation measures to discourage wildlife presence on site and avoid roadkill will be taken if needed.

7.3.3 Decommissioning/Closure 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.

The general focus of the decommissioning and closure phase is to rehabilitate the disturbed lands to create stable, non-polluting and self-sustaining ecosystems capable of being incorporated into the future landscape, which will be consistent with activities in the general surrounding area. However, considering that Decommissioning and Closure will not happen for many years, the future land use of the area is not known, and no detailed information is available at this stage, it is not possible to discuss in details the effects of this phase on the biodiversity component.

In general, it is expected that during decommissioning, the impact factors will be similar to those considered for the construction phase.

However, positive impacts deriving from the re-establishment of natural vegetation and the restoration of the disturbed areas will allow to reclaim most of the areas with an expected overall positive effect on biodiversity compared to the operation phase.

7.3.4 Net Loss Assessment for Natural Habitats

The present net loss assessment identifies and discusses residual and unavoidable impacts on Natural Habitats and on species of conservation concern within the AoI. Residual impacts are assessed considering the effect of the avoidance mitigation and monitoring measures for construction and operation.

No Critical Habitats were identified within or around the AoI. Therefore, they are not discussed in the present assessment.

For Natural Habitats direct impacts are mainly associated with habitat loss in correspondence of the permanent footprints of the Project.

Restoration activities will be conducted on all temporary facilities used for the construction phase (i.e., campsite and administrative building). It is expected that a total of 0.81 ha occupied by temporary facilities during construction will be restored with the aim of returning the areas to their former natural condition as “E6.2-Continental inland salt steppes”.

The effect of indirect impacts such as emission of noise, dust, and light, increase in vehicular traffic, accidental introduction and dispersal of alien species. will be mitigated by measures presented in for the construction and operation phases to the point that their effect on Natural Habitat and Species of Conservation Concern is expected to be c negligible. Therefore, the only direct impacts remaining will be those due to the presence of permanent buildings/infrastructures.

Monitoring measures and remedial actions are planned and will be carried out during operation to ensure the avoidance and minimization of any indirect impacts and the full restoration of the natural habitats within the area of the temporary facilities.

Considering that no detailed information is available at this stage on the decommissioning and closure plan that will occur after 30 years of operation, using a precautionary approach, the net loss is calculated conservatively at the end of the operation phase corresponding to the areas permanently occupied by the presence of permanent buildings/infrastructures.

Permanent buildings/infrastructures occupy an area of 8.61 ha. This area is considered as an unavoidable residual impact and as a net loss of the natural habitat “E6.2 - Continental inland salt steppes”.

In addition, PV panels occupy an area of about 191.87 ha that also fell within “E6.2 - Continental inland salt steppes” habitat. Within this areas flora and vegetation is expected to recover during the operation phase. In fact, SPPs have shown to determine beneficial effects on biodiversity, observed in the many case studies considered and reported also by IUCN Guidelines (Bennun *et al.*, 2021[41]), especially when a Project is accompanied by implementation of a long-term management and restoration measures.

Literature shows several examples of positive impacts for biodiversity deriving from the construction of SPPs, especially on arid grassland ecosystems, such as increased plant species diversity and soil microorganisms (Bai et al., 2022[42]), increase in plant species diversity, plant biomass and plant functional traits connected to

[41] Bennun L., van Bochove J., Ng C., Fletcher C., Wilson D., Phair N., Carbone G. (2021). Mitigating biodiversity impacts associated with solar and wind energy development. Guidelines for project developers. Gland, Switzerland: IUCN and Cambridge, UK: The Biodiversity Consultancy.

[42] Bai Z., Jia A., Bai Z., Qu S., Zhang M., Kong L., Sun R., Wang M. (2022). Photovoltaic panels have altered grassland plant biodiversity and soil microbial diversity. Front Microbiol. 2022 Dec 15;13:1065899. doi: 10.3389/fmicb.2022.1065899. PMID: 36590393; PMCID: PMC9797687

reproductive fitness (Zhai et al., 2018[43]), increase aboveground biomass, soil moisture and vegetation cover (Hassanpour et al., 2018[44], Zhang et al., 2023[45]), floral and pollinator abundance (Graham et al., 2021[46]).

The particular edaphic conditions present under the PV panels and the grazing exclusion, could potentially determine an increase in local species richness, diversity and biomass for the most common and generalist flora species (Tanner et al., 2020[47]) compared to the surrounding overgrazed continental salt steppe habitat. However, the change could disadvantage the specialist species, such as arid and salt tolerant endemic species due to the novel microenvironments generated under the solar panels. Endemic species may be particularly disadvantaged because they often have limited distributions, narrow climatic envelopes, or specialized life histories.

Specific mitigation measures for the long-term management and restoration of the temporary facilities and PV panels are identified in the previous chapters to maximize the potential positive effects on biodiversity and ecosystem services and mitigate the negative impacts. The effect of grazing exclusion and PV panels on the three flora species identified as species of conservation concern (*Gypsophila oblanceolata*, *Onopordum davisii*, and *Petrosimonia triandra*) is less clear and will need to be monitor.

For some fauna species the presence of a fenced area occupied by permanent facilities and PV panels will create a loss of potential habitats, while for others in particular among the species of conservation concern Common, Tortoise (*Testudo graeca*, VU), the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT) the area could still be considered a suitable habitat, and in some cases the fence and the PV panels could even offer protection from grazing and from predators.

The presence and abundance of most affected flora and fauna species of conservation concern will be carefully monitored within the AoI. Specific monitoring measures for both flora and fauna species will be detailed in the Biodiversity Management Plan. In case set Key Performance Indicator are not met remedial actions will be proposed and implemented by the Company’s Biodiversity Assistant Specialist

The results of the monitoring during the operation phase will also allow to confirm or modify the net loss estimated for Natural Habitat. In case of non-conformities remedial actions will be elaborated, including additional mitigation and offset measures.

[43] Zhai B., Gao Y., Dang X. H., Chen X., Cheng B., Liu X. J. & Zhang C. (2018). Effects of photovoltaic panels on the characteristics and diversity of *Leymus chinensis* community. Chinese Journal of Ecology. 37. 2237-2243. 10.13292/j.1000-4890.201808.029

[44] Hassanpour E., Selker J. and Higgins C. (2018). Remarkable agrivoltaic influence on soil moisture, micrometeorology and water-use efficiency. PLOS ONE. 13. e0203256. 10.1371/journal.pone.0203256.

[45] Zhang Y., Tian Z., Liu B., Chen S. and Wu J. (2023) Effects of photovoltaic power station construction on terrestrial ecosystems: A meta-analysis. Front. Ecol. Evol. 11:1151182. doi: 10.3389/fevo.2023.1151182

[46] Graham M., Ates S., Melathopoulos A., Moldenke A., DeBano S., Best L. and Higgins C. (2021). Partial shading by solar panels delays bloom, increases floral abundance during the late-season for pollinators in a dryland, agrivoltaic ecosystem. Scientific Reports. 11. 7452. 10.1038/s41598-021-86756-4

[47] Tanner K. E., K. A. Moore-O'Leary, I. M. Parker, B. M. Pavlik, and R. R. Hernandez. (2020). Simulated solar panels create altered microhabitats in desert landforms. Ecosphere 11(4):e03089. 10.1002/ecs2.3089.

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8.0 CLIMATE CHANGE RISK ASSESSMENT

8.1 Introduction

G4 Bor-3 Solar Power Plant Project ("the Project") having a capacity of 130 MWp /100 MWe, is planned by Kalyon Enerji Yatırımları A.Ş. ("Kalyon Enerji") and Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş. ("Client") a subsidiary of Kalyon Enerji. The Project will be located in Niğde Province, in the Bor District, Seslikaya and Badak neighbourhoods in Türkiye.

Kalyon Enerji retained WSP Danışmanlık ve Mühendislik Ltd. Şti. ("WSP Türkiye") to prepare the Environmental and Social Impact Assessment ("ESIA") for the Project in compliance with the national and international requirements detailed above.

Climate change is a multifaceted and complex issue that can lead to serious environmental and socioeconomic consequences and even threaten the security of countries. The impacts of climate change have become one of the most important challenges for the life of future generations.

This report presents a Climate Change Risk Assessment (CCRA) for the evaluation, at present and in the future, of the potential climate-related events that could affect the Project and that may exacerbate as a consequence of the climate change.

Within this framework stands the revision and release of the Equator Principles[1] (EPs, version IV) which is a risk management framework adopted by financial institutions for determining, assessing, and managing environmental and social risks in projects and is primarily intended to provide a minimum common standard for due diligence and monitoring to support responsible risk decision-making. Currently more than 110 Equator Principles Financial Institutions (EPFIs) have officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets. The EPs categorize projects that are financed by EPFIs based on the environmental and social impacts that they generate and the risks that they may pose to financing. Category A projects have the highest risks, while category C is used for low-risk projects.

According to EPIV, a Climate Change Risk Assessment (CCRA) is required to be undertaken:

- For Category A and, as appropriate, Category B projects. For these projects, the CCRA has to include consideration of relevant climate-related 'Physical Risks' as defined by the Task Force on Climate-Related Financial Disclosure (TCFD)[2].
- For all projects, in all locations, when combined Scope 1 and Scope 2 emissions are expected to be more than 100,000 tons of CO_2 equivalent annually. For these projects, the CCRA is to include considerations of climate-related 'Transition Risks' (as defined by the TCFD). The CCRA must also include a completed alternatives analysis which evaluates lower greenhouse gas (GHG) intensive alternatives.

As per the environmental and social categorization criteria of the applicable standards, based on the discussions held with the Lenders and Lenders' Advisor, available data, the National EIA, Project area being located inside Key Biodiversity Area (KBA), the Project is categorised as "Category A". Since combined emissions of the Project are below 100,000 tons of CO_2 equivalent annually, only Physical Risks are included in this CCRA Report.

The TCFD Recommendations on Climate-related Financial Disclosures state that "Physical risks resulting from climate change can be event driven (acute) or longer-term shifts (chronic) in climate patterns".

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[1] The Equator Principles Association, 2020 (The Equator Principles_EP4_July2020 (equator-principles.com).

[2] Task Force on Climate-Related Disclosures (TCFD), Recommendations of the Task Force on Climate-related Financial Disclosures, June 2017.

Acute physical climate risks can include increased severity and frequency of droughts, storms, floods, heat waves and wildfires. Chronic physical climate risks can include sea level rise and longer-term temperature increase. Climate-related Physical Risks may include a variety of effects:

- Direct damage to assets, as a result of extreme weather events (i.e., drought, storms) or rising sea levels.
- Changes in water availability, sourcing and quality, often with consequent social impacts.
- Disruption to operations, ability to transport goods and supplies and impacts on employee/community safety, and more.

This assessment should be considered a screening level CCRA aimed at supporting the Environmental and Social Assessment process in the frame of the Equator Principles IV provisions. This CCRA relies on the interpretation of the results of modelling of future climatic conditions which have an inherent high level of uncertainty, and on the identification of project vulnerability that are based on a feasibility level of definition. The conclusions and recommendations are meant to guide the Client in defining an appropriate Risk Management framework and should not be relied upon in the design and sizing of specific infrastructures, nor in taking financial decisions regarding the feasibility or level of exposure to future damages or losses related to climate change.

8.2 Project Background

An Environmental Impact Assessment (EIA) report has been prepared for the Project per the requirements of national EIA Regulation and the “EIA Positive” decision has been acquired on October 27,2022 (Decision no: 6891). EIA Positive decision has been taken over by Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş from Kalyon Enerji Yatırımları A.Ş. referring to letter no: E-71595204-220.99-6343245 and dated May 2023 in which subsidiary shall have the full responsibility to comply with EIA commitments. A Gap Analysis Study, previously prepared by WSP Türkiye in April 2023, has identified gaps of the existing national EIA Report and available documentation obtained from Kalyon Enerji and suggest actions to close these gaps to reach a full bankable ESIA in line with the International Conventions, IFIs Performance Standards (Equator Principles IV (EP), International Finance Corporation (IFC) Performance Standards (PS), Organisation for Economic Co-operation and Development (OECD)’s Common Approaches and Guidelines, and the best practices in the industry along with the national legislation).

The main components of the plant consist of solar panels, a panel carrier system, an inverter station (inverter, transformer, ring main unit (rmu)) and the substation. Associated infrastructure and utilities can be listed as the administrative building, Supervisory Control and Data Acquisition (SCADA) System and the overhead power transmission line (OHTL). Once the Solar Power Plant is put into operation, it is planned to produce 100 MWe of electricity annually, and the electricity produced will be connected to the Bor Substation via ~13 km 154 kV OHTL. Details of the Project components are provided in Chapter 3 of the ESIA Report.

The Project pre-construction activities, namely, mobilization of temporary site facilities, site preparation, grading and levelling, material delivery and storage and certain early trenching activities for cable laying has started in March 2023. The construction period of the Project is estimated to be 8 months and the total operation period will be 30 years.

The Project will be established on a pastureland / treasury land of 201.6 hectares. The Project area has been classified as an "Industrial Zone" in the 1/100.000 Scale Environmental Plan. The area lays within the borders of the "Niğde-Bor Energy Specialized Industrial Zone".

The Project is part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor district of Niğde province on 29.09.2023. The legal status of the plot was formerly pastureland, and it was declared an industrial zone suitable for the development of a solar project: a

YEKA. Consequently, it was launched the "Competition Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy"; YEKA SPP-4 (Bor-1, Bor-2 and Bor-3) competitions were held on 08.04.2022. YEKA Right of Use Agreements were signed on 16.05.2022 with Kalyon Enerji Yatırımları A.Ş., which won the competition held by the Ministry of Energy and Natural Resources for the G4 Bor-3 region. The contract for the YEKA area was taken from Kalyon Enerji A.Ş. to its subsidiary, Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş from Kalyon Enerji Yatırımları A.Ş., as of March 7, 2023.

8.3 Methodology

According to the ISO 14091 Standard "Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment[3]" Climate Risk Assessments fulfil diverse objectives depending on the information needs of a Client, and on challenges caused by climate change. These can include the following.

- Raising awareness: Risk assessments help increase awareness of the consequences of climate change.
- Identification and prioritization of risks: many factors contribute to a system's sensitivity, exposure and adaptive capacity. Climate change risk assessments provide insight into these factors and this helps the Client to prioritize the risks to be addressed.
- Identification of entry points for climate change adaptation intervention: the final results and the process of risk assessment can help identify possible adaptation responses. Risk assessments can show where early action is required.
- Tracking changes in risk and monitoring and evaluating adaptation: repeating risk assessments can help to track changes over time and generate knowledge on the effectiveness of adaptation.

This section of the CCRA chapter presents an overview of the methodology for CCRA for physical risks and applies it to the Project. The assessment will result in the identification of physical risks that may affect the Project within a certain time frame, and in a number of adaptation measures that the Client may consider and implement to mitigate these risks.

WSP developed a risk assessment methodology based on existing methodologies for the assessment of climate change risks and vulnerability as part of adaptation strategies. Guidelines and methodologies from the ISO 14091 as well as the Intergovernmental Panel on Climate Change (IPCC)[4] and the World Bank Group[5] were used as a guidance for defining factors that contribute to determine the risk. These methodologies consider a variety of risk components whose definitions are as follows:

- Climate-related Hazard: natural or human induced climate-related hazard, such as flood, wildfire, extreme heat, that can occur at the Project Site. The changes in intensity of hazard related events and of their probability over-time are influenced by climate change.
- Exposure: the possibility for a Project in a specific site to be adversely affected by a certain hazard because of the presence of certain Project services, resources, infrastructures, people and other Project's intrinsic elements that are prone to be affected. A Project, depending on its intrinsic nature and characteristics, may or may not be exposed to a certain hazard that occur at the Project Site. Exposure is therefore an indicator of if the Project "can or cannot be affected" by a certain hazard.

[3] ISO 14091 gives guidelines for assessing the risks related to the potential impacts of climate change. It describes how to understand vulnerability and how to develop and implement a sound risk assessment in the context of climate change.

[4] The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.

[5] The World Bank Group (WBG) is a family of five international organizations that make leveraged loans to developing countries.

- Sensitivity: propensity or predisposition of elements of the Project to be affected by a certain hazard. Sensitivity is a measure of "how much" a Project exposed to a certain hazard can be affected.
- Adaptive capacity: the ability of the Project to adjust to climate hazard-related events, to mitigate potential damages, to take advantage of opportunities, or to respond to the consequences.
- Vulnerability: expresses the magnitude of potential effects and consequences of climate hazard-related events on elements of the Project. Vulnerability results from the combination of Sensitivity and Adaptive capacity.
- Risk: the result of the combination of Hazard probability or intensity at a certain time and the Vulnerability.

This methodology assesses all different climate-related hazards independently, at present and in the future, over a time consistent with the temporal scope of the assessment, and according to multiple future carbon emission scenarios. For each specific hazard, the risk components are assigned a qualitative class ("i.e., "high", "medium", "low") and then combined using qualitative matrices, as explained in Figure 1. The result is a class of Risk ("low", "medium", "high" or "extreme") for each climate-related hazard considered in the analysis. The following figure shows risk assessment process for a specific hazard "h" the Project is exposed to.

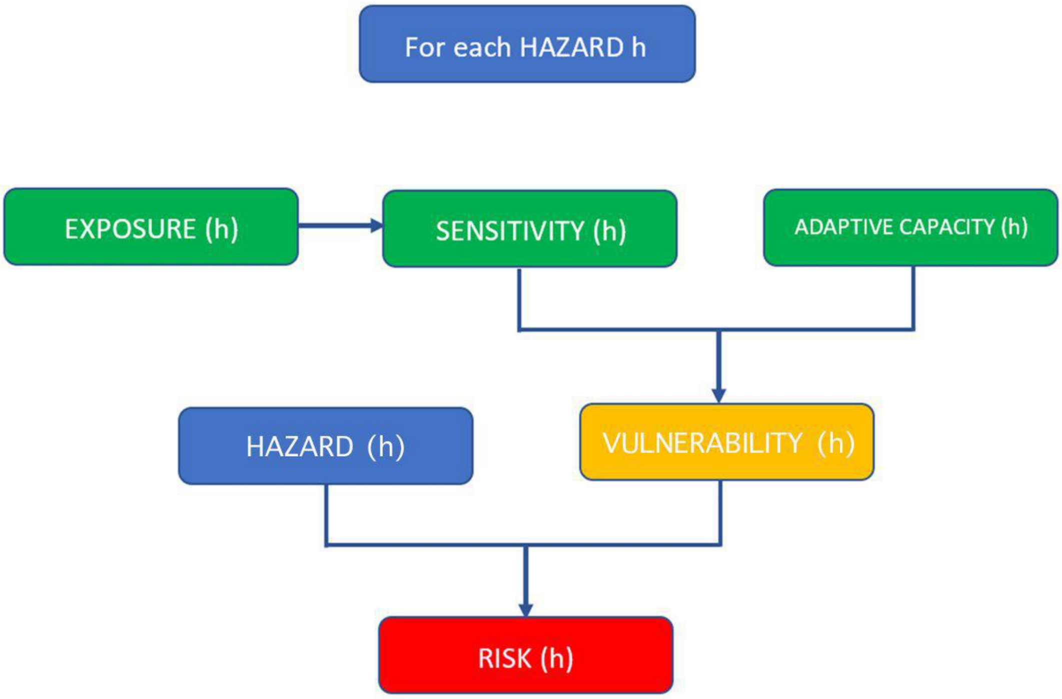


Figure 1: Workflow of the risk assessment for a specific hazard "h" the Project is exposed to, showing how different risk factors are combined across the analysis.

8.4 Climate Change Risk Assessment

This section presents the of CCRA that takes into consideration all project facilities as described in ESIA Section 3 - Project Description.

8.4.1 Current Climate Overview

The Project is located in the city of Niğde, Türkiye. Information collected from the World Bank Group – Climate Change Knowledge Portal[6] was used for an overview of the current climate and the mean climate projections. Meteorological data were obtained from Meteorology Stations located around the Project site. The data were recorded in Niğde Meteorology Station and obtained from the Turkish State Meteorology General Directorate to establish the basic conditions for meteorology and climatology.

Türkiye is located between the subtropical and temperate zones, giving rise to a variety of climate zones observed in the country. These climate zones include the Mediterranean Climate, characterized by hot and dry summers and mild, rainy winters. The Black Sea Climate features cool summers and warm winters along the coastal areas, while the higher regions experience cold, snowy winters. The Terrestrial Climate exhibits significant temperature differences between seasons and day and night. Additionally, the Marmara Climate acts as a transition zone, combining characteristics of the Terrestrial, Black Sea, and Mediterranean climates. In terms of precipitation, Türkiye receives the majority of its rainfall during winter and spring. During the summer months, precipitation decreases, while temperatures and evaporation rates increase. The annual long-term mean precipitation is recorded at 574 mm. However, there has been an observable increase in the number of meteorological extreme events, particularly since 2000 (covering the period from 1981 to 2017). These events include phenomena such as severe storms, floods, and heatwaves, reflecting a trend towards more extreme weather occurrences in recent years.

Niğde is located in the Central Anatolia region of Türkiye. The continental climate is prevailing in the Niğde province and winters are cold and snowy, and summers are hot and dry with transitional periods of mild weather in spring and autumn. According to the observation records of Niğde Meteorology Station between 1960 and 2021, the annual average temperature is 11.2°C. The highest temperature was recorded in July and August with 38.5°C, and the lowest temperature was measured in February with -24.2°C. Temperature observations show that Niğde has warmed significantly in recent decades. Between 1901 and 2021, the average annual temperature increased by about 1.5°C as can be seen from Figure 2 below.

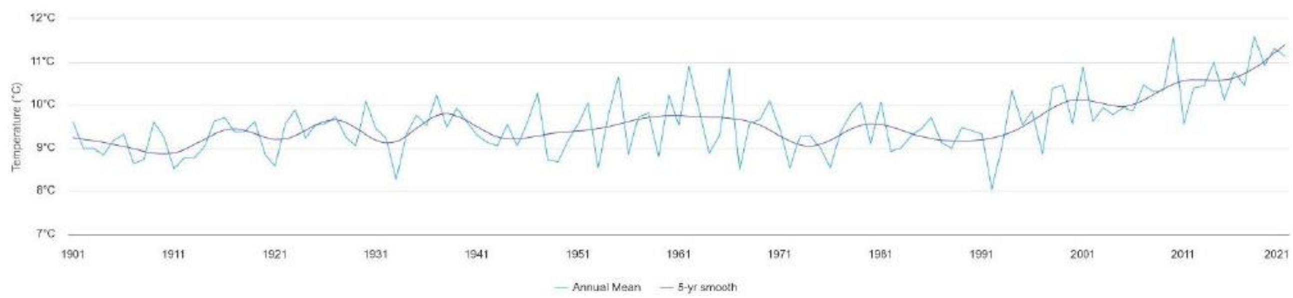


Figure 2: Observed Average Annual Mean-Temperature of Niğde for 1901-2021

Historical climate trends show that between the years 1901 and 2020 the average annual precipitation in Niğde decreased about 3 mm as presented in Figure 3. According to the observation records of Niğde Meteorology Station between 1960 and 2021, the annual average total precipitation is 336.9 mm. The maximum amount of precipitation per day was measured in December with 54.5 mm.

[6] The Climate Change Knowledge Portal (CCKP) provides global data on historical and future climate, vulnerabilities, and impacts.

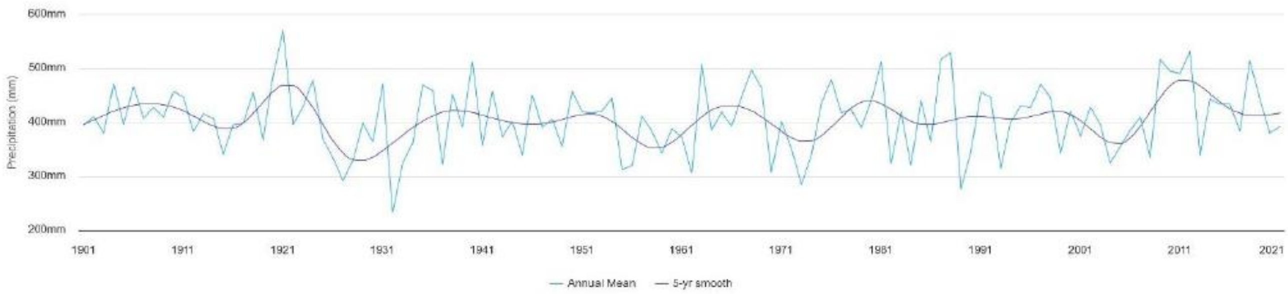


Figure 3: Observed Average Annual Precipitation of Niğde for 1901-2021

8.4.2 Climate Projections

World Bank Climate Change Knowledge Portal was used for the climate projections which uses climate projection data refers to modeled data generated by the Coupled Model Inter-comparison Projects (CMIPs) of the World Climate Research Program. The specific data presented here is from CMIP6, which is the Sixth phase of the CMIPs. These CMIPs serve as the fundamental data source for the Intergovernmental Panel on Climate Change (IPCC) Assessment Reports. CMIP6, in particular, supports the IPCC's Sixth Assessment Report.

In analyzing and interpreting climate change projections from multi-model ensembles, outputs are presented as a range, which represents model spread. CCKP identifies the range of 10th and 90th percentiles, as and median (or 50th percentile). The 10th percentile indicates that just 10% of simulation outputs fall below this result. The 90th percentile means that 90% of all simulation outputs fall below this result.

The projection data is provided at a resolution of 1.0º x 1.0º (100 km x 100 km), offering a spatial representation of climate information. The data used are those referring to the Multi model ensemble for the following scenarios:

- SSP1 – 2.6: optimistic scenario in which global CO_2 emissions are drastically reduced reaching net zero after 2050 due to an evolution of societies towards environmental and social sustainability and temperatures stabilize around 1.8°C more by the end of the century;
- SSP2 – 4.5: Intermediate scenario in which CO_2 emissions hover around current levels before starting to decline mid-century but fail to reach net zero by 2100. Socio-economic factors follow their historical trends without significant changes. Progress towards sustainability is slow, with development and income growing unevenly. In this scenario, temperatures rise by 2.7°C by the end of the century;
- SSP5 – 8.5: Scenario where current CO_2 emission levels roughly double by 2050. The global economy is growing rapidly, but this growth is fuelled by fossil fuel exploitation and high-intensive lifestyles energy. By 2100, the global average temperature will be as much as 4.4°C higher.

Since the construction period of the Project is estimated to be 8 months and the total operation period will be 30 years, two time periods which includes this total period (2020-2039 and 2040-2059) were taken into consideration within the scope of the CCRA.

Temperature

In the graph below, black line belongs to the historical refence data of the years 1995-2014, dark blue line corresponds to the projections under SSP1-2.6 and orange line represents SSP2-4.5, while dark red line represents the projections under the SSP5-8.5 scenario. The area above each line presents the 90th percentile while the area below presents the 10th percentile. Significant increase in mean annual temperature is projected for Niğde, under SSP5-8.5 by the end of the century as can be seen from Figure 4.

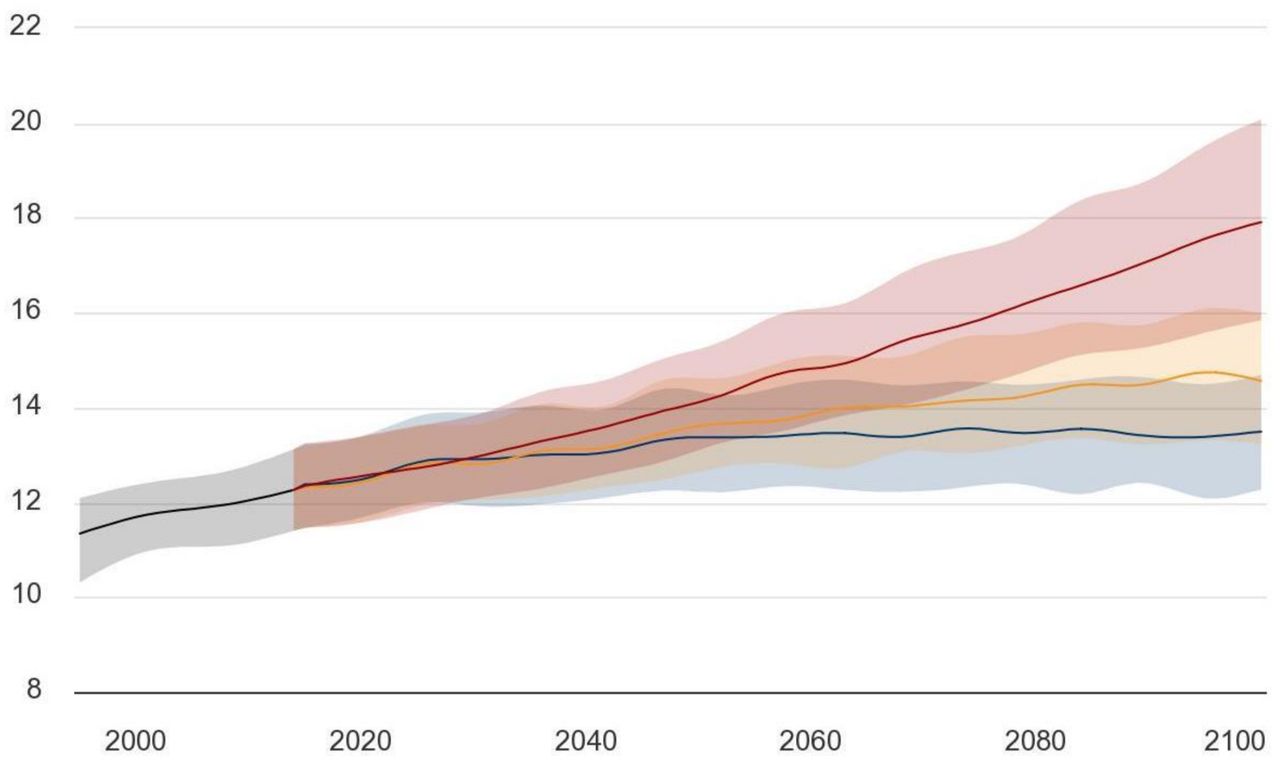


Figure 4: Projected Mean Temperature - Niğde (Ref. Period: 1995-2014), Multi-Model Ensemble

The projections for the mean temperatures according to the years under all scenarios are given in Table 1.

Table 1: Projected Mean-Temperature for Niğde

Year	SSP1-2.6		SSP2-4.5		SSP5-8.5	
	50th Percentile (or Median)	10-90th Percentile Range	50th Percentile (or Median)	10-90th Percentile Range	50th Percentile (or Median)	10-90th Percentile Range
2040	13.03°C	12.08 to 13.90°C	13.16°C	12.32 to 14.02°C	13.55°C	12.53 to 14.39°C
2060	13.41°C	12.42 to 14.47°C	13.89°C	12.76 to 14.97°C	14.81°C	13.70 to 16.03°C
2080	13.50°C	12.40 to 14.47°C	14.39°C	13.29 to 15.51°C	16.28°C	14.93 to 17.72°C
2100	13.48°C	12.34 to 14.51°C	14.62°C	13.31 to 15.92°C	18.07°C	16.08 to 19.97°C

The projections for the mean temperature anomaly for each month between the years 2021 and 2100 under each scenario are given in Table 2, Table 3, Table 4.

Table 2: Projected Mean-Temperature Anomaly Niğde, (SSP1-2.6, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-260	2061-2070	2071-2080	2081-2090	2091-2100
January	0.67°C	1.19°C	1.09°C	1.24°C	1.32°C	1.29°C	1.37°C	1.5°C
February	0.8°C	0.83°C	0.95°C	1.1°C	1.58°C	1.41°C	1.52°C	1.35°C
March	0.8°C	0.83°C	0.77°C	1.16°C	1.11°C	1°C	1.25°C	1.48°C
April	0.87°C	0.66°C	0.78°C	1.14°C	1.13°C	1.32°C	1.36°C	0.99°C
May	1.08°C	1.15°C	1.39°C	1.75°C	1.63°C	1.53°C	1.77°C	1.5°C
June	1.11°C	1.34°C	1.64°C	1.59°C	1.66°C	1.56°C	1.67°C	1.46°C
July	1.19°C	1.56°C	1.79°C	1.88°C	1.85°C	1.95°C	2.12°C	1.89°C
August	1.29°C	1.43°C	1.97°C	1.99°C	1.94°C	2.17°C	2.15°C	2.05°C
September	1.08°C	1.27°C	1.9°C	1.8°C	1.86°C	2.14°C	1.95°C	1.59°C
October	0.94°C	1.42°C	1.6°C	1.66°C	1.48°C	1.48°C	1.54°C	1.16°C
November	1.08°C	0.9°C	1.18°C	1.13°C	1.44°C	1.2°C	1.14°C	1.11°C
December	0.97°C	0.99°C	1.04°C	1.41°C	1.3°C	1.51°C	1.25°C	1.04°C

Table 3: Projected Mean-Temperature Anomaly Niğde, (SSP2-4.5, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-260	2061-2070	2071-2080	2081-2090	2091-2100
January	0.73°C	0.96°C	1.02°C	1.37°C	1.8°C	1.65°C	2.1°C	2.11°C
February	0.81°C	0.98°C	1.29°C	1.54°C	1.86°C	2.05°C	2.23°C	2.38°C
March	0.44°C	0.73°C	1.32°C	1.49°C	1.63°C	1.85°C	1.97°C	2.23°C
April	0.53°C	0.95°C	1.39°C	1.59°C	1.74°C	1.91°C	2.53°C	2.34°C
May	0.87°C	1.23°C	1.51°C	1.88°C	2.39°C	2.55°C	2.66°C	2.75°C
June	1.03°C	1.58°C	1.84°C	2.15°C	2.38°C	2.86°C	3.04°C	3.16°C
July	1.13°C	1.84°C	2.12°C	2.39°C	2.86°C	3.26°C	3.47°C	3.79°C
August	1.09°C	1.62°C	2.05°C	2.49°C	3.08°C	3.34°C	3.65°C	3.75°C
September	1.21°C	1.58°C	2.08°C	2.46°C	2.62°C	2.92°C	3.05°C	3.69°C
October	1.08°C	1.27°C	1.59°C	2.11°C	2.47°C	2.5°C	2.87°C	3.06°C
November	0.75°C	1.05°C	1.26°C	1.62°C	2.1°C	2.14°C	2.29°C	2.54°C
December	0.94°C	1.14°C	1.35°C	1.78°C	1.93°C	2.01°C	2.02°C	2.02°C

Table 4: Projected Mean-Temperature Anomaly Niğde, (SSP5-8.5, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-260	2061-2070	2071-2080	2081-2090	2091-2100
January	0.65°C	0.99°C	1.26°C	2.01°C	2.67°C	2.79°C	3.63°C	4.12°C
February	0.6°C	0.83°C	1.33°C	2.06°C	2.35°C	3.05°C	3.59°C	4.3°C
March	0.55°C	0.96°C	1.48°C	1.98°C	2.44°C	3.07°C	3.57°C	4.25°C
April	0.6°C	1.03°C	1.81°C	2.15°C	2.59°C	3.41°C	4.02°C	4.76°C
May	1.06°C	1.45°C	1.86°C	2.78°C	3.29°C	4.28°C	5.34°C	6.02°C
June	1.23°C	1.64°C	2.35°C	3.06°C	3.72°C	4.91°C	5.44°C	6.39°C
July	1.2°C	1.8°C	2.65°C	3.51°C	4.09°C	5.26°C	6.2°C	7.1°C
August	1.18°C	1.86°C	2.63°C	3.55°C	4.41°C	5.46°C	6.18°C	7.07°C
September	1.19°C	1.69°C	2.59°C	3.43°C	4.14°C	5.06°C	6.08°C	6.85°C
October	0.98°C	1.59°C	2.16°C	2.85°C	3.69°C	4.33°C	5.14°C	6.09°C
November	0.8°C	1.13°C	1.66°C	2.37°C	2.82°C	3.31°C	4.4°C	4.88°C
December	0.65°C	1.15°C	1.63°C	2.11°C	2.37°C	2.95°C	3.63°C	4.49°C

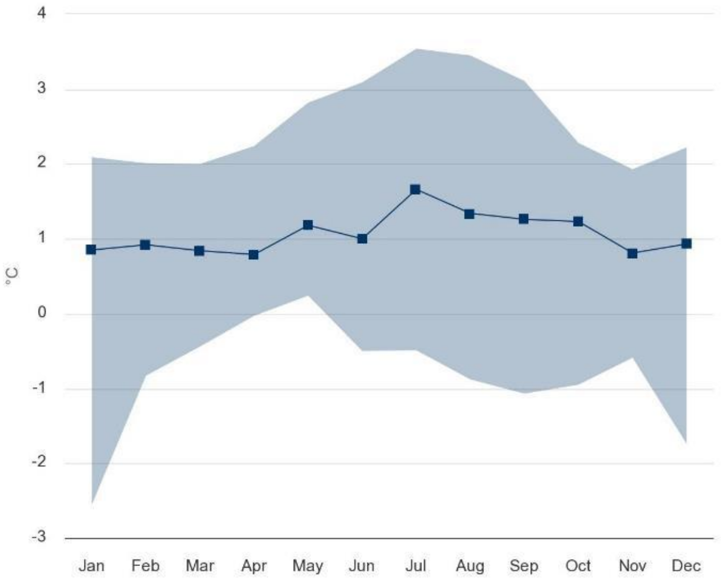
2020-2039

According to SSP1-2.6, SSP2-4.5 and SSP5-8.5 scenarios, Projected Mean-Temperature anomaly for the years 2020-2039 is given in Figures below.

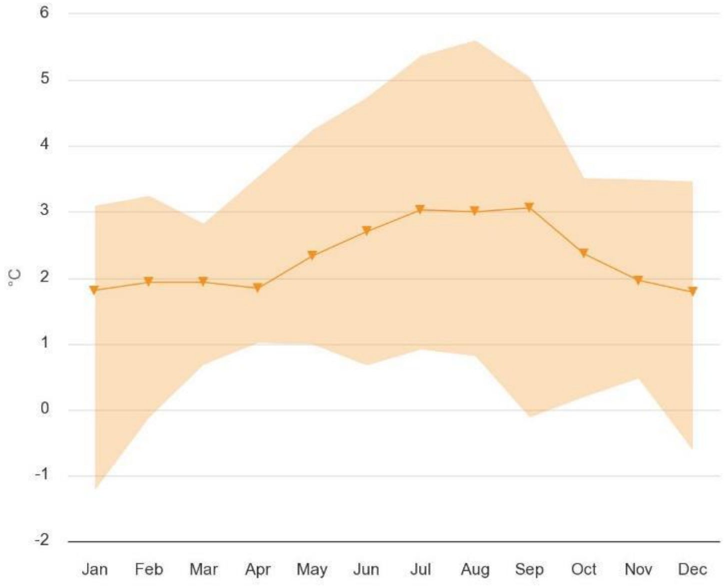
The graph represents monthly temperature anomalies (differences from the long-term average) from January to December for the years 2020 to 2039.

