DRAFT REPORT

Project ANKA - G3-Gaziantep-1-1, 2-1, 3-1 Solar Power Plant, Gaziantep

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 Development
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 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 Ecosystem Component
VU	Vulnerable
WB	World Bank

Abbreviation	Definition
WB ESF	World Bank Environmental and Social Framework
WHO	World Health Organisation
WSP Türkiye	WSP 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

G3-GAZİANTEP-1-1/2-1/3-1 Solar Power Plants Project with a total installed capacity of approximately 65 MWp/50 MWe, is planned by Kalyon Enerji Yatırımları A.Ş. (“Kalyon Enerji”) and Kalyon YEKA GES 3 ve 4 Güneş Enerjisi Yatırımları A.Ş. (”Kalyon”), a subsidiary of Kalyon Enerji. The Project will be in Gaziantep Province, in the Şahinbey District, Kürüm neighborhood in Türkiye.

The Project Area had been announced as a Renewable Energy Resource Area (YEKA) by the Ministry of Energy and Natural Resources. Scope of the "Contest Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" published in the Official Gazette dated 03/07/2020 and numbered 31174; YEKA G3-GAZİANTEP-1-1/2-1/3-1 competitions were won by the Client. YEKA Right of Use Contract were signed on 01.07.2021 between the winner of the competition, Kalyon Enerji Yatırımları A.Ş and the Ministry of Energy and Natural Resources. Pre-license was given by the Ministry of Industry and Technology, numbered ÖN/11080-30/05183 and 28.07.2022.

The Project consists of three sub-projects namely, G3-Gaziantep-1-1 Solar Power Plant Project, G3-Gaziantep 2-1 Solar Power Plant Project and G3-Gaziantep 3-1 Solar Power Plant Project. Individual Environmental Impact Assessment (EIA) reports have been prepared for these sub-projects per the requirements of national EIA Regulation and the “EIA Positive” decisions for each have been acquired as shown in Table 1-1.

Table 1-1: EIA Decisions of Sub-Projects

Name of Sub Project	Allocated Area (ha)	Capacity	National EIA Status	Land Allocation
G3-Gaziantep 1-1 Solar Power Plant Project	49.98	26 MWp/26 MWm/ 20 MWe	EIA Positive Decision Acquired (Decision Date/No: 25.12.2022/6884)	Pastureland – Treasury land
G3-Gaziantep 2-1 Solar Power Plant Project	48.12	26 MWp/26 MWm/ 20 MWe	EIA Positive Decision Acquired (Decision Date/No: 26.12.2022/6885)	Pastureland – Treasury land
G3-Gaziantep 3-1 Solar Power Plant Project	24.86	13 MWp/13 MWm/ 10 MWe	EIA Positive Decision Acquired (Decision Date/No: 26.12.2022/: 6886)	Pastureland – Treasury land
TOTAL	**122.96**	**65 MWp/65 MWm/50 Mwe**	-	-

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 Reports and available documentation obtained from the Client and suggest actions to close these gaps to reach a full bankable Environmental and Social Impact Assessment (ESIA) in line with the International Conventions, IFIs Performance Standards (Equator Principles IV (EP), International Finance Corporation (IFC) Performance Standards (PS), Organization 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 Client 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 and in Chapter 2.

The main components of the plant consist of solar panels, panel carrier systems, inverter stations (consist of inverter, transformer, ring main unit and the substation). 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 -135,808 MWh of electricity annually, and the electricity produced will be connected to two separate 1272 MCM OHTLs namely Polateli ~100 m length 154 kV OHTL and Abdülhamit Han ~100 m length 154 kV OHTL. Details of the Project components are provided in Chapter 3 of this report.

The Project construction activities has been started in July 2023. The construction period of the Project is estimated to be 6 months and the total operation period will be 30 years.

The Project will be established on a pastureland of 122.96 hectares. Preparation and Approval of 1/25000 and 1/5000 Master Development Plan and 1/1000 Implementation Development Plan Approval has been completed and cadastral controls are in progress.

According to the Official Letter dated 29.06.2022 and numbered E-88108382-754-105533 from Gaziantep Metropolitan Municipality, Gaziantep 2040 1/100.000 scaled Provincial Environmental Plan has been canceled with the judicial decision of Gaziantep (2nd) Administrative Court dated 13.03.2020 and numbered E:2018/3825-K:2020/236. After the judicial decision, it was decided to replan with the decision of the Gaziantep Metropolitan Municipality Council dated 17.07.2020 and numbered 329, and it was unplanned in terms of the Environmental Plan. As per this official letter, Provincial Environmental Planning continues throughout the borders of Gaziantep Metropolitan Municipality.