The values above the baseline values that are represented by the line in the middle indicate anomalies which are temperatures that are higher than the long-term average and the values below the baseline negative anomalies indicate the temperatures that are lower than the long-term average.

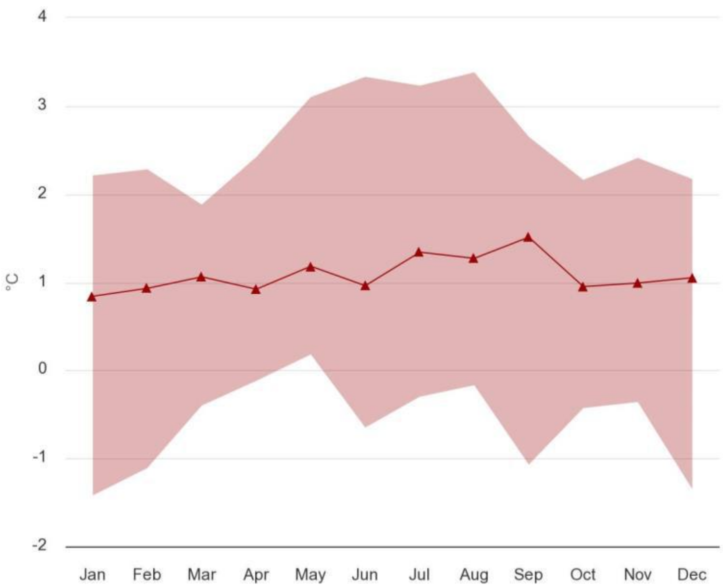
The highest deviation is expected as an increase of 3.83 ˚C in July under the SSP2-4.5 scenario and -2.55 ˚C as a decrease in January under the SSP1-2.6 scenario as can be seen from the Figure 5 (b) and (a), respectively.



SSP1-2.6 (a)



SSP2-4.5 (b)



SSP5-8.5 (c)

Figure 5: Projected Mean Temperature Anomaly for 2020-2039 - Niğde (Ref. Period: 1995-2014), Multi-Model Ensemble

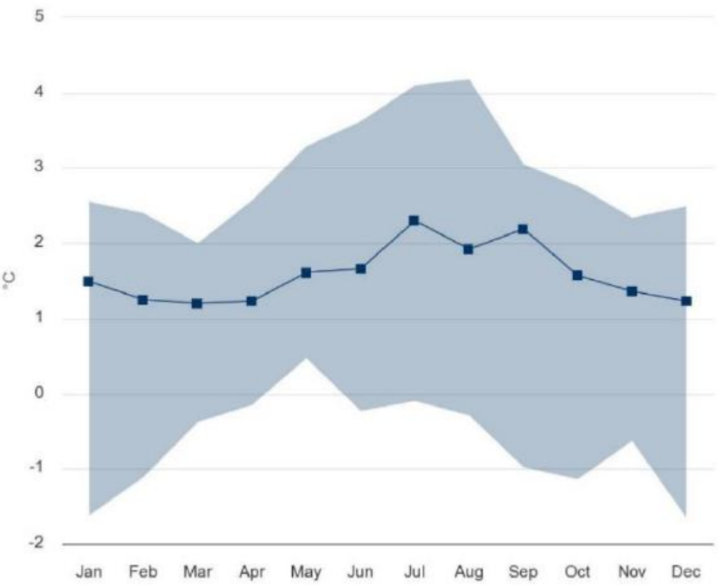
2040-2059

According to SSP1-2.6, SSP2-4.5 and SSP5-8.5 scenarios, Projected Mean-Temperature anomaly for the years 2040-2059 is given in the graphs below.

The graph represents monthly temperature anomalies (differences from the long-term average) from January to December for the years 2040 to 2059.

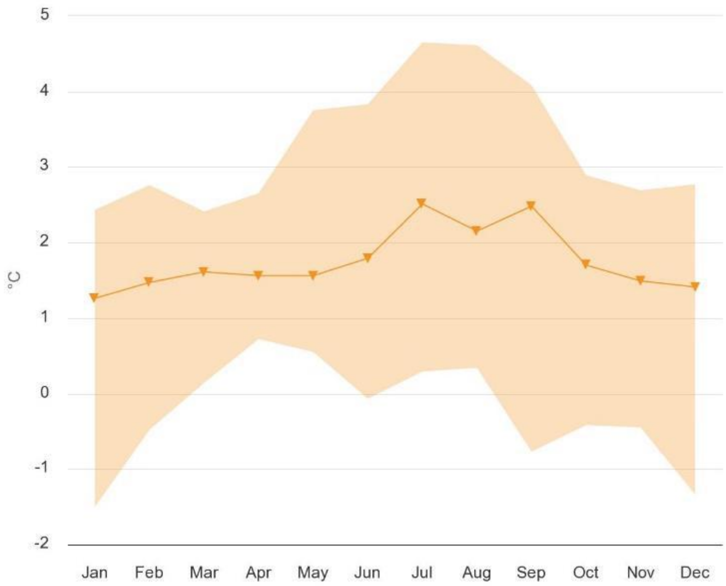
The values above the baseline values that are represented by the line in the middle indicate anomalies which are temperatures that are higher than the long-term average and the values below the baseline negative anomalies indicate the temperatures that are lower than the long-term average. The highest deviation from the baseline values is expected as an increase of 5.14 ˚C in August under the SSP5-8.5 scenario and -1.62 ˚C as a decrease in December under the SSP1-2.6 scenario as can be seen from the

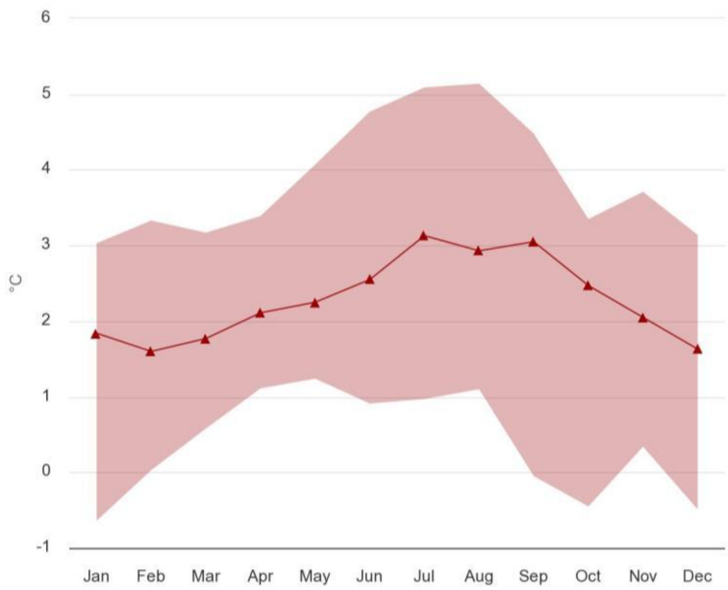
Figure 6 (c) and (b), respectively.



SSP1-2.6 (a)

SSP2-4.5 (b)





SSP5-8.5 (c)

Figure 6: Projected Mean Temperature Anomaly for 2040-2059 - Niğde (Ref. Period: 1995-2014), Multi-Model Ensemble

Precipitation

In the graph below, black line belongs to the historical refence data of the years 1995-2014, dark blue line corresponds to the projections under SSP1-2.6 and orange line represents SSP2-4.5, while dark red line represents the projections under the SSP5-8.5 scenario. The area above each line presents the 90th percentile while the area below presents the 10th percentile. Significant decrease in precipitation is projected for Niğde, under SSP5-8.5 by the end of the century as can be seen from Figure 7.

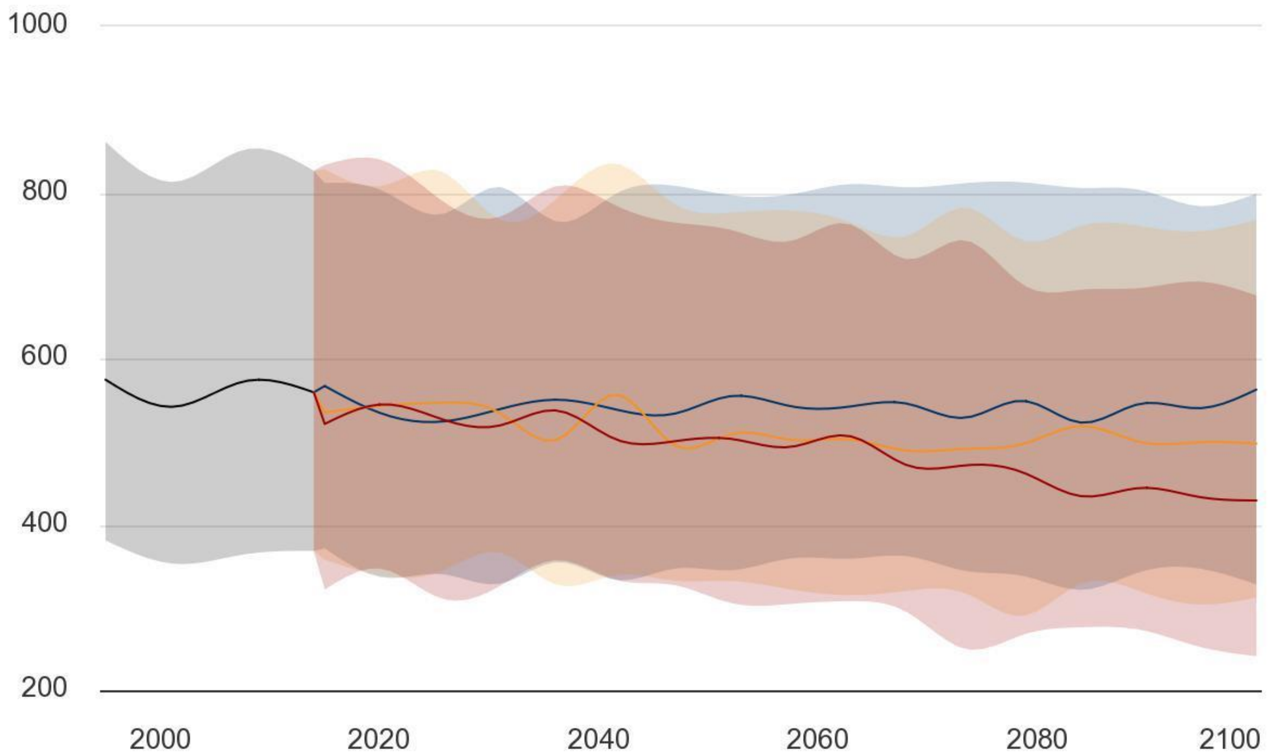


Figure 7: Project Precipitation - Niğde (Ref. Period: 1995-2014), Multi-Model Ensemble

The projections for the precipitation according to the years under all scenarios are given in Table 5.

Table 5: Projected Precipitation - Niğde

Year	SSP1-2.6		SSP2-4.5		SSP5-8.5	
	50th Percentile (or Median)	10-90th Percentile Range	50th Percentile (or Median)	10-90th Percentile Range	50th Percentile (or Median)	10-90th Percentile Range
2040	543.18 mm	338.87 to 784.97 mm	547.17 mm	333.42 to 831.52 mm	513.12 mm	340.88 to 795.07 mm
2060	539.18 mm	359.59 to 804.32 mm	501.65 mm	316.92 to 774.90 mm	501.86 mm	306.21 to 754.95 mm
2080	544.66 mm	333.28 to 810.54 mm	502.68 mm	295.15 to 740.58 mm	454.83 mm	271.48 to 681.31 mm
2100	562.39 mm	327.55 to 798.51 mm	497.30 mm	311.81 to 767.09 mm	428.70 mm	241.02 to 675.87 mm

The projections for the projected precipitation anomaly for each month between the years 2021 and 2100 under each scenario are given in Table 6, Table 7, Table 8.

Table 6: Projected Precipitation Anomaly Niğde, (SSP1-2.6, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-260	2061-2070	2071-2080	2081-2090	2091-2100
January	-1.94 mm	-4.26 mm	-4.11 mm	-0.58 mm	-1.29 mm	-1.39 mm	-4.9 mm	2.24 mm
February	-4.51 mm	-5.22 mm	-5.77 mm	-6.04 mm	-2.94 mm	-4.09 mm	-3.93 mm	-5.25 mm
March	0.74 mm	0.03 mm	3.25 mm	-1.54 mm	-1.7 mm	0.68 mm	-2.69 mm	0.43 mm
April	-0.35 mm	-0.99 mm	1.41 mm	3.4 mm	0.13 mm	0.97 mm	-1.33 mm	3.21 mm
May	-2.07 mm	-0.99 mm	0.98 mm	-0.39 mm	2.9 mm	-0.26 mm	2.69 mm	2.09 mm
June	2.35 mm	0.82 mm	0.62 mm	-1.28 mm	-0.84 mm	-1.3 mm	-0.29 mm	3.63 mm
July	-0.11 mm	-0.71 mm	-0.27 mm	-0.34 mm	-0.63 mm	-0.29 mm	-0.4 mm	-0.3 mm
August	-0.54 mm	-0.27 mm	-0.37 mm	-0.6 mm	-0.51 mm	-0.58 mm	-0.55 mm	-0.42 mm
September	-1.26 mm	-0.54 mm	-0.86 mm	-2.1 mm	-1.39 mm	-2.52 mm	-1.42 mm	-1.86 mm
October	-2.65 mm	-6.13 mm	-0.43 mm	-0.37 mm	-4.71 mm	-1.99 mm	-4.03 mm	-2.02 mm
November	-7.2 mm	-2.32 mm	-11.26 mm	-2.1 mm	-7.58 mm	-8.57 mm	-4.71 mm	-9.42 mm
December	-7.04 mm	-4.97 mm	-3.47 mm	-3.89 mm	2.95 mm	-6.08 mm	-0.46 mm	-7.85 mm

Table 7: Projected Precipitation Anomaly Niğde, (SSP2-4.5, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-260	2061-2070	2071-2080	2081-2090	2091-2100
January	-1.62 mm	-11.16 mm	-4.51 mm	-7.05 mm	-4.7 mm	-7.07 mm	-7.85 mm	-8.17 mm
February	-5.59 mm	-0.9 mm	-1.66 mm	-1.37 mm	-6.1 mm	-9 mm	-10.58 mm	-8.68 mm
March	-1.65 mm	-4.77 mm	-4.64 mm	-3.62 mm	-4.6 mm	-3.71 mm	-3.28 mm	-5.24 mm
April	0.56 mm	1.7 mm	2.42 mm	-3.96 mm	-0.63 mm	-5.8 mm	-0.35 mm	-0.73 mm
May	-1.58 mm	-3.1 mm	-1.86 mm	-1.53 mm	-6.48 mm	-2.61 mm	1.56 mm	-1.83 mm
June	1.53 mm	-0.46 mm	-0.92 mm	1.09 mm	-1.79 mm	-1.28 mm	0.43 mm	-1.4 mm
July	-0.27 mm	-0.35 mm	-0.27 mm	-0.89 mm	-0.9 mm	-1.45 mm	-0.92 mm	-1.57 mm
August	-0.38 mm	-0.25 mm	-0.37 mm	-0.66 mm	-0.42 mm	-0.77 mm	-0.92 mm	-0.43 mm
September	-0.38 mm	-1.64 mm	-2.05 mm	-1.95 mm	-1.66 mm	-3.18 mm	-3.43 mm	-2.42 mm
October	-2.8 mm	-0.21 mm	-0.12 mm	-2.8 mm	-4.94 mm	-6.05 mm	-5.63 mm	-5.62 mm
November	-7.45 mm	-12.15 mm	-8.32 mm	-6.76 mm	-14.97 mm	-15 mm	-11.8 mm	-12.04 mm
December	-4.04 mm	-4.37 mm	-6.03 mm	-16.57 mm	-13.5 mm	-3.26 mm	-7.76 mm	-11.14 mm

Table 8: Projected Precipitation Anomaly Niğde, (SSP5-8.5, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-260	2061-2070	2071-2080	2081-2090	2091-2100
January	-8.91 mm	-3.64 mm	-5.97 mm	-5.91 mm	-17.16 mm	-17.53 mm	-17.21 mm	-14.7 mm
February	-1.54 mm	-7.51 mm	-4.96 mm	-15.35 mm	-8.76 mm	-14.54 mm	-16.13 mm	-12.95 mm
March	-4.87 mm	-3.74 mm	-5.11 mm	-4.15 mm	-4.81 mm	-9.9 mm	-7.28 mm	-14.72 mm
April	-3.3 mm	2.31 mm	-6.03 mm	-3.93 mm	-5.64 mm	-6.82 mm	-6.24 mm	-10.91 mm
May	-3.03 mm	-0.18 mm	-3.35 mm	-4.52 mm	-2.49 mm	-6.73 mm	-6.79 mm	-11.31 mm
June	0.9 mm	-1.33 mm	-1.37 mm	-0.8 mm	-1.01 mm	-0.07 mm	-1.89 mm	-5.32 mm
July	-0.74 mm	-0.45 mm	-0.88 mm	-0.85 mm	-1.59 mm	-0.98 mm	-0.95 mm	-1.87 mm
August	-0.29 mm	-0.36 mm	-0.23 mm	-1.08 mm	-0.7 mm	-1.54 mm	-1.78 mm	-1.47 mm
September	-1.19 mm	-0.98 mm	-2.27 mm	-2.83 mm	-3.4 mm	-4.61 mm	-4.82 mm	-5.4 mm

Years / Months	2021-2030	2031-2040	2041-2050	2051-260	2061-2070	2071-2080	2081-2090	2091-2100
October	-0.7 mm	-4.2 mm	-2.95 mm	-3.3 mm	-3.5 mm	-6.52 mm	-9.42 mm	-9.26 mm
November	-7.86 mm	-7.86 mm	-11.79 mm	-20.49 mm	-8.93 mm	-16.84 mm	-21.97 mm	-22.13 mm
December	-8.66 mm	-7.83 mm	-15.57 mm	-18.9 mm	-20.96 mm	-21.3 mm	-19.69 mm	-26.63 mm

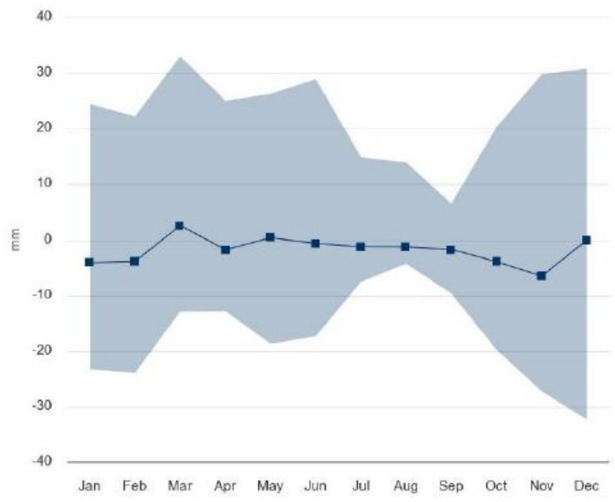
2020-2039

According to SSP1-2.6, SSP2-4.5 and SSP5-8.5 scenarios, Projected Precipitation anomaly for the years 2020-2039 is given in graphs below.

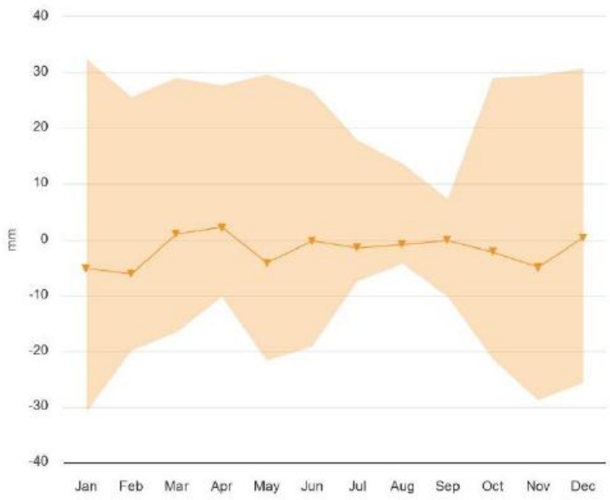
The graph represents projected precipitation anomalies (differences from the long-term average) from January to December for the years 2020 to 2039.

The values above the baseline values that are represented by the line in the middle indicate anomalies which are precipitation values that are higher than the long-term average and the values below the baseline negative anomalies indicate the precipitation values that are lower than the long-term average.

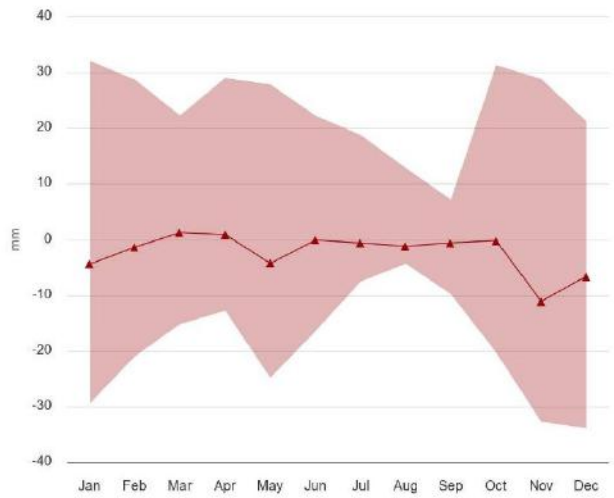
The highest deviation from the baseline values is expected as an increase of 32.48 mm in January under the SSP2-4.5 scenario and -33.94 mm as a decrease in December under the SSP5-8.5 scenario as can be seen from the Figure 8 (b) and (c), respectively.



SSP1-2.6 (a)



SSP2-4.5 (b)



SSP5-8.5 (c)

Figure 8: Projected Precipitation Anomaly for 2020-2039 - Niğde (Ref. Period: 1995-2014), Multi-Model Ensemble

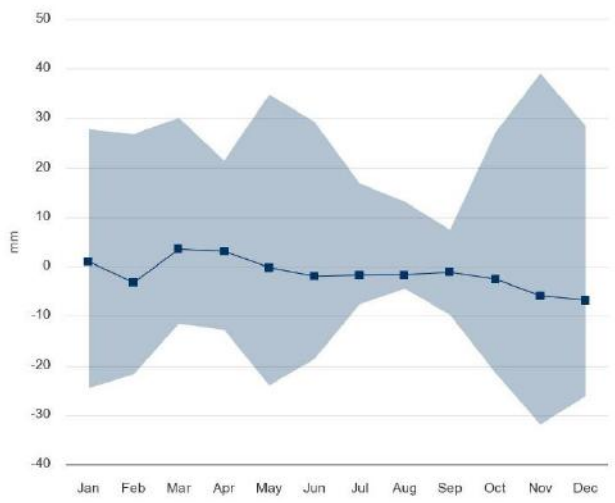
2040-2059

According to According to SSP1-2.6, SSP2-4.5 and SSP5-8.5 scenarios, Projected Precipitation anomaly for the years 2040-2059 is given in graphs below.

The graph represents projected precipitation anomalies (differences from the long-term average) from January to December for the years 2020 to 2039.

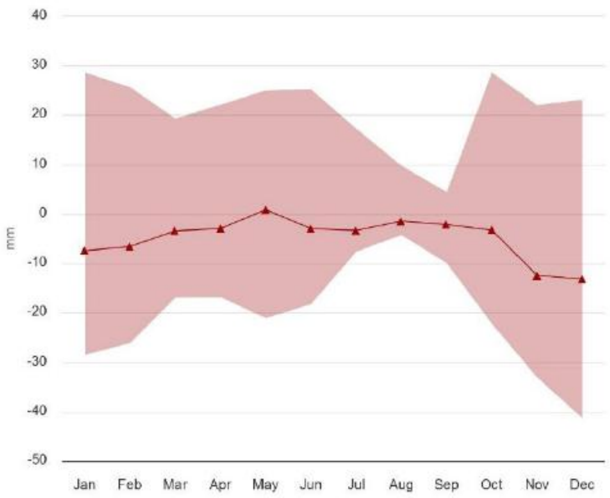
The values above the baseline values that are represented by the line in the middle indicate anomalies which are precipitation values that are higher than the long-term average and the values below the baseline negative anomalies indicate the precipitation values that are lower than the long-term average.

The highest deviation from the baseline values is expected as an increase of 39.09 mm in November under the SSP1-2.6 scenario and -41.33 mm as a decrease in December under the SSP5-8.5 scenario as can be seen from the Figure 9 (a) and (c), respectively.



SSP1-2.6 (a)

SP2-4.5 (b)



SSP5-8.5 (c)

Figure 9: Projected Precipitation Anomaly for 2040-2059 - Niğde (Ref. Period: 1995-2014), Multi-Model Ensemble

8.4.3 Assessment of Hazards

8.4.3.1 Identification and assessment of relevant climate-related hazards

According to ISO 14091, the first step in the CCRA requires to identify the climate-related hazards that may affect the Project site and, among them, those the Project may be exposed to. Additional available literature (i.e., IPCC Report on Impacts, Adaptation and Vulnerability, UNEP Finance Initiative, World Bank National & Policy Climate and Disaster Risk Screening tool) was considered to define a framework and guide the hazard identification process.

Key questions to consider in the hazard identification process are the following:

- Which are the past events and what are the main issues that affected the site and may be related to climate change?
- Which are the climate-related hazards that may become relevant in the future?

Information from World Bank Group – Climate Change Knowledge Portal, Vulnerability section, were consulted to identify the most relevant hazards at the Country level. In addition to this, THINK HAZARD portal (implemented by Global Facility for Disaster Reduction and Recovery (GFDRR) in collaboration with World Bank and providing high level hazard assessment worldwide) was used to refine the investigation at the level of the city of Niğde.

The outcomes of this processes resulted in the following list of selected hazards. They are listed together with the main justification for their inclusion and assessment ("Highest", "High", "Medium", "Low" or "Lowest) for the the risk assessment. The assessment was qualitatively characterized based on the future projections and selected according to the characteristics of the Project.

- **Flooding Hazard**

Flooding is a recurring natural hazard throughout Niğde.

The flood risk in Niğde is influenced by its geographic location in the Central Anatolia region of Türkiye. While the city is not located directly on the coast, it can still be affected by heavy rainfall from weather systems passing over the area.

During periods of intense precipitation, rivers and streams in and around Niğde can swell, potentially leading to localized flooding in low-lying areas and areas with inadequate drainage. Urbanization and changes in land use can also contribute to increased flood risk by altering natural drainage patterns.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as "HIGH".

- **Extreme Heat Hazard**

The mean annual temperature in Niğde has increased by an average of 0.5°C per decade since 1971, adding up to a 1.5°C temperature increase since last century. Temperatures are projected to keep rising. This can have significant implications for extreme heat.

Projections indicate prolonged exposure to extreme heat, resulting in heat stress, is expected to occur at least once in the next five years.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as "HIGH".

- **Extreme Cold Hazard**

In Niğde Province, in January, which is typically the coldest month of the year, average minimum temperatures moved from -6.37°C for the period 1901-1930 to -5.58° in the period 1991-2020. According to all scenarios, minimum temperatures are expected to further increase in the future.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “LOW”.

- **Drought Hazard**

Droughts have large impacts on agricultural production and the population. Niğde Province has a desertification risk above medium level. It is situated at an elevation of about 1300 m above sea level.

According to a study, 110 droughts lasting six months and more occurred between 1950 and 2015. It was determined that drought magnitude increases from 1-month time scale to 36-month timescale.[7]

Additionally, if droughts intensify, they will pose serious threats to food security, people’s main livelihood activity (agriculture), and water resources.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “HIGH”.

- **Severe Storms Hazard**

According to The European Severe Weather Database (ESWD)[8], severe storms including severe wind, heavy rain, large hail, damaging lightning is a recurring hazard in Niğde.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “HIGH”.

- **Extreme Precipitations Hazard**

Extreme rainfall events can trigger massive mudslides in poorly constructed urban areas and along degraded and deforested slopes. Additionally, increases in the intensity of rains with climate change will have serious implications on agriculture, sedimentation rates, infrastructure, and industry.

The severity of heavy precipitation events is projected to increase, though rainfall events will likely be less frequent.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “MEDIUM”.

- **Wildfires Hazard**

According to Think Hazard portal, in Niğde Province the wildfire hazard is classified as high which means that there is greater than a 50% chance of encountering weather that could support a significant wildfire that is likely to result in both life and property loss in any given year. Based on data available in the Global Forest Watch, Niğde lost 79 ha overall from all loss factors between 2001 and 2022, including the loss of 23 ha of tree cover due to fires. In this time frame, the year 2021 had the greatest amount of tree cover loss due to fires, with 7 ha lost to fires accounting for 55% of all tree cover loss for that year. Fires were responsible for 23% of tree cover loss in Niğde between 2001 and 2022.

In extreme fire weather events, strong winds and winds born debris may weaken the integrity of infrastructures. Future climate projections based on models indicate that there will likely be more instances of fire weather in

[7] https://www.researchgate.net/publication/322157691_INVESTIGATION_OF_TRENDS_IN_METEOROLOGICAL_DROUGHTS_IN_NIGDE_PROVINCE

[8] https://eswd.eu/

this area, including higher temperatures and more variable rainfall. Due to longer periods without rain during fire seasons, the length of the fire season and the number of days with weather that could assist fire spread are projected to rise in areas already subject to wildfire hazard.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “HIGH”.

8.4.3.2 *Exposure assessment*

Once hazards potentially affecting the Project site were identified, the exposure of the Project to each hazard was addressed. The key question in the exposure assessment is the following:

- In case of any of the selected climate-related hazard hitting the Project site, would the Project be impacted?

The evaluation considered the intrinsic characteristics and features of the Project.

Table 9: Exposure Assessment

HAZARD	ELEMENT EXPOSED	EXPOSURE	JUSTIFICATION
FLOODING	Infrastructures/People	YES	Flooding could cause damages to project components (solar panels, tacker (panel carrier) system, and PV module carrier system, DC Combiner Box, inverter stations and substation) and associated infrastructure and utilities (administrative building, Transformer Center Building), as well as disruptions to access roads and affect people.
EXTREME HEAT	Infrastructures/People	YES	Project components and associated facilities could be affected by extremely hot temperatures. Similarly, people would be impacted by temperatures which are already high and they are expected to increase even further.
DROUGHT	Infrastructures/People	YES	The plant depends on water for its functions.
SEVERE STORMS	Infrastructures/People	YES	Lightings, intense rain accompanied with strong wind and potentially hail would cause disruptions to project components as well as associated facilities and a thread to people. Severe storms could also cause local flooding which could represent an additional disturbance.
EXTREME PRECIPITATIONS	Infrastructures/People	YES	Project components, and access roads would be highly exposed in case of extreme precipitations. People as well would be impacted, in particular in case of flooding due to intense rain.
WILDFIRES	Infrastructures/People	YES	In case of wildfires both people and infrastructures may be affected.

The Project was considered exposed to all relevant climate-related hazards potentially affecting the Project site. Therefore, all of them were scoped in for further assessment.

8.4.4 Assessment of Sensitivity, Adaptive Capacity and Vulnerability

8.4.4.1 Sensitivity

For each hazard, the Sensitivity was qualitatively characterized based on a set of indicators, selected according to the characteristics of the Project potentially exposed to that hazard.

The final step was to assign a class of Sensitivity (“High”, “Medium” or “Low”), entailing all information collected through the assessment process, also considering their relative importance, reliability and completeness. A conservative approach has been adopted assigning a higher Sensitivity class whenever the assessment was uncertain due to inconsistent indicators.

The Project Sensitivity towards each hazard is presented below with the main considerations that justify the assessment.

Sensitivity to Flooding: overall Sensitivity has been assigned “MEDIUM” The level is justified that all project components would be highly impacted in case of flooding.

Sensitivity to Extreme heat: overall Sensitivity has been assigned “MEDIUM”. The plant would be impacted with moderate consequences due to both the nature of the hazard and the typology of the infrastructure.

- No green areas are present in the Project site that may absorb heat in case of hot temperatures.
- Project components could be susceptible to high temperatures. Solar panels can experience reduced efficiency and potential malfunctions in cases of extreme heat.
- Roads are the only gateway to the plant. Extreme heat can particularly damage roads, creating traffic disruptions.

Sensitivity to Extreme cold: overall Sensitivity has been assigned “MEDIUM”. The plant would be impacted with moderate consequences due to both the nature of the hazard and the typology of the infrastructure.

- Ice formation on solar panels, cables, and other equipment can disrupt operations and increase the risk of physical damage. Icing on moving parts, such as tracking systems, may cause them to malfunction.
- Snow buildup on solar panels can block sunlight and significantly reduce energy production. The weight of accumulated snow can also strain the mounting structures, potentially causing damage.
- Roads are the only gateway to the plant. Icy and snowy roads can lead to traffic disruptions.

Sensitivity to Drought: overall Sensitivity has been assigned “MEDIUM”.

- According to the experience gained from other projects operated by Kalyon Enerji, there has been no need for panel cleaning in the first three years. If panel cleaning with wet cleaning method is required in the following years of operation, the amount of water required per cleaning is calculated as 520 m3 according to the assumption that 4 tons per MWp will be required. The water will be supplied through groundwater well similar to potable water.
- Water need for dust suppression during dry periods is estimated to be 50 m3/day and it will be supplied through the effluent of the wastewater treatment plant having advanced treatment. Additional water need will be supplied from Kemerhisar Municipality by water tankers.

Sensitivity to Severe storms: overall Sensitivity has been assigned “HIGH”. The level is justified that all project components and other infrastructures would be highly impacted in case of strong wind, lightings and intense precipitations which typically characterize severe storms events.

- Severe storms may be accompanied with lightings that could affect the solar panels and the other components of the Project.

Sensitivity to Extreme precipitation: overall Sensitivity has been assigned "MEDIUM".

- Extreme precipitation could bring damage to the plant and the operations.
- Run-off waters may affect all Project components.
- Extreme precipitations may bring local flooding, potentially affecting the following more sensitive Project components.

Sensitivity to Wildfires: overall Sensitivity has been assigned "HIGH".

- There are a few potential fire hazards in the plant:
  - Solar power plants, with their extensive array of panels, are susceptible to lightning strikes. A direct lightning strike or induced surges can cause electrical and fire hazards.
  - Malfunctioning inverters can generate excess heat and pose a fire risk.
  - Electrical faults or malfunctions within the solar panel system, such as faulty wiring or overheating components, can lead to electrical fires.

8.4.4.2 Adaptive Capacity

Similar to Sensitivity, the Adaptive Capacity was qualitatively assessed through the information provided the Client. The final step was to assign a class of Adaptive Capacity ("High", "Medium" or "Low"), entailing all information collected through the assessment process, also considering their relative importance, reliability and completeness. A conservative approach has been adopted assigning a lower Adaptive Capacity class whenever the assessment was uncertain due to inconsistent indicators.

The following are considerations related to considerations that apply to all hazards; their evaluation helped with an overall identification of the Adaptive Capacity versus climate change-related events in the Project region:

- In October 2021, Türkiye ratified the Paris Agreement and pledged to achieve net zero emissions by 2053. To strengthen its efforts, Türkiye is establishing new institutional arrangements, including the Ministry of Environment, Urbanization, and Climate Change (MoEUCC), and is updating its National Climate Change Action Plan, which identifies and defines a set of strategic options of mitigation and adaptation for different economic sectors.
- A Country Climate and Development Report for Türkiye was published in June 2022. The report identifies pathways to achieving climate-resilient growth. A robust analysis of the impact of climate science was undertaken, followed by an in-depth analysis of the macroeconomic and sectoral implications of climate impacts on Türkiye's future development prospects. The report was developed by the World Bank, the IFC and Multilateral Investment Guarantee Agency.
- The Project has an active Emergency Preparedness & Response Plan, which was prepared by WSP. It includes also extreme weather events (flooding and lightning).

The following section presents the Adaptive Capacity specific for each hazard at the Project level; this can be achieved through design and engineering solutions or dedicated maintenance that can be introduced at Project level and do not depend on any external factor or elements.

Adaptive Capacity to Flooding: overall Adaptive Capacity has been assigned “HIGH”.

- By adding the reinforced concrete structure under the fences, the safety of the work site improved by increasing the height of the security fence, and the site was protected from flood and surface water.
- The foundation of the inverter station was raised 60 cm from the ground level against the risk of water rising.
- The infrastructure of the inverter station is designed in such a way that the surface and storm water infiltration will be prevented and water is collected in the water collection -pit -constructed -on the ground level of the station and discharged with the help of a pump.
- The manhole cover located at the entrance of the foundation of the inverter station is manufactured as leakproof.
- Waterproofing is provided with XPS Board and Membrane insulation materials inside the concrete foundation.

Adaptive Capacity to Extreme Heat: overall Adaptive Capacity has been assigned “MEDIUM”.

- When air conditioning systems are used, energy efficiency techniques will be considered as much as possible according to the following criteria:
  - Placing air intakes and air-conditioning units in cool, shaded locations;
- Ventilation and air conditioning system is being installed in the switchyard. There will be a self-cooling system in inverters.

Adaptive Capacity to Extreme Cold: overall Adaptive Capacity has been assigned “MEDIUM”.

- PV modules that are selected for the plant can operate up to -40 degree Celsius.

Adaptive Capacity to Drought: there are few Adaptive Capacity measures in place. Overall Adaptive Capacity has been assigned “MEDIUM”.

- Project will reduce, as much as possible, water use for cleaning. The water distribution system at camps and buildings (e.g., taps, toilet flushing) will be periodically checked to ensure that they are working properly and that taps are not left open.
- Soiling of PV modules will be monitored through devices to optimize the time for cleaning which will reduce the water consumption.
- Treated domestic wastewater would be reused for dust control in accordance with the standards defined in the Wastewater Treatment Plants Technical Procedures Communique if it is deemed feasible. In case wastewater reuse would be decided to be applied, a wastewater reuse plan will be prepared during the construction phase describing which types of wastewater are suitable for each reuse application and effective control measures will be implemented to prevent misuse of reused water.

Adaptive Capacity to Severe Storms: overall Adaptive Capacity has been assigned “LOW”. Little Adaptive Capacity seem to be in place to prevent or mitigate potential disruptions caused by severe storms.

- No specific measures are in place according to available information to protect the plant from infiltration due to intense precipitations, or disruption caused by strong wind and lightings which often characterize severe storms events.

Adaptive Capacity to Extreme Precipitations: overall Adaptive Capacity has been assigned “MEDIUM”.

- Assessment of surface water runoff and flooding conditions after heavy rainfall events for efficiency of water conveyance systems will be implemented.
- While adaptive capacity measures stated in the adaptive capacity to flooding part above are determined, extreme precipitation cases are also taken into consideration.

Adaptive Capacity to Wildfires: overall Adaptive Capacity has been assigned “MEDIUM”.

- All personnel will receive a “Training on Actions and Measures to be Taken During Emergencies” annually regarding the established emergencies. Through the competent authorities, it will be ensured that the Fire Fighting, Search, Rescue, Evacuation and First Aid teams receive the necessary training.
- Fire equipment, first aid equipment and alarm systems will be checked monthly to review their efficiencies.

8.4.4.3 Vulnerability

The magnitude of potential effects and consequences were assessed for each hazard, combining the Sensitivity and the Adaptive Capacity. A qualitative approach has been used, applying the matrix shown below.

VULNERABILITY			
	SENSITIVITY		
ADAPTIVE CAPACITY	Low	Medium	High
High	Lowest	Low	Medium
Medium	Low	Medium	High
Low	Low	High	Highest

Figure 10: Vulnerability Matrix

The Vulnerability of the Project resulted higher for Drought, Severe Storms and Extreme Precipitations. The level of Vulnerability for these hazards is “highest”, meaning that the Project could experience severe damages and consequences in case of any of these extreme events related to climate change.

The Project resulted less vulnerable to Extreme Heat and Wildfires. The level of Vulnerability for Extreme Heat is “medium”, meaning that the Project would be affected in case of such event but consequences would be less severe. Finally, the Project resulted having a “low” vulnerability to Wildfires.

Table 10 shows the details of Vulnerability assessment for all hazards.

Table 10: Vulnerability Assessment

Hazard	Sensitivity	Adaptive Capacity	Vulnerability
FLOODING	MEDIUM	HIGH	LOW
EXTREME HEAT	MEDIUM	MEDIUM	MEDIUM
EXTREME COLD	MEDIUM	MEDIUM	MEDIUM
DROUGHT	MEDIUM	MEDIUM	MEDIUM
SEVERE STORMS	MEDIUM	LOW	HIGH
EXTREME PRECIPITATIONS	MEDIUM	MEDIUM	MEDIUM
WILDFIRES	HIGH	MEDIUM	HIGH

8.4.5 Physical Risk Assessment

The Climate Change Risk has been assessed combining Vulnerability and Hazard levels, according to qualitative considerations based on the following matrix:

RISK					
	VULNERABILITY				
HAZARDS	Lowest	Low	Medium	High	Highest
Lowest	Lowest	Lowest	Low	Low	Medium
Low	Low	Low	Low	Medium	Medium
Medium	Low	Medium	Medium	High	High
High	Low	Medium	High	High	Highest
Highest	Medium	High	High	Highest	Highest

Figure 11: Risk Matrix

A summary of the outcomes is presented in Table 11.

Table 11: Risk Assessment

Hazard	Vulnerability	Hazard Class	Risk
FLOODING	LOW	HIGH	MEDIUM
EXTREME HEAT	MEDIUM	HIGH	HIGH
EXTREME COLD	MEDIUM	LOW	LOW
DROUGHT	MEDIUM	HIGH	HIGH
SEVERE STORMS	HIGH	HIGH	HIGH
EXTREME PRECIPITATIONS	MEDIUM	MEDIUM	MEDIUM
WILDFIRES	HIGH	HIGH	HIGH

8.4.6 Risk Mitigation Actions and Conclusions

The Climate Change Physical Risk Assessment helped identifying the most critical climate-related risks, at present or in the future, according to different emission scenarios and during the lifetime of the Project as a consequence of Climate Change.

Based on these results and the assessment of the Vulnerability, it was possible to identify, for each hazard, a few measures that could be put in place to prevent or to reduce the potential impacts.

The list of measures identified here has not to be considered binding nor exhaustive. However, it should be taken under consideration to try to reduce the Vulnerability of the plant towards climate-related hazards.

All Risks

- The Project Emergency Preparedness & Response Plan should include considerations, procedures and measures to deal with all hazards, such as extreme weather conditions, drought and wildfires. In addition to this, keep updating and revising the existing emergency response plans.
- Making sure all necessary equipment and training are provided along the entire Project lifespan.
- Implement an early warning system and make provision for a direct connection with any existing early warning systems at local or regional level to guarantee information on potential extreme event are monitored and shared on a daily basis.

- Maintain an efficient network connectivity within the Project site, making sure mobile communication and alternative communication systems would be available in case of an emergency due to climate-related extreme events.
- Collaborate with local Authorities to guarantee that roads connecting to the plant are maintained on a regular basis. This would increase the Adaptive Capacity in all hazards, particularly those related to potential flooding.

Risk of Extreme Heat and Cold

- Provide adequate and regular maintenance of cooling and heating systems verifying that the adequacy is guaranteed in the face of the expected increase and decrease in temperatures and heat waves and cold waves.
- Consider using materials for the administrative building and other infrastructures with a lower capacity to absorb heat and higher capacity to maintain their main properties in case of extremely high temperatures.
- Provide proper and regular maintenance to administrative building, infrastructures and equipment to avoid increasing their sensitivity hot and cold temperatures.
- Rescheduling working hours during extremely hot and cold periods to ensure the safety and efficiency of staff working in outdoor areas.

Risk of Droughts

- Improve water efficiency systems and technologies to reduce water consumption.

Risk of Severe Storms and Extreme Precipitations

- Flooding assessment on a regional scale has to be completed to assess the flooding conditions and the necessary changes will be incorporated into the design. A supplemental assessment of stormwater drainage risks to the environment has to be undertaken to verify the stormwater drainage designs' effectiveness in mitigating impacts on surrounding land use, surface and groundwater or sensitive ecological receptors therein.
- Implement measures to protect the plant and its main more sensitive infrastructures from infiltration due to intense precipitations, or disruption caused by strong wind and lightings which often characterize severe storms events.
- Installing lightning rods at the Project site.
- Keep manholes and drainage channels clean to avoid potential flooding in cases of heavy rain associated with intense precipitations.
- Verify that materials potentially subject to displacement in the presence of strong gusts of wind are adequate to cope with more intense and more frequent storms.
- Collaborating with the Municipality of Niğde and Niğde Special Provincial Administration to better understand the contents of their plan to mitigate the effects of the rains. Trying to identify shared measures and strategies to reduce and prevent disruptions in case of extreme precipitations.
- Commission more in-depth geotechnical studies to better characterize the stability of the geological formation in the Project area, particularly in the presence of exceptional amount of water, in case of intense precipitations.
-

Risk of Wildfires

- Organize awareness programs and personnel availability to deal with potential fires, possibly in collaboration with the Fire Department in Niğde.
- Verify the adequacy of the maintenance program of all prevention and fire emergency systems.

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9.0 CUMULATIVE IMPACT ASSESSMENT

There is no universally accepted methodology or best practice to assess cumulative impacts, although various guidance documents exist (such as the IFC Good Practice Handbook on Cumulative Impacts Assessment and Management). The approach used in this chapter has been adopted based on the principles of the relevant guidance, previous experience, the nature of the Project, and the information obtained from the online EIA platform of Türkiye (for other proposed projects in the AoI).

Cumulative impacts are defined as "… those that result from the successive, incremental, and/or combined impacts of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones." (IFC Good Practice Handbook: Cumulative Impact Assessment and Management).

Cumulative impacts can result from various types of interaction(s) among different impact factors:

- Impacts arising from the accumulation of different impact factors at a specific location or over a specific receptor; as an example, the concurrent presence of the emission of noise and air, visual impact, and water resources during construction and operation at the same location;
- Impacts arising from the same impact factor over the same receptor in a different geographic location; as an example, the degradation of the same habitats in different locations may harm the population of associated species across their entire distribution area.
- Impacts arising from the concurrent presence of impact factors caused by the Project and other development projects; as an example, we can consider the emission of dust from the construction of the Project and the concurrent construction of a new road or construction/operation of an industrial development at the same location.

According to IFC, cumulative impact assessment is the process of:

- analysing the potential impacts and risks of proposed developments in the context of the potential impact of other human activities and natural environmental and social external drivers on the chosen valued environmental and social components (VECs) over time, and
- proposing concrete measures to avoid, reduce, or mitigate such cumulative impacts and risks to the extent possible.

IFC proposes a six-step approach for the CIA study (Figure 9-1) in the CIA Handbook which has been used for the CIA of the Project.

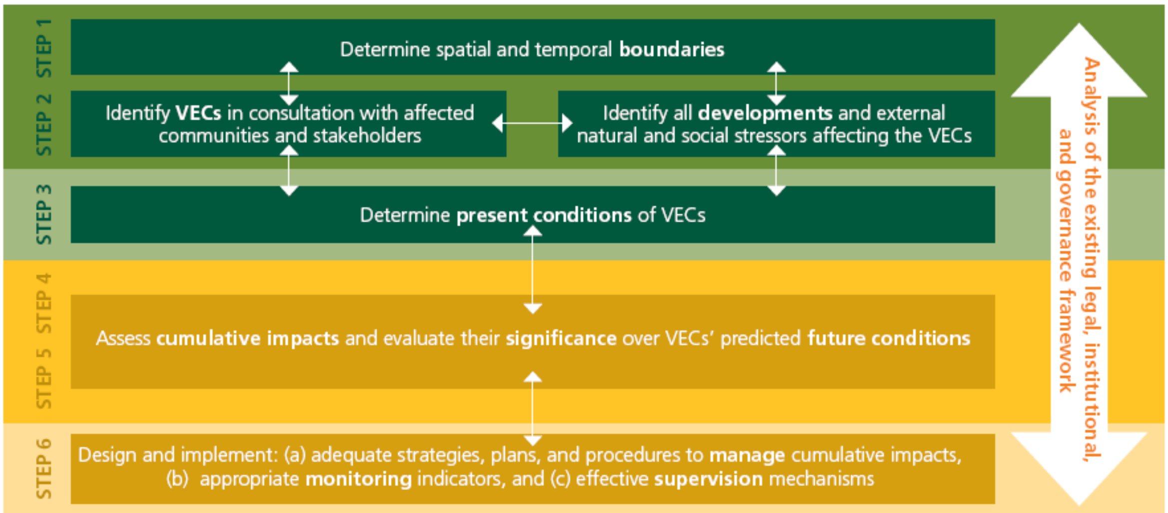

Figure 9-1: Cumulative Impact Assessment Methodology

This chapter presents the implementation of the stepwise methodology detailed in the CIA Handbook and the results of the CIA for Project. Above mentioned steps are listed below:

- Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries
- Step 2: Scoping Phase II – Other Activities and Environmental Drivers
- Step 3: Establish Information on the Baseline Status of VECs
- Step 4: Assess Cumulative Impacts on VECs
- Step 5: Assess Significance of Predicted Cumulative Impacts
- Step 6: Management of Cumulative Impacts

9.1 Step 1 – VECs, Spatial and Temporal Boundaries

In the first step of this CIA study, objectives are listed as:

- Identifying and agreeing on VECs in consultation with stakeholders.
- Determining the time frame (temporal boundaries) for the analysis.
- Establishing the geographic scope (spatial boundaries) of the analysis.

9.1.1 Valued Environmental and Social Component (VEC)

VECs are defined as fundamental elements of the physical, biological or socio-economic environment, including the air, water, soil, terrain, vegetation, wildlife, fish, birds and land use that may be affected by a proposed project.

In that respect, in this ESIA Report various sensitive receptors, sources and stakeholders have been identified which can be considered as VECs for the CIA. The potential identified VECs for the Project can be listed for construction and operation phases below:

<u>Construction</u>

- Noise
- Air Quality

- Traffic
- Visual Aesthetics
- Terrestrial Biodiversity
- Social (resettlement and land acquisition, community health and safety, labour influx)

Operation

- Visual Aesthetics
- Terrestrial Biodiversity
- Social (community health and safety, economy, labour influx)

9.1.2 Temporal Boundaries

The temporal boundary of the CIA contains the entire Project lifecycle (i.e., from construction until the end of decommissioning and closure). However, the capability of reasonably predicted future actions and tendencies (including the planning/implementation of other relevant projects in the region) limits the CIA process.

Therefore, for this CIA, consideration is given to the scope that is practical for discussion and assessment of cumulative impacts with the other projects for the construction and operation phases.

9.1.3 Spatial Boundaries

The relevant spatial boundaries for this CIA are the same with each specific Area of Influence (AoI) defined in Chapter 5 for each relevant topic (physical, biodiversity, social, etc.).

9.2 Step 2 – Other Activities and Environmental Drivers

Objectives of Step-2 are to:

- Identify other past, existing, or planned activities within the analytical boundaries,
- Assess the potential presence of natural and social external influences and stressors.

9.2.1 Other Activities

In the scope of the CIA study, past, existing, and planned projects and activities that are present in the CIA examination area have been assessed considering the spatial and temporal boundaries explained above. These existing and planned projects and activities have been taken into consideration by the CIA if an ongoing activity has a potential for interaction with the Project.

During the determination of the activities, the following sources have been used:

- Online EIA Platform of the Turkish Ministry of Environment, Urbanization and Climate Change
- Google Earth satellite views
- Internet searches especially for the SPP projects

Existing, and reasonably planned projects and activities likely to interact with the Project are given in detail in the table below.

Table 9-1: Existing and Planned Projects (3rd party facilities) and Activities in the CIA Examination Area

No	Project / Activity	Distance to the Project (m)	Capacity	Condition
1	G4-BOR-1 Solar Power Plant Project	546	140 MWp / 100 Mwe 201.3 hectare	Under construction
2	G4-BOR-2 Solar Power Plant Project	0	150 MWp / 100 Mwe 202.2 hectare	Under construction
3	G4-BOR-1 SPP Electricity Transmission Line	1097 m	154 kV 1272 MCM	Under construction (25%)
4	G4-BOR-2 SPP Electricity Transmission Line	475 m	154 kV 1272 MCM	Construction completed
5	G4-BOR-3 SPP Electricity Transmission Line	0	154 kV 1272 MCM	Under construction (90%)

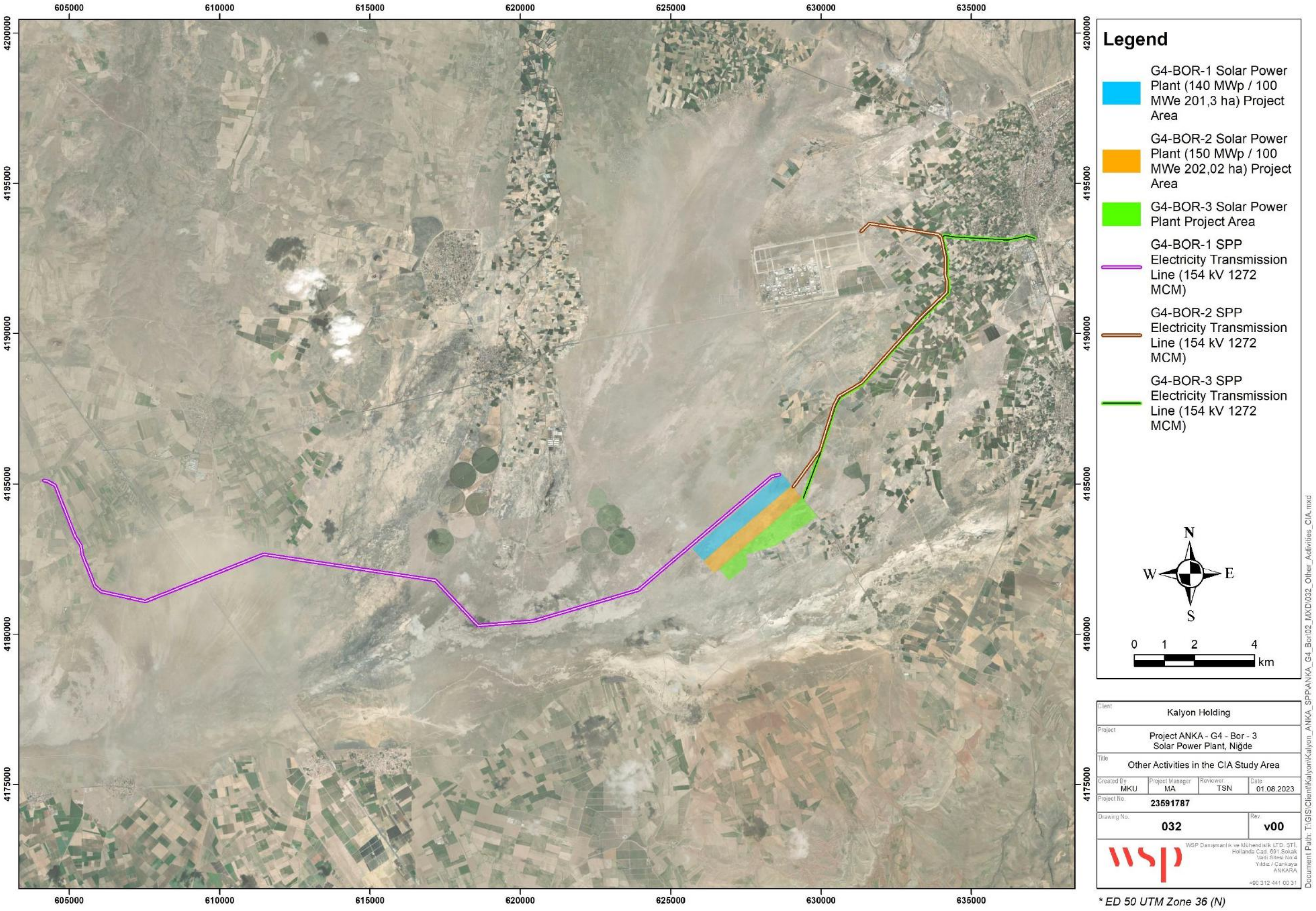

Figure 9-2: Other Activities in the CIA Study Area

9.2.2 Environmental Drivers

Environmental drivers are defined as natural drivers and other stressors, such as wildfires, droughts, floods, predator interactions, human migration, and new settlements that may exert an influence on the VEC conditions (IFC, 2013).

Environmental drivers have significant impacts on a variety of environmental and social components. Project impacts that discharge pollutants to lakes or rivers, or that withdraw water for industrial or agricultural purposes are likely to be more significant during periods of drought. The fire regime in forested areas is a major driver that shapes social, ecological, and economic systems. For the purposes of the CIA, identification of such processes is not a question of new research but is based on existing knowledge of the ecology and/or natural dynamics of the selected VECs.

According to the existing information, no major environmental driver that can create a cumulative impact on selected VECs has been identified.

9.3 Step 3 – Establish Information on Baseline Status of VECs

Considering that the existing/planned facilities identified in Step 2 are already in their construction or operation periods at the time of baseline studies conducted of the ESIA, the baseline measurement results presented in Chapter 6 of this ESIA also reflect the impacts of the construction and operation activities of the 3rd party facilities.

9.4 Step 4 – Assess 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 from various past, present, and planned developments. The objective is to estimate the state of VECs as they result from the aggregated stresses that affect them (IFC, 2013).

Whether each present and planned project will have an impact on VECs is presented below. Afterwards, VECs that were affected by at least one more project with the Project were determined for the cumulative impact assessment study.

The significance of these impacts will be presented in the next chapter.

Table 9-2: Cumulative Impact Assessment

Project / Activity	Construction						Operation		
	Noise	Air Quality	Traffic	Visual Aesthetics	Terrestrial Biodiversity	Social	Visual Aesthetics	Terrestrial Biodiversity	Social
G4-BOR-1 Solar Power Plant Project	√	√	√	√	√	√	√	√	√
G4-BOR-2 Solar Power Plant Project	√	√	√	√	√	√	√	√	√
G4-BOR-1 SPP Electricity Transmission Line	√	√	√	√	√	√	√	√	√
G4-BOR-2 SPP Electricity Transmission Line	√	√	√	√	√	√	√	√	√

Project / Activity	Construction						Operation		
	Noise	Air Quality	Traffic	Visual Aesthetics	Terrestrial Biodiversity	Social	Visual Aesthetics	Terrestrial Biodiversity	Social
G4-BOR-3 SPP Electricity Transmission Line	√	√	√	√	√	√	√	√	√

9.5 Step 5 – Assess Significance of Predicted Cumulative Impacts

In the ESIA process, components of impact significance (magnitude, spatial scale, duration, frequency) are typically factors in deciding whether mitigation is necessary. Consequently, the evaluation of significance and the design of management and/or mitigation are in reality iterative. The significance of a cumulative impact is evaluated not in terms of the amount of change, but in terms of the potential resulting impact on the vulnerability and/or risk to the sustainability of the VECs assessed.

To understand the cumulative impact of the projects on the VECs identified in Table 9-2, their PIF or PTD in Turkish (Project Introductory File prepared for the project which will have smaller scale environmental impacts), EIAs (if any) and some academic articles were taken into account.

Definition of the sensitivity of the environmental and social components

Geology and geomorphology & Natural Hazard Seismology:

- Presence of faults: Areas with active faults are considered to pose the highest risks to the Project and hence are considered of higher sensitivity;
- Presence of landslides: Areas within the range of landslides are considered to pose the highest risks to the Project and hence are considered of higher sensitivity;
- Other geohazards: (karst areas, slope erosion, liquefaction, stream channels, etc.). The presence of other geohazards in the Project area is considered of higher sensitivity; and
- Seismicity: The location of the Project in areas classified as at seismic risk is considered of higher sensitivity.

Soils:

- Soil agricultural potential: soils with the highest agricultural potential according to local or global assessments are attributed a higher sensitivity;
- Soil erosion potential: Soils with the highest erosion potential according to local or global assessments are attributed a higher sensitivity; and
- Soil pollution potential: soils in areas identified and previously used for industrial, mining, or intensive agriculture are attributed a higher sensitivity.

Surface water:

- Presence of water bodies in the Project area of influence and level of ecological integrity; the sensitivity increases with the level of ecological integrity;
- Presence of water bodies in the Project area of influence and level of water/sediment pollution; the sensitivity increases in the presence of polluted watercourse; and

- Presence of waterbodies and level of tolerance to hydrological changes; the sensitivity is higher for waterbodies with a low level of tolerance for hydrological changes.

Groundwater:

- Presence of shallow aquifers; the sensitivity increases with the presence of shallow aquifers that could be more easily exposed to contamination sources;
- Productivity of exploited aquifers; Aquifers with low productivity might be depleted in case the Project entails groundwater abstraction. The sensitivity is higher for aquifers with low productivity;
- Presence and extent of existing groundwater exploitation; the sensitivity is higher for aquifers already exploited;
- Rock permeability; The sensitivity increases in case the subsoil is made of rocks with high permeability; and
- Aquifer vulnerability; The sensitivity increases with the vulnerability of the aquifer as determined by accepted methodologies.

Air quality:

- Presence of settlements and population potentially exposed to air emissions from the Project; the sensitivity increases with the number of people exposed;
- Presence of vulnerable targets (schools, hospitals, retirement houses, etc.) exposed to air emissions from the Project; the sensitivity increases with the number of vulnerable people exposed;
- Air quality levels in the areas affected by the Project; the sensitivity increases in areas already polluted and areas designated for air quality protection; and
- Presence of sensitive ecological receptors like protected or classified areas, protected or endangered habitats and species.

Noise and vibration:

- Presence of settlements and population potentially exposed to noise and vibration from the Project; the sensitivity increases with the number of people exposed;
- Presence of vulnerable targets (schools, hospitals, retirement houses, etc.) exposed to noise and vibration from the Project; the sensitivity increases with the number of vulnerable people exposed;
- Noise and vibration levels and/or sources in the areas affected by the Project; the sensitivity increases in areas already experiencing high levels of noise and vibrations and in areas designated for protection from noise and vibrations; and
- Presence of sensitive ecological receptors like protected or classified areas, protected or endangered habitats and species.

Landscape and components with sensitivity to visual quality:

- Presence and number of settlements/people within the visual zone of visual influence.
- Presence of areas of touristic interest within the visual zone of visual influence.
- Presence of roads and volume of traffic within the visual zone of visual influence.

- Presence of archaeological, cultural, and historic areas within the visual zone of visual influence.
- Presence of natural parks protected and classified areas within the visual zone of visual influence.

Habitats and biodiversity features:

- The number of species of flora or fauna present in the habitat. The sensitivity increases with the number of species present.
- Presence of threatened species of flora or fauna in the habitat as defined by global (IUCN) or national red lists. The sensitivity increases with the number of threatened species present and the threat level.
- Presence of endemic or restricted range species of flora or fauna in the habitat as defined by global (IUCN) or national red lists. The sensitivity increases with the number of species present and the level of endemicity.
- Presence of protected species or species listed in international conventions for the protection of biodiversity. The sensitivity increases with the number of protected/listed species.
- Presence of invasive alien species. The sensitivity is higher for habitats in areas with a higher number of invasive alien species present.
- Presence of natural habitats; The sensitivity increases with the surface of natural habitats present in the Project area of influence.
- Presence of threatened or protected habitats; The sensitivity increases with the surface of threatened or protected habitats present in the Project area of influence.
- Presence of critical habitats; The sensitivity increases with the surface of critical habitats present in the Project area of influence.
- Presence of relevant nursery, spawning or feeding grounds or migration routes.

Protected areas:

- Presence of protected areas; The sensitivity increases with the number, extent and level of protection of protected areas present in the Project area of influence.

Local communities:

- Presence of skilled personnel in the local community; the sensitivity (to positive impacts) is higher the more people with skills relevant to the Project.
- Presence of businesses and economic activities relevant to the Project; The sensitivity to positive impacts is higher for communities with a well-structured business community.
- Level of health care available; The Project could cause a population influx that can put a strain on existing health services if left unmanaged. The sensitivity of communities is higher in areas with an insufficient level of healthcare available.
- Presence of communicable diseases; The spreading of communicable diseases can be exacerbated by the influx of workers due to the Project. The sensitivity of communities is higher for those more prone to be affected due to local conditions.
- The overall health state of the population; the Project might cause increased levels of exposure to environmental health determinants like air pollutants, noise and vibrations, etc. The sensitivity of communities is higher in the presence of existing health issues in the communities potentially affected by the Project.

- The presence of environmental health determinants like air and water pollution, and soil and groundwater contamination increase the community sensitivity.
- Areas with concentrated fisheries activities; areas with an abundance of fishery resources.

Education

- Presence of education facilities;
- Level of education of the population;

Health

- Level of health care available; The Project could cause a population influx that can put a strain on existing health services if left unmanaged. The sensitivity is higher in areas with an insufficient level of healthcare available;
- Presence of communicable diseases; The spreading of communicable diseases can be exacerbated by the influx of workers due to the Project. The sensitivity is higher in areas affected by a high level of communicable diseases.
- The overall health state of the population; the Project might cause increased levels of exposure to environmental health determinants like air pollutants, noise and vibrations, etc. The sensitivity is higher in the presence of existing health issues in the communities potentially affected by the Project.
- Presence of existing environmental health determinants. The presence of environmental health determinants like air and water pollution, and soil and groundwater contamination are increasing the sensitivity.

Ecosystem Services

- Presence of ecosystem services;
- Dependence of the local communities on ecosystem services

Cultural heritage:

- Presence of protected or recognized sites of archaeological or cultural value; the sensitivity increases with the number, cultural/scientific value and level of protection of sites potentially affected;
- Presence of sites with a high archaeological potential in the absence of specific site information or appropriate protection mechanisms; the sensitivity increases with the archaeological potential as indicated by relevant experts;
- The presence of intangible cultural values like sacred sites, initiation sites, sites used for cultural events, sites recognized in oral traditions, etc. the sensitivity increases with the number of sites and values as recognized by the local communities.

9.5.1 Noise

Cumulative impacts on noise are likely to occur at most sites where construction will be conducted concurrently. During the construction phase of the Project, an increase in ambient noise levels is expected due to the operation of generators, heavy machinery, equipment etc. during:

- General engineering/construction work; and
- Material transportation.

Apart from the Project, two other SPP projects adjacent to the Project area, namely the G4-Bor-1 Solar Power Plant Project to be realized by Smart GES Enerji Üretim A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş., will be constructed. While the construction of the G4-Bor-2 Solar Power Plant Project has been initiated before the background noise level measurements, construction of the G4-Bor-1 Solar Power Plant Project has not been initiated yet. Based on that, baseline noise measurements already cover the noise emissions generated from the construction of the G4-Bor-2 Solar Power Plant Project. However, the project schedule, construction technologies, number of machinery and equipment of G4-BOR-1 SPP ETL and G4-BOR-3 SPP ETL are not certain yet. On the other hand, G4-BOR-2 SPP ETL construction was completed. Due to the lack of detailed information about these projects, it cannot be determined at this stage whether a certain exceedance can be expected in terms of noise.

To display the cumulative impacts of the construction of the Project and the constructions of the other two SPPs, a cumulative noise modelling study is conducted. Due to similarities between projects in terms of both area and construction technologies, the number of machinery and equipment to be used in the infrastructure and superstructure constructions are assumed identical to the Project. The noise levels of these equipment/machines were obtained from the library of SoundPlan Essential 5.0 and were introduced to the model.

In the context of the worst-case scenario approach, it has been accepted that the machines and equipment used in the construction activities are working simultaneously, in a collective way and at maximum sound power levels.

The calculated noise levels at the chosen receptors, where baseline noise measurements were conducted, the cumulative results and the comparison of the results with the IFC standards and Turkish limit values are presented in Section 7.1.2.3.1 of the ESIA. Detailed breakdown of the cumulative results of the assessed receptors are given below:

- IFC day-time noise standard is exceeded at locations N-5, N-6 and N-7;
- Turkish day-time noise regulatory limit value is exceeded at location N-6; and
- Turkish evening-time noise regulatory limit value is exceeded at locations N-5 and N-6.

The mitigation measures to be taken by Kalyon to further reduce the impacts are given in Chapter 7.1.2.3.2, and Chapter 7.1.2.4.2 and Pollution Prevention Plan. Considering all mitigation measures and commitments specified in the ESIA and the management plan, the expected cumulative impact of this project will be **Low**.

9.5.2 Air Quality

Cumulative impacts on air quality are likely to occur at most sites where construction will be conducted concurrently. Heavy construction is a source of dust emissions that may have a substantial temporary impact on local air quality. Emissions during the construction activities are associated with land clearing, ground excavation, cut and fill operations, and construction of the facility. Dust emissions often vary substantially over different phases of the construction process.

Land preparation activities and corresponding dust emissions are calculated based on the assumptions on excavation amounts, bulk density of soil, duration of earthworks, size of the area on which activities will take place, working hours per day, capacity of each truck, etc. The total amount of dust to emerge from the Project construction activities is calculated as 0.625 kg/h which is below the threshold value for the air emission dispersion modelling requirement defined by the Turkish Regulation (i.e., 1 kg/h threshold value for area source defined in Table 2.1 in Annex-2 of the SKHKKY). Therefore, possible impacts on air quality have been assessed without using software models.

Apart from the Project, two other SPP projects adjacent to the Project area, namely the G4-Bor-1 Solar Power Plant Project to be realized by Smart GES Enerji Üretim A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş., will be constructed. While the construction of the G4-Bor-2 Solar Power Plant Project has been initiated before the background noise level measurements, construction of the G4-Bor-1 Solar Power Plant Project has not been initiated yet. Based on that, baseline noise measurements already cover the pollutant emissions generated from the construction of the G4-Bor-2 Solar Power Plant Project. However, the project schedule, excavation amounts, construction technologies, and the number of machinery and equipment of G4-BOR-1 SPP ETL and G4-BOR-3 SPP ETL are not certain yet. On the other hand, G4-BOR-2 SPP ETL construction was already completed. Due to the lack of detailed information about these projects, it cannot be determined at this stage whether a certain exceedance can be expected in terms of air quality. However, due to similarities between projects in terms of both area and construction technologies, the number of machinery and equipment to be used in the infrastructure and superstructure constructions are assumed to be identical to the Project, and the expected cumulative impact of this planned project will be **Low**.

On the other hand, gaseous emissions originating from the exhaust emissions due to fuel combustion in operation of the heavy-duty vehicles are calculated by using the Emission Standards Reference Guide published by USEPA. According to this guide, the major gaseous pollutants emitted from these types of vehicles are nitrogen oxides (NOx), carbon monoxide (CO) and non-methane hydrocarbons (NMHC). Within the scope of the Project, the amount of gaseous pollutants was calculated by using the emission factor presented in Section 7.1.1.1.1. All results are significantly below the national limit values. On the other hand, the project schedule, construction technologies, and number of machinery and equipment of G4-BOR-1 SPP ETL, G4-BOR-2 SPP ETL and G4-BOR-3 SPP ETL are not certain yet. However, due to similarities between projects in terms of both area and construction technologies, the number of machinery and equipment to be used in the infrastructure and superstructure constructions are assumed to be identical to the Project, and the expected cumulative impact with this planned projects will be **Low**.

9.5.3 Terrestrial Biodiversity

A total of three Solar Power Plant Projects, including the present G4-BOR-2 SPP Project, and the two Transmission Lines considered will be located within the salt steppe of the Ereğli Plain Key Biodiversity Area (KBA) and Important Bird Area (IBA). The area of these Projects has been severely degraded by water abstraction, which caused the disappearance of the wetland ecosystem that supported the presence of migratory and breeding birds, overgrazing and wind erosion.

During construction and operation phases, potential impacts on biological components from the Project will mainly be associated with the following impact factors: removal of soil, introduction of buildings/infrastructures, emission of noise, emission of particulate matter, emission of light Increase of traffic, introduction of alien species (potential).

The main impact of the projects on biodiversity will be due to the presence of permanent infrastructures (e.g., inverter stations, substation, administrative buildings, internal roads, etc.) will cause a loss of available natural habitat during the entire operation phase, which will directly and indirectly affect habitats, flora, and fauna species. Flora and vegetation are expected to at least partially recover during the operation phase, due to rehabilitation of the temporary facilities, but also in the areas under the PV panels. In addition, if indirect impacts are not properly mitigated, habitat fragmentation and degradation could also occur.

However, literature shows that the construction of Solar Power Plants in desertic and steppe areas could determine overall positive effects on biodiversity, in terms of increased plant diversity and increased plant biomass (Bai *et al.*, 2022[1]; Graham *et al.*, 2021[2]; Hassanpour *et al.*, 2018[3]) provided that appropriate long-term management and restoration activates implemented.

Based on these considerations and assuming that appropriate mitigation and monitoring measures will be applied in all SPPs and associated powerlines, the expected cumulative impact of these projects at the regional scale is expected to be **Low**.

9.5.4 Traffic

The Project activities related to the site preparation and construction works will require the movement of trucks entering and leaving the Project Area for the transportation of machinery, equipment, construction material and staff. During the construction phase, the Project's vehicles will not be on the road at the same time. However, in the worst-case scenario, it is assumed that the vehicles will all be on the road at the same time. Based on that, approximately a 3.3% increase in State Road traffic could be expected in terms of total vehicle flow rate per hour. It should be noted that since the assessment is based on the maximum traffic load increases at the worst-case scenario during rush hour, the increase in road traffic will be much lower than the values given in the table above most of the time during a daily period.

On the other hand, during the operation phase of the Project, the vehicle traffic will be mainly from the maintenance works and staff shuttles/cars entering and leaving the Project Area. In this regard, the expected impacts of the traffic load during the operation phase can be listed below:

- The high speed of vehicles is a concern for local communities.
- Occupational safety risks concerning vehicle/worker accidents

According to the EIAs of other planned SPP projects, there will be a temporary increase of 3.38 % due to G4-BOR-1 SPP and 5.79% due to G4-BOR-2 in the existing traffic load, which will not adversely affect the traffic in the region. In addition, according to the PIF of the planned G4-BOR-1 ETL project, during the construction phase, the existing traffic load on the highway closest to the project area with the highest number of vehicles is expected to increase by 0.10% on Adana Aksaray Highway and 0.40% on a Niğde Highway in the worst-case scenario. Within the scope of the G4-BOR-2 and G4-BOR-3 ETL projects a total of 8 vehicles will be used during the construction phase. These vehicles will mainly be used for construction works within the facility. The traffic load that will be created by all vehicles using the highway has been calculated in the PIFs. There will be an increase of 0.001% in the existing traffic load due to these additional vehicles. However, G4-BOR-2 SPP ETL construction was already completed therefore it is expected that this project will not have an impact on traffic.

The mitigation measures to be taken by Kalyon Enerji to further reduce the impacts are given in Chapter 7.1.6 and the Traffic Management Plan.

Considering the traffic load increase amount calculated for the projects and all mitigation measures specified in the ESIA, the management plan and other projects' EIAs/PIFs, the expected cumulative traffic impact will be at **low** significance even when the worst-case scenario is considered.

[1] Bai Z., Jia A., Bai Z., Qu S., Zhang M., Kong L., Sun R., Wang M. (2022). Photovoltaic panels have altered grassland plant biodiversity and soil microbial diversity. Front Microbiol. 2022 Dec 15;13:1065899. doi: 10.3389/fmicb.2022.1065899. PMID: 36590393; PMCID: PMC9797687.

[2] Graham M., Ates S., Melathopoulos A., Moldenke A., DeBano S., Best L. and Higgins C. (2021). Partial shading by solar panels delays bloom, increases floral abundance during the late-season for pollinators in a dryland, agrivoltaic ecosystem. Scientific Reports. 11. 7452. 10.1038/s41598-021-86756-4.

[3] Hassanpour E., Selker J. and Higgins C. (2018). Remarkable agrivoltaic influence on soil moisture, micrometeorology and water-use efficiency. PLOS ONE. 13. e0203256. 10.1371/journal.pone.0203256.