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 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 Area was announced as a Renewable Energy Resource Area (YEKA) by the Ministry of Energy and Natural Resources. Scope of the "Contest Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" published in the Official Gazette dated 03/07/2020 and numbered 31174; YEKA G3-GAZİANTEP-1-1/2-1/3-1 competitions were won by the Client. YEKA Right of

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

Use Contract were signed on 01.07.2021 between the winner of the competition, Kalyon Enerji Yatırımları A.Ş and the Ministry of Energy and Natural Resources. Pre-license was given by the Ministry of Industry and Technology, numbered ÖN/11080-30/05183 and 28.07.2022.

Construction activities has been started in July 2023.

Background on the Project Owner, Kalyon Enerji

The Client 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, the Client 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. When the client engages in impact investments in clean energy, due consideration is given to both the objectives of the nation in question and the global imperatives.

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;
- 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 Environmental and Social Management System ("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, available data, the National EIA and the rationale presented in detail in the Gap Assessment, the Project is proposed to be categorized as "Category B".

Table 1-2: Project Categorization According to Applicable Standards

Applicable Standard	Category Explanation
IFC PSs (2012)	Category B: Business activities with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures
EPIV (2020)	Category B – Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures.

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 was the preparation of the gap analysis to identify gaps in the national EIA Report and existing documentation provided by the Client with respect to the relevant international standards, and to suggest actions to address these gaps. The overall objective of the study was to review existing technical documents, reports and studies to evaluate the possibility of using the already available data 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 related documents.

1.2.3.3 Baseline Data Collection

Baseline information to be used in 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, utilizing 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:

- 7th-9th of June 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.
- 9th-10th of May 2023 by the expert botanist Prof. Dr. Hayri Duman from Gazi University (Faculty of Science, Dpt. Biology), herpetologist Ass. Prof. Dr. Onur Candan from Ordu University (Faculty of Science, Dpt. Biology), fauna expert Şafak Bulut from 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 and vibration were carried out by the Client. EHSS pre-construction survey including biodiversity was carried out by the Client on April 12, 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:

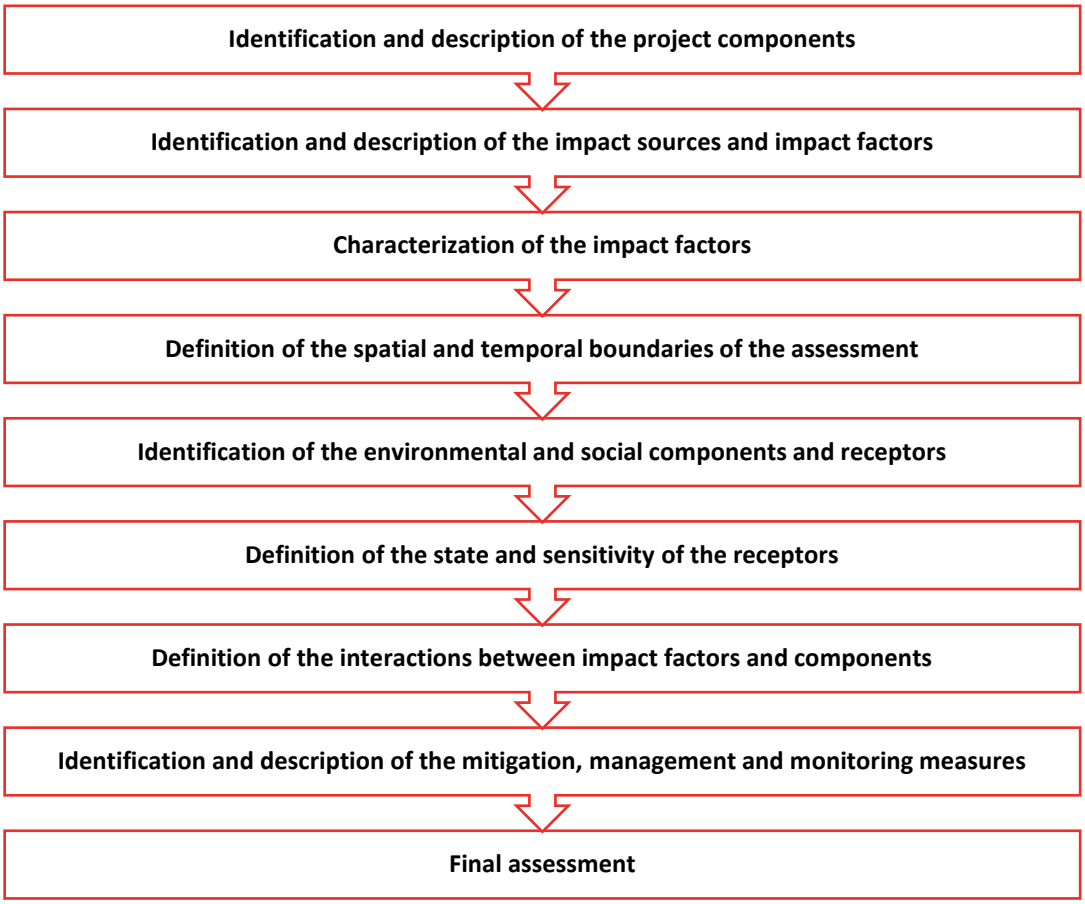


Figure 1-1: Steps of WSP Türkiye's Impact Assessment Methodology

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 favourable 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.

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 December 25, 2022 and December 26, 2022 (for G3-Gaziantep-1-1 Solar Power Plant Project Decision no: 6884, for G3-Gaziantep 2-1 Solar Power Plant Project Decision no: 6885 and for G3-Gaziantep 3-1 Solar Power Plant Project Decision no: 6886).

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.

Gaziantep 2040 1/100.000 scaled Provincial Environmental Plan has been canceled with the judicial decision of Gaziantep (2nd) Administrative Court dated 13.03.2020 and numbered E:2018/3825-K:2020/236. After the judicial decision, it was decided to make a re-plan with the decision of the Gaziantep Metropolitan Municipality Council dated 17.07.2020 and numbered 329, and it was unplanned in terms of the Environmental Plan. As per this official letter, Provincial Environmental Planning continues throughout the borders of Gaziantep Metropolitan Municipality.

Preparation and Approval of 1/25000 and 1/5000 Master Development Plan and 1/1000 Implementation Development Plan Approval has been completed and cadastral controls are in progress.

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	Pending for Completion of Change of Purpose of Allocation of Pasturelands
	Preliminary and Final Project Approvals	Electric Facilities Project Regulation (Official Gazette: 29221(repeated))	The preliminary project has been submitted for approval.
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	1/25000, 1/5000, 1/1000 plans are approved. Cadastral controls are in progress.
	Permit for the use of agricultural lands for non-	Law on Soil Protection and Land Use (No: 5403, 2005)	Not required.

Subject	Permit / Approval	Relevant Regulatory Framework	Status
	agricultural purposes (if required)		
	Approval of expropriation plans (if required)	Expropriation Law (No: 2942, 1983)	Not required.
	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 required.
	Permit for the use of pasture lands (change of the purpose of allocation) (if required)	Pasture Law (No: 4342, 1998)	Pending approval from Ministry of Agriculture and Forestry. Awaiting board decision.
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	In progress
	Workplace notification for construction	Regulation on Starting Up and Operating a Workplace	In progress
	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 once the construction commences.
	Permit for on-site fuel storage	Regulation on Environmental Permits and Licenses	To be obtained if required.
	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 if required. Not required as of today.
	Temporary operating certificate/environmental permit (discharge, emission, etc.) for camp site wastewater	Regulation on Environmental Permits and Licenses Regulation on Water Pollution Control	To be obtained if required. Not required as of today.