9.5.5 Visual

During construction works, construction machinery will be introduced to the site and dust emissions will be of concern. On the other hand, temporary and permanent structures will also be constructed during this phase of the project. During the construction phase, it is also expected to have light emissions around the Project area. Construction vehicles, dust, and equipment will have visual impacts on viewers and general visibility (clarity of air) in the immediate vicinity of the construction site. However, the construction of the projects was temporary and has a short duration. In addition, there is a limited overlap of the projects in their construction phase.

On the other hand, during the operation phase, permanent structures and solar panels will be present in the projects area. The PV panels have impacts on visual aesthetics in terms of glint and glare impacts. In the Project, SiO_2 coating will be used. Silica is the most widely used ARC coating material in solar panels. This coating reduces reflections by applying a thin layer of silica on the front surface of the solar panel. However, information on the visual impacts of other projects including material to be used in the project could not be found.

Based on that, considering the worst-case scenario, the expected cumulative impact of this project will be Low.

9.5.6 Land Occupation

Three SPPs are part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor district of Niğde province on 29.09.2023. The legal status of the plots was formerly pastureland, and it was declared an industrial zone suitable for the development of solar projects: a Renewable Energy Resource Area.

The land within the Project area and the surrounding SPP Projects is owned by the government, and it is classified as Niğde-Bor Energy Specialized Industrial Zone with the decision taken on 01.06.2018 by Niğde Governorship Revenue Office National Real Estate Directorate.

Consequently, it was launched the "Competition Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy"; YEKA SPP-4 (Bor-1, Bor-2 and Bor-3) competitions were held on 08.04.2022. YEKA Right of Use Agreements were signed on 16.05.2022 with Kalyon Enerji Yatırımları A.Ş., which won the competition held by the Ministry of Energy and Natural Resources for the G4 Bor-3 region. The contract for the YEKA area was taken from Kalyon Enerji Yatırımları A.Ş. to its subsidiary, Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş., as of March 7, 2023.

Within the scope of the project, 5 m of health protection band has been determined within the EIA area of 201.6 ha, and the determined health protection band will also be used as the building approach distance in zoning plans.

The Project area is classified as IV. class lands and determined as treasury land. In the parcels of pasture quality within the borders of Niğde-Bor Energy Specialized Industrial Zone where the project site is located, with the letter dated 01.06.2018 and numbered 7112 of the Niğde Governorship Revenue Office National Real Estate Directorate, a change in qualification was made, and its registration was carried out in the name of the treasury. In this context, the entire project area remains within the treasury land.

The land allocation impact will result in negative impacts. Before the implementation of the suggested mitigating measures are put into place, all impacts are expected to occur frequently. To properly compensate the PAPs through the implementation of the Community Development Plan, the impact on the occupation of pasturelands is anticipated to decrease to between medium to negligible levels. The land requirements of the SPPs are presented below.

Ecogreen: The project site is located 26.5 km north of Niğde City Center and 13.3 km north of Bor District Center. The nearest sensitive structure is located in the Seslikaya neighbourhood, 1.43 km southeast of the project site. The entire project area remains within the treasury land. The project area is categorized as an

"Industrial Zone" in the 1/100,000 Scale Environmental Plan. The total area required for the Project development is 202,02 ha.

Smart: The project site is located 26.5 km north of Niğde City Center and 13.3 km north of Bor District Center. The nearest sensitive structure is located in the Seslikaya neighbourhood, 1.43 km southeast of the project site. The entire project area remains within the treasury land. The project area is categorized as an "Industrial Zone" in the 1/100,000 Scale Environmental Plan. The total area required for the Project development is 201,3 ha.

ETLs: There will be a loss of agricultural area only due to the pole areas during the transition from the agricultural areas. During the crossing of the agricultural areas of the line, the property right will be expropriated for the pole locations and the easement right will be obtained. Thus, the loss of property owners will be compensated in compliance with the Expropriation Law. After the installation of the ETLs, agricultural activities can be carried out by considering the distances specified in the "Regulation on Electric Power Current Facilities" During the construction, excavation, filling and operation process, the surrounding agricultural lands, agricultural infrastructure and agricultural production will not be damaged, and in case of damage, the damages will be compensated by TEİAŞ.

9.5.7 Community Health and Safety

The Project, other projects, and external drivers could contribute to the potential negative impacts on this VEC by increasing, dust and degradation of air quality, noise and population increase due to the general construction activities.

However, according to mitigation measures for both ESIA, the Project´s embedded controls and programs proposed would appropriately mitigate the negative impacts and contribution medium to low.

9.5.8 Employment

The Project and the other five projects including 2 SPPs and three ETLs and external drivers could contribute to the job opportunity generation on this VEC. However, the main employment opportunities of all Projects will be during the construction phases of the Projects which will create short-term job opportunities in the region. Considering the duration of employment, the impact has been assessed as low. The employment requirements for each project are provided below.

Ecogreen: 80 personnel will work during the construction phase of the project and 25 personnel will be employed during the operation phase.

Smart: The construction period of the project will be 6 months and the operation will work 30 days a month / 16 hours a day, in 2 shifts. 100 personnel will work during the construction phase of the project and 20 personnel will be employed during the operation phase.

ETL (G4-Bor-1): It is planned to employ 40 personnel during the construction phase of the project, and the social needs of the personnel to be employed will be met from the construction site to be established within the scope of the G4-BOR-1 SPP unit.

ETL (G4 Bor-2): 2 It is planned to employ 40 personnel during the construction phase of the project, and the social needs of the personnel to be employed will be met from the construction site established within the scope of the SPP unit. On the other hand, G4 Bor-2 ETL construction was already completed.

ETL (G4 Bor 3): 40 personnel are planned to be employed during the construction phase of the project, and the social needs of the personnel to be employed will be met from the construction site to be established within the scope of the SPP unit and/or the mobile construction site to be established in the region.

9.5.9 Local Procurement

The Project and other five projects including 2 SPPs and three ETLs and external drivers could contribute to the local procurement.

The Projects are expected to create economic contributions to the local economy by purchasing goods and services such as fuel needs of mobile equipment, transportation, foods, passenger automobiles to be used in the Project, electrical energy needs of the Project, maintenance and repair materials, office supplies, vehicle, travel, logistics, food, accommodation, communication, security. Due to these features, the Project will benefit the strengthening of the local economy of the region. However, the main local procurement opportunities of all Projects will be during the construction phases of the Projects which will create short-term economic contributions in the region. Considering the duration this impact has been assessed as low.

9.5.10 National Energy Production

G4 Bor-3 Solar Power Plant Project (“the Project”) will have 130 MWp /100 Mwe. The total energy production of the Ecogreen Project will be 150 MWp /100 Mwe and Smart SPP will be 140 MWp /100 Mwe. Among renewable energy sources, solar energy is the energy type with the highest potential. Türkiye, which has a high solar energy potential due to its location, has an average annual total sunshine duration of 2,640 hours (daily total of 7.2 hours) and an average total radiation intensity of 1,311 kWh/m^2-year (daily total of 3.6 kWh/m^2). Considering the possibility of providing uninterrupted energy with energy transmission, the Projects is expected to have a substantial contribution to the national economy of Türkiye.

9.6 Step 6 – Management of Cumulative Impacts – Design and Implementation

The management approach to implementation needs to be adaptive, monitoring both the impacts and the effectiveness of management approaches and adjusting the management to ensure the avoidance of unacceptable cumulative impacts. As with management of impacts identified in ESIA, this works best when management of cumulative impacts is integrated into company business plans and strategies.

The definition of a detailed mitigation strategy for cumulative impacts of the projects would require a set of information and data on the various projects involved that are not currently available, as well as extending the study area significantly beyond the boundaries defined for Project ESIA.

Thus, the preparation of a mitigation strategy for cumulative impacts would require cooperation and coordination among the Project owners. Furthermore, the implementation would also require the cooperation, and consent as applicable, of several related authorities that govern the various VECs, such as the departments of forestry, wildlife, and water resources management. The effectiveness of this coordination/cooperation cannot be guaranteed at this stage and will depend on the mutual preparedness of companies other than Kalyon Enerji and the related authorities to cooperate on this issue during the future phases of these projects.

According to this CIA study, cumulative impacts from the Project and other projects were generally found to be of low intensity or negligible. However, below considerations would be needed to effectively manage the cumulative impacts:

- 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 that 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 minimize individual development’s contributions. For the management of cumulative impacts, multiple stakeholders need to be involved in a collective responsibility to eliminate or minimize the impacts. Therefore, Kalyon Enerji will conduct close engagement and consultation activities with the projects mentioned in this CIA and government agencies, if necessary. For this, it is recommended for Kalyon Enerji to prepare a specific Stakeholder List for the CIA.

- Kalyon Enerji will ensure that all mitigation measures given in this ESIA, and all management plans are implemented. Since the proposed Project will be one of the largest projects in the region, the specific mitigation and monitoring measures described for each component in Chapter 7 of this ESIA report, will be important to manage the cumulative impacts. To ensure this, the monitoring programs and KPIs provided in the related ESIA chapters will be followed by Kalyon Enerji.
- In case of any grievances about the cumulative impact, Kalyon Enerji will inform the other project owners and joint actions will be taken.
- Kalyon Enerji will conduct close engagement and consultation activities with the projects mentioned in this CIA.
- Collaborative planning/process for protection and enhancement of VECs.

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10.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

10.1 Introduction

This Environmental and Social Management Plan (ESMP) identifies and presents the framework and the strategy for implementing and improving the Environmental and Social Management System (ESMS) of the G4 Bor-3 Solar Power Plant Project (“the Project”), planned by Kalyon Enerji Yatırımları A.Ş. (“Kalyon Enerji”) and Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş. (“Client”) a subsidiary of Kalyon Enerji.

The ESMP is an integral part of the ESIA as it is a system-setting document for the Project and its contractors and represents a commitment towards environmental and social sustainability applied to the Project’s entire life cycle. The ESMP is an overarching document developed in accordance with the corporate policies of Kalyon Enerji with the commitments included in the Environmental and Social Impact Assessment (ESIA) and, more broadly, with the Turkish regulatory framework relevant to the Project as well as with the E&S Standards that apply to the Project. These include International Finance Corporation (IFC) Performance Standards (PS), Guidance Documents, IFC General Environmental, Health, and Safety (EHS) Guidelines, Equator Principles (EP), and Organisation for Economic Co-operation and Development (OECD)’s Common Approaches. The Project ESMP consists of several sub-management plans as demonstrated further in Figure 10-1, in which the ESIA mitigation measures are reflected and compliance with applicable Project legislation, standards and limits are ensured.

The ESMS of the Project defined within this ESMP is developed and under continuous improvement to ensure the appropriate management of environmental and social risks to meet the objectives set by existing Kalyon Enerji policies and directives regarding E&S. Environmental and social management system at all phases is required to meet national, international standards, best practices, and Projects’ documents and requirements. Referring to the integrated policies, there are targets to achieve the Projects with zero waste, zero incidents, and full respect for humans including vulnerable groups.

Nine elements of ESMS help to assess, control, and continually improve the E&S performance, The Project ESMP has to comply with these elements.

Figure 10-1 Map Showing Nearest Settlements to the Project Site Elements of ESMS (IFC, 2015)

The E&S mitigation measures defined in the ESIA process were transposed into a Commitments Register (Chapter 10.8.8) serving as a tool which informs this ESMP as well as the associated ESMS planning and processes to be implemented at the various levels of the Project organization to ensure that the Project requirements, regulations, and standards are met.

10.2 Objectives of the ESMP

A key objective of the ESMP is to “operationalise” the E&S (including occupational health and safety) commitments and mitigations as identified in the ESIA to ensure that the Project (including construction, operation, and decommissioning) is undertaken in a way to minimise the negative impacts on the physical, biological, and social environments in the Project-affected area.

More specifically, the ESMS defined within this ESMP will:

- Establish environmental and social management standards that comply with or surpass Good International Industrial Practices (GIIP) and reasonable community expectations,
- Adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize and restore E&S impacts,
- Develop and implement policies, plans and procedures to integrate E&S aspects within the overall project management framework throughout its lifecycle,
- Facilitate the implementation of management plans as defined by the ESIA for the avoidance, minimisation, and control of E&S impacts,
- Inform Project personnel about their responsibilities with respect to E&S issues and monitor how those responsibilities are implemented,
- Train project personnel, contractors, and community representatives, as necessary, in relevant environmental and social procedures, actions, and monitoring programmes,
- Establish a monitoring programme to assess the effects of residual impacts on the environment and monitor the ESMS performance and,
- Provide for periodic system audits and identify corrective actions, if necessary, to reach the planned objectives.

The Project ESMP includes a set of associated E&S sub-management plans as listed in Table 10-1, which have been prepared for addressing specific E&S issues. The ESMPs provide details of the actions that will be taken by the Client during the construction phase and, later, during operations to mitigate and manage the Project’s E&S impacts and risks. This ESMP outlines how the Project will monitor, and how external contractors will address and manage E&S risks and impacts generated by their activities in line with the mentioned standards. The Project ESMP also includes tools for auditing and monitoring the Project’s performance and communicating monitoring outcomes to stakeholders.

Additional details related to the operation phase of the Project are expected to be developed in due course. Accordingly, this Project ESMP will be subject to revisions before the start of operations to encompass and consider any new information relevant to the management of E&S impacts and risks. The purpose of this ESMP is to define:

- The scope of the ESMS during the construction and operation phases
- The standards applied to the Project ESMS during the construction and operation phases
- Responsibilities and commitments, for the implementation of the ESMS
- The framework for the definition and implementation of the mitigation measures applicable to the Project
- The framework for the definition, implementation, and management of the monitoring activities and

- The framework for the review of the environmental and social performance and of the adequacy of the ESMPs.

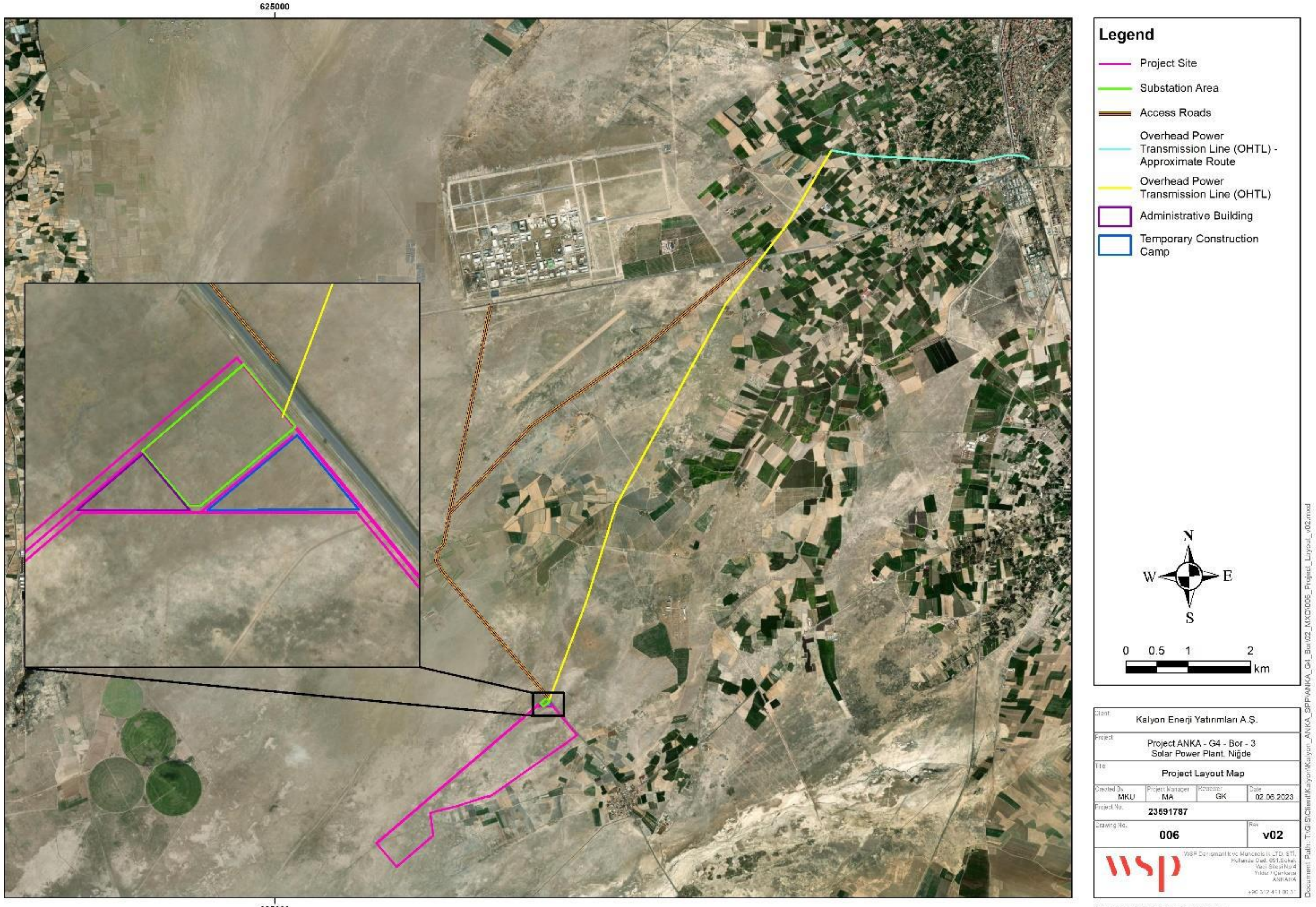
The Project ESMP will apply to normal operating conditions during the construction, operation, and decommissioning activities. Emergency situations resulting from unplanned events will be addressed in a specific Emergency Preparedness and Response Plan (EPRP), also an element of the ESMS.

Although the Client will have full control and ultimate responsibility on the construction, operations and decommissioning of the Project, an EPC and a number of subcontractors will be retained for carrying out different activities that will have to maintain their own ESMS, while incorporating the Project ESMPs into their own Project-specific ESMP aligned with the provisions included in this Project ESMP and the ESIA developed for the entire Project.

10.3 Project Description

G4 Bor-3 Solar Power Plant Project ("the Project") having a capacity of 140 MWp /100 MWe, is planned by Kalyon Enerji Yatırımları A.Ş. and this Project will be developed and constructed by Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş, a subsidiary of Kalyon Enerji. The Project will be located in Niğde Province, in the Bor District, Seslikaya and Badak neighbourhoods in Türkiye. Once the Solar Power Plant is put into operation, it is planned to produce -266010 MWh of electricity annually, and the electricity produced will be connected to the Bor Substation via ~13 km 154 kV OHTL.

The project layout is presented in Figure 10-2.



* ED 50 UTM Zone 36 (N)

Figure 10-2: Project Layout

The Project is part of a process initiated by the Ministry of Energy and Natural Resources, which has allocated 2,539 hectares of land in the Bor district of Niğde province on 29.09.2023. The legal status of the plot was formerly pastureland, and it was declared an industrial zone suitable for the development of a solar project: a Renewable Energy Resource Area.

The Project will be established on a pastureland of 201.6 hectares. The Project area has been classified as an "Industrial Zone" in the 1/100.000 Scale Environmental Plan. The area lies within the borders of the "Niğde-Bor Energy Specialized Industrial Zone".

The closest settlements to the SPP site are Seslikaya Village at 1.4 km, Emen Village at 2.7 km and Badak Village at 4.9 km, and the nearest residence is located 700 m southeast of Seslikaya Village. As reported by Kalyon, there is an idle barn approximately 80 m from the Project area. The nearest settlements to the Project site are shown in Figure 10-3.

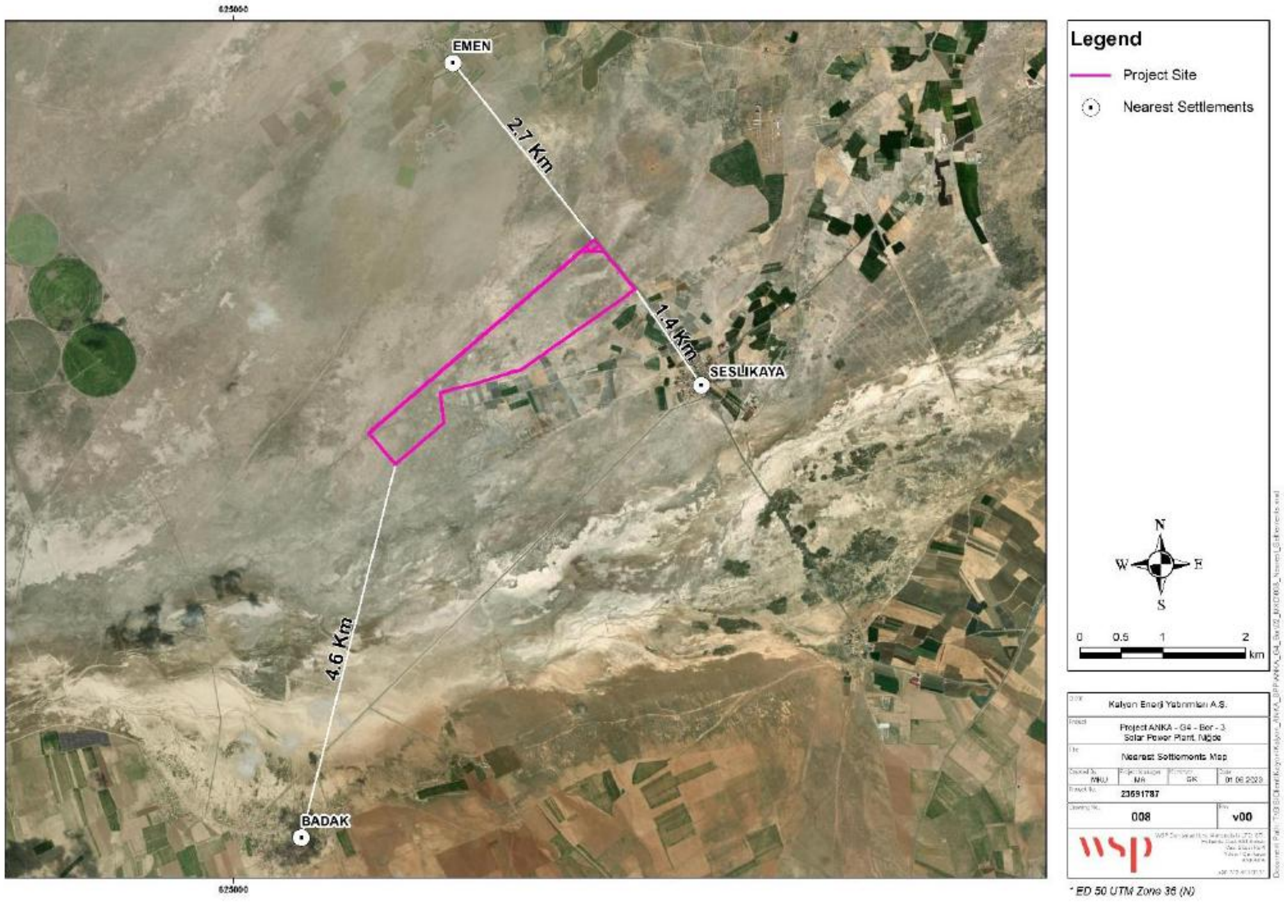


Figure 10-3 Map Showing Nearest Settlements to the Project Site

10.4 Legal, Regulatory and Policy Framework

This section includes policies, standards, and requirements of reference for this Plan that are applicable for, but not limited to, construction, operation, and decommissioning phases of the Project.

It is important to note that the Project will comply with the adopted Project Standards.

Project standards are described in the Project ESIA and are listed below:

- National legislative requirements and all permits, licenses, and approvals
- IFC PSs
- Equator Principles (EPs) IV
- Other good international industry practices (GIIP).
- International Conventions and Protocols Türkiye is a party to
- Kalyon Enerji's IMS Policy, Health&Safety Policy, Environment and Climate Change Policy, Social Impact and Human Rights Policy and related practices and procedures
- EBRD and IFC, Workers' Accommodation: processes and standards

For a detailed breakdown of the project standards regarding air quality, water quality, soil quality, noise and vibration please refer to Appendix A.

10.4.1 Applicable Turkish Legislation

The Turkish legal framework for environmental protection was developed in line with national and international initiatives and standards, and some of them have been revised recently to be harmonized with the European Union (EU) Directives in the scope of pre-accession efforts of Türkiye to the EU. The Turkish Environment Law No. 2872 dated 1983 set the general framework of the environmental requirements for the protection of the environment. It has a comprehensive structure that has a holistic and integrated vision of the environment. “Polluter pays” and “user pays” principles and carrying capacity concepts form the basis of regulatory tools in Environmental Law. The Law is supported by numerous regulations and decrees prepared/updated in the process of alignment with EU legislation.

10.4.2 Applicable International Legislation

Türkiye is a party to many international agreements regarding multiple social and environmental subjects. These are listed in ESIA - Chapter 2 Regulatory and Policy Framework and their applicability are discussed further in the relevant chapters of this ESIA. Türkiye has also ratified several international European, United Nations, and ILO conventions on several topics including labour conditions and human rights.

The following international standards are also applied to the Project:

- Equator Principles IV (2020)
  - Principle 1: Review and Categorization
  - Principle 2: Environmental and Social Assessment
  - Principle 3: Applicable Environmental and Social Standards
  - Principle 4: Environmental and Social Management System and Equator Principles Action Plan
  - Principle 5: Stakeholder Engagement
  - Principle 6: Grievance Mechanism

  - Principle 7: Independent Review
  - Principle 8: Covenants
  - Principle 9: Independent Monitoring and Reporting
  - Principle 10: Reporting and Transparency.
- IFC Performance Standards (2012):
  - Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts
  - Performance Standard 2: Labour and Working Conditions
  - Performance Standard 3: Resource Efficiency and Pollution Prevention
  - Performance Standard 4: Community Health, Safety, and Security
  - Performance Standard 5: Land Acquisition and Involuntary Resettlement
  - Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
  - Performance Standard 7: Indigenous Peoples (not applicable to the Project)
  - Performance Standard 8: Cultural Heritage
- IFC General EHS Guidelines (2007)
- IFC EHS Guidelines for Electric Power Transmission and Distribution (2007)
- Performance Indicators and Monitoring, Documents Pertaining to Human Rights (2012)
- Other IFC Guidelines:
  - IFC's Good Practice Note on Addressing Grievances from Project-Affected Communities (2009)
  - IFC's Good Practice Note on Managing Contractors' Environmental and Social Performance (2017)
  - IFC's Good Practice Handbook on Use of Security Forces: Assessing and Managing Risks and Impacts (2017)
  - IFC's Introduction to Health Impact Assessment (2009)
  - IFC and EBRD's Guidance Note on Workers' Accommodation: Processes and Standards (2009)
  - IFC's Good Practice Handbook on Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets (2013)

10.5 ESMP

The Project ESMP (this document) is structured to present the pillars of the ESMS that the Client has established for the Project, referring to the existing overarching integrated management system documents and consisting of the newly prepared documents:

- Corporate Policies and Directives
- Project-specific HR Policy and Procedure
- Risks and impacts identification process (the ESIA)

- Management of Change (MoC) procedure of the Project
- Environmental and Social Management Plan (ESMP).
- Organisational Capacity and Competency (Figure 10-5)
- Communication to and engagement with stakeholders (Project Stakeholder Engagement Plan (SEP) will be disclosed on the Kalyon Enerji website)
- Emergency Preparedness and Response
- Monitoring and review.

The selected EPC and subcontractors are required to develop their ESMPs incorporating the requirements of the Project ESMPs defined and prepared as per the ESIA requirements. They have to follow these documents, including E&S plans and procedures while working on the Project. Such plans and procedures are reviewed and approved by the Client for construction, operation and decommissioning to assess their alignment with the Project ESMS.

The following sections of this chapter include an overview of the elements that constitute Project ESMS.

10.5.1 Environmental and Social Policies

- The Client has IMS Policy, OHS Policy, Environment and Climate Change al Policy, Social Impact, and Human Rights Policy. A Sustainability Policy is being prepared that covers all policies compatible with its vision and mission. Kalyon Enerji will ensure that all employees within the Project organization are acquainted with the policy and its associated procedures. Additionally, EPC and its sub-contractors will be required to adhere to the Policy's requirements through a contractually binding agreement.

10.5.2 Risks and Impacts Identification Process

E&S aspects and impacts associated with the Project have been identified and evaluated as part of the ESIA process as summarized in Figure 10-4. Details on the full impact assessment methodology used are provided in the ESIA Chapter 5 - Methodology.

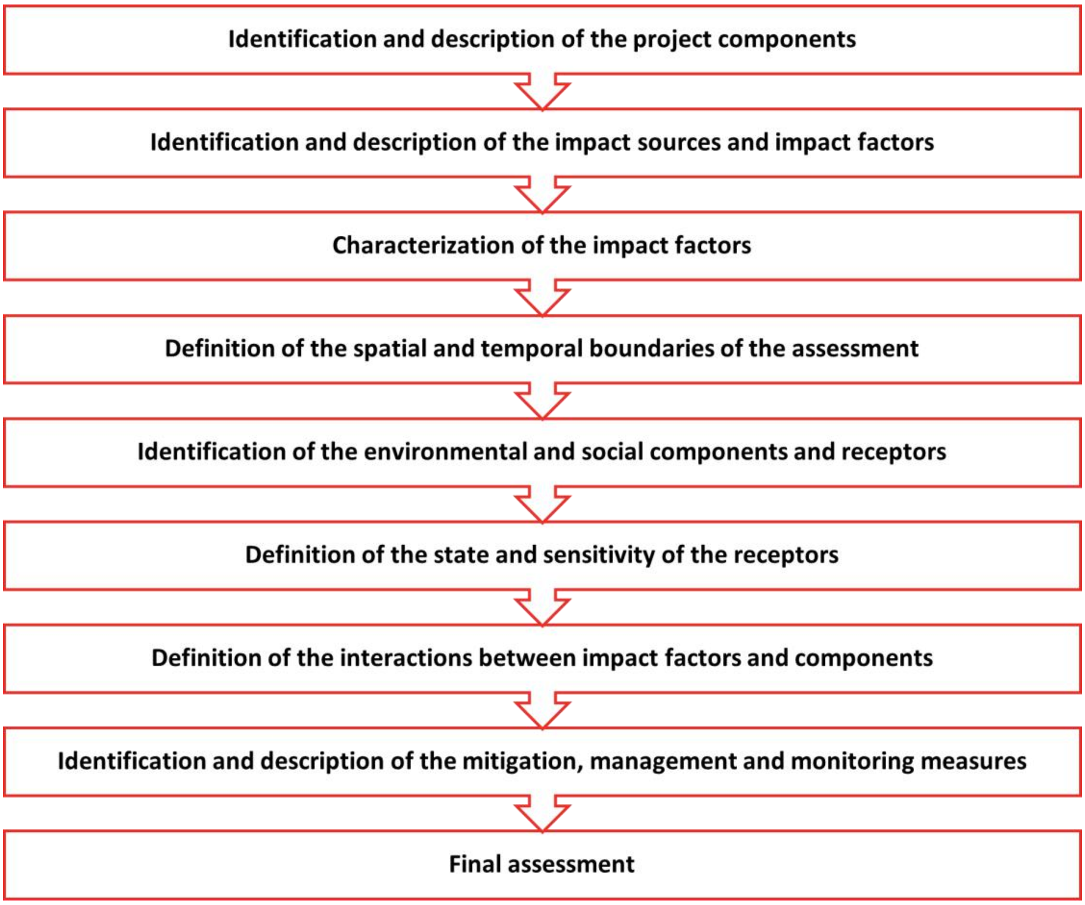


Figure 10-4: Impact Assessment Approach

The ESIA resulted in the identification of E&S risks and potential impact factors for which specific mitigation measures were identified to mitigate the effects of the impact factors. The ESIA was prepared in accordance with both National Regulations and applicable international standards. The ESIA process included the following steps:

- Review of available Project and environmental and social documentation
- Gap Analysis Study with a preliminary independent opinion on the Project's E&S risks/aspects as well as the adequacy of the assessments carried out and the plans and procedures developed to manage the impacts from the Project in compliance with applicable IFIs' E&S Policies and Standards. The results of the initial Gap Analysis Study identified the need for additional baselines and to re-evaluate the outcomes of the national EIA carried out to achieve full compliance with lenders' standards
- Site visits to the Project to see the different project areas and meet/work close with the Client team
- Biological and physical baselines surveys have been performed for physical (air quality, noise and vibration measurements at sensitive receptors, soil, groundwater) and biological (flora, fauna) components to provide an understanding of the environmental context in the Regional Study Area (RSA) and the Area of Influence (AoI) of the Project before its realization
- A Stakeholder Engagement process including community-level surveys, focus group discussions, key informant interviews
- The ESIA report: an ESIA report has been prepared and includes the results of the ESIA process carried out as well as an assessment of the Project's adverse and positive impacts and includes mitigations measures that will be the basis for the preparation of ESMPs, a component of the Project's ESMS. The ESIA report includes a Non-Technical Summary (NTS) prepared for disclosure.

10.5.3 Management of Change

The Project develops a system that includes appropriate tools and procedures to identify future risks and impacts that may arise from Project changes, which may differ or be additional to those already identified in the ESIA. The Client's MoC (Management of Change) process screens are used to manage such risks and impacts. The MoC process assesses risks and impacts related to injury/health, environment, damage, etc., on a scale of 1-5, ranging from insignificant to catastrophic/severe.

Specifically, The Client develops a standalone MoC Procedure that occurs during the Project development and the like. The purpose of the MoC is to evaluate the impacts of changes in the Project and track the necessary information to effectively manage the consequences of the change on environmental and social components inside the Project's area of influence. The key principles of the MoC will include:

Specifically, The Client develops a dedicated MoC Procedure to be implemented during the Project development. The purpose of this procedure is to evaluate the impacts of Project changes and track the necessary information to effectively manage the resulting consequences on environmental and social aspects within the Project's AoI. The key principles of the MoC process include:

- Managing permanent, temporary, and urgent/emergency changes to procedures or process equipment.
- Providing screening tools and procedures to evaluate proposed changes and their consequences in terms of environmental and social risks and impacts within the project's area of influence.
- Implementing procedures to assess the impacts and risks generated by the changes and determine if they may result in additional risks and impacts beyond those identified in the ESIA process. If differences are found, the MoC process should provide additional or enhanced mitigations to be included in the Environmental and Social Management Plans (ESMPs) to address the risks associated with the changes.
- Including provisions for communicating the proposed changes, their consequences, and any new management requirements to personnel whose job tasks may be affected by the changes. These individuals may require training before implementing the changes.
- Ensuring that all critical documentation remains up to date as changes are implemented.

The Client will structure its MoC assessment process using a 1-5 level scale and categorize changes according to their significance as follows:

- **Level III:** Changes of **higher significance** that are reasonably likely to have significant adverse impacts outside the scope or study area of the ESIA and are not mitigated by the existing ESMP and mitigation measures. This may trigger the need for an addendum to the ESIA and a formal submission and approval process. Changes in project standards also fall under this category. Level III changes require revising or updating the ESMP and the ESMS.
- **Level II:** Changes of **moderate significance** that are considered material to the findings of the ESIA and fall within the scope or study area covered by the ESIA. This may require minor modifications to the ESMP and additional surveys or environmental and social assessments, as necessary.
- **Level I:** Changes of **minor significance** that are largely deemed immaterial to the findings of the ESIA and do not affect the project's ability to meet environmental and social performance requirements through the existing ESMP and ESMS. These changes may require limited or no additional environmental or social study or survey activities.

For Level III and II changes that are likely to require an ESMP update, it is important to notify all relevant stakeholders. Workers or other parties involved in implementing measures to manage the effects of the changes should be trained to understand the implications of the changes and their ability to respond accordingly.

10.5.4 Environmental and Social Management Plans

The Client has developed a comprehensive set of Environmental and Social Management Plans (ESMPs) and procedures in alignment with their policies and commitments. These plans specifically address the environmental and social impacts identified in the ESIA for each Project component. The ESMPs include relevant mitigation measures to address these impacts. The table below presents the complete set of ESMPs that has been developed and implemented to fulfil the Project's commitments, along with the corresponding IFC PSs that each plan will contribute to complying with.

Table 10-1: ESMPs

Relevant IFC PS	Plans / Procedures
IFC PS1 5-24: Assessment and Management of Environmental and Social Risks and Impacts	▪ ESMP - (this chapter) ▪ Stakeholder Engagement Plan
IFC PS2: Labour and Working Conditions	▪ Human Rights Management Plan ▪ Camp Site and Offsite Accommodation Management Plan ▪ Labour Management Plan ▪ Contractor Management Plan ▪ Supplier Management Plan
IFC PS3: Resource Efficiency and Pollution Prevention IFC EHS Guidelines	▪ Resource Efficiency Management Plan ▪ Pollution Prevention Plan (e.g., air, noise, wastewater, soil, groundwater contamination, hazardous material management, etc.) ▪ Waste Management Plan ▪ Soil Management and Erosion Control Plan ▪ Hazardous Material Management Plan
IFC PS4: Community Health, Safety, and Security IFC EHS Guidelines	▪ Traffic Management Plan ▪ Community Health and Safety Management Plan ▪ Security Management Plan ▪ Emergency Preparedness and Response Plan
IFC PS5: Land Acquisition and Involuntary Resettlement	▪ Not applicable
IFC PS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	▪ Biodiversity Management Plan
IFC PS7: Indigenous Peoples	▪ Not applicable
IFC PS8: Cultural Heritage	▪ Cultural Heritage Management Plan and Chance Find Procedure

The ESMPs will be implemented:

- across the Project organization, including, EPC, its sub-contractors, and primary suppliers over which the Client has control or influence.

- inside the Project Area of Influence including the associated facilities (as defined by IFC PS1: “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”).

The ESMPs contain the following components:

- Objectives of the document
- Reference to relevant legal requirements
- Roles and responsibilities for implementation
- Links to other management plans, as necessary
- List of management and mitigation measures
- Monitoring and reporting requirements
- Qualitative or quantitative Key Performance Indicators (KPIs) and measures for assessing the effectiveness of the mitigation measures identified during the impact assessment process
- Training and awareness requirements, as needed
- Inspections, audits, and reviews.

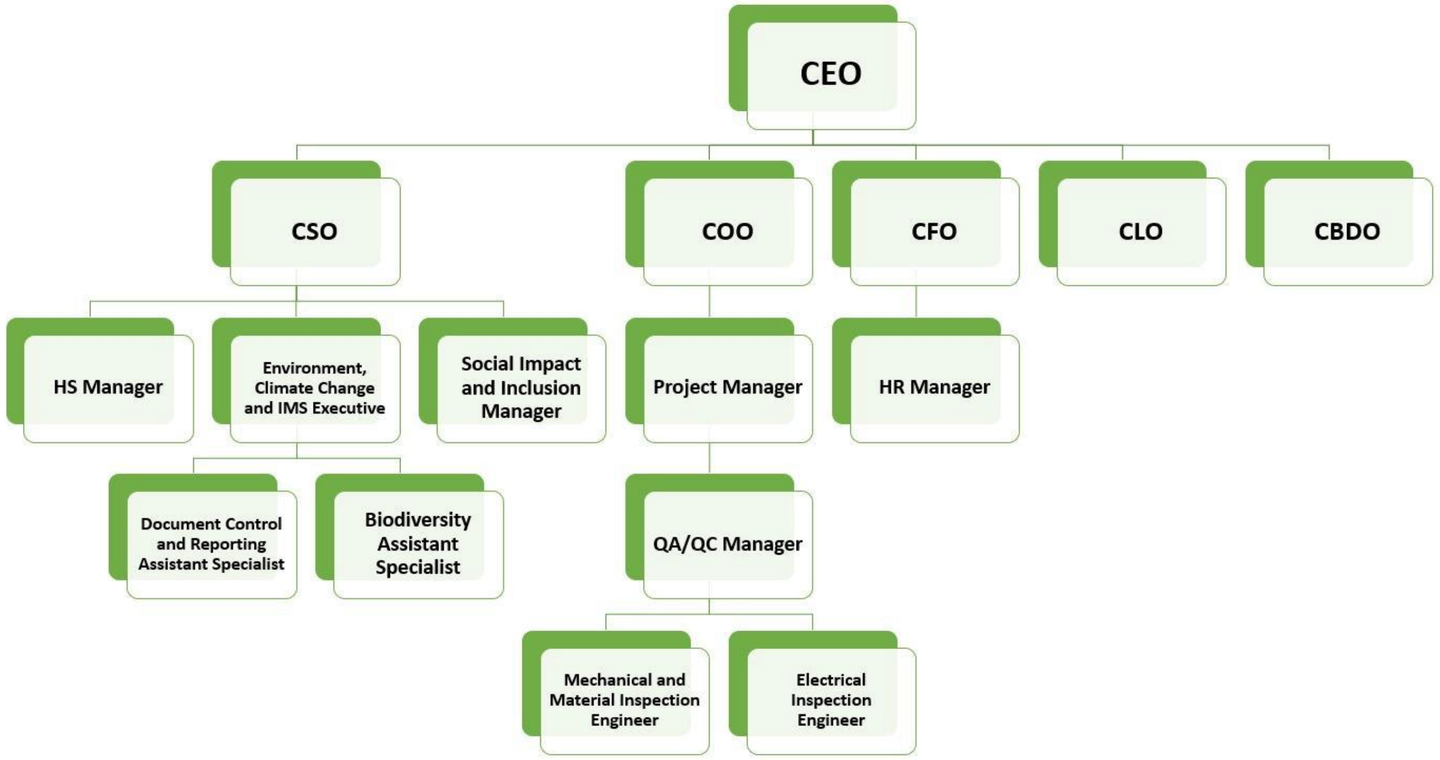
Each management plan has a similar structure, but the level of detail and complexity is appropriate to the expected impacts and risks of the Project identified in the ESIA. The mitigation measures identified in the relevant sections of the ESIA are included in each management plan, which will be disclosed to stakeholders in accordance with the SEP.

The ESMPs will be shared with EPC and subcontractors to ensure they develop their own equivalent management plans, procedures, and work instructions that align with the ESMP. Additional mitigation measures specific to their activities will be included as necessary.

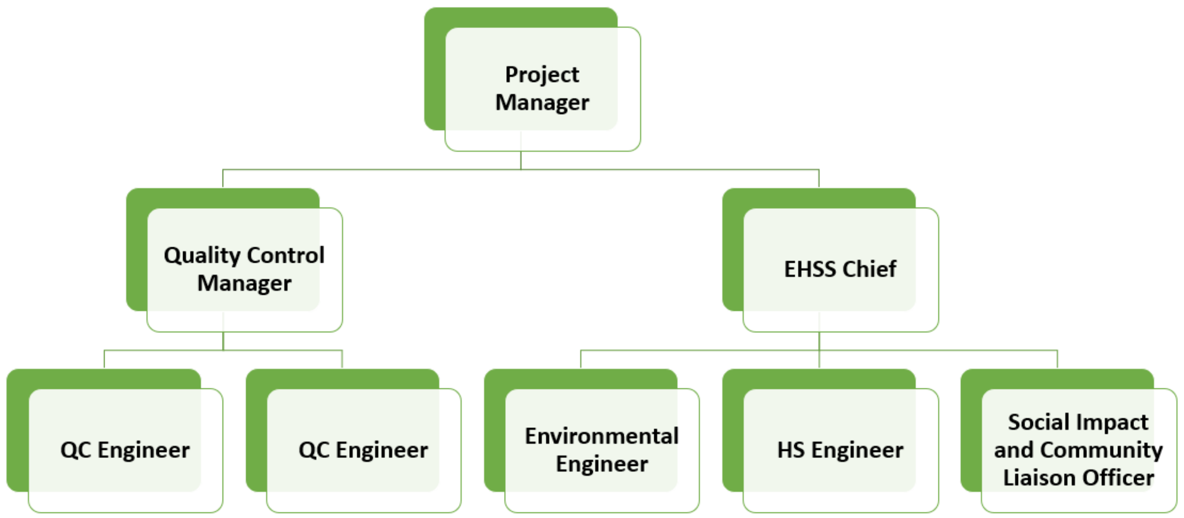
10.6 Organisational Structure and Competency

10.6.1 Resources, Roles, Responsibility and Authority

To effectively implement the Environmental and Social Management System (ESMS), all parties involved in the Project (Client, EPC, and its sub-contractors) need to establish dedicated organizational structures with clearly defined responsibilities for managing environmental and social aspects, including health and safety as per the IFC PSs. Figure 10-5 illustrates the organization chart showing the Project Parties.



CLIENT ORGANIZATION STRUCTURE



EPC ORGANIZATION STRUCTURE

Figure 10-5: Organization Chart

Below are the key roles and positions involved in the Project. These descriptions are intended as a starting point and will be further developed by the Client, specifying the exact number and nature of positions and staff to be employed.

Table 10-2: Roles and Responsibilities

Role	Overall Responsibilities	Specific responsibilities
Client Management	▪ Provide strategic E&S direction across the Project. ▪ Oversee and monitor the implementation of the ESMPs. ▪ Approve EPC's document/plan/procedure prepared and ensure they are aligned with the ESMS requirements. ▪ Monitor that sufficient and qualified resources are allocated for the ESMS implementation. ▪ Monitor that clear and specific roles and responsibilities are defined at all levels of the organisation involved in the plan implementation.	▪ Ensure that sufficient and qualified resources (including financial) are allocated across the different work streams to ensure effective implementation of the mitigation measures included in the ESMPs. ▪ Ensure that EPC is qualified to carry out its tasks and have in place effective ESMPs aligned with those developed by the Client. ▪ Ensure that qualified specialists are appointed to supervise E&S aspects on the ground. ▪ Sign off this ESMP and the related ESMPs as well as those developed by contractors and subcontractors' plans.
Client Site Personnel	▪ Monitor that Project ESMP documentation is maintained and implemented. ▪ Work with EPC to monitor that their Project specific ESMP is in-line with the Company ESMS and this ESMP and support when gaps are identified. ▪ Monitor the implementation of the ESMP of EPC and subcontractors.	▪ Provide day-to-day advice and guidance on all Project E&S requirements, including to EPC and subcontractors. ▪ Conduct training and awareness programmes with personnel involved in the ESMP implementation, as needed. ▪ Monitor that this Plan and related ESMPs are up to date and appropriate to the nature and scale of the Project's activities and ensure they are implemented effectively. ▪ Ensure Health, Safety, Security and Environment (HSSE) audits are carried out across the different Project areas to ensure EPC and subcontractors are effectively implementing the mitigation measures identified. Maintain records of all non-conformances raised and take appropriate actions to ensure corrective measures are implemented. ▪ Collect and perform QA/QC review of all monitoring data and develop performance monitoring reports (including those provided by specialized contractors) for Management, stakeholders, and Lenders.
EPC and its sub-contractors Management	▪ Ensure that each subcontractor has in place an ESMP aligned with the Project ESMP and relevant management plans commensurate	▪ Ensure the workforce is trained for the specific tasks assigned and implement the HSSE requirements included in the

Role	Overall Responsibilities	Specific responsibilities
	to the risks associated with the subcontractor's activities. ▪ Monitor the ESMP implementation and check performance. ▪ Follow up on on-compliance identified until their closure.	ESMPs and line with contractual arrangements. ▪ Provide relevant monitoring data and reports of the monitoring activities carried out as requested by the Client. ▪ Propose changes and integrations to the monitoring activities included in this manual and the related ESMPs if they do not fit the specific activities carried out.
All employees	▪ Be aware of the requirements included in the different management plans as needed by the relevant work task assigned.	▪ To comply with environmental management requirements. ▪ Report on any activities which represent a deviation from or a non-compliance with the ESMS requirements. ▪ Implement the mitigation measures identified in the ESMPs during the execution of the works.

Job-specific roles and positions together with job descriptions and responsibilities have been further described within the individual ESMPs. In alignment with the requirements of IFC PS1, the Client will ensure that job-specific training (see next Chapter 10.6.2 on *Training, Awareness and Competence* for additional details) will be in place to ensure that all employees are qualified and aware of the policies and procedures. Likewise, the Client will require that EPC and subcontractors have appropriate training for all their employees operating on the Project. Such training will include a minimum of the following:

10.6.2 Training, Awareness and Competence

The Client will provide appropriate EHSS training programmes to all their managers and employees based on their assigned tasks. The purpose of this training is to ensure the following:

- All staff is aware of the -EHSS risks associated with the Project and of the need to implement the ESMP, and the requirements therein, and that failure in the implementation of these requirements may lead to significant -EHSS impacts and a breach in the commitments taken by the Project to be aligned to Lenders' requirements
- Staff with direct responsibility for the Project's -EHSS performances have the adequate knowledge, skills, and experience to perform their duties and are familiar with the applicable laws, regulations relevant to their job task
- Staff possess the knowledge, skills, and experience to implement the specific measures and actions required under the ESMPs.

In addition to the above, EPC will be required to develop its training and awareness procedures and a training program for its personnel, including subcontractors. These procedures should identify the training needs, planning, and execution, and should provide specific instructions for developing and maintaining an up to date -EHSS training program. The training programs will have different levels of competency and training based on individual personnel's -EHSS responsibilities and involvement. Approval from the Client will be required for EPC training programs to ensure they are suitable for the assigned tasks.

10.7 Stakeholder Engagement

10.7.1 Engagement Process and Disclosure of Information

According to IFC PS1, it is necessary to have effective stakeholder engagement to prevent and reduce social risks and to ensure that the Project maintains a long-term social license to operate. Stakeholder engagement plays a crucial role in establishing strong, positive, and responsive relationships, which are essential for effectively managing the environmental and social risks and impacts associated with a project.

The main objective of effective stakeholder engagement is to provide stakeholders with relevant information about the Project's potential environmental and social impacts through transparent disclosure. This helps ensure that stakeholders have accurate perceptions of the proposed development. It also involves consulting with stakeholders to gather their feedback and opinions, as well as providing a mechanism for addressing any concerns or complaints they may have. Stakeholders can be either external or internal to the Client (presumably the organizations involved in the project) and can include individuals or groups who:

- Directly or indirectly affected by the Project,
- Interested in the Project and its activities,
- Able to influence the Project and the expected results.

The stakeholder engagement process helps to:

- identify and involve all stakeholders potentially affected by the Project,
- ensure a good understanding of the Project activities and potential impacts/benefits,
- identify issues early in the Project cycle that may pose risks to the Project or its stakeholders,
- ensure that mitigation measures are appropriate (implementable, effective, and efficient),
- establish a system for long-term and mutual communication between the Project and stakeholders that benefits all parties.

The stakeholder identification process has been performed by the Client supported by Project consultants during direct meetings with authorities, key stakeholders, and representatives of local communities. Detailed information on stakeholder engagement activities performed and planned are presented in the SEP and included:

- Publication of planned activity (which is the legal definition for the project) through regional and local newspapers and the Project website,
- Public hearings in a frame of public discussion procedure,
- Consultations with public authorities at national, regional, and local levels.

The SEP outlines a systematic approach to stakeholder engagement to support the Client in developing and maintaining strong and constructive relationships with the stakeholders and in addressing their concerns about the Project. The SEP and its implementation fall under the Client's responsibility. In particular, the SEP for the construction phase includes:

- provisions for the disclosure to the affected communities of relevant information on:
  - The purpose, nature and scale of the Project,
  - The duration of proposed Project activities,
  - Potential risks/impacts and relevant mitigation measures,

  - The stakeholder engagement process envisaged going forward and,
  - A Grievance Mechanism is consistent with IFC PS1 requirements scaled to the risks and impacts of the project.
- Provisions for a stakeholders' consultation and participation process appropriate for the potentially affected communities, their decision-making process and the need to reach/include disadvantaged or vulnerable groups,
- Documents to demonstrate how the feedback from stakeholders' consultation and participation has been included in the Client management decision-making process and used to identify specific mitigation measures, as needed,
- The provision of periodic reports to the potentially affected communities to update them on progresses of the implementation of the ESMPs, also addressing eventual grievances received,
- an internal Grievance Mechanism for all employees and contractors and,
- an external Grievance Mechanism with a procedure providing a framework for receiving, recording, and facilitating the resolution of concerns raised by affected communities.

The SEP is considered a living document and will be regularly monitored, reviewed and updated by the Client throughout all stages of the Project implementation to ensure:

- it remains fit for the purpose at each phase of the Project,
- it addresses the outcomes of stakeholders' consultation activities,
- it addresses the grievances received from stakeholders.

The internal communication amongst the various functions and roles and the different Project parties is addressed in this ESMP.

10.7.2 Internal Grievance Mechanism

An internal grievance mechanism has been developed for the Project. All direct and indirect Project workers will follow this procedure. The procedure defines grievances as a statement of dissatisfaction over any condition that allegedly harms the employee. A grievance may relate to matters involving internal communication, responsibilities abuse, abuse in the authority line, race, colour, ancestry, national origin, religion, age, sex, sexual orientation, gender identity, sexual harassment, or disability status.

In case requested, all grievance holders will have the right to remain anonymous and maintain their confidentiality. The client will not disclose any grievance holder's credentials without ensuring their consent first. If such consent is given, only the managers and personnel related to that specific grievance will be informed.

The employee Request and Grievance Register of the Client used for the ANKA Project is presented in the appendix of the SEP.

10.7.3 External Grievance Mechanism

An external grievance mechanism of the Client has been developed for the Project. The external grievance mechanism is a part of the management system, and it is responsive to any concerns and complaints, particularly from affected stakeholders and communities. Special care will be focused on training the designated staff involved in the management of the grievance mechanism. The overarching aim of this grievance mechanism is to provide all stakeholders with the opportunity to obtain information about the Client's activities and facilities, deliver their complaints and requests in a structured and formal manner and receive prompt, fair and effective responses.

Any comments or concerns will be brought to the Company's attention verbally or in writing (by post or e-mail) or by filling in a grievance form. The grievance form will be made available on the Company website, at the Project site, at the Mukhtar's office, alongside a description of the grievance mechanism. Grievance forms can then be submitted to the contact points. All grievances will be:

- Acknowledged within seven working days after receipt; and
- Responded no later than within 30 working days after receipt.

Specifically, nominated, and trained members of staff will record grievance information in a grievance register the information in the grievance register will include the Stakeholder name and contact details and details of the grievance and how and when it was submitted, acknowledged, responded to and closed out.

The grievance mechanism is widely announced to the public with stakeholder meetings held for project-affected communities. Additional meetings will be organized to target women Project Affected People (PAPs) and vulnerable groups for sharing information on grievance mechanism that also allows anonymous grievances.

Gender equality is observed by the Client. There is a woman environmental engineer in the Project. She will deal with the complaints and demands of women in the Project area. The grievances will be reviewed by the team according to the Project's human rights and grievance mechanism.

10.7.4 Emergency Preparedness and Response

The Client has established an EPRP for the Project, following IFC EHS Guidelines - 3.7 Emergency Preparedness and Response. The purpose of the EPRP is to effectively respond to emergency situations associated with the Project to prevent and mitigate harm to people and the environment. The EPRP addresses various emergency conditions, including:

- Life and fire safety including natural disasters,
- Incidents that may occur at the Project site,
- Leaks or spills of hazardous chemicals/hazardous substances in construction areas,
- Transportation of hazardous chemicals/ waste inside the working areas and off-site on public roads,
- Attacks and sabotage to the construction sites,
- Natural events such as landslides, flooding, etc. and,
- First aid emergency procedures and cases.

The EPRP includes detailed information for the following key elements:

- Applicable legislation requirements and reference and contact details of local government agencies (e.g., police, emergency rescue),
- Identification of emergency situations and scenarios that may arise during routine activities or because of unplanned events, and communities and individuals that may be impacted,
- Definition of emergency response standard operating procedures for specific types of events,
- Roles and responsibilities for the implementation of the EPRP,
- Equipment, tools, and resources to manage emergency preparedness and response,
- Communication procedures, including awareness campaigns to potentially affected communities and local government agencies,
- Training for workers on EPRP requirements to ensure an effective response to emergency situations,

- Minimum requirements for the EPRPs to be developed by contractors and subcontractors for their job-specific needs,
- Periodic emergency drills, involving workers and affected communities as needed to increase awareness and verify the effectiveness of the response to emergency situations.

The EPRP will have to be periodically reviewed and revised, as necessary, to reflect possible changes during the construction, operation, and decommissioning phases.

10.8 ESMS Audit, Monitoring, Review and Performance Reporting

A Monitoring Programme has been developed and integrated into sub-ESMPs to monitor compliance with ESIA, ESMS, ESMPs, and relevant national and international requirements. The main objectives of the monitoring programme will be to:

- Identify any new E&S impacts derived from the Project activities/works and identify proper mitigation measures,
- Follow up on the status of action and performance in managing and mitigating previously identified E&S impacts,
- Follow up on the status of stakeholder grievances and how they were resolved,
- Monitor -EHSS activities undertaken by EPC and subcontractors and overall Project -EHSS performances.

Monitoring will be performed by qualified staff and EPC. The results of the monitoring will be included in reports that assess the severity of non-compliance and provide recommendations for remedial actions.

10.8.1 Environmental and Social Monitoring

The Project-specific ESMPs contain detailed actions for mitigating and monitoring E&S aspects, aligned with the commitments outlined in the ESIA. The Management Plans provide the necessary information for monitoring and measuring the -EHSS performance and compliance with the requirements of the ESMS. The extent of monitoring will be appropriate to the EHSS risks and impacts associated with the Project, as well as the relevant obligations and requirements.

The specific monitoring activities, including their scope, frequency, methodologies, and responsibilities, have been defined in the Management Plans. The allocation of responsibilities between the Client, EPC and its subcontractors has been outlined, considering applicable Project requirements such as ESIA commitments, IFC PSs, and Turkish Regulations. The monitoring process will also take into account any specific requests or requirements from relevant regulatory authorities. The Client will be ultimately responsible for collecting and processing the information related to monitoring activities carried out by EPC and subcontractors and for developing, updating, and managing the tools for data collection and processing.

10.8.2 EHSS Monitoring

The Client will be required to create an -EHSS monitoring program that aligns with their activities and the identified relevant risks. The purpose of the -EHSS monitoring program is to assess the effectiveness of prevention and control strategies, as well as the Project's -EHSS procedures, using a set of Key Performance Indicators (KPIs). EPC’s and each sub-contractor's -EHSS monitoring program should, at a minimum, include the following:

- Periodical meetings,
- Site inspections, findings and corrective actions reports,
- Internal audits and corrective actions,
- Corrective action reports for the external audits conducted by the Client and the authority

10.8.3 Evaluation of Compliance

The Client will monitor and evaluate compliance with the ESMS through internal auditing to ensure compliance with:

- The regulatory requirements and permits set by the Turkish legislation;
- IFC PSs;
- Commitments undertaken by the Client in the ESIA and other E&S–related documents; and
- ESMPs requirements.

establish a similar system to evaluate their compliance with the operation requirements, and the Client will oversee the implementation of this process. Any deviations from these requirements will be classified as "Non-Compliance situations" and ranked accordingly:

- Level 1 Non-Compliance (N-CP): evidence of a complete deviation or non-fulfilment of the requirements that can lead to significant impacts on Client operations (e.g., interruption of operations, serious E&S or OHS consequences, reputational risks, etc.) and whose resolution has to be managed in coordination with external bodies (i.e., authorities). These N-CPs will have to be immediately communicated to Client Project Level's Quality Manager as part of the management review process. The Project Level's Quality Manager will identify the appropriate preventative actions/corrective actions (PA/CAs) and require approval from Client Management. The N-CPs and the PA/CAs implemented will be disclosed to stakeholders during the periodic engagement activities. Level 1 deviations will also require immediate communication with the Lenders,
- Level 2 Non-Compliance (N-CP): evidence of a complete deviation or non-fulfilment of the requirements that can lead to limited impacts on Client operations and whose resolution does not involve external parties and could be managed in coordination with other internal managers (e.g., contractors). These N-CPs will have to be immediately communicated to Client Project Level's Quality Manager as part of the management review process. The Project Level's Quality Manager will identify the appropriate PA/CAs and require approval from Client Management. Level 2 deviations will need to be communicated to the lenders as part of periodic communications,
- Level 3 Non-Compliance (N-CP): partial deviation or non-fulfilment of the requirements with limited impacts on Client operations and whose resolution can be managed directly by the Project Level's Quality Manager These N-CPs will be addressed directly by the Project Level's Quality Manager through appropriate PA/CAs. Progresses will be communicated to Client Management as part of the management review process. No communication with the lenders will be required and,
- Observation (OBS) issues that are not a breach or deviation from requirements may need specific actions to improve performance and achieve full compliance.

N-CPs and OBSs can be identified by the Client during formal audits/site inspections at any time during the construction and operation phases and by reporting the observed -EHSS concern to the work lead and the Project Level's Quality Manager r who will evaluate and eventually confirm the level of severity assigned and take actions, accordingly.

A PA/CAs process will be established to address each non-compliance situation and identify root causes to prevent recurrence. EPC will be required to implement a similar system for addressing N-CPs relevant to their operations.

10.8.4 -EHSS Reporting

The Client will develop -EHSS reports in accordance with national, international, and Project reporting requirements. It is the responsibility of the EPC and subcontractors to report periodically to the Client. EPC and subcontractors will submit weekly reports that include inspection findings and corresponding corrective actions.

Additionally, a monthly EHSS statistics report will be prepared, covering KPIs such as OHS incidents, environmental incidents, and social grievances.

All Project personnel are accountable for reporting incidents and hazards to their immediate supervisors. Incidents will undergo investigation, and incident reports will be created in compliance with national and international reporting standards.

In the event of serious incidents, both Client, EPC and each of its sub-contractor will have the responsibility to ensure that injured employees are provided with the following support and services:

- Prompt medical assistance and, if necessary, medical evacuation
- Employee assistance programs
- Notification and contact with their family or next of kin
- Direct access to communications (such as phones).

10.8.5 Performance Records

The Client will maintain records that provide evidence of ESMS performance and adherence to the requirements outlined in the ESMP, as well as national and international regulations. Kalyon Enerji Environment, Climate Change, and IMS Executive, Social Impact and Inclusion Manager and HS Manager will be responsible for maintaining the relevant records. Some examples of these documents include:

- Reports of internal EHSS audits & inspections
- Reports of external -EHSS audits
- Non-conformities, corrective/preventive actions form
- Minutes of the management review meetings
- Reports of -EHSS monitoring, including analytical certificates
- Records of grievances submitted
- Records of incidents and relevant investigations
- Communication with the authorities
- Communication with stakeholders and stakeholder engagement activities carried out
- Any other relevant document providing evidence of the ESMS performance.

EPC will be required to implement a similar system and provide results to the Client.

10.8.6 Inspection & Audit

The Client will provide an inspection & audit program that includes the audit schedule, frequency, objectives, and responsibilities of auditors. This program will be implemented periodically and effectively for the:

- Proper implementation of -EHSS and HR policies, as well as the provisions outlined in the ESMPs.
- Adequate implementation of Contractor's Management Plans, which are derived from the Client's ESMPs requirements.

- Compliance with national regulations, ESIA commitments, and IFC PSs and
- Alignment of contractors with their contractual obligations.

EHSS inspections will be conducted by the Client to verify compliance with EHSS activities at the worksite. EPC and its sub-contractors will perform site EHSS inspections every week during the construction phase.

Internal audits and inspections will be carried out by Client's internal audit teams every month to monitor ESMS performance.

External audits will be conducted by various entities, including National Authorities, Lenders' Environmental & Social Consultants, and Integrated Management System Monitoring. These audits aim to assess the following:

- Project compliance with Turkish regulatory requirements (legislation and relevant permits), ESIA commitments, IFC PS
- Proper implementation of ESMS, including policies, manuals, ESMPs, procedures and conformity to the specified requirements.

10.8.7 Management Review

The Client Management will periodically review the performance of the ESMS (e.g., quarterly during construction and annually during operation) to ensure its adequacy and effectiveness in alignment with the Project activities. The -Chief Sustainability Officer will be responsible for organizing management review meetings in the following cases:

- Major Non-Compliances (i.e., Level 1 and Level 2)
- Serious injuries/fatalities involving Project employees, contractors, third parties, project assets, etc.
- Significant changes to the Project design that trigger the management of change procedure
- Grievances with the potential to impact media or to result in a claim and
- Significant changes to the regulatory framework.

Input documentation/information to support the management review process will include at least:

- Internal/external audit reports and records of non-compliance.
- Incident reports and EHSS statistics
- Progress on preventive/corrective actions
- Update on actions from the last management review meeting
- -EHSS monitoring reports
- Grievances records/updates on stakeholders' engagement activities.

Kalyon Enerji Environment, Climate Change, and IMS Executive -will issue meeting minutes that outline the agreed actions, measures taken, and the related responsibilities. It may be necessary to make changes to the ESMS documentation, such as policies, procedures, and ESMPs, as required.

-EHSS Coordinators from the EPC might be invited to attend these management review meetings if actions needed will affect their operations. EPC will be required to implement a similar management review system concerning their operation and report progresses to the Client.

10.8.8 Commitments Register

All mitigation measures to address potential project impacts identified in the ESIA package have been captured into a Commitments Register (given below) that includes tables with relevant mitigation and monitoring measures for each of the environmental and social components. The Commitments Register is part of the ESIA package and could be used as a tool that consolidates the applicable mitigation measures and monitoring activities defined in the ESIA package during Project construction, operation, and decommissioning phases.

Table 10-3: Mitigation measures and monitoring actions for the social components

Component	Phase	Project action	Mitigation measures	Monitoring measures
Population and Demography	Construction	General engineering/construction works;	■ Camp Site and Offsite Accommodation Management will be implemented. ■ During the workers' accommodation design and planning process, the Annex I Checklist on Workers' Accommodation provided in the IFC - EBRD Guiding Notes on Workers' Accommodation will be followed to ensure that the document's requirements are met. ■ Accommodation will be fully contained with meals, entertainment, medical clinic. By this way interaction of the workers with local communities will be prevented as much as possible. The potential negative results of the interaction with the community residents will be explained to workers via social induction/trainings. Workers will not need to go into communities and if they pass through communities to get to the site at the beginning and end of their shift, they will be discouraged from interacting negatively with community residents. ■ Priority for the employment opportunities will be given to local residents where applicable, ■ Workers' accommodations will be designed in compliance with the processes and standards of the IFC and the EBRD (2009), and the basic needs of the workers will be provided within the borders of the accommodation to limit the interaction of the workers with the local communities to prevent the pressure on the local utilities and the services, ■ In case of the recruitment of workers outside the local area, cultural awareness training will be provided to workers to prevent any cultural conflicts, ■ Employee Code of Conduct will be -applied, ■ The mukhtars of the villages will be informed about the construction of the workers' accommodation, and the workers that will be accommodated in the camps will be registered in the village system (if required), ■ A grievance mechanism will be applied to record any gender-based complaints, and necessary measures will be taken accordingly.	■ Grievances records ■ Stakeholder Engagement and consultation registers ■ Number of the local employees ■ Training records on the Code of Conduct ■ Camp Inspection reports ■ Announcement of employment opportunities.
	Operation	Plant/infrastructure operation	■ Priority for the employment opportunities will be given to local residents where applicable, ■ In case of the recruitment of workers outside the local area, cultural awareness training will be provided to workers to prevent any cultural conflicts, ■ Employee Code of Conduct will be -applied, ■ A grievance mechanism will be applied to record any gender-based complaints, and necessary measures will be taken accordingly.	■ Grievances records ■ Stakeholder Engagement and consultation registers ■ Announcement of employment opportunities.

Component	Phase	Project action	Mitigation measures	Monitoring measures
Economy and Employment	Construction	General engineering/construction works;	■ The Project will implement human resource policy in compliance with the IFC PS-2 on Labor and Working Conditions. Such policies are expected to provide more predictable employment opportunities for direct and indirect employees, ■ The Project will enhance local employment, and referential employment will be given to qualified local people. Hiring preference criteria will prioritize settlements directly affected by the current activities of the Project, ■ Individuals whose livelihood sources are affected by the Project impacts will be given priority in the recruitment process of the Project, ■ Formal and transparent recruitment process will be implemented to provide equal opportunity to the applicants, ■ The mukhtars of the villages will be informed about the recruitment opportunities of the Project (announcements, banners) to reduce the requirement of the non-local labor force, ■ Where applicable, vocational training will be provided to local people to maximize the local labor force, ■ Before the procurement, local suppliers will be identified, and priority on purchases will be given to goods and services from local businesses, ■ Capacity development will be applied, including the OHS and HR, ■ Equal procurement opportunities will be provided to local small businesses through the Supplier Management Plan, ■ EPC, subcontractors and suppliers will be monitored to prevent child and forced labor through Contractor Management Plan and Supplier Management Plan, ■ An equal tender process will be applied, ■ Equal pay for equal jobs will be provided to the local and non-local labor forces, ■ Bank accounts will be provided to workers, and payments will be made via these bank accounts, ■ The Worker Grievance mechanism will be implemented.	■ Grievances records ■ Labor Audit Repots ■ Number of local employees
	Operation	Plant/infrastructure operation	■ To contribute to regional and global energy security, ■ To be a regional trade center in energy, ■ To consider social and environmental impacts in the context of sustainable development in every phase of the energy chain	■ Annual energy production records

Labour and Working Conditions	Construction & Operation	General engineering/construction works; Plant/infrastructure operation	■ The accommodation of the workers will be clean and safe, and it will meet the basic needs of workers, providing minimum amounts of space for each worker; sanitary, laundry and cooking facilities. Overcrowding will be avoided. ■ Heating, air-conditioning, and ventilation will be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time. ■ Drinking water to be provided to Project workforce and water to be supplied to food preparation, washing and bathing areas will meet the requirements of the Turkish Regulation Concerning Water Intended for Human Consumption. ■ Adequate lavatory facilities (toilets, urinals, washbasins, and showers) will be provided for the number of people expected to work in the facility and allowances will make for indicating whether the toilet facility is “In Use” or “Vacant”. Toilet facilities will also be provided with adequate supplies of hot and cold running water, soap, and hand drying devices. ■ First aid and medical facilities as well as provisions for safety against potential hazards (fire, etc.) will be provided at the camp sites. ■ Domestic wastewater and waste to be produced at camp sites will be properly managed and disposed of in line with the requirements of Waste Management Plan. ■ Workers who accommodate in the camps will be made aware of any rules governing the accommodation. ■ Project’s Grievance Mechanism will provide means to the Project personnel to lodge their complaints. The Client will ensure that the workers are informed of the grievance mechanism at the time of recruitment and make it easily accessible to them. ■ The following plans will be implemented: ▪ Camp Management Plan and Offsite Accommodation Management Plan ▪ Community Health and Safety Plan. ▪ Security Management Plan ▪ Labor Management Plan ■ Provide and implement a grievance mechanism for employees and any suppliers. ■ Ensure employees and any suppliers have access to human resources policies. ■ Ensure employees are aware of their rights to join local trade unions. ■ Undertake independent audits and inspections. ■ The Client will implement Human Resources policy which observes wage standards, working hour regulation, freedom of association and staff encouragement. The policy will also eliminate child and forced labor, discrimination on the basis of religion, language, gender or social status, bullying and harassment. ■ Workers will be provided with information including, but not be limited to, entitlement to wages, hours of work, overtime arrangements and overtime compensation, and any benefits (such as leave for illness, maternity / paternity, or holiday). ■ All workers will be able to join trade unions of their choice and have the right to collective bargaining. ■ Contracts will be verbally explained to all workers where this is necessary to ensure that workers understand their rights prior to any employment contract to be signed.	■ Grievances records ■ Work contracts in line with Turkish Law and the IFC PS2. ■ Workforce statistics ■ Labor Audit Report(s) ■ Training Records

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ Wages, benefits and conditions of work offered will be comparable to those offered by equivalent employers in Niğde and same sector. ■ The Project and all contractors will put in place a formal worker grievance mechanism.	
Land Use (Livelihoods and Land Access Restrictions)	Construction	General engineering/construction works;	■ Economic displacement impacts will be minimized during the design phase of the Project. ■ Community Development Plan will be prepared and implemented to bridge the gaps between Turkish Expropriation Law and IFC PS-5. ■ Vulnerable people that will be affected by the land acquisition will be determined and specific assistance will be provided including transportation and legal. ■ During the recruitment process priority will be provided to people who lost their livelihoods as a result of the establishment of the Project. ■ All construction works will be continuing within the borders of the designated areas and in case of an unplanned damage, loss of the affected PAPs will be compensated by the contractors. ■ Community Liaison Officer will be hired and monitor the land acquisition process and collect grievances. ■ Implementation of the Community Development Programs in accordance with IFC requirements to restore the livelihood loss of the residents as a result of the loss of the grazing areas. ■ Grievance mechanism will be -applied. ■ Impacts to agricultural and pasture lands will be minimized as far as possible by keeping the Project construction footprint as narrow as possible, and efficiently restoring any damaged areas. ■ Any business losses will be compensated at a full replacement value. ■ Any loss of or damage to crops caused by Project activities will be compensated. ■ During operation it is essential that the water structures, will be regularly inspected and be periodically maintained to ensure proper conveyance of water, avoid stagnation and prevent flooding and damages. ■ Hunting and collection of wild animals will be strictly prohibited within the Project area. ■ A CDP will be developed and implemented and one of the main target groups will be the ecosystem users.	■ Grievances records ■ Monitoring report results

Community Health and Safety	Construction	General engineering/construction works;	A Traffic Management Plan have been prepared within the scope of the Project to maintain traffic safety on the roads to be used and to prevent the risks which may outcome due to Project activities ensuring a "safe site, safe vehicle and safe driver" at all times. The following points will be considered as a minimum regarding traffic management: ■ Referring to the Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place: ▪ To exchange information on the Project with the local community and other stakeholders; and ▪ To record and respond to complaints and concerns from the local community members and other stakeholders. ■ Considerations will be given to traffic volumes at the rush hours of the day, and transportation of equipment and materials will be utilized at quieter periods to avoid increased congestion on the roads used by the local communities. ■ It will be ensured that the roads will be made suitable for heavy vehicle use by taking necessary permits and making necessary arrangements. In case of any road damage, necessary maintenance works will be undertaken. ■ Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility. ■ Community Health and Safety Plan (CHSP) will be implemented, ■ In case construction activities are required on the existing roads will only start after the relevant permits are obtained; all necessary precautions will be taken as signage, barrier, fence, lighting, ■ Vulnerable and critical points will be identified in the Project site (including sensitive receptors such as hospitals and schools) to envisage the access routes for construction traffic, ■ Construction vehicles will only operate in the defined routes; vehicles will be monitored via an In Vehicle Monitoring System, ■ Cameras will be placed in appropriate places on the roads so that construction vehicles belong to different projects can be distinguished and monitored. ■ At all times, vehicles will be kept on designated site roads where established. Off-road driving is prohibited except in emergencies or if no roads have been established. ■ If reversing cannot be avoided in the work areas, necessary reversing procedures will be identified, including installing reversing aids on vehicles, reversing sensors etc. Trained banksman will be used when reversing cannot be avoided. ■ Parking areas will be designated with signs, and reverse parking will be implemented for emergencies. ■ The routes to be used by pedestrians will be segregated from heavy vehicle routes where possible. ■ Appropriate traffic signs, signals, lights and markings will be placed in the required areas to prevent potential accidents/incidents. Barriers will be placed in the required areas to protect human health and assets. ■ The speed limits will be implemented. Vehicle speeds will be monitored randomly through speed gun tools.	■ Grievance records ■ Stakeholder engagement and consultation register ■ Environmental monitoring records ■ Training records on health topics, community awareness and code of conduct ■ Traffic accident records ■ Training records on drivers ■ Visual Inspections ■ Training records of security personnel ■ Training records of community consultations ■ Security incident records ■ Monitoring reports results

			■ Seatbelts will be worn in vehicles and machinery when being operated. ■ No vehicle/equipment/material will be allowed to enter work areas before obtaining approval from security. ■ Loading areas will be designed appropriately to prevent/minimize vehicle/pedestrian contact and property damages. ■ All operators will be licensed/certified for the type of vehicle being driven and will undergo medical surveillance. ■ Repair and maintenance of vehicles will be done by the authorized bodies. ■ Changes in the condition of the roads will be monitored regularly, and road improvement works will be carried out, when necessary, ■ Fatigue and distraction procedures will be established considering the local legal requirements and the nature of the work. ■ Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanisms. Collaboration with local communities and responsible authorities will be ensured to improve signage, visibility, and road safety conditions, especially near the roads and other locations where children may be present. ■ In SEP of the Project, these information-sharing methods and schedules will be defined. ■ In order to minimize the particulate matter emission that will occur within the scope of the Project: ■ The transportation routes to be used will be watered regularly with water sprinklers, ■ The removal and laying operations of the materials will be carried out without tossing as much as possible. ■ Measures defined in Chapter 7.X of the ESIA Report and Pollution Prevention Plan will be followed. ■ All machines to be used under normal operating conditions will not run simultaneously, ■ Monthly and annual maintenance of machinery and equipment will be done periodically, ■ Measures defined in Chapter 7.X of the ESIA Report and Pollution Prevention Plan will be followed. ■ Quality spare parts and lubrication products will be used. Considering the expected population influx and the insufficient infrastructure system in some of the settlements in the AoI identified in the socioeconomic baseline, mitigation measures have been defined to prevent the pressure and negative impact on infrastructure and services caused by the population influx, especially during the construction phase. Certain negative impacts related to the population influx due to the Project on infrastructure and services are as follows: ■ The inability of vulnerable groups to equally access social and health services due to supply-demand imbalance, ■ Population influx due to the Project intensifying health services and decreasing the quality of service, ■ Delays in responding to emergencies on time,	

			■ The emergence of inadequacies due to increased demand for drugs and medical needs. The population increase may lead increase in communicable and infectious diseases in the Project Area of Influence. The following are the essential control measures to be implemented to avoid the spread of communicable diseases: ■ Pre-employment health screening and regular medical checks of workers per Turkish regulatory requirements, ■ Regular cleaning principles to be applied in the Project site, ■ Community Health and Safety Management Plan should be implemented for the Project that includes medical surveillance, ■ Awareness-raising on healthy lifestyles for workers and community-level training. ■ All waste or excess material that may be remained due to the activities in the Project area will be disposed of under laws and regulations. ■ Waste Management Plan and Pollution Prevention Plan will be followed. A Security Management Plan have been prepared in line with the national (Private Security Services Law No: 5188, 2004) and international (e.g., IFC PS4) standards within the scope of the Project to manage the security-related impacts and ensure the security of the activities, assets, work premises at the Project and avoid potential impacts on workers and the local community. The following measures will be considered as a minimum regarding security arrangements: ■ Security will be provided at the Project area by third-party company or in-house security personnel with no criminal histories or history of abuse, ■ Security personnel will be trained adequately in their envisaged roles and responsibilities, the use of force (and, where applicable, firearms), and appropriate conduct toward workers and affected communities and the applicable law, ■ Security patrols will be done at regular intervals, ■ Entry of unauthorized persons will be prevented by using appropriate tools and gadgets. Warning signs about unauthorized entry will be available at various locations at the Project crossings, ■ Entry and removal of equipment/material will be controlled at the control points; the movement of equipment/material will be allowed after the approval of the relevant department, ■ A grievance mechanism will be in place for the affected communities to express their concerns about the security arrangements and acts of the security personnel, ■ Relevant Project officials will continuously accompany the visitors during their stay on the Project site, and all visitors will be recorded, ■ All visitors will be given brochures explaining the Project area, site rules and what to do in case of emergencies, ■ Personal Protective Equipment will be provided to visitors coming to the Project site, ■ All areas that may be dangerous to visitors will be locked, ■ All areas that pose a danger at the Project area will be marked with appropriate signs.	