Subject	Permit / Approval	Relevant Regulatory Framework	Status
	discharge, emission due to heating		
	Water use agreement with the Municipality (if required)	-	To be obtained after construction permit if required.
	Groundwater use permit (if required)	Law on Groundwater Resources (No. 167, 1960)	Not required.
	Wastewater acceptance Protocol with GASKİ	Regulation on Water Pollution Control	To be obtained prior to construction
	Waste management plan approval	Regulation on Waste Management	To be obtained prior to 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 prior to construction
	Agreements with licensed waste management and disposal companies	Regulation on Waste Management	To be obtained prior to construction
	Night work permit (if required)	Regulation on Assessment and Management of Environmental Noise	To be obtained prior to construction
	Private security permit	Regulation on the Implementation of the Law Concerning Private Security Services	To be obtained prior to construction
	Temporary land use permit for Camp Site	Permit of Governorship and Ministry of Agriculture and Forestry	Ongoing
Operation	License Application	Electricity Market License Regulation	In progress, to be obtained once Preliminary Project was approved.
	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

Subject	Permit / Approval	Relevant Regulatory Framework	Status
	Waste management plan approval, 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	Waste Management Regulation	To be obtained at the start of operation
	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 A 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

G3-GAZİANTEP-1-1/2-1/3-1 Solar Power Plants Project with a total installed capacity of approximately 65 MWp/50 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 in Gaziantep Province, in the Şahinbey District, Kürüm neighborhood in Türkiye. Once the Solar Power Plant is put into operation, it is planned to produce 50 MWe of electricity in annual basis, and the electricity produced will be transferred to two separate 1272 MCM OHTLs namely Polateli ~100 m 154 kV OHTL and Abdülhamit Han ~100 m 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 is planned to be started in August 2023.

Project layout is presented in Figure 3-2. Figure 3-1 represents the actual site conditions.

Figure 3-1: Photos of General Site Activities (Dated May 10, 2023, taken by WSP Golder)