<table>
<tr><th>Component</th><th>Phase</th><th>Project action</th><th>Mitigation measures</th><th>Monitoring measures</th></tr>
<tr><td></td><td>Operation</td><td>Plant/infrastructure operation</td><td>A Traffic Management Plan have been prepared within the scope of the Project to maintain traffic safety on the roads to be used and to prevent the risks which may outcome due to Project activities ensuring “safe site, safe vehicle and safe driver” at all times.

Following points will be considered as a minimum regarding traffic management:

■ Referring to Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place:
▪ to exchange information on the Project with the local community and other stakeholders; and
▪ to record and respond any complaints and concerns raised by the local community members and other stakeholders.
■ Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility.
■ At all times vehicles will be kept on designated site roads where established. Off-road driving will not be permitted other than emergency situations, or if no roads have been established yet.
■ Parking areas will be designated with signs and reverse parking will be implemented for emergency situations.
■ The routes to be used by pedestrians will be segregated from vehicle routes where possible.
■ The speed limits will be implemented.
■ Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanism. Collaboration with local communities and responsible authorities will be ensured to improve signage, visibility, road safety conditions especially near the roads and other locations where children may be present.
■ Appropriate traffic signs, signals, lights and markings will be placed at the required areas to prevent potential accidents/incidents. Barriers will be placed at the required areas to protect both human health and assets.</td><td>■ Grievance records
■ Stakeholder engagement and consultation register
■ Training records on health topics, community awareness and code of conduct
■ Traffic accident records
■ Training records on drivers
■ Visual Inspections
■ Monitoring reports results</td></tr>
</table>

Component	Phase	Project action	Mitigation measures	Monitoring measures
Cultural Heritage	Construction	General engineering/construction works	■ Cultural Heritage Management Plan and Chance Find Procedure, which are necessary for the management of the "chance finds", prepared in compliance with the project organization will be implemented. All operators, who are to be engaged in the soil works, and project workers should receive training related to "project requirements, protection of cultural and archaeological heritage, laws and legislations related with the archaeological and cultural heritage and cultural heritage management plan and chance find procedures". ■ In case any chance find is encountered during the construction activities, the further steps should be taken in accordance with the plans and procedures and the relevant bodies, and the Directorate of the Museum will be notified immediately. In cases where any find or information associated with archaeological potential of the site is already discovered, relevant instructions about the sensitivity of the site will be shared with all construction teams a few days before the construction activities. The construction activities will be conducted with appropriate equipment and methods. The appropriate equipment will be identified together with the directorate of the museum and the construction teams. ■ Protection of site: chance find should not be moved, removed or further disturbed. ■ In particular, all operators and Project workers assigned to land preparation works should receive training on project requirements, protection of cultural and archaeological heritage, laws and regulations regarding archaeological and cultural heritage, Cultural Heritage Management Plan and Chance Find Procedure;	■ Visual check ■ Site inspection reports ■ Monitoring reports results
Visual Aesthetics	Construction	General engineering/construction works	■ After the completion of construction, the areas used as construction area will be returned to their original use. ■ During the construction phase, restricted hours of working will be proposed especially for built up areas. Using machinery during those hours should be avoided in residential properties. ■ The housekeeping of the entire Project Area will be given importance throughout the life of the Project. ■ To minimize light spillage from the site, every effort should be made to minimize the number of lights consistent with health and safety standards. In a similar way, all lights should be shielded and as much as possible pointed to the ground to avoid direct light effects on sensitive receptors around the Project Area. ■ Regular monitoring of the affected people's grievances with regard to visual impacts. For this, the external grievance mechanism should be implemented properly, and all stakeholders should have access to this mechanism. ■ Implementation of dust suppression during construction.	■ Grievance records

Component	Phase	Project action	Mitigation measures	Monitoring measures
	Operation	Plant/infrastructure operation	■ The housekeeping of the entire Project Area will be given importance throughout the life of the Project. ■ To minimize light spillage from the site, every effort should be made to minimize the number of lights consistent with health and safety standards. In a similar way, all lights should be shielded and as much as possible pointed to the ground to avoid direct light effects on sensitive receptors around the Project Area. ■ Regular monitoring of the affected people's grievances with regard to visual impacts. For this, the external grievance mechanism should be implemented properly, and all stakeholders should have access to this mechanism.	■ Grievance records

Table 10-4: Mitigation measures and monitoring actions for the onshore Physical and Biological components

Component	Phase	Project action	Mitigation measures	Monitoring measures
Air Quality	Construction	General engineering/construction works (i.e., land clearing, ground excavation, cut and fill operations, camp site operations) Material transportation	■ Use of water spraying at construction sites and transportation routes, especially in hot-dry seasons and in windy conditions, ■ Loads in all trucks transporting dust-generating materials will be sprayed with water to suppress dust (keeping the material moist), ■ Ensure loading and unloading without skidding, ■ Use of water suppression for control of loose materials on paved or unpaved road surfaces ■ Completed earthworks will be sealed as soon as reasonably practicable after completion; ■ In case alternative roads are present, construction traffic will avoid passing through the settlements. If unavoidable, necessary measures (i.e., speed limits) will be taken to prevent/minimize transportation related emissions and inform the communities about the activities and schedule; ■ Enforce speed limits and reduce vehicle movements and idling on site; ■ Trucks carrying fine material (excavation soil or fine material, etc.) to the site or from the site will be covered with tarpaulin to prevent dust emissions; ■ Lighting of fire and burning of materials in will be prohibited; ■ Activities will be conducted trying to use the minimum required number of means at the same time, ■ Transportation distances will be minimized where possible, ■ Vehicle engines and other machinery will be kept turned on only if necessary, avoiding any unnecessary emission; ■ Machinery and equipment will be periodically checked and maintained to ensure their good working condition; ■ All equipment and machinery must be maintained for compliance with standards and technical regulations for the protection of the environment and have appropriate certifications; ■ Emergency generator working hours will be recorded and necessary emission measurements will be conducted in case of exceeding 500 working hours in a year. Monthly operating hours of the previous year and the records regarding the amount of gas/fuel consumed in emergency situations and the frequency of the emergency (year/day) will be reported to Provincial Directorate of Ministry of Environment, Urbanization and Climate Change (MoEUCC) until January 31 of each year.	■ Grievances records ■ Air quality monitoring results ■ Regular (daily) visual monitoring ■ Maintenance records of vehicles and equipment ■ Warnings/penalties given by public authorities

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ Exhaust gas emission arising from the engine land vehicles in traffic will comply with the Regulation on Control of Exhaust Gas Emissions. Vehicles will be subjected to appropriate routine maintenance programs and emission measurements as required by the regulation. The use of vehicles that do not comply with the emission limits will not be permitted until such vehicles will be serviced and re-tested. Emission measurements of heating centers in the construction camps (if any) will be conducted according to Regulation on Control of Air Pollution from Heating if the thermal power is below 1000 kW and Regulation on Control of Industrial Air Pollution if the thermal power is above 1000 kW ■ Keep stockpiles for the shortest possible time; ■ Consider the prevailing wind direction when siting stockpiles to reduce the likelihood of affecting sensitive receptors; ■ Slow down or cease the dust generating work under strong winds, such as reducing work activities or using water spray to reduce dust dispersion. ■ Minimize material handling and avoid double handling; ■ Where dust levels may still cause a nuisance (despite measures above), water or other control measures may be required as additional measures to control dust. ■ Electric small-scale mechanization and technical tools will be used when available and feasible; ■ Provide PPE to workers on site, such as dust masks where dust levels are likely to be excessive; ■ During the second half of the August 2023, ▪ Additional dust water suppression methods will be applied, such as increasing the water spraying. minimize the number of the vehicles in this period as much as possible.	
	Operation	Plant/infrastructure operation	■ Vehicle engines and other machinery will be kept turned on only if necessary, avoiding any unnecessary emission. ■ Vehicles will be periodically checked and maintained to ensure their good working condition. ■ Activities will be conducted trying to use the minimum required number of means at the same time;	■ Maintenance records of vehicles and equipment
Noise and Vibration	Construction	General engineering/construction works Material transportation.	■ Selection of equipment with lower sound power levels; ■ Installing silencers for fans; ■ Installing suitable mufflers on engine exhausts and compressor components; ■ Installing acoustic enclosures for equipment casting radiating noise; ■ Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas; ■ Speed limit applications should be applied throughout site for the Project vehicles that will transport construction materials / equipment; ■ Properly refurbished and/or new machinery, equipment and vehicles will be used to the extent possible; ■ Any component of machinery or equipment, which is thought to generate excessive noise (e.g., a defective muffler, broken or loosely placed engine hood) will be discarded if said components cannot be maintained/repaired and they will be replaced as appropriate;	■ Grievances records ■ Noise monitoring results ■ Maintenance records of vehicles and equipment ■ Warnings/penalties given by public authorities

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ Engine covers will be kept closed when the equipment is in operation to minimize noise; ■ Workers will be trained in noise abatement best practices, including avoiding unnecessary operation of engines and switching off equipment when it is not required; ■ Idling of construction vehicles will be avoided; ■ Best management practices (e.g., selection of equipment and work methods) will be used to limit vibration impacts, particularly nuisance vibration. Heightened attention to vibration control will occur when working within 50 meters of residences and other sensitive receptors with high vibration creating equipment. Significant changes to the vibration levels can occur based on the soil conditions and the driving energy of the hammer; ■ Re-locating noise sources to fewer sensitive areas to take advantage of distance and shielding; ■ Reducing the Project traffic routing through community areas wherever possible; ■ Developing a grievance mechanism to record and respond to complaints; ■ Carrying out the regular maintenance of the construction equipment in order to minimize the possible high noise levels generated by the equipment. ■ Performing quarterly monitoring campaigns at the baseline noise measurement locations during the construction phase; and ■ If the construction phases of the Project and G4-Bor-1 Solar Power Plant Project to be realized by Smart GES Enerji Üretim A.Ş. and G4-Bor-2 Solar Power Plant Project to be realized by Ecogreen Elektrik Enerji Üretim A.Ş. overlap, Kalyon Enerji will communicate with the planned project contractors, and plan the construction activities to minimize the adverse noise impacts on receptors through measures such as scheduling of noise generating activities.	
	Operation	Plant/infrastructure operation	■ In case of any noise related grievance, noise measurement campaign will be carried out immediately at the area where noise related grievance is received; ■ Noise levels will be monitored at the receptors where the defined noise limit values are exceeded, at least for a year on monthly basis; and ■ In cases when monitoring results indicate that noise levels are above the defined limits, then noise abatement measures will be implemented (e.g., noise barriers at the source, soundproofing, etc.).	■ Maintenance records of vehicles and equipment ■ Noise monitoring results ■ Grievances records
Soil and Subsoil	Construction	General engineering/construction works; Material Storage Accommodation and management of the workforce	■ Project-specific Soil Management and Erosion Control Plan will be implemented. ■ To prevent off-site sediment movement, erosion control measures such as drainage channels will be implemented as necessary prior to the start of construction operations. ■ Wherever possible, land preparation and construction activities shall be re-scheduled during extreme weather conditions to avoid risk of erosion. ■ Subsoil removal studies will be completed in compliance with the Regulation on Control of Excavated Soil, Construction and Demolition Wastes issued on March 18, 2004 at Official Gazette no: 25406 and other international practices. ■ Subsoil loss will be minimized with appropriate equipment, plan, procedure, and schedule. Also, unnecessary soil stripping will not be	■ Visual Site inspection ■ Monitoring report results ■ Maintenance records of vehicles and equipment ■ Grievances records ■ Waste disposal records ■ Records of the contractual agreements for disposal of wastes

Component	Phase	Project action	Mitigation measures	Monitoring measures

			carried out during construction activities to minimize disturbance to vegetation, ground species and soils.
			■ Bedding, padding, backfilling, and aggregate materials will be purchased from licensed quarries.
			■ Excess excavated material will be disposed at licensed storage/recycling facilities as required by the Regulation on Excavation, Construction and Demolition Wastes issued on March 18, 2004 at Official Gazette no.25406. In case a licensed facility cannot be found, the Client will identify parcels, for which usage rights will be obtained from the respective right holders as per the requirements of the applicable legislation. Environmental and social assessment studies as per Management of Change Procedure will be implemented during selection and entry to the off-site excavated material storage sites. Criteria such as selecting brownfields, that are not used for agricultural or grazing purposes and having a sufficient distance to settlement areas and will be considered in the selection of excavated material storage sites
			■ Project-specific Pollution Prevention Plan and Waste Management Plan will be implemented to ensure that the amount of release and spills can be taken under control before reaching substantial amounts that may potentially affect the quality of soil.
			■ The areas, where the hazardous materials (chemicals, liquids etc.) storage tanks located (i.e., hazardous material storage areas), will be designed and constructed to avoid potential contamination into the soil (paved areas with sufficient secondary containment, proper drainage systems, storage as per Material Safety Data Sheet (MSDS) requirements etc.). Also, the Project will comply with relevant legal and project safety requirements to avoid leakages from hazardous materials (chemicals, liquids etc.) storage facilities on-site;
			■ The temporary waste storage areas will be constructed based on the requirements listed in the Regulation on Waste Management issued on April 02, 2015 Official Gazette no: 29314 and GIIP.
			  ▪ The area will be separate from the facilities and buildings, away from human traffic.
			  ▪ There will be a suitable space for the licensed vehicles to receive the wastes.
			  ▪ Storage area will have all kinds of precautions against possible fires and spills (fire extinguisher, spill kit, etc.).
			  ▪ Hazardous wastes and non-hazardous wastes will be stored separately, having different entrance doors.
			  ▪ In order to protect the compartment where hazardous waste will be stored from precipitation, the top and four sides will be covered. The compartments where non-hazardous wastes will also be covered from precipitation.
			  ▪ Storage area will be closed, the entrance door will be lockable (kept locked) and the authorized the staff will have the keys.
			  ▪ The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas.
			  ▪ Adequate drainage system will be provided to collect any leakages.
			  ▪ The floor will be covered with concrete, the edges of the floor will be raised with concrete walls/parapets for hazardous waste compartment.
			  ▪ In order for the concrete to be impermeable; cured concrete with a minimum thickness of 25 cm will be applied or the	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			concrete to be used for this purpose will be in C30 (STS) standard. If this condition is not met, impermeability will be ensured by laying a of at least 1 mm between the concrete and the soil floor. ▪ Wastes will be stored separately from each other, in tanks and containers. Labels indicating the type of waste will be placed for each type of waste. ▪ Removal of wastes will be ensured inappropriate frequencies so that storage capacities at the temporary waste storage areas/storage compartments are not exceeded. Hazardous wastes (except medical waste) will be temporarily stored at the waste storage areas for a maximum duration of 6 months and non-hazardous waste for a maximum duration of one year. ■ Industrial Waste Management Plans for all temporary waste storage area established by -EPC and its-subcontractor (including hazardous and non-hazardous waste) will be submitted to the relevant Provincial Directorate of MoEUCC as per the format defined by the MoEUCC. ■ Temporary Waste Storage Permit will be obtained from the related Provincial Directorate of MoEUCC for temporary waste storage sites at the site generating hazardous waste of more than 1,000 kg per month. ■ Hazardous Materials and Hazardous Waste Compulsory Liability Insurance will be executed as per the relevant provisions of the Regulation on Waste Management for the hazardous waste temporary storage areas/containers regardless of the amount of hazardous waste stored; ■ Waste reuse/recycling/recovery/disposal agreements with the Municipality and licensed recovery/disposal -companies will be executed for the management of hazardous and non-hazardous waste. ■ Official waste declarations for all waste generated will be submitted to the online system of MoEUCC, starting from January each year until the March at least. ■ Waste storage out of the designated storage areas will be prohibited. Wastes generated in the interim storage areas will be transferred to the temporary storage area; ■ Regular maintenance of vehicles and machinery/equipment will be undertaken to ensure that leakages of oil/fuel or any other hazardous material is prevented; ■ Impervious (concrete etc.) surfaces will be designated for the refueling and maintenance of the machinery/vehicles. If it is not possible according to the nature of the Project, all refueling tankers and all heavy machinery used at the site will have drip trays, and these trays will be placed under the pipe connection points to prevent accidental leakage to the soil during refueling operations; ■ Generators will be equipped with drip trays and to be checked regularly to prevent soil contamination; ■ Secondary containments, ponds and drip trays will be checked regularly, especially during extreme weather conditions; ■ Portable spill containment and clean-up materials (spill kits) will be made available and easily accessible at the construction site, instructions on how to use spill containment and clean-up materials will be included in the kits; ■ Training on spill response, use of containment and clean-up material (spill kits) will be provided to works (including the subcontractor workers);	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ In case of a spill/leakage incident on-site, contamination levels will be identified by means of sampling and analyses studies to be conducted by accredited laboratories and the results will be compared with baseline concentrations of the related parameters to plan corrective actions where necessary; ■ Pumps and transmixers will be washed only at the concrete plants, concrete slurry will not be discharged into environment; ■ Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan. ■ Project-specific Pollution Prevention Plan will be implemented for the management of sewage wastewater and implemented during the construction and operation phases of the Project. ■ A leakproof report of the septic tanks will be ensured and necessary measures will be taken to prevent them from deforming in extreme weather conditions; ■ No untreated wastewater discharges of any type to land will be allowed. Polluted water (if any generated as a result of accidental leakages) will be properly collected or managed to prevent the soil pollution. ■ Discharge of wastewater will be in compliance with the applicable regulatory requirements given in Appendix B.	

	Operation	Plant/infrastructure operation	■ Project-specific Pollution Prevention Plan and Waste Management Plan will be implemented to ensure that the amount of release and spills can be taken under control before reaching substantial amounts that may potentially affect the quality of soil.
			■ The areas, where the hazardous materials (chemicals, liquids etc.) storage tanks located (i.e., hazardous material storage areas), will be designed and constructed to avoid potential contamination into the soil (paved areas with sufficient secondary containment, proper drainage systems, storage as per Material Safety Data Sheet (MSDS) requirements etc.). Also, the Project will comply with relevant legal and project safety requirements to avoid leakages from hazardous materials (chemicals, liquids etc.) storage facilities on-site;
			■ The temporary waste storage areas will be constructed based on the requirements listed in the Regulation on Waste Management issued on April 02, 2015 Official Gazette no: 29314 and GIIP.
			  ▪ The area will be separate from the facilities and buildings, away from human traffic.
			  ▪ There will be a suitable space for the licensed vehicles to receive the wastes.
			  ▪ Storage area will have all kinds of precautions against possible fires and spills (fire extinguisher, spill kits, etc.).
			  ▪ Hazardous wastes and non-hazardous wastes will be stored separately, having different entrance doors.
			  ▪ In order to protect the compartment where hazardous waste will be stored from precipitation, the top and four sides will be covered. The compartments where non-hazardous wastes will also be covered from precipitation.
			  ▪ Storage area will be closed, the entrance door will be lockable (kept locked) and the authorized the staff will have the keys.
			  ▪ The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas.
				■ Visual Site inspection
				■ Monitoring report results
				■ Maintenance records of vehicles and equipment
				■ Grievances records
				■ Waste disposal records
				■ Records of the contractual agreements for disposal of wastes

Component	Phase	Project action	Mitigation measures	Monitoring measures
			▪ Adequate drainage system will be provided to collect any leakages. ▪ The floor will be covered with concrete, the edges of the floor will be raised with concrete walls/parapets for hazardous waste compartment. ▪ In order for the concrete to be impermeable; cured concrete with a minimum thickness of 25 cm will be applied or the concrete to be used for this purpose will be in C30 (STS) standard. If this condition is not met, impermeability will be ensured by laying a membrane of at least 1 mm between the concrete and the soil floor. ▪ Wastes will be stored separately from each other, in tanks and containers. Labels indicating the type of waste will be placed for each type of waste. ▪ Removal of wastes will be ensured in appropriate frequencies so that storage capacities at the temporary waste storage areas/storage compartments are not exceeded. Hazardous wastes (except medical waste) will be temporarily stored at the waste storage areas for a maximum duration of 6 months and non-hazardous waste for a maximum duration of one year. ■ Industrial Waste Management Plans for all temporary waste storage area established by contractors (including hazardous and non-hazardous waste) will be submitted to the relevant Provincial Directorate of MoEUCC as per the format defined by the MoEUCC. ■ Temporary Waste Storage Permit will be obtained from the related Provincial Directorate of MoEUCC for temporary waste storage sites at the site generating hazardous waste of more than 1,000 kg per month. ■ Hazardous Materials and Hazardous Waste Compulsory Liability Insurance will be executed as per the relevant provisions of the Regulation on Waste Management for the hazardous waste temporary storage areas/containers regardless of the amount of hazardous waste stored; ■ As per the Circular entitled 'COVID-19 Measures for the Waste Management of Single Use Masks, Gloves and Other Personal Hygiene Materials'; ▪ Masks, gloves and other personal hygiene material wastes generated at the offices, dormitories and work sites will be collected separately. ▪ Waste bins will be placed at the entrances and exits of the office buildings, dormitories, cafeterias and at common areas across the accommodation facilities and work sites. ▪ The waste bins will be labelled explicitly. ▪ Waste bags will not be mixed with other wastes and the waste bags will be transported to a designated temporary storage area by securing them in a second bag via tightly closing. ▪ The wastes will be kept at designated temporary storage areas out of reach of other people and animals for at least 72 hours and then will be delivered to the municipality to be managed under 'other' domestic waste category. ▪ The temporary waste storage areas will be kept closed at all times and secured appropriately. ▪ The wastes generated in potential site quarantine/isolation units and at the site infirmaries will be managed as 'medical waste' and wastes generated from these areas will not be mixed with other wastes.	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ Waste reuse/recycling/recovery/disposal agreements with the Municipality and licensed recovery/disposal firms will be executed for the management of hazardous and non-hazardous waste. ■ Official waste declarations for all waste generated will be submitted to the online system of MoEUCC, starting from January each year until the March at least. ■ Waste storage out of the designated storage areas will be prohibited. Wastes generated in the interim storage areas will be transferred to the temporary storage area; ■ Regular maintenance of vehicles and machinery/equipment will be undertaken to ensure that leakages of oil/fuel or any other hazardous material is prevented; ■ Impervious (concrete etc.) surfaces will be designated for the refueling and maintenance of the machinery/vehicles. If it is not possible according to the nature of the Project, all refueling tankers and all heavy machinery used at the facility will have drip trays, and these trays will be placed under the pipe connection points to prevent accidental leakage to the soil during refueling operations; ■ Generators and any equipment containing chemicals will be placed in localized bunded & kerbed areas for containment of drainage, spillages and leaks in order to minimize contaminated water routed to the drains. ■ Secondary containments, ponds and drip trays will be checked regularly, especially during extreme weather conditions; ■ Portable spill containment and clean-up materials (spill kits) will be made available and easily accessible at the facility, instructions on how to use spill containment and clean-up materials will be included in the kits; ■ Training on spill response, use of containment and clean-up material (spill kits) will be provided to works; ■ In case of a spill/leakage incident on-site, contamination levels will be identified by means of sampling and analyses studies to be conducted by accredited laboratories and the results will be compared with baseline concentrations of the related parameters to plan corrective actions where necessary; ■ Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan.	
Hydrology and Surface Water	Construction	General engineering/construction works; Accommodation and management of the workforce	■ The project will comply with safety requirements to avoid leakages from hazardous chemicals/materials and liquids (diesel fuel, oil etc.) stored on-site. ■ The areas where the diesel/fuel storage tanks are located (can be named hazardous material storage areas), will be designed and constructed to avoid potential contamination of the soil (paved areas with sufficient secondary containment, proper drainage systems, collection ponds etc.). ■ The temporary waste storage areas will be constructed based on the requirements listed in “Regulation on Regular Storage of Wastes” issued on *Official Gazette* No:27533, Dated: 26/03/2010 (Amended: OG-24/06/2022-31876) and “Regulation on Waste Management” issued on *Official Gazette*, Dated: 02/04/2015, No: 29314 (Amended: OG-23/03/2017-30016). ■ Considering the flooding risk, the following engineering studies were taken into account during the project design phase. ▪ By adding the reinforced concrete structure under the fences, the safety of the work site improved by increasing the height of	■ Incident/accident reports ■ Monitoring report results ■ Visual Site inspection

Component	Phase	Project action	Mitigation measures	Monitoring measures
			the security fence, and the site was protected from flood and surface water. ▪ The foundation of the inverter station was raised 60 cm from the ground level against the risk of water rising. ▪ The infrastructure of the inverter station is designed in such a way that the surface and storm water infiltration will be prevented, and water is collected in the water collection -pit -constructed -on the ground level of the station and discharged with the help of a pump. ▪ The manhole cover located at the entrance of the foundation of the inverter station is manufactured as leakproof. ▪ Waterproofing is provided with XPS Board and Membrane insulation materials inside the concrete foundation. ■ Bor Plain is the accumulation area of surface waters flowing from the north, northeast, east, southeast, and south, and the waters running off in rainy periods increase water levels in both vadose and phreatic zones. For this reason, it should be taken into consideration during the construction phase and appropriate solutions such as drainage channels or dewatering activities should be considered against possible water level increases during the design. ■ The General Directorate of State Hydraulic Works (DSI), and General Directorate of Water Management (SYGM) will be consulted regarding hydrological studies and surface water quality and any additional studies will be conducted upon their opinions prior to the construction phase based on the opinions of these institutions. ■ Safe Fueling and Gasoline Handling Guidelines will be developed in the construction areas. No fueling of vehicles or equipment will take place within excavated areas. If heavy equipment cannot be moved to appropriate fueling points, an impervious surface (such as a drip-tray) will be used for refueling this equipment to prevent accidental releases to groundwater aquifers. ■ Hazardous materials will not be stored in excavated areas and all handling of all hazardous materials will be in accordance with the Control of Substances Hazardous to Health Procedure. These procedures will be in line with Environmental, Health, and Safety (EHS) Guidelines: Environmental Hazardous Material Management (IFC, 2007). ■ Management of the construction site during periods of heavy rainfall will be considered. Exposed surfaces and stored materials will be covered if necessary to reduce the erosion of sediments into surface waters. ■ Treated domestic wastewater would be reused for local watering of vegetation, dust control or as a fire-fighting reserve in accordance with the standards defined in the Wastewater Treatment Plants Technical Procedures Communique if it is deemed feasible. In case wastewater reuse would be decided to be applied, a wastewater reuse plan will be prepared during the construction phase describing which types of wastewaters are suitable for each reuse application and effective control measures will be implemented to prevent misuse of reused water. ■ The specific items in the management plans will address the measures below related to surface water and protection: ▪ Design and management of spoil and soil storage areas and opening stores of construction materials to control sediment loss into runoff by minimizing the length and angle of slopes.	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ Schemes to prevent new ground surface eruptions from rainfall erosion or to avoid construction activities during periods of heavy rainfall. ■ Diversion of external 'clean' runoff around the construction area to prevent mixing of 'clean' and 'dirty' runoff and reduce the size of the required sediment basins. ■ Conveyance of all 'dirty' runoff to the proposed sediment basins. ■ Establishment of barrier fences and/or markings to determine the extent of the structure/work area that may be damaged. ■ Limitation of exposure to the soil and the minimum amount of deterioration required for the construction. ■ Covering and protection of degraded fertile ground with soil, vegetation, mulch or erosion-resistant material. ■ Collection and management of polluted water (if any generated by accidental leakages) in order to prevent mixing with any water body. ■ Protection of existing drainage and irrigation channels, sediment barriers, green areas, protection strips, such as drains, and drainage and erosion control pits by taking appropriate measures. ■ Collection and settlement of drainage from excavations to remove suspended materials prior to discharge in accordance with required permits. Construction of local perimeter drains around working areas to collect suspended runoff and direct it to a system of settlement basins before discharge following required permits, where practicable. ■ Regular inspection and maintenance of all structures and facilities to ensure proper and efficient operation, especially after heavy rainfall. Removing sediment deposits and disposing of them either by spreading them on site (if uncontaminated) or at a suitably licensed facility. ■ Training workers (including subcontractor workers) on spill response, use of containment and clean-up materials (spill kits).	
	Operation	Plant/infrastructure operation	■ The project will comply with safety requirements to avoid leakages from hazardous chemicals/materials and liquids stored on-site. ■ The temporary waste storage areas will be constructed based on the requirements listed in "Regulation on Regular Storage of Wastes" issued on *Official Gazette* No:27533, Dated: 26/03/2010 (Amended: OG-24/06/2022-31876) and "Regulation on Waste Management" issued on *Official Gazette*, Dated: 02/04/2015, No: 29314 (Amended: OG-23/03/2017-30016). ■ Leak-proof quality septic tanks will be provided for the collection of the generated domestic wastewater. Collected wastewater will either be collected by vacuum trucks and disposed of at the nearest licensed WWTP as per the agreements/protocols to be executed with the related municipalities/licensed companies or to the main campsite package WWTPs.	■ Incident/accident reports ■ Monitoring report results ■ Visual Site inspection
Hydrogeology and Groundwater	Construction	General engineering/construction works; Material Storage Accommodation and management of the workforce	■ Treatment, storage, and disposal should be done according to regulatory requirements after performing the necessary analyses and obtaining relevant permits. ■ Bor Plain is the accumulation area of surface waters flowing from the north, northeast, east, southeast, and south, and the waters running off in rainy periods increase water levels in both vadose and phreatic	■ Groundwater monitoring results ■ Incident/accident reports ■ Monitoring report results ■ Visual Site inspection

Component	Phase	Project action	Mitigation measures	Monitoring measures
			zones. For this reason, it should be taken into consideration during the construction phase and appropriate solutions such as drainage channels or dewatering activities should be considered against possible water level increases during the design. ■ Regarding the risk of heavy rainfall and flooding, a reinforced concrete structure was added under the fences and the Inverter station to increase the height and protect the site from flooding and surface water. In addition, the infrastructure of the Inverter station was designed to prevent surface and rainwater infiltration, and impermeable insulation materials were selected for the concrete foundation. ■ Safe Fueling and Gasoline Handling Guidelines will be developed in the construction areas. No fueling of vehicles or equipment will take place within excavated areas. If heavy equipment cannot be moved to appropriate fueling points, an impervious surface (such as a drip-tray) will be used for refueling this equipment to prevent accidental releases to groundwater aquifers. ■ Hazardous materials will not be stored in excavated areas and all handling of all hazardous materials will be in accordance with the Control of Substances Hazardous to Health Procedure. These procedures will be in line with Environmental, Health, and Safety (EHS) Guidelines: Environmental Hazardous Material Management (IFC, 2007). As an example, secondary containment structures will consist of berms, dikes, or walls capable of containing the larger 110 percent of the largest tank or 25 percent of the combined tank volumes in areas where hazardous materials are handled (e.g., fuel stores and loading areas, concrete mixing, hazardous material stores) to prevent hazardous materials entering the site drainage. ■ An Emergency Response Plan (ERP) will be developed in line with Environmental, Health, and Safety (EHS) Guidelines: General EHS guidelines (IFC, 2007) for handling spills of hazardous materials including fuels that will be handled during construction works. ■ The specific items in the management plans will address the measures below related to groundwater and protection: ▪ Preventing the discharge of untreated wastewater, residues or other waste into groundwater or surface water. ▪ Controlling and avoiding wastewater flows from any field activities (i.e., excavations, and vehicle/equipment washing). ▪ Collecting and managing contaminated water (if any generated as a result of accidental leakages) in order to prevent mixing with any water body and topsoil/soil pollution. ▪ Assuring the maintenance of vehicles and equipment (if necessary) in designated areas with impermeable surfaces (concrete floors, etc.) and if necessary, secondary containment systems. ▪ Making portable spill containment and clean-up materials (spill kits) available and easily accessible at the construction site, including instructions on how to use spill containment and clean-up materials. ▪ Training workers (including subcontractor workers) on spill response, use of containment and clean-up materials (spill kits). ▪ Providing adequate and properly maintained tanks, paved ground, spill containment materials and proper secondary containment systems with sufficient volume for fuel/oil storage and for the storage of other fluids and hazardous substances to prevent loss to the soil.	

Component	Phase	Project action	Mitigation measures	Monitoring measures
	Operation	Plant/infrastructure operation	■ The project will comply with safety requirements to avoid leakages from hazardous chemicals/materials and liquids stored on-site. ■ The temporary waste storage areas will be constructed based on the requirements listed in “Regulation on Regular Storage of Wastes” issued on Official Gazette No:27533, Dated: 26/03/2010 (Amended: OG-24/06/2022-31876) and “Regulation on Waste Management” issued on Official Gazette, Dated: 02/04/2015, No: 29314 (Amended: OG-23/03/2017-30016). ■ Leak-proof quality septic tanks will be provided for the collection of the generated domestic wastewater. Collected wastewater will either be collected by vacuum trucks and disposed of at the nearest licensed WWTP as per the agreements/protocols to be executed with the related municipalities/licensed companies or to the main campsite package WWTPs.	■ Groundwater monitoring results ■ Incident/accident reports ■ Monitoring report results ■ Visual Site inspection
Traffic	Construction	General engineering/construction works; Material Storage	■ Referring to Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place: ▪ to exchange information on the Project with the local community and other stakeholders; and ▪ to record and respond any complaints and concerns raised by the local community members and other stakeholders. ■ Considerations will be given to traffic volumes at the rush hours of the day and transportation of equipment and materials will be utilized at quieter periods to avoid increased congestion on the roads used by the local communities. ■ It will be ensured that the roads will be made suitable for the heavy vehicle use by taking necessary permits and making necessary arrangements. In case of any damage on the roads, necessary maintenance works will be undertaken. ■ Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility. ■ At all times vehicles will be kept on designated site roads where established. Off-road driving will not be permitted other than emergency situations, or if no roads have been established yet. ■ If reversing cannot be avoided at the work areas, necessary reversing procedures will be identified including installing reversing aids on vehicles, reversing sensors etc. Trained banksman will be used when reversing cannot be avoided. ■ Parking areas will be designated with signs and reverse parking will be implemented for emergency situations. ■ The routes to be used by pedestrians will be segregated from heavy vehicle routes where possible. ■ The speed limits will be implemented. ■ Seatbelts will be worn in vehicles and machinery when being operated. ■ No vehicle/equipment/material will be allowed to enter work areas before obtaining approval from the security. ■ Loading areas will be designed appropriately to prevent/minimize vehicle/pedestrian contact and property damages. ■ All operators will be licensed/certified for the type of vehicle being driven and will undergo medical surveillance. ■ Repair and maintenance of vehicles will be done by the authorized bodies. ■ Fatigue and distraction procedures will be established considering the local legal requirements and the nature of the work. ■ Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanism. Collaboration with local communities and responsible authorities will be ensured to	■ Visual inspection ■ Monitoring report results ■ Maintenance records of vehicles and equipment ■ Grievances records ■ Traffic accident records ■ Training records on drivers

Component	Phase	Project action	Mitigation measures	Monitoring measures
			improve signage, visibility, road safety conditions especially near the roads and other locations where children may be present. ■ Appropriate traffic signs, signals, lights and markings will be placed at the required areas to prevent potential accidents/incidents. Barriers will be placed at the required areas to protect both human health and assets.	
	Operation	Plant/infrastructure operation	■ Referring to Stakeholder Engagement section of this ESIA Report, a continuous stakeholder engagement process and grievance mechanism will be in place: ▪ to exchange information on the Project with the local community and other stakeholders; and ▪ to record and respond any complaints and concerns raised by the local community members and other stakeholders. ■ Project site will be equipped with suitable and sufficient lighting to ensure sufficient visibility. ■ At all times vehicles will be kept on designated site roads where established. Off-road driving will not be permitted other than emergency situations, or if no roads have been established yet. ■ Parking areas will be designated with signs and reverse parking will be implemented for emergency situations. ■ The routes to be used by pedestrians will be segregated from vehicle routes where possible. ■ The speed limits will be implemented. ■ Seatbelts will be worn in vehicles and machinery when being operated. ■ No vehicle/equipment/material will be allowed to enter work areas before obtaining approval from the security. ■ All operators will be licensed/certified for the type of vehicle being driven and will undergo medical surveillance. ■ Repair and maintenance of vehicles will be done by the authorized bodies. ■ Project disclosure activities will include informing communities about the project traffic management controls, planned road closures, blasting activities and grievance mechanism. Collaboration with local communities and responsible authorities will be ensured to improve signage, visibility, road safety conditions especially near the roads and other locations where children may be present. ■ Appropriate traffic signs, signals, lights and markings will be placed at the required areas to prevent potential accidents/incidents. Barriers will be placed at the required areas to protect both human health and assets.	■ Visual inspection ■ Monitoring report results ■ Maintenance records of vehicles and equipment ■ Grievances records ■ Traffic accident records ■ Training records on drivers

Component	Phase	Project action	Mitigation measures	Monitoring measures
Greenhouse Gas (GHG) Emissions	Construction & Operation	General engineering/construction works; Plant/infrastructure operation	■ The Best Available Techniques should be taken into consideration in Project design as much as possible. The applicability of the Best Available Techniques (BATs) developed within the European regulatory framework [i.e., Integrated Pollution Prevention and Control, “IPPC”, BAT Reference Documents (BREFs) according to the European Directive 2010/75/EU (IED)] should be evaluated and integrated into the Project design. ■ All employees will be provided climate, resource and energy efficiency awareness training. ■ The most efficient equipment in terms of fuel usage and effective operation will be chosen. Maintenance of all machinery and equipment will be periodically conducted to ensure efficient fuel use and effective operation as well. ■ Efficient resource and material use will be promoted through the development and implementation of a management plans to reduce direct and indirect GHG emissions due to the Project. Other aspects of resource efficiency regarding water usage are covered in Project Description and related impact assessment section. ■ No idling and out-of-scope operation of the machinery and equipment will be allowed. ■ Vegetation cover will not be disturbed if not necessary ■ In order to reduce the GHG emissions resulting from waste disposal processes, amount of wastes generated as a result of project actions will be minimized and generated wastes will be recycled accordingly. ■ During the closure phase, rehabilitation of land will help to recover lost carbon sink by converting the disturbed land to its original state as much as possible, which will act as a long-term mitigation measure.	■ Resource consumption records ■ Records on data resources invoices ■ Training records ■ Records on amount of generated wastes ■ Maintenance records of machinery and equipment

Table 10-5: Mitigation measures and monitoring actions for the offshore Physical and Biological components

Component	Phase	Project action	Mitigation measures	Monitoring measures
Biological Components	Construction	General engineering/construction works Material transportation Material storage	Avoidance measures have been considered particularly during the design of the facilities and include: ▪ minimization of the footprint of individual facilities; ▪ utilization of the existing modified habitat for placement of temporary facilities was prioritized as much as possible. 1) vegetation disturbance: ▪ limiting natural vegetation disturbance to the minimum necessary during construction works. For this purpose, limits of temporary and permanent facilities will be clearly signed in order to reduce the risk of footprint creep; ▪ in order to minimize the mortality of wildlife species, biological surveys (pre-construction surveys) will be implemented to identify and eventually relocate fauna species. An expert wildlife ecologist will perform pre-construction surveys in the areas where temporary and permanent facilities will be located (not earlier than 7 days before). The survey will focus on fauna species with limited mobility (e.g., mammals and reptiles) that cannot move ahead of construction. If any of these species are observed, they will be collected by the ecologist and translocated to undisturbed but similar sites within the AoI. – Reptiles will be caught and moved to a suitable receptor site, no smaller than the capture site and containing the same habitat characteristics and prey availability, at a minimum distance of 50 m from the Project footprint during construction phase. If essential works are required in winter, when tortoise are hibernating, then the works area should be checked carefully for hibernation burrows. If a reptile is found during such works and it is hibernating, it should be carefully moved to an alternative part of the site that will remain undisturbed. If this is not possible, then the animal should be taken in to care until it can be released on site, the following spring. – The monitoring of the activity of the small mammal species identified as species of conservation concern, in particular of the Brandt's Hamster (*Mesocricetus brandti*, NT), the Anatolian Vole (*Microtus anatolicus*, DD and Restricted Range), and the Anatolian Ground Squirrel (*Spermophilus xanthoprymnus*, NT) will be performed, through the use of endoscopic cameras located within their burrows. If any living specimen is observed and essential works that involve breaking ground are required in the areas where burrows are present, a gradual increase of the level of disturbance over a	▪ Monitoring reports results of invasive flora species within and around the construction site ▪ Observations records of fauna species, and in particular of the identified reptile species of conservation concern (Testudo graeca) and of the identified terrestrial mammal species of conservation concern (Mesocricetus brandti, Microtus anatolicus, Spermophilus xanthoprymnus, and Vormela peregusna), within and around the AoI ▪ Records of accidents involving wildlife ▪ Records of observation of live animal or carcasses along the access road or on the construction site

Component	Phase	Project action	Mitigation measures	Monitoring measures
			few days (at least 4 consecutive days) will be implemented, in order to allow for the animal to autonomously leave the burrow before it is fully excavated (e.g., day 1 machinery and equipment bought to the working area, day 2 manual excavation, day 3 mechanical excavation in the vicinity of the borrow). ▪ vehicle movement will be restricted to the Project Site and the existing roads that connect the construction sites with the surrounding areas. Off road driving will be prohibited in order to avoid any unnecessary disturbance of natural vegetation. 2) emission of noise: ▪ night works will be avoided (from 8 pm to 6 am) to reduce impacts on nocturnal fauna species; ▪ limiting the number and the speed of vehicle movements along the existing access roads. 3) emission of particulate matter: ▪ Dust deriving from construction material handling will be minimized by using covers and/or control equipment (water suppression, bag house, or cyclone) and increasing the moisture content by water spraying. ▪ Speed limit for all vehicles will be implemented so as not to generate dust emissions, and all trucks will be properly maintained at all times. ▪ Internal roads will be adequately compacted, maintained, and sprayed with water if needed, to minimize dust from vehicle movements. If water spraying is deemed insufficient, other means of surface treatment (e.g., hygroscopic media, such as calcium chloride, and soil natural–chemical binding agents) for unpaved internal roads will be implemented, by using a sprinkler system or a “water-mist cannon”. 4) increase of traffic: ▪ install speed limits and animal crossing signs on the access roads. ▪ avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife. ▪ if fauna species are encountered employees and contractors will wait until it moves on by itself or they will ask the assistance of the Environmental technician for its safe removal and relocation in a suitable environment. ▪ awareness among employees and contractors working on site about the protected species/habitats potentially present in the area will be developed, in order to	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			ensure constant monitoring and promote actions to be taken if wildlife is encountered. 5) accidental introduction and spreading of alien species: ▪ the use of non-native flora species, and especially of species classified as invasive alien species must be avoided during rehabilitation/restoration works. ▪ if the spreading of invasive species is observed, an appropriate eradication program will be developed and implemented. Areas cleared during construction for temporary use will be restored, as soon as possible, with the goal of producing a stable vegetative cover to minimize erosion, dust deposition and spreading of invasive alien species, and the aim of re-establish the original habitat with a positive impact on biodiversity. Only plants that are native to the region will be used for restoration and habitat rehabilitation. Seeding and planting of grass and shrub species typical of the local flora will be implemented to ensure optimal ground cover. The use of autochthonous adult plants and/or of seeds collected at the shortest distance possible from the restoration sites will be of fundamental importance in order to maximize the success of the translocation operations (Abeli & Dixon, 2016[1]).	
	Operation	Plant/infrastructure operation	Avoidance measures have been considered particularly during the design of the facilities and include: ▪ minimisation of the footprint of individual facilities. ▪ utilization of the existing modified habitat for placement of temporary facilities was prioritized as much as possible. 1) Presence of permanent infrastructures: ▪ The areas occupied by the new permanent infrastructures will be fenced but modification to fencing will be made in order to minimize the barrier effect. Modifications to fencing can involve maintaining gaps between the base of the fence and the These gaps will occur at regular intervals along the fence line, with a frequency of 1 gap every 100 m. In addition, each single gap could have a height of 10 cm and a width of 1 m. ▪ Non-reflective coating can be applied to the panels to minimize reflection, which can attract aquatic insects and possibly birds, as it mimics reflective surfaces of waterbodies. ▪ Flora and fauna specific monitoring campaigns within and without the areas occupied by the new permanent	▪ Floristic and vegetational monitoring report results. ▪ Monitoring results of invasive flora species in the areas under the photovoltaic panels ▪ Terrestrial fauna monitoring results ▪ Records of accidents involving wildlife or the observation of live animal or carcasses along the permanent access roads or in the areas occupied by permanent infrastructures

[1] Abeli T. & Dixon K. (2016). Translocation ecology: the role of ecological sciences in plant translocation. Plant Ecology. 217. 10.1007/s11258-016-0575-z.

Component	Phase	Project action	Mitigation measures	Monitoring measures
			infrastructures will be implemented (see Section 7.3.2.4.). ▪ vehicle movement will be restricted to the existing roads that connect the operation sites with the surrounding areas. Off road driving will be prohibited in order to avoid any unnecessary disturbance of natural vegetation. 2) Emission of noise: No additional minimization measures are deemed necessary in addition to those included in Chapter 7.1.2. 3) Emission of light: ▪ it is recommended to keep the number of light sources to the minimum; ▪ preferred types of light in exterior lighting (e.g.: lights on site due to security reasons) applications are: - low pressure sodium lamps (SOX); - light emitting diodes (LEDs): light source of choice, emitted more directional, warmer colour temperatures (closer to 3000°K); - light triggered by presence detectors, and lights oriented to the ground. ▪ these types of lights should be avoided: – mercury lamps (MBF): bluish-white lamps (attract insects and tolerant bat species); – high pressure sodium lamps (SON): brighter pinkish-yellow lamps, used as road lighting. 4) Introduction of alien species ▪ the use of non-native flora species, and especially of species classified as invasive alien species must be avoided during rehabilitation/restoration works. ▪ if the spreading of invasive species is observed, an appropriate eradication program will be developed and implemented.	

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11.0 CONCLUSION

The ESIA for the Project has been conducted following a series of phases including:

- Gap Analysis
- Baseline studies
- Impact assessment
- Stakeholder engagement
- Environmental and Social Management System Plans

The ESIA complies with the specified Turkish Legislation, and it is aligned with the 2012 IFC Performance Standards and General EHS Guidelines. The various activities have been carried out by a working group including Turkish and International experts in environmental and social disciplines.

Several environmental and social surveys, modelling work and assessments have been conducted within the scope of the ESIA. These are:

- Baseline surveys of environmental, biological and social components;
- Baseline measurements for physical components (soil, groundwater, air, noise and vibration)
- Impact assessments of the physical, biological and social components

The general methodology for the impact assessment is based on the definition of Valued Environmental and Social Components (VECs), that are aspects of the physical, biological and social environment that are considered worthy of protection by the relevant legislation or by international standards, and of Assessment Endpoints, that are specific and measurable aspects of the VECs that allow for the assessment of impacts (both positive and negative).

The process of assessing impacts has been based on the following steps:

- The identification of Project Components, as individual elements of the Project that are characterized by similar features and construction, operation and decommissioning procedures;
- The identification of Impact Factors, or factors that can change the environmental and social quality of the VECs like air emissions, water discharge etc.;
- The definition of the sensitivity of the VECs to the Impact Factors identified, based on the environmental and social data collected during baseline; and
- The definition of the Impacts as a result of the interaction between Impact Factors and Sensitivity of the VECs for each of the identified Assessment Endpoints.

Each of the Project components has been associated to one or more impact factor for each of the phases of construction, operation and decommissioning.

Impacts have been assessed considering the correct application of a set of standard mitigation measures that are drawn from good industry practice. Additional site or issue specific mitigation measures have been identified to address areas where high residual impacts are likely to occur, in order to ensure the impacts after additional mitigation measure are kept at an acceptable level.

Impacts have been assessed separately for the three phases of construction, operation and decommissioning, as the nature and extent of the impacts in the three phases is substantially different.

As a result of the Environmental and Social Assessment Study the following conclusion have been driven:

1) Continuous stakeholder engagement is necessary to manage the social risks of the Project. Stakeholder Engagement Plan including the internal and external grievance mechanisms will be prepared for the Project.

2) Air and noise monitoring programmes will be in place for the Project to be in compliance with regulatory requirements applicable to the Project.

3) For the biodiversity components, a list of mitigation measures is defined for Project phases within the scope of ESIA including additional field studies for data collection.

4) The Project will develop an Environmental and Social Management System in line with both corporate requirements and the requirements that are defined as part of the ESIA study.

The mitigation measures developed, to minimise the environmental and social impacts of the Project are detailed in relevant sections of this report.

The requirements of an Environmental and Social Management System are also provided as part of the Environmental and Social Impact Study focusing on:

- Environmental and Social Management System Structure
- Environmental and Social Management Plan(s)
- Labour Issues and Health & Safety Management Plan(s)
    - Labour Conditions
    - Occupational Health and Safety
    - Community Health and Safety

Residual Impacts

The surveys, studies and the impact assessments have allowed the Client to develop robust mitigation measures for residual impacts. As discussed in Section 5.7, the Residual Impact Value (RIV) results from the impact value and the effectiveness of the mitigation measure put in place to reduce the negative outcomes generated by the Project Actions/Impact Factors (or to maximize the positive ones). The RIVs contribute to the overall impact on each component. Overall impact is a synthesis of the residual impacts on a component from all the impact factors generated by the Project actions.

Relying on the assessment conducted in Section 7, the overall residual impact value on each component is summarized in the following sections.

Physical

The overall residual impact is assessed to be low for *Noise and Vibration* components since the actual impact corresponds mainly in construction phase (very limited period). During the construction phase of the Project, a monitoring program of noise at the baseline noise measurement locations and at the receptors where the defined noise limit values are exceeded, will be in place.

Air Quality and Soil and Subsoil components were assessed as negligible and low during construction and operation phases. In order to mitigate these residual impacts, detailed measures have been developed as presented in Section 7.1.1 and Section 7.1.3.

The overall residual impacts for *Hydrogeology and Groundwater and Hydrology and Surface Water* and *Traffic* -were assessed as negligible during construction and operation phases. The monitoring program to be used for surface water and groundwater quality will be based on site-specific risk assessments as well as specific guidelines for water quality standards.

Mitigation measures listed -in Section 7.1.6.1.2 and Section 7.1.6.2.2 will be strictly followed in order to prevent any harm to workers and the community related to traffic. Continuous stakeholder engagement process and grievance mechanism will be in place. There will be positive impact of the traffic based on the decreased road traffic load on provincial level.

Biological

For the biological components the overall residual impact was assessed to be negligible, low and medium for during construction phase. For operation phase, overall low residual impact has been assessed.

Detailed mitigation measures for biological components presented in Section 7.3.1.2 and Section 7.3.2.2 and these mitigation measures will be strictly followed. Areas cleared during construction for temporary use, such as camp areas, and storage areas, will be restored, as soon as possible, with the goal of producing a stable vegetative cover to minimize erosion, dust and spreading of invasive alien species, and the aim of recreating the original natural habitat and possibly enhancing flora species richness and diversity.

Monitoring and additional site survey will be implemented for biological components in accordance with the recommendations listed in the Section 7.3.1.4 and Section 7.3.1.4 of the ESIA.

Social

The possible social impacts of the Project will be both positive and negative. It is seen that the impacts on *Population and Demography* were negligible and low with the proposed mitigation measures. Unlike other Project components, the *Economy and Employment* are expected to have high positive impact on both the construction and operation periods. Components on *Labor and Working Conditions were* assessed as medium with the implementation of the mitigation measures defined in Section 7.1.4.1.2 and Section 7.1.4.2.2. The monitoring program to be used for auditing working conditions will be based on site-specific risk assessments as well as specific guidelines for workers' accommodation standards.

The overall residual impacts for *Land Use, Cultural Heritage* and *Visual Aesthetics* were assessed as negligible during construction and operation phases, while the residual impacts for *Community Health and Safety* are assessed as both negligible and low for all phases of the Project.

In order to mitigate these overall social residual impacts several mechanisms will be put in place, such as Stakeholder Engagement Plan (including Grievance Redress Mechanism), and specific management plans such as Contractor Management Plan, Community Health and Safety Plan, Camp Site and Offsite Accommodation Management Plan.

Signature Page

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APPENDIX A

List of Applicable National Legislation and International Agreements Ratified by Türkiye

Table 7: Current Relevant Environmental Laws and Regulations in Türkiye

Law/Regulation
Permitting
Regulation on Environmental Impact Assessment
Regulation on Environmental Auditing
Regulation on Environmental Permit and License
Communique on the Administrative Fines to be implemented in accordance with the first section (k) of article 20 of the Environmental Law numbered 2872 (and annual updates of the Communique)
Regulation on Electric Power Current Facilities
Industrial Zones Law No. 4737
Air Quality
Regulation on Control of Industrial Air Pollution
Regulation on Control of Air Pollution caused by Heating
Regulation on Assessment and Management of Air Quality
Regulation on Ozone Layer Depleting Materials
Regulation on Monitoring of Greenhouse Gas Emissions
Communique on Monitoring and Reporting of Greenhouse Gases
Regulation on Exhaust Gas Emission Control
Communique on Continuous Emission Monitoring Systems
Regulation on the Reduction in the Sulphur Content of Some Fuel Types
Regulation on Control of Odour-Generating Emissions
Water Quality
Law on Groundwater, No. 167
Regulation on Water Pollution Control
Regulation on Protection of Groundwater against Pollution and Deterioration
Regulation on Control of Pollution Caused by Hazardous Substances in Water and its Environment

Law/Regulation
Regulation on Surface Water Quality
Regulation on the Protection of Drinking-Utility Water Basins
Regulation on Flood and Sedimentation Control
Regulation on Preparation, Implementation and Follow-up of Basin Management Plans
Regulation on Water Intended for Human Consumption
Communique on Turkish Water Pollution Control Regulation Sampling and Analysis Methodology
Communique on Turkish Water Pollution Control Regulation Administrative Procedures
Soil Quality
Regulation on Control of Soil Pollution and Contaminated Lands by Point Sources
Technical Guidelines for the Regulation on Soil Pollution Control and Contaminated Sites by Point Sources -Polluted Sites, Management System, Technical Document -Polluted Site, Investigation Technical Guidance Document -Polluted Site, Risk Assessment Technical Guidance Document -Polluted Site, Clean-Up and Monitoring Technical Guidance Document
Law on Protection of Soil and Land Use (No: 5403)
Law on Pasture
Waste Management
Regulation on Waste Management
Regulation on Zero Waste
Regulation on Control of Excavation Soil and Demolition Waste
Regulation on Control of Waste Batteries and Accumulators
Regulation on Control of End-of-Life Tires
Regulation on Control of Polychlorinated biphenyls (PCBs) and Polychlorinated terphenyls (PCT)s
Regulation on Management of Waste Oils
Regulation on Control of End-of-Life Vehicles

Law/Regulation
Regulation on Control of Waste Vegetative Oils
Regulation on Control of Medical Wastes
Regulation on Landfills
Regulation on the Control of Packaging Wastes
Regulation on the Control of Waste Electrical and Electronic Equipment
Regulation on the General Principles of Waste Pre-Treatment and Recovery Facilities
Regulation on Incineration of Wastes
Hazardous Materials
Law on Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Hazardous Materials
Implementation Regulation of The Law on Law on Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Hazardous Materials
Regulation on Radiation Safety
Regulation on the Safe Transportation of Radioactive Materials
Regulation on the Transportation of Hazardous Goods by Road
Regulation on the Classification, Packaging, and Labelling of Materials and Mixtures
Regulation on Safety Data Sheets on Hazardous Materials and Mixtures
Noise Management
Regulation on Environmental Noise Control
Regulation on Noise Emission in the Environment Generated by the Equipment Used in the Open Space
TS ISO 1996-1- Acoustics - Description, measurement and assessment of environmental noise -Part 1: Basic quantities and assessment procedures
TS ISO 1996-2- Acoustics - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels
Nature Conservation and Biodiversity
Regulation on Wildlife Protection and Wildlife Enhancement Areas

Law/Regulation
Law on Forestry (No: 6831)
Law on National Parks
Law on Fisheries
Law on Animal Protection
Decree-Law Establishing the Special Environmental Protection Agency
Terrestrial Hunting Law
Coastal Law
Regulation for Implementing the Convention on International Trade in Endangered Species of Wild Fauna and Flora
Regulation on the Protection of Wetlands
Regulation on Fisheries
Communiqué About Export of Natural Floral Onions in 2021 List
Regulation on Collection, Production and Export of Natural Floral Onions from Nature
Energy Efficiency
Law on Energy Efficiency, No. 5627
Regulation on the Improvement of the Energy Sources and the Efficiency in the Energy Usage
Cultural Heritage
Law on Protection of Cultural and Natural Heritage (No: 2863)
Regulation on Research, Drilling and Excavation of Cultural and Natural Assets
Principal Decision No. 658 issued on 5 November 1999
Law No. 5448 on 19/01/2006 on the Law on the Approval of the Convention for the Protection of the Intangible Cultural Heritage
Other Applicable Legislation
Türkiye Building Earthquake Regulation
Regulation on Buildings to be Constructed in Earthquake Zones

Law/Regulation
Regulation on Buildings to be Constructed in Disaster Areas
Disaster Regulation for Highway Roadside Engineering Structures
Road Transport Regulation
Highway Traffic Regulation
Turkish Petroleum Law
Industry Registry Law
Agriculture Law
Law on Industrial Zones
Regulation on Industrial Zones
Law on Military Restricted Zones and Security Zones
Regulation on Opening a Business and Working Licenses
Wastewater Treatment/Deep Sea Discharge Facility Project Approval Circular" numbered 2018/4 and dated 20.11.2018
Energy Production
Electricity Market Connection and System Use Regulation
Electricity Market License Regulation
Electricity Market Distribution Regulation
Law on Utilization of Renewable Energy Resources for Electricity Generation (Law No: 5346)
Regulation on Competitions Regarding Preliminary License Applications Made for Installation of Energy Generation Facilities Based on Wind and Solar Power
Regulation on Electric Power Current Facilities

Table 8: Existing Labour and H&S Laws and Regulations in Türkiye

Existing Labour and H&S Law and Regulations
The Labour Law – No.4857 (Aims to regulate the working conditions and work-related rights and obligations of employers and employees working within the confines of an employment contract.)
Law on Occupational Health and Safety – Law No. 6331
Regulation on Occupational Health and Safety Services
Regulation on Machine Guards
Regulation on Machinery Safety
Regulation on Safety and Health Requirements Working with Display Screen Equipment
Regulation on Protection of Workers from the Risks of Vibration
Regulation on Prevention of Workers from Risks Created from Noise
Regulation of Fighting with Dust
Regulation on Health and Safety Signs
Regulation on Health and Safety at Construction Sites
Regulation on Protection of Workers from the Risk of Explosive Media
Regulation on Health and Safety Precautions Regarding Working with Asbestos
Regulation on Manual Handling Works
Regulation on Principles and Procedures for Health and Safety Training of Employees
Regulation on Health and Safety Precautions Regarding Workplace Buildings and Their Annexes
Regulation on Use of Personnel Protective Equipment in Workplaces
Regulation on Health and Safety Conditions Regarding Use of Work Equipment
Regulation on Health and Safety Regarding Temporary or Fixed-Term Works
Personnel Protective Equipment Regulation
Regulation on Health and Safety Precautions Regarding Working with Chemicals
Regulation on Subcontractor

Existing Labour and H&S Law and Regulations
Regulation on Protection of Buildings Against Fire
Regulations on the Prevention of Biological Exposure Risks
Regulation on the Employment of Pregnant or Lactating Women, Children's Care Homes and Breastfeeding Rooms
Regulation on Health and Safety Precautions Regarding Working with Cancerogenic and Mutagenic Substances
Regulation on the Procedures and Principles of the Employment of Children's and Young Workers
Regulation on Working Hours as per the Labour Law
Regulation on Overtime and Overtime Hours as per the Labour Law
Regulation on Working Hours that Cannot Be Divided into Weekly Working Days
Regulation on Health and Safety Committees
Regulation on Supporting Health and Safety Services
Regulation on Health and Safety Risk Assessment
Regulation on First Aid
Regulation on Work Stoppage in Workplaces
Regulation on Emergency Cases in Workplaces
Regulation on the Prevention of Major Industrial Accidents and Reducing Their Effects
Law on General Sanitation

Table 9: International Conventions/Protocols Türkiye Has Signed

International Convention / Protocol	
European Cultural Convention; 19.12.1954	17/06/1957, 9635
International Convention for the Establishment of the European and Mediterranean Plant Protection Organization; Paris, 1951	10/04/1965, 11976
The Agreement for the Establishment of the General Fisheries Commission for the Mediterranean (GFCM); Rome, 1949	19/03/1954, 8662

International Convention / Protocol	
Agreement on an International Energy Program; Paris, 1974	23/01/1981
The Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention); Barcelona, adopted on 16.02.1976, entered into force 12.02.1978	12/06/1981, 17368
Convention on Long-Range Transboundary Air Pollution; Geneva, 1979	23/03/1983,17996
The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention); Bern, opened for signature on 19.09.1979, entered into force on 01.06.1982	20/02/1984, 18318
Protocol to the Convention on Long-Range Transboundary Air Pollution on the Financing of the Co-operative Program for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe; Geneva, 1984	23/07/1985, 18820
Protocol for the Protection of the Mediterranean Sea against Pollution from the Land-Based Sources; Athens, 1980	18/03/1987, 19404
Protocol Concerning Specially Protected Areas in the Mediterranean; Geneva, 1982 (date of signature 06.11.1986)	23/10/1988, 19968
Convention on the Control of Transboundary Movements of Hazardous Waste and Disposal; Basel, 22.03.1989	15/05/1994, 21935
Convention on the Protection of the Black Sea against Pollution (Bucharest Convention); Bucharest, entered into force 21.04.1994	14/12/1993, 21788
United Nations Convention to Combat Desertification; Paris, 17.6.1994, entered into force in December 1996	16/05/1998, 23344
Biodiversity Convention; opened for signature at the Earth Summit in Rio de Janeiro on 5.6.1992, entered into force on 29.12.1993	27/12/1996, 22860
United Nations Framework Convention on Climate Change; 2004, and Kyoto Protocol on Global Warming; 2008 The general principle of Kyoto is the signatory parties should decrease their GHG emissions by 5.2% of the 2009 amount till the end of 2012. After 2012, a new agreement and new emission limits will come into the picture.	Turkish Parliament accepted to be a signatory of the Kyoto Protocol in February 2009. However, Türkiye was not a party to the Protocol, and thus had no commitment, until the end of 2012.
The International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) dated 1973, amended by the 1978 Protocol	24/06/1990, 20558

International Convention / Protocol	
International Convention for the Safety of Life at Sea (SOLAS 1974/1988)	25/5/1980, 16998 / 31/01/2013, 28545
United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention on the Protection and Promotion of the Diversity of Cultural Expressions. Paris, 20 October 2005	
United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention for the Safeguarding of the Intangible Cultural Heritage. Paris, 17 October 2003.	17 October 2003
United Nations Educational, Scientific, and Cultural Organisation (UNESCO), Convention concerning the Protection of the World Cultural and Natural Heritage. Paris, 16 November 1972	16 November 1972
United Nations Framework Convention on Climate Change., Paris Climate Agreement. Paris, 4 November 2016	The Law Regarding the Approval of the Paris Agreement was published in the Official Gazette dated 7 October 2021 and numbered 31621

APPENDIX B

Applicable Environmental Limits

AIR QUALITY

This section has been developed considering the national legislation and international standards detailed above. Legislation and standards used mainly to develop this chapter are listed below.

- Regulation on Control of Industrial Air Pollution (Dated 03.07.2009 and Numbered 27277)
- Regulation on Assessment and Management of Air Quality (Dated 06.06.2008 and Numbered 26898)
- IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

Ambient Air Quality Standards

Limit values for stack gas emissions and standards for ambient air quality have been set in “Regulation on Control of Industrial Air Pollution”.

According to the Article 6 of the Regulation:

- *In new establishments, stack gas emissions of the facilities should be determined as mass flow rate and concentration, and emissions except for stacks to atmosphere should be determined as hourly mass flow rate.*
- *For all of the facilities in the new establishment; If the mass flows in Annex-2 Table-2.1 are exceeded, by the operating company; In the impact area of the facilities, it is necessary to calculate the contribution value to air pollution by performing a dispersion model to evaluate the pollution of the establishment.*
- *The air quality limit values given in Annex 2.2 should not be exceeded in the facility impact area.*

The below table presents the limit values specified in Annex-2 requirements and other international standards.

Table 10: Ambient Air Quality Standards

Pollutant	Time/ Averaging Period	Maximum Allowable Limit		
		Turkish Regulation on Control of Industrial Air Pollution[1]	Turkish Regulation on Assessment and Management of Air Quality[2]	IFC / WHO[3]
SO_2 (µg/m³)	Hourly (Cannot be exceeded more than 24 times in a year)	350 (for 2019-2023) **350 (for 2024 and after)**	**350**	-
	24-hour (Cannot be exceeded more than 3 times in a year)	125 (for 2019-2023) 125 (for 2024 and after)	125	125 (Interim target-1) 50 (Interim target-2) **20 (guideline)**
	10-minute	-	-	**500 (guideline)**
	Long-term limit	60 (for 2019-2023) **60 (for 2024 and after)**	**60**	-
	Yearly and winter season (Oct 1st – March 31st) (for wildlife and ecosystem)	20 (for 2019-2023) **20 (for 2024 and after)**	**20**	-
NO_2 (µg/m³)	Hourly (Cannot be exceeded more than 18 times in a year)	250 (for 2019-2023) **200 (for 2024 and after)**	**200**	**200 (guideline)**
	Yearly	40 (for 2019-2023) **40 (for 2024 and after)**	**40** **30 (NO_X)**	**40 (guideline)**
PM10 (µg/m³)	24-hour (Cannot be exceeded more than 35 times in a year)	50 (for 2019-2023) **50 (for 2024 and after)**	**50**	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) **50 (guideline)**

Pollutant	Time/ Averaging Period	Maximum Allowable Limit		
		Turkish Regulation on Control of Industrial Air Pollution[1]	Turkish Regulation on Assessment and Management of Air Quality[2]	IFC / WHO[3]
	Yearly	40 (for 2019-2023) 40 (for 2024 and after)	40	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) **20 (guideline)**
Fine particles (PM2.5, µg/m^3)	24-hour	-	-	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) **25 (guideline)**
	Yearly	-	-	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) **10 (guideline)**
CO (mg/m^3)	Maximum daily 8-hour mean	10 (for 2019-2023) **10 (for 2024 and after)**	**10**	-
H_2S	Hourly	**100**	-	-
	Short-term limit	**20**	-	-
TOC (µg/m^3)	Hourly	280 (for 2019-2023) 280 (for 2024 and after)	-	-
	Short-term limit	70 (for 2019-2023) **70 (for 2024 and after)**	-	-
Settled Dust (mg/m^2/day)	Short-term limit	390 (for 2019-2023) **390 (for 2024 and after)**	-	-
	Long-term limit	210 (for 2019-2023) **210 (for 2024 and after)**	-	-

Pollutant		Time/ Averaging Period	Maximum Allowable Limit		
			Turkish Regulation on Control of Industrial Air Pollution[1]	Turkish Regulation on Assessment and Management of Air Quality[2]	IFC / WHO[3]
In Settled Dust (mg/m^2/day)	Pb and Compounds	Long-term limit	250 (for 2019-2023) **250 (for 2024 and after)**	-	-
	Cd and Compounds	Long-term limit	3.75 (for 2019-2023) **3.75 (for 2024 and after)**	-	-
Ozone µg/m^3		Maximum daily 8-hour mean	-	120	160 (Interim target-1) **100 (guideline)**

1 Regulation on Control of Industrial Air Pollution (Dated 03.07.2009 and Numbered 27277)
2 Regulation on Assessment and Management of Air Quality (Dated 06.06.2008 and Numbered 26898)
3 IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)
Note: Project Standards, which are determined as the most stringent values among given limits, are indicated in **red** colour.

WASTEWATER QUALITY

DOMESTIC WASTEWATER

As per The Water Pollution Control Regulation (WPCR), the facilities having a worker population of less than 2000 will take the opinion of the Provincial Directorate of Environmental, Urbanization and Climate Change regarding the disposal of the wastewater. The Provincial Directorate will consider the environmental status of the area and the nature of the project, and decide on the disposal method (i.e. wastewater treatment plant, impermeable septic tank etc.). In case the Provincial Directorate decides for the establishment of the wastewater treatment plant, the following limits will be applied.

Table 11: Effluent Discharge Limits for Domestic Wastewater to the Receiving Environment*

PARAMETER	Unit	Water Pollution Control Regulation Table 21.1: Sector: Domestic Wastewaters	IFC General EHS Guideline: Wastewater and Ambient Water Quality, Table 1.3.1 Indicative Values for Treated Sanitary Sewage Discharges
		2 hr Composite Sample	
Biological Oxygen Demand (BOD)	(mg/L)	50	**30**
Chemical Oxygen Demand (COD)	(mg/L)	160	**125**
Total Suspended Solids (TSS)	(mg/L)	**60**	**50**
pH	-	**6-9**	**6-9**
Total Nitrogen	(mg/L)	-	**10**
Total Phosphorus	(mg/L)	-	**2**
Oil and Grease	(mg/L)	-	**10**
Total Coliform Bacteria	MPN1[1] / 100 ml	-	**400**

1 MPN = Most Probable Number

* Receiving environment: The near or distant environment, such as lakes, streams, coastal and sea waters and underground waters, where wastewater is discharged or indirectly mixed,

Note: Project Standards, which are determined as the most stringent values among given limits, are indicated in **red** colour.

INDUSTRIAL WASTEWATER

Treatment of groundwater will lead to the generation of industrial wastewater (backwash wastewater from filters) in the potable water treatment plant. Effluent limits as per WPCR are given below.

Table 12: Effluent Discharge Limits to Receiving Body for Backwash Wastewater of Drinking Water Filters

PARAMETER	unit	Water Pollution Control Regulation Table 20.5: Other Industrial Wastewater (Backwashing of Drinking Water Filters and Similar)	Water Pollution Control Regulation Table 20.7: Water Softening, Demineralization and Regeneration, Activated Carbon Washing and Regeneration Facilities
		2 hr Composite Sample	2 hr Composite Sample
Chemical Oxygen Demand (COD)	(mg/L)	70	-
Total Suspended Solids (TSS)	(mg/L)	150	-
pH	-	6-9	6-9
Chloride (Cl^-)	(mg/L)	-	2000
Sulphate (SO4-2)	(mg/L)	-	3000
Iron (Fe)	(mg/L)	-	10
Fish Bioassay (ZSF)	-	-	10

DRINKING WATER QUALITY

Table 13: Drinking Water Quality Standards

Parameter	Unit	Turkish[1]	WHO[2]
Acrylamide	µg/L	**0.1**	0.5
Aluminium	µg/L	**200****	-
Ammonium	mg/L	**0.5****	-
Antimony	µg/L	**5**	20
Arsenic	µg/L	**10**	**10**
Barium	mg/L	-	**1.3**
Benzene	µg/L	**1**	10
Benzo(a)pyrene	µg/L	**0.01**	0.7
Boron	mg/L	**1**	2.4
Bromate	µg/L	**10**	10
Cadmium	µg/L	5	**3**
Chlorate	mg/L	-	**0.7**
Chloride	mg/L	**250****	**-**

Parameter	Unit	Turkish[1]	WHO[2]
Chromium	µg/L	**50**	**50**
Clostridium perfringens including spores	number/100 ml	**0****	-
Copper	mg/L	**2**	**2**
Cyanide	µg/L	**50**	-
1,2-dichloroethane	µg/L	**3**	30
Epichlorohydrin	µg/L	**0.1**	0.4
Fluoride	mg/L	**1.5**	1.5
Iron	µg/L	**200****	-
Lead	µg/L	**10**	**10**
Manganese	µg/L	**50****	80
Mercury	µg/L	**1**	6
Nickel	µg/L	**20**	70
Nitrate	mg/L	**50**	50
Nitrite	mg/L	**0.5**	3
Pesticides	µg/L	**0.1**	-
Pesticides Total	µg/L	**0.5**	-
Polycyclic aromatic hydrocarbons	µg/L	**0.1**	-
Selenium	µg/L	**10**	40
Sulphate	mg/L	**250****	-
Sodium	mg/L	**200****	-
Tetrachloroethene and Trichloroethene	µg/L	**10**	40
Trihalomethanes Total	µg/L	**100**	-
Uranium	µg/L	-	**30**
Vinyl chloride	µg/L	0.5	**0.3**
Conductivity	µS cm^{-1} at 20 °C	**2500**	-
Oxidisability	mg/L O2	**5****	-
Coliform bacteria	number/100 ml	**0**	-

Parameter	Unit	Turkish[1]	WHO[2]
Tritium[8]	Bq/l	**100****	**100**
Indicative dose	mSv	**0.10**	-
Taste	Acceptable to consumers and no abnormal change		
Colony count 22°C	No abnormal change		
Total organic carbon (TOC)	No abnormal change		
Turbidity	Acceptable to consumers and no abnormal change		
Colour	Acceptable to consumers and no abnormal change		
Odour	Acceptable to consumers and no abnormal change		

* WHO
** Indicator values
*** Elevated levels of tritium may indicate the presence of other artificial radionuclides. If the tritium concentration exceeds its parametric value, an analysis of the presence of other artificial radionuclides shall be required
[1] Regulation on the Water Intended for Human Consumption, O.G.:25730, 2005
[2] WHO Guidelines for drinking-water quality, 4th edition, incorporating the 1st and 2nd addendum

SOIL QUALITY

The Regulation on Soil Pollution Control and Point Source Contaminated Sites (“Soil Regulation”) was published on June 8, 2010 (Official Gazette: 27605) and was fully implemented on June 8, 2015. In accordance with Social Regulation, it is obligatory to prevent pollution, stop pollution release in polluted areas and determine the extent of pollution.