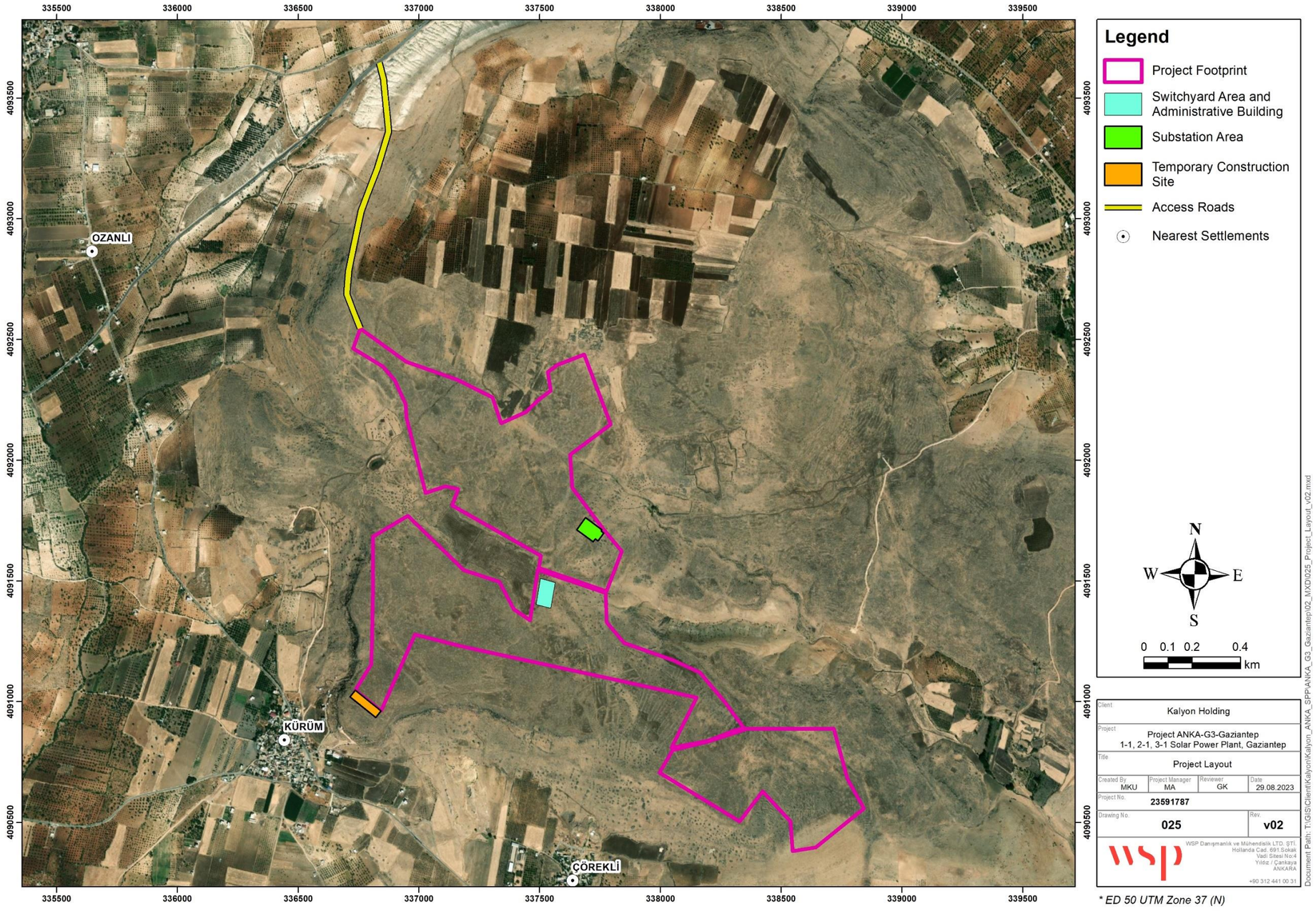


Figure 3-2: Project Layout

3.2 Project Components

The main components of the plant consist of solar panels, PV module carrier system (one-axis solar tracker), DC Combiner Boxes, inverter stations and a substation. Other infrastructure and utilities can be listed as the Transformer Center Building (Supervisory Control and Data Acquisition (SCADA)), administration building (including dining hall, security building, personnel workshop). 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 two separate 1272 MCM OHTLs namely Polateli ~100 m 154 kV OHTL and Abdülhamit Han ~100 m 154 kV OHTL. Details of the Project components are provided in Chapter 3 of this report.

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

Cables

Cables

Cables

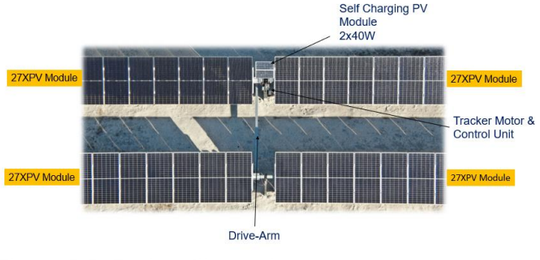
PV Module & Tracker (Panel Carrier) System

- 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 kalyon PV

Panel Power: 400 W
Panel QTY: 162368 PCS

SINGLE AXIS TRACKER SYSTEM PVH



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 33.6kV.
- 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 3-3: 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.

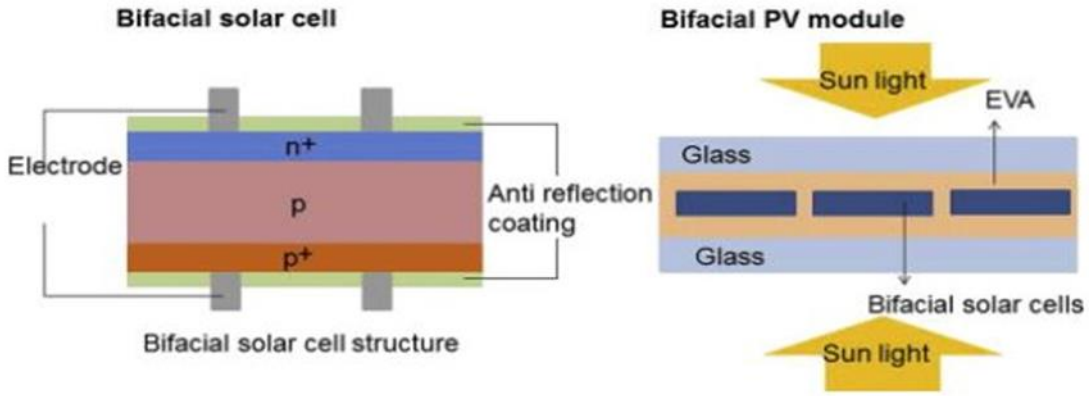


Figure 3-4 Bifacial Cell Structure

As shown in Figure 3-4, 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.