Facilities must ensure that the waste and residues are not discharged into the environment and are stored in compliance with the standards and procedures stated in the Environmental Law and the relevant regulations. This is to ensure that they do not harm the soil and cause soil pollution. According to the Soil Regulation, it is the responsibility of the facility owner to remediate (i.e., clean up) contaminated soil. In addition to this, once remediation has been undertaken, parameters listed in the regulation should be analysed through soil sampling and should comply with the generic limit values of these parameters.

“Potential Soil Pollutant Activities and Activity Specific Pollution Indicator Parameters List” is given in Annex 2, Table 2 of the Soil Regulation. The activities within the Project would probably be covered with the below-listed activity codes in the Soil Regulation.

Table 14: Applicable Activity Codes of the Project and Relevant Contaminant Indicator Parameters

NACE Code	Industrial Activity	Activity-Based Contaminant Indicator Parameters
3511	Electricity Production	TOX, TPH, As, B, Ba, Cd, Cr, Cu, Hg, Mo, Pb, Sb, Se, Zn

[8] Council Directive 2013/51/Euratom of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption (europa.eu)

Soil Quality Standards in the “Soil Regulation* related to the above-mentioned activity codes are given below.

Table 15: Soil Quality Standards

Regulation on Soil Pollution Control and Point Source Contaminated Sites					
Measured Parameters	**Units**	**Ingestion of soil or dermal contact (mg/kg oven-dry soil)**	**Outdoor inhalation of fugitive dust (mg/kg oven-dry soil)**	**Transport of pollutants to groundwater and use of groundwater for drinking [1] (mg/kg oven-dry soil)**	
				SF = 10	**SF = 1**
Extractable Metals / Major Cations					
Antimony	mg/kg	31	-	2	0.2
Arsenic	mg/kg	0.4	471	3	0.3
Barium	mg/kg	15643	433702	288	29
Cadmium	mg/kg	70	1124	27	3
Chromium	mg/kg	235	24	900000	1
Cobalt	mg/kg	23	-	5	0.5
Copper	mg/kg	3129	-	514	51
Lead	mg/kg	400	-	135	14
Mercury	mg/kg	23	-	3	0.6
Molybdenum	mg/kg	391	-	14	1
Nickel	mg/kg	1564	-	13	1
Selenium	mg/kg	391	-	0.5	0.05
Vanadium	mg/kg	548	-	2556	256
Zinc	mg/kg	23464	-	6811	681
Total Petroleum Hydrocarbons (TPH)	mg/kg	188496	-	175	17.4

1 If the distance to the aquifer is less than 3m, the aquifer is cracked or karstic, or the pollution source area is 10 hectares or more, the dilution factor SF is taken as "1"; in other cases, SF should be taken as "10".

NOISE

Table 16: Noise Limits (Turkish Regulation on Environmental Noise Control)

Noise Source	Measured Parameter	Environmental Noise Value (Regulation on Environmental Noise Control, Annex-2, Table 1)		
		Day 07:00 – 19:00	Evening 19:00 – 23:00	Night time 23:00 - 07:00
Industrial facilities, transportation sources	LAeq,5min.	65 dB(A)	60 dB(A)	55 dB(A)

Noise Source	Measured Parameter	Environmental Noise Value (Regulation on Environmental Noise Control, Annex-2, Table 1)		
		Day 07:00 – 19:00	Evening 19:00 – 23:00	Night time 23:00 - 07:00
Music broadcasting establishments (1)	LAeq 63-250 Hz	60 dB(A)	55 dB(A)	50 dB(A)
Workplaces (2)	LAeq,5min.	Background + 5 dB(A)		Background + 3 dB(A)
In case of more than one workplace (3)	LAeq,5min.	Background + 7 dB(A)		Background + 5 dB(A)
All sources	LCmax	100 dB(C)		

Table 17: IFC Noise Standards

	One Hour LAeq* (dBA) (IFC EHS Guidelines General EHS Guidelines: Environmental Noise Management and Noise at Work Directive 2003/10/EC) [1]	
Receptor	Day-time 07:00 - 22:00	Night time 22:00 - 07:00
Residential; institutional; educational	55	45
Industrial; Commercial	70	70

1 According to the IFC General EHS Guideline Noise measurement levels sourced from Project activities should not exceed the levels presented above or result in a maximum increase in background levels of **3 dB** at the nearest receptor location off-site.

VIBRATION

Table 18: Vibration Standards (Turkish Regulation on the Environmental Noise Control)

Regulation on the Environmental Noise Control Noise (Annex-2, Table 5)		
Maximum Allowed Vibration Velocity (Peak value – mm/s)	**Continuous Vibration**	**Intermittent Vibration**
Residential Areas	5	10
Industrial and Commercial Areas	15	30
Historical and Natural Structures[1]	2	5

1 These limit values determined for historical and natural structures may be limited by precise, comprehensive vibration measurements and scientific studies to be carried out on-site.

Vibration criteria are defined in “BS 5228-2:2009 - Code of practice for noise and vibration control on construction and open sites” which defines vibration limits for humans and which could result in cosmetic damage to buildings.

Table 19: Guidance on Effects of Vibration Levels on Humans

Vibration level $[mm/s]$	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaints but can be tolerated if prior warning and explanation have been given to residents.
10	Vibration is likely to be intolerable for any more than very brief exposure to this level.
Source: BS 5228-2:2009. Code of practice for noise and vibration control on construction and open sites. Vibration	

Table 20: Transient Vibration Guide Values for Cosmetic Damage of Buildings

Type of building	Peak component particle velocity in the frequency range of predominant pulse, $[mm/s]$	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50	50
Unreinforced or light-framed structures Residential or light commercial buildings	15-20	20-50
Note: Values referred to are at the base of the building		
Source: BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration		

According to BS 7385-2:1993, minor damage to buildings is possible at vibration levels greater than twice those given in Table 20 and major damage to a building structure can occur at values greater than four times the tabulated values.

In addition, the values in Table 20 are related predominantly to transient vibration that does not generate resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as generating resonance, then the guide values in Table 20 might need to be reduced by up to 50%. Therefore, the lower limit for vibration level that may cause cosmetic damage to residential buildings is 5 mm/s, while the limit of human perception is much lower, comprising 0.14 to 0.30 mm/s.

WATER QUALITY

SURFACE WATER

Classification of the surface water quality will be done based on the threshold values provided in Annex-5, Table 2 of the Regulation on Surface Water Quality. Relevant parameters and threshold values for each water quality class are listed below.

Table 21: Inland Surface Waters Quality Criteria

Parameters	Unit	Regulation on Surface Water Quality, Annex 5, Table 2 Water Quality		
		Class I	Class II	Class III
Ammonium Nitrogen	mg/L	< 0,2	1	>1
Biochemical Oxygen Demand (BOD)	mg/L	< 4	8	>8
Dissolved Oxygen	mg/L	> 8	6	< 6
Fluoride	µg/L	≤ 1000	1500	> 1500
Orthophosphate Phosphorus	mg/L	< 0,05	0,16	> 0,16
Conductivity	µS/cm	< 400	1000	> 1000
Chemical Oxygen Demand (COD)	mg/L	< 25	50	> 50
Manganese	µg/L	≤ 100	500	> 500
Nitrate Nitrogen	mg/L	< 3	10	> 10
pH	-	6-9	6-9	6-9
Colour (436 nm)	m-1	≤ 1.5	3	> 4.3
Colour (525 nm)	m-1	≤ 1.2	2.4	> 3.7
Colour (620 nm)	m-1	≤ 0.8	1.7	> 2.5
Selenium	µg/L	≤ 10	15	> 15
Sulphur	µg/L	≤ 2	5	> 5
Total Nitrogen	mg/L	< 3,5	11,5	> 11,5
Total Phosphorous	mg/L	< 0,08	0,2	> 0,2
Total Kjeldahl Nitrogen	mg/L	< 0,5	1,5	> 1,5
Oil-Grease	mg/L	< 0,2	0,3	> 0,3

APPENDIX B

Applicable Environmental Limits

AIR QUALITY

This section has been developed considering the national legislation and international standards detailed above. Legislation and standards used mainly to develop this chapter are listed below.

- Regulation on Control of Industrial Air Pollution (Dated 03.07.2009 and Numbered 27277)
- Regulation on Assessment and Management of Air Quality (Dated 06.06.2008 and Numbered 26898)
- IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)

Ambient Air Quality Standards

Limit values for stack gas emissions and standards for ambient air quality have been set in "Regulation on Control of Industrial Air Pollution".

According to the Article 6 of the Regulation:

- *In new establishments, stack gas emissions of the facilities should be determined as mass flow rate and concentration, and emissions except for stacks to atmosphere should be determined as hourly mass flow rate.*
- *For all of the facilities in the new establishment; If the mass flows in Annex-2 Table-2.1 are exceeded, by the operating company; In the impact area of the facilities, it is necessary to calculate the contribution value to air pollution by performing a dispersion model to evaluate the pollution of the establishment.*
- *The air quality limit values given in Annex 2.2 should not be exceeded in the facility impact area.*

The below table presents the limit values specified in Annex-2 requirements and other international standards.

Table 10: Ambient Air Quality Standards

Pollutant	Time/ Averaging Period	Maximum Allowable Limit		
		Turkish Regulation on Control of Industrial Air Pollution[1]	Turkish Regulation on Assessment and Management of Air Quality[2]	IFC / WHO[3]
SO_2 (µg/m³)	Hourly (Cannot be exceeded more than 24 times in a year)	350 (for 2019-2023) **350 (for 2024 and after)**	**350**	-
	24-hour (Cannot be exceeded more than 3 times in a year)	125 (for 2019-2023) 125 (for 2024 and after)	125	125 (Interim target-1) 50 (Interim target-2) **20 (guideline)**
	10-minute	-	-	**500 (guideline)**
	Long-term limit	60 (for 2019-2023) **60 (for 2024 and after)**	**60**	-
	Yearly and winter season (Oct 1st – March 31st) (for wildlife and ecosystem)	20 (for 2019-2023) **20 (for 2024 and after)**	**20**	-
NO_2 (µg/m³)	Hourly (Cannot be exceeded more than 18 times in a year)	250 (for 2019-2023) **200 (for 2024 and after)**	**200**	**200 (guideline)**
	Yearly	40 (for 2019-2023) **40 (for 2024 and after)**	**40** **30 (NO_X)**	**40 (guideline)**
PM10 (µg/m³)	24-hour (Cannot be exceeded more than 35 times in a year)	50 (for 2019-2023) **50 (for 2024 and after)**	**50**	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) **50 (guideline)**

Pollutant	Time/ Averaging Period	Maximum Allowable Limit		
		Turkish Regulation on Control of Industrial Air Pollution[1]	Turkish Regulation on Assessment and Management of Air Quality[2]	IFC / WHO[3]
	Yearly	40 (for 2019-2023) 40 (for 2024 and after)	40	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) **20 (guideline)**
Fine particles (PM2.5, µg/m³)	24-hour	-	-	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) **25 (guideline)**
	Yearly	-	-	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) **10 (guideline)**
CO (mg/m³)	Maximum daily 8-hour mean	10 (for 2019-2023) **10 (for 2024 and after)**	**10**	-
H_2S	Hourly	**100**	-	-
	Short-term limit	**20**	-	-
TOC (µg/m³)	Hourly	280 (for 2019-2023) 280 (for 2024 and after)	-	-
	Short-term limit	70 (for 2019-2023) **70 (for 2024 and after)**	-	-
Settled Dust (mg/m²/day)	Short-term limit	390 (for 2019-2023) **390 (for 2024 and after)**	-	-
	Long-term limit	210 (for 2019-2023) **210 (for 2024 and after)**	-	-

Pollutant		Time/ Averaging Period	Maximum Allowable Limit		
			Turkish Regulation on Control of Industrial Air Pollution[1]	Turkish Regulation on Assessment and Management of Air Quality[2]	IFC / WHO[3]
In Settled Dust (mg/m^2/day)	Pb and Compounds	Long-term limit	250 (for 2019-2023) **250 (for 2024 and after)**	-	-
	Cd and Compounds	Long-term limit	3.75 (for 2019-2023) **3.75 (for 2024 and after)**	-	-
Ozone µg/m^3		Maximum daily 8-hour mean	-	120	160 (Interim target-1) **100 (guideline)**

1 Regulation on Control of Industrial Air Pollution (Dated 03.07.2009 and Numbered 27277)
2 Regulation on Assessment and Management of Air Quality (Dated 06.06.2008 and Numbered 26898)
3 IFC General Environmental, Health, and Safety (EHS) Guidelines (WHO stands for World Health Organization) (Dated 30 April 2007)
Note: Project Standards, which are determined as the most stringent values among given limits, are indicated in **red** colour.

WASTEWATER QUALITY

DOMESTIC WASTEWATER

As per The Water Pollution Control Regulation (WPCR), the facilities having a worker population of less than 2000 will take the opinion of the Provincial Directorate of Environmental, Urbanization and Climate Change regarding the disposal of the wastewater. The Provincial Directorate will consider the environmental status of the area and the nature of the project, and decide on the disposal method (i.e. wastewater treatment plant, impermeable septic tank etc.). In case the Provincial Directorate decides for the establishment of the wastewater treatment plant, the following limits will be applied.

Table 11: Effluent Discharge Limits for Domestic Wastewater to the Receiving Environment*

PARAMETER	Unit	Water Pollution Control Regulation Table 21.1: Sector: Domestic Wastewaters 2 hr Composite Sample	IFC General EHS Guideline: Wastewater and Ambient Water Quality, Table 1.3.1 Indicative Values for Treated Sanitary Sewage Discharges
Biological Oxygen Demand (BOD)	(mg/L)	50	**30**
Chemical Oxygen Demand (COD)	(mg/L)	160	**125**
Total Suspended Solids (TSS)	(mg/L)	**60**	**50**
pH	-	**6-9**	**6-9**
Total Nitrogen	(mg/L)	-	**10**
Total Phosphorus	(mg/L)	-	**2**
Oil and Grease	(mg/L)	-	**10**
Total Coliform Bacteria	MPN1[1] / 100 ml	-	**400**

1 MPN = Most Probable Number

* Receiving environment: The near or distant environment, such as lakes, streams, coastal and sea waters and underground waters, where wastewater is discharged or indirectly mixed,

Note: Project Standards, which are determined as the most stringent values among given limits, are indicated in **red** colour.

INDUSTRIAL WASTEWATER

Treatment of groundwater will lead to the generation of industrial wastewater (backwash wastewater from filters) in the potable water treatment plant. Effluent limits as per WPCR are given below.

Table 12: Effluent Discharge Limits to Receiving Body for Backwash Wastewater of Drinking Water Filters

PARAMETER	unit	Water Pollution Control Regulation Table 20.5: Other Industrial Wastewater (Backwashing of Drinking Water Filters and Similar)	Water Pollution Control Regulation Table 20.7: Water Softening, Demineralization and Regeneration, Activated Carbon Washing and Regeneration Facilities
		2 hr Composite Sample	2 hr Composite Sample
Chemical Oxygen Demand (COD)	(mg/L)	70	-
Total Suspended Solids (TSS)	(mg/L)	150	-
pH	-	6-9	6-9
Chloride (Cl^-)	(mg/L)	-	2000
Sulphate (SO4-2)	(mg/L)	-	3000
Iron (Fe)	(mg/L)	-	10
Fish Bioassay (ZSF)	-	-	10

DRINKING WATER QUALITY

Table 13: Drinking Water Quality Standards

Parameter	Unit	Turkish[1]	WHO[2]
Acrylamide	µg/L	**0.1**	0.5
Aluminium	µg/L	**200****	-
Ammonium	mg/L	**0.5****	-
Antimony	µg/L	**5**	20
Arsenic	µg/L	**10**	**10**
Barium	mg/L	-	**1.3**
Benzene	µg/L	**1**	10
Benzo(a)pyrene	µg/L	**0.01**	0.7
Boron	mg/L	**1**	2.4
Bromate	µg/L	**10**	10
Cadmium	µg/L	5	**3**
Chlorate	mg/L	-	**0.7**
Chloride	mg/L	**250****	-

Parameter	Unit	Turkish[1]	WHO[2]
Chromium	µg/L	**50**	**50**
Clostridium perfringens including spores	number/100 ml	**0****	-
Copper	mg/L	**2**	**2**
Cyanide	µg/L	**50**	-
1,2-dichloroethane	µg/L	**3**	30
Epichlorohydrin	µg/L	**0.1**	0.4
Fluoride	mg/L	**1.5**	1.5
Iron	µg/L	**200****	-
Lead	µg/L	**10**	**10**
Manganese	µg/L	**50****	80
Mercury	µg/L	**1**	6
Nickel	µg/L	**20**	70
Nitrate	mg/L	**50**	50
Nitrite	mg/L	**0.5**	3
Pesticides	µg/L	**0.1**	-
Pesticides Total	µg/L	**0.5**	-
Polycyclic aromatic hydrocarbons	µg/L	**0.1**	-
Selenium	µg/L	**10**	40
Sulphate	mg/L	**250****	-
Sodium	mg/L	**200****	-
Tetrachloroethene and Trichloroethene	µg/L	**10**	40
Trihalomethanes Total	µg/L	**100**	-
Uranium	µg/L	-	**30**
Vinyl chloride	µg/L	0.5	**0.3**
Conductivity	µS cm^{-1} at 20 °C	**2500**	-
Oxidisability	mg/L O2	**5****	-
Coliform bacteria	number/100 ml	**0**	-

Parameter	Unit	Turkish[1]	WHO[2]
Tritium[8]	Bq/l	**100****	**100**
Indicative dose	mSv	**0.10**	-
Taste	Acceptable to consumers and no abnormal change		
Colony count 22°C	No abnormal change		
Total organic carbon (TOC)	No abnormal change		
Turbidity	Acceptable to consumers and no abnormal change		
Colour	Acceptable to consumers and no abnormal change		
Odour	Acceptable to consumers and no abnormal change		

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** Indicator values
*** Elevated levels of tritium may indicate the presence of other artificial radionuclides. If the tritium concentration exceeds its parametric value, an analysis of the presence of other artificial radionuclides shall be required
[1] Regulation on the Water Intended for Human Consumption, O.G.:25730, 2005
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SOIL QUALITY

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"Potential Soil Pollutant Activities and Activity Specific Pollution Indicator Parameters List" is given in Annex 2, Table 2 of the Soil Regulation. The activities within the Project would probably be covered with the below-listed activity codes in the Soil Regulation.

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NACE Code	Industrial Activity	Activity-Based Contaminant Indicator Parameters
3511	Electricity Production	TOX, TPH, As, B, Ba, Cd, Cr, Cu, Hg, Mo, Pb, Sb, Se, Zn

[8] Council Directive 2013/51/Euratom of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption (europa.eu)

Soil Quality Standards in the "Soil Regulation* related to the above-mentioned activity codes are given below.

Table 15: Soil Quality Standards

Regulation on Soil Pollution Control and Point Source Contaminated Sites					
Measured Parameters	**Units**	**Ingestion of soil or dermal contact (mg/kg oven-dry soil)**	**Outdoor inhalation of fugitive dust (mg/kg oven-dry soil)**	**Transport of pollutants to groundwater and use of groundwater for drinking [1] (mg/kg oven-dry soil)**	
				SF = 10	**SF = 1**
Extractable Metals / Major Cations					
Antimony	mg/kg	31	-	2	0.2
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Mercury	mg/kg	23	-	3	0.6
Molybdenum	mg/kg	391	-	14	1
Nickel	mg/kg	1564	-	13	1
Selenium	mg/kg	391	-	0.5	0.05
Vanadium	mg/kg	548	-	2556	256
Zinc	mg/kg	23464	-	6811	681
Total Petroleum Hydrocarbons (TPH)	mg/kg	188496	-	175	17.4

1 If the distance to the aquifer is less than 3m, the aquifer is cracked or karstic, or the pollution source area is 10 hectares or more, the dilution factor SF is taken as "1"; in other cases, SF should be taken as "10".

NOISE

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		Day 07:00 – 19:00	Evening 19:00 – 23:00	Night time 23:00 - 07:00
Industrial facilities, transportation sources	LAeq,5min.	65 dB(A)	60 dB(A)	55 dB(A)

Noise Source	Measured Parameter	Environmental Noise Value (Regulation on Environmental Noise Control, Annex-2, Table 1)		
		Day 07:00 – 19:00	Evening 19:00 – 23:00	Night time 23:00 - 07:00
Music broadcasting establishments (1)	LAeq 63-250 Hz	60 dB(A)	55 dB(A)	50 dB(A)
Workplaces (2)	LAeq,5min.	Background + 5 dB(A)		Background + 3 dB(A)
In case of more than one workplace (3)	LAeq,5min.	Background + 7 dB(A)		Background + 5 dB(A)
All sources	LCmax	100 dB(C)		

Table 17: IFC Noise Standards

	One Hour LAeq* (dBA) (IFC EHS Guidelines General EHS Guidelines: Environmental Noise Management and Noise at Work Directive 2003/10/EC) [1]	
Receptor	Day-time 07:00 - 22:00	Night time 22:00 - 07:00
Residential; institutional; educational	55	45
Industrial; Commercial	70	70

1 According to the IFC General EHS Guideline Noise measurement levels sourced from Project activities should not exceed the levels presented above or result in a maximum increase in background levels of **3 dB** at the nearest receptor location off-site.

VIBRATION

Table 18: Vibration Standards (Turkish Regulation on the Environmental Noise Control)

Regulation on the Environmental Noise Control Noise (Annex-2, Table 5)		
Maximum Allowed Vibration Velocity (Peak value – mm/s)	**Continuous Vibration**	**Intermittent Vibration**
Residential Areas	5	10
Industrial and Commercial Areas	15	30
Historical and Natural Structures[1]	2	5

1 These limit values determined for historical and natural structures may be limited by precise, comprehensive vibration measurements and scientific studies to be carried out on-site.

Vibration criteria are defined in “BS 5228-2:2009 - Code of practice for noise and vibration control on construction and open sites” which defines vibration limits for humans and which could result in cosmetic damage to buildings.

Table 19: Guidance on Effects of Vibration Levels on Humans

Vibration level $[mm/s]$	Effect
0.14	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3	Vibration might be just perceptible in residential environments.
1.0	It is likely that vibration of this level in residential environments will cause complaints but can be tolerated if prior warning and explanation have been given to residents.
10	Vibration is likely to be intolerable for any more than very brief exposure to this level.
Source: BS 5228-2:2009. Code of practice for noise and vibration control on construction and open sites. Vibration	

Table 20: Transient Vibration Guide Values for Cosmetic Damage of Buildings

Type of building	Peak component particle velocity in the frequency range of predominant pulse, $[mm/s]$	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures	50	50
Industrial and heavy commercial buildings		
Unreinforced or light-framed structures	15-20	20-50
Residential or light commercial buildings		
Note: Values referred to are at the base of the building		
Source: BS 7385-2:1993. Evaluation and measurement for vibration in buildings. Guide to damage levels from ground-borne vibration		

According to BS 7385-2:1993, minor damage to buildings is possible at vibration levels greater than twice those given in Table 20 and major damage to a building structure can occur at values greater than four times the tabulated values.

In addition, the values in Table 20 are related predominantly to transient vibration that does not generate resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as generating resonance, then the guide values in Table 20 might need to be reduced by up to 50%. Therefore, the lower limit for vibration level that may cause cosmetic damage to residential buildings is 5 mm/s, while the limit of human perception is much lower, comprising 0.14 to 0.30 mm/s.

WATER QUALITY

SURFACE WATER

Classification of the surface water quality will be done based on the threshold values provided in Annex-5, Table 2 of the Regulation on Surface Water Quality. Relevant parameters and threshold values for each water quality class are listed below.

Table 21: Inland Surface Waters Quality Criteria

Parameters	Unit	Regulation on Surface Water Quality, Annex 5, Table 2 Water Quality		
		Class I	Class II	Class III
Ammonium Nitrogen	mg/L	< 0,2	1	>1
Biochemical Oxygen Demand (BOD)	mg/L	< 4	8	>8
Dissolved Oxygen	mg/L	> 8	6	< 6
Fluoride	µg/L	≤ 1000	1500	> 1500
Orthophosphate Phosphorus	mg/L	< 0,05	0,16	> 0,16
Conductivity	µS/cm	< 400	1000	> 1000
Chemical Oxygen Demand (COD)	mg/L	< 25	50	> 50
Manganese	µg/L	≤ 100	500	> 500
Nitrate Nitrogen	mg/L	< 3	10	> 10
pH	-	6-9	6-9	6-9
Colour (436 nm)	m-1	≤ 1.5	3	> 4.3
Colour (525 nm)	m-1	≤ 1.2	2.4	> 3.7
Colour (620 nm)	m-1	≤ 0.8	1.7	> 2.5
Selenium	µg/L	≤ 10	15	> 15
Sulphur	µg/L	≤ 2	5	> 5
Total Nitrogen	mg/L	< 3,5	11,5	> 11,5
Total Phosphorous	mg/L	< 0,08	0,2	> 0,2
Total Kjeldahl Nitrogen	mg/L	< 0,5	1,5	> 1,5
Oil-Grease	mg/L	< 0,2	0,3	> 0,3

APPENDIX C

Detailed Project Schedule

ANKA SPP's SCHEDULE

Activity ID	Activity Name	Start	Finish
ANKA-12	ANKA 390 MWp - 300 MWe Detailed-ESIA Actuals	01-Jul-21 A	19-Jun-24
ANKA-12.1	Niğde	16-May-22 A	26-Sep-23
A37210	Ministry Approval of Design	02-Feb-23 A	10-Feb-23 A
A37230	Construction Permit	01-Aug-23	04-Aug-23
A37240	Final Delivery Acceptance Certificate Application & Issuance	10-Aug-23	15-Aug-23
A37250	Environmental Impact Assessment Approval	01-Jun-22 A	01-Nov-22 A
A37260	Signing of YEKA Contract (Niğde-Bor)	16-May-22 A	
A37270	Signing TEİAŞ Connection Agreement	05-Oct-22 A	05-Jan-23 A
A37280	EMRA (EPDK) Pre Lisence Approval	01-Jun-22 A	01-Sep-22 A
A37290	Base Plan Approval of the Site	01-Jun-22 A	15-Sep-22 A
A37300	Master Plan Approval	18-May-22 A	22-Feb-23 A
A37310	Transfer of Land Ownership	18-Nov-22 A	16-Mar-23 A
A37320	Electricity Generation Lisence Approval	01-Aug-23	04-Aug-23
A37330	Land Allocation Approval	01-Mar-23 A	13-Mar-23 A
A61130	Baseline Studies (Physical Measurements & Biodiversity Monitoring	10-Jan-23 A	10-Mar-23 A
ANKA-12.1.1	Engineering	06-Sep-22 A	12-Aug-23
A1160	SPP Engineering	28-Sep-22 A	15-Jun-23 A
A1210	CCTV & Lighting Engineering	01-Jun-23 A	12-Aug-23
A34150	Substation Contracting & Engineering	06-Sep-22 A	01-Jun-23 A
A34160	OHTL Contracting, Engineering	04-Oct-22 A	31-Mar-23 A
ANKA-12.1.5	Niğde ESIA	21-Mar-23 A	21-Aug-23
ANKA-12.1.2	Procurement	07-Feb-23 A	11-Sep-23
ANKA-12.1.3	Construction	24-Feb-23 A	26-Sep-23
ANKA-12.1.3.1	Solar System	24-Feb-23 A	26-Sep-23
ANKA-12.1.3.2	Substation	13-Mar-23 A	30-Aug-23
ANKA-12.1.3.3	OHTL	01-Apr-23 A	30-Aug-23
ANKA-12.1.4	Test & Commissioning - Niğde Bor 130 MWp SPP	31-Aug-23	25-Sep-23
A37380	Final Acceptance & Commercial Operation of SPP		25-Sep-23
ANKA-12.1.4.1	Solar System	01-Sep-23	25-Sep-23
ANKA-12.1.4.2	Substation	05-Sep-23	19-Sep-23
ANKA-12.1.4.3	154 kV OHTL	31-Aug-23	04-Sep-23

APPENDIX D

List of Species

Flora Species

Family	Species	Global IUCN Status	Local IUCN Status	End./ RR	Lit./ Obs.
Amaranthaceae	*Camphorosma monspeliaca*	-	-	-	O 2023
Amaranthaceae	*Halocnemum strobilaceum*	-	-	-	O 2023
Amaranthaceae	*Petrosimonia triandra*	-	VU	Regional Endemic	O 2023
Amaranthaceae	*Suaeda carnosissima*	-	-	-	O 2023
Asteraceae	*Achillea wilhelmsii*	-	-	-	O 2023
Asteraceae	*Anthemis fumariifolia*	-	LC	Widespread endemic	O 2023
Asteraceae	*Artemisia santonicum*	LC	-	-	O 2023
Asteraceae	*Cirsium alatum*	-	-	-	O 2023
Asteraceae	*Inula aucherana*	-	-	-	O 2023
Asteraceae	*Onopordum davisii*	-	NT	Regional Endemic	O 2023
Asteraceae	*Scorzonera hieracifolia*	-	LC	Widespread endemic	O 2023
Asteraceae	*Taraxacum farinosum*	-	LC	Widespread endemic	O 2023
Brassicaceae	*Alyssum linifolium* var. *linifolium*	-	-	-	O 2023
Brassicaceae	*Lepidium cartilagineum* subsp. *cartilagineum*	-	-	-	O 2023
Caryophyllaceae	*Gypsophila oblanceolata*	-	VU	Regional Endemic	O 2023
Chenopodiaceae	*Atriplex verrucifera*	-	-	-	O 2023
Convolvulaceae	*Convolvulus lineatus*	-	-	-	O 2023
Cyperaceae	*Bolboschoenus maritimus* var. *maritimus*	LC	-	-	O 2023
Fabaceae	*Astragalus mesogitanus*	-	LC	Widespread endemic	O 2023
Frankeniaceae	*Frankenia hirsuta*	-	-	-	O 2023

Family	Species	Global IUCN Status	Local IUCN Status	End./ RR	Lit./ Obs.
Plantaginaceae	*Plantago maritima*	LC	-	-	O 2023
Plumbaginaceae	*Limonium iconicum*	-	LC	Widespread endemic	O 2023
Plumbaginaceae	*Limonium lilacinum*	-	-	Widespread endemic	O 2023
Poaceae	*Aeluropus littoralis*	LC	-	-	O 2023
Poaceae	*Cynodon dactylon*	-	-	-	O 2023
Poaceae	*Eremopyrum bonaepartis* subsp. *bonaepartis*	-	-	-	O 2023
Poaceae	*Puccinellia koeieana* subsp. *anatolica*	-	LC	Widespread endemic	O 2023
Sapotaceae	*Bassia pilosa*	-	-	-	O 2023

Amphibian species

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.
Bufonidae	*Bufotes sitibundus*	DD	-	L
Bufonidae	*Bufotes variabilis*	DD	-	L
Ranidae	*Pelophylax ridibundus*	LC	-	L

Reptile species

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.
Agamidae	*Stellagama stellio*	LC	-	L
Colubridae	*Elaphe sauromates*	LC	-	L
Colubridae	*Natrix tessellata*	LC	-	L

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.
Colubridae	*Platyceps najadum*	LC	-	L
Gekkonidae	*Mediodactylus kotschyi*	LC	-	L
Lacertidae	*Ophisops elegans*	LC	-	L
Lacertidae	*Parvilacerta parva*	LC	-	L
Scincidae	*Heremites vittatus*	LC	-	L
Testudinidae	*Testudo graeca*	VU	-	L

Bird Species

Family	Species	Global IUCN Status	End./ RR	Lit./Obs.
Accipitridae	*Accipiter nisus*	LC	-	O 2023
Accipitridae	*Aegypius monachus*	NT	-	O 2023
Accipitridae	*Aquila chrysaetos*	LC	-	O 2023
Accipitridae	*Aquila heliaca*	VU	-	L
Accipitridae	*Aquila nipalensis*	EN	-	L
Accipitridae	*Buteo rufinus*	LC	-	O 2023
Accipitridae	*Circaetus gallicus*	LC	-	O 2023
Accipitridae	*Circus aeruginosus*	LC	-	L
Accipitridae	*Circus cyaneus*	LC	-	L
Accipitridae	*Circus macrourus*	NT	-	L
Accipitridae	*Hieraaetus pennatus*	LC	-	L
Accipitridae	*Neophron percnopterus*	EN	-	L

Family	Species	Global IUCN Status	End./ RR	Lit./Obs.
Alaudidae	*Alaudala rufescens*	LC	-	L
Alaudidae	*Calandrella brachydactyla*	LC	-	O 2023
Alaudidae	*Galerida cristata*	LC	-	O 2023
Alaudidae	*Melanocorypha calandra*	LC	-	O 2023
Apodidae	*Apus apus*	LC	-	O 2023
Charadriidae	*Charadrius leschenaultii*	LC	-	O 2023
Charadriidae	*Vanellus vanellus*	NT	-	L
Columbidae	*Columba livia*	LC	-	O 2023
Columbidae	*Streptopelia decaocto*	LC	-	O 2023
Corvidae	*Corvus cornix*	LC	-	O 2023
Corvidae	*Corvus frugilegus*	LC	-	O 2023
Corvidae	*Corvus monedula*	LC	-	O 2023
Corvidae	*Pica pica*	LC	-	O 2023
Emberizidae	*Emberiza calandra*	LC	-	O 2023
Emberizidae	*Emberiza hortulana*	LC	-	O 2023
Emberizidae	*Emberiza melanocephala*	LC	-	O 2023
Falconidae	*Falco cherrug*	EN	-	L
Falconidae	*Falco naumanni*	LC	-	O 2023
Falconidae	*Falco peregrinus*	LC	-	L
Falconidae	*Falco tinnunculus*	LC	-	L
Fringillidae	*Carduelis carduelis*	LC	-	O 2023

Family	Species	Global IUCN Status	End./ RR	Lit./Obs.
Fringillidae	*Linaria cannabina*	LC	-	O 2023
Hirundinidae	*Delichon urbicum*	LC	-	O 2023
Hirundinidae	*Hirundo rupestris*	LC	-	O 2023
Hirundinidae	*Hirundo rustica*	LC	-	O 2023
Laniidae	*Lanius collurio*	LC	-	O 2023
Meropidae	*Merops apiaster*	LC	-	O 2023
Motacillidae	*Anthus campestris*	LC	-	L
Muscicapidae	*Oenanthe isabellina*	LC	-	O 2023
Otididae	*Otis tarda*	VU	-	L
Passeridae	*Passer domesticus*	LC	-	O 2023
Phasianidae	*Alectoris chukar*	LC	-	L
Pteroclidae	*Pterocles orientalis*	LC	-	L
Strigidae	*Athene noctua*	LC	-	O 2023
Sturnidae	*Sturnus vulgaris*	LC	-	O 2023
Upupidae	*Upupa epops*	LC	-	O 2023

Mammal species

Family	Species	Global IUCN Status	End./ RR	Lit./Obs.
Canidae	*Canis aureus*	LC	-	L
Canidae	*Canis lupus*	LC	-	L
Canidae	*Vulpes vulpes*	LC	-	O 2023
Cricetidae	*Arvicola amphibius*	LC	-	L
Cricetidae	*Mesocricetus brandti*	NT	-	O 2023
Cricetidae	*Microtus anatolicus*	DD	-	O 2023
Cricetidae	*Microtus guentheri*	LC	-	L
Cricetidae	*Microtus mystacinus*	LC	-	L
Cricetidae	*Microtus socialis*	LC	-	L
Cricetidae	*Nothocricetulus migratorius*	LC	-	L
Dipodidae	*Scarturus williamsi*	LC	-	O 2023
Erinaceidae	*Erinaceus concolor*	LC	-	O 2023
Gliridae	*Dryomys nitedula*	LC	-	L
Herpestidae	*Herpestes ichneumon*	LC	-	L
Leporidae	*Lepus europaeus*	LC	-	O 2023
Miniopteridae	*Miniopterus pallidus*	NT	-	L
Molossidae	*Tadarida teniotis*	LC	-	L
Muridae	*Apodemus mystacinus*	LC	-	L
Muridae	*Apodemus witherbyi*	LC	-	L
Muridae	*Meriones tristrami*	LC	-	L

Family	Species	Global IUCN Status	End./ RR	Lit./Obs.
Muridae	*Mus macedonicus*	LC	-	L
Muridae	*Mus musculus*	LC	-	L
Muridae	*Rattus norvegicus*	LC	-	L
Muridae	*Rattus rattus*	LC	-	L
Mustelidae	*Lutra lutra*	NT	-	L
Mustelidae	*Martes foina*	LC	-	L
Mustelidae	*Martes martes*	LC	-	L
Mustelidae	*Meles meles*	LC	-	L
Mustelidae	*Mustela nivalis*	LC	-	L
Mustelidae	*Vormela peregusna*	VU	-	O 2023
Rhinolophidae	*Rhinolophus ferrumequinum*	LC	-	L
Rhinolophidae	*Rhinolophus hipposideros*	LC	-	L
Sciuridae	*Sciurus anomalus*	LC	-	L
Sciuridae	*Spermophilus xanthoprymnus*	NT	-	O 2023
Soricidae	*Crocidura leucodon*	LC	-	L
Soricidae	*Crocidura suaveolens*	LC	-	L
Spalacidae	*Nannospalax xanthodon*	DD	-	O 2023
Suidae	*Sus scrofa*	LC	-	L
Vespertilionidae	*Barbastella barbastellus*	NT	-	L
Vespertilionidae	*Eptesicus serotinus*	LC	-	L
Vespertilionidae	*Myotis aurascens*	LC	-	L

Family	Species	Global IUCN Status	End./ RR	Lit./Obs.
Vespertilionidae	*Myotis blythii*	LC	-	L
Vespertilionidae	*Myotis myotis*	LC	-	L
Vespertilionidae	*Myotis mystacinus*	LC	-	L
Vespertilionidae	*Pipistrellus pipistrellus*	LC	-	L
Vespertilionidae	*Plecotus kolombatovici*	LC	-	L
Vespertilionidae	*Plecotus macrobullaris*	LC	-	L

Signature Page

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