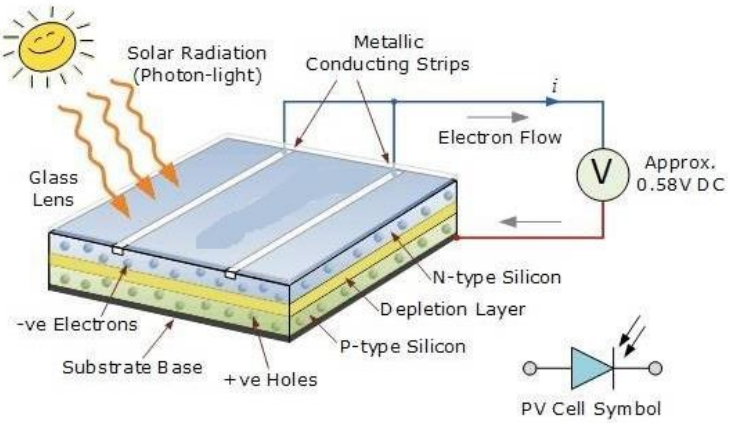


Figure 3-5 Cell Structure

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 module 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.

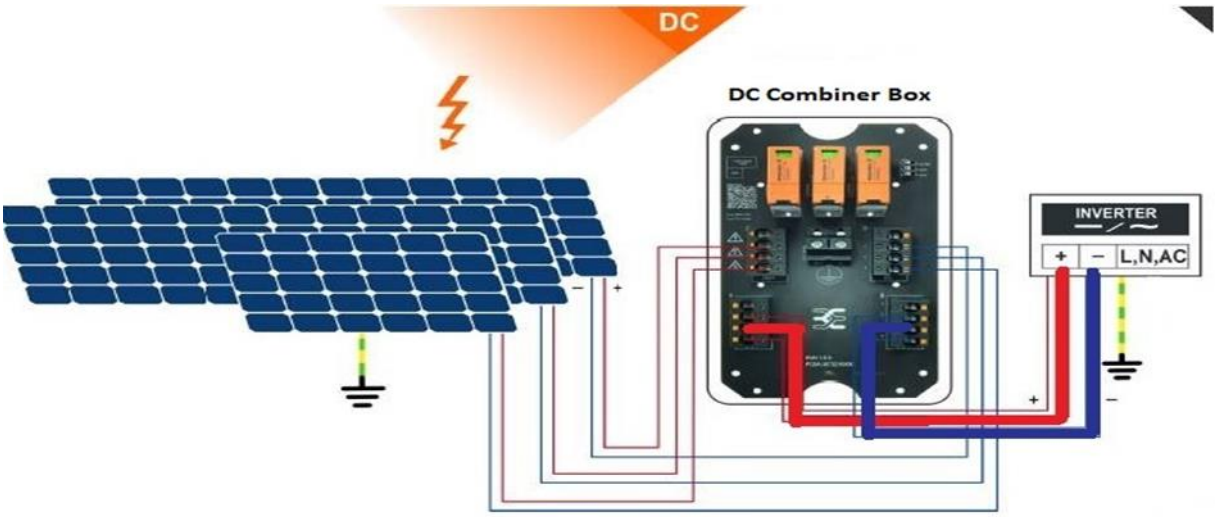


Figure 3-6 Visual Demonstration of the Collection of Strings in the DC Combiner Box

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 33,600V. 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.

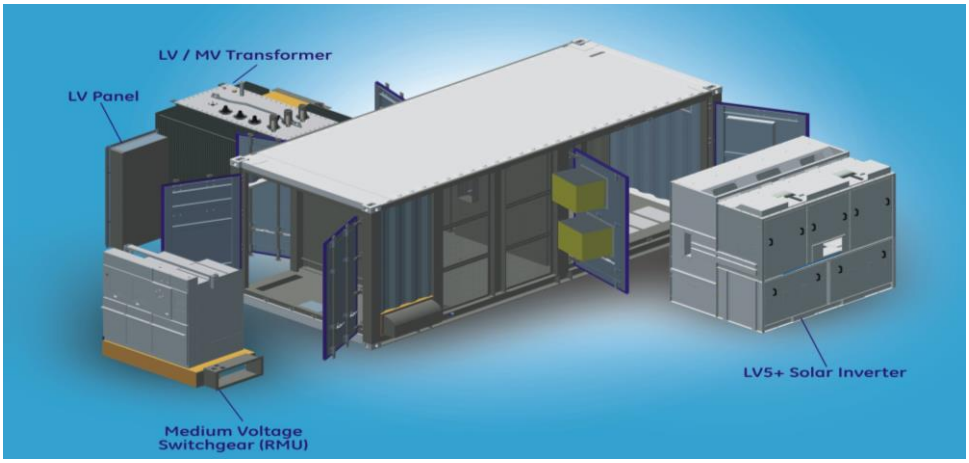


Figure 3-7 Visual Demonstration of an Inverter Station

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 3-8.

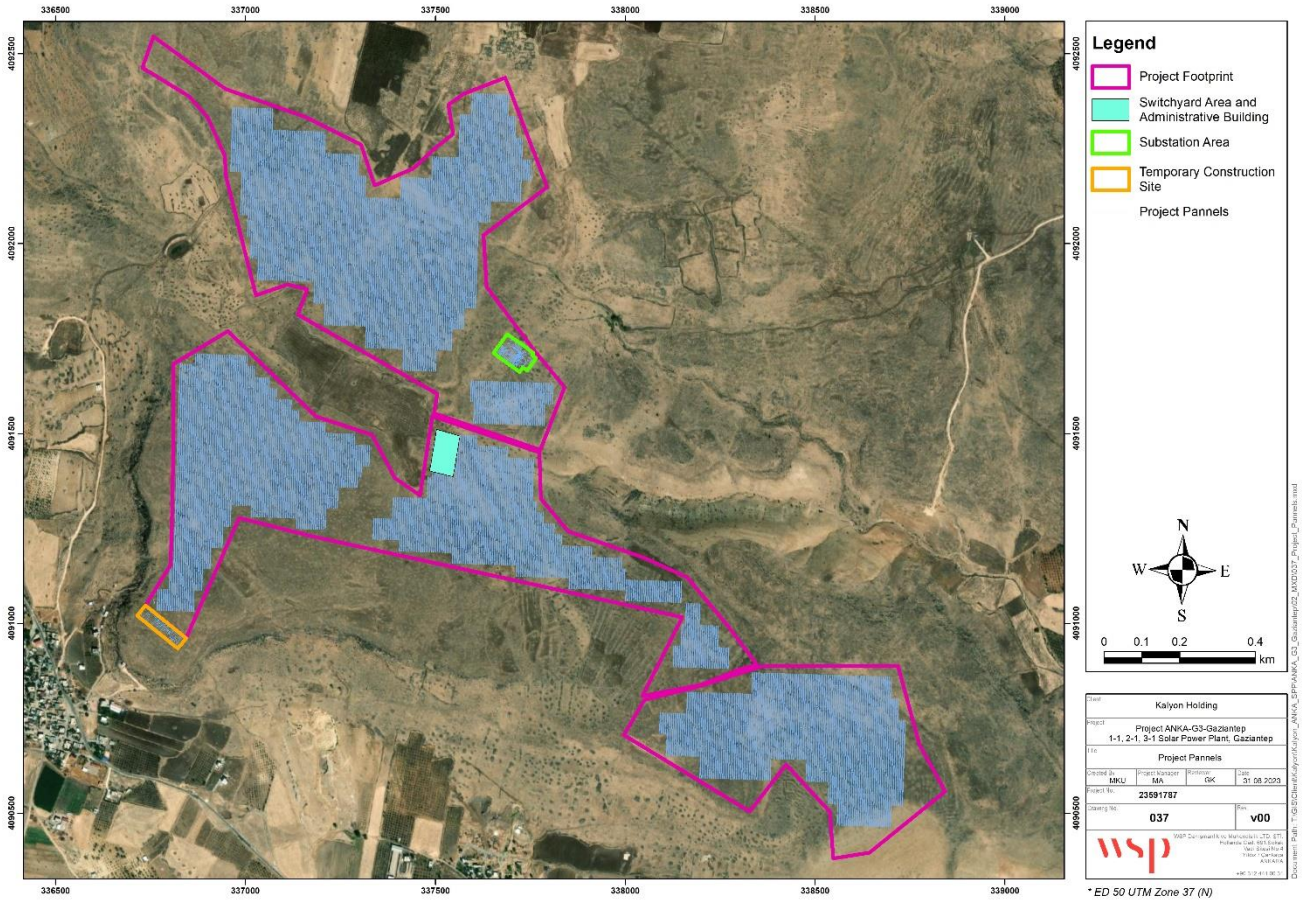


Figure 3-8: Layout of Project Components

3.3 Project Phases

3.3.1 Construction Phase

The construction phase activities include site clearance and 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.

With the help of a dozer, stripping will be done according to the desired level and then the stripped material will be loaded onto the truck with an excavator and transported to the designated area.

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.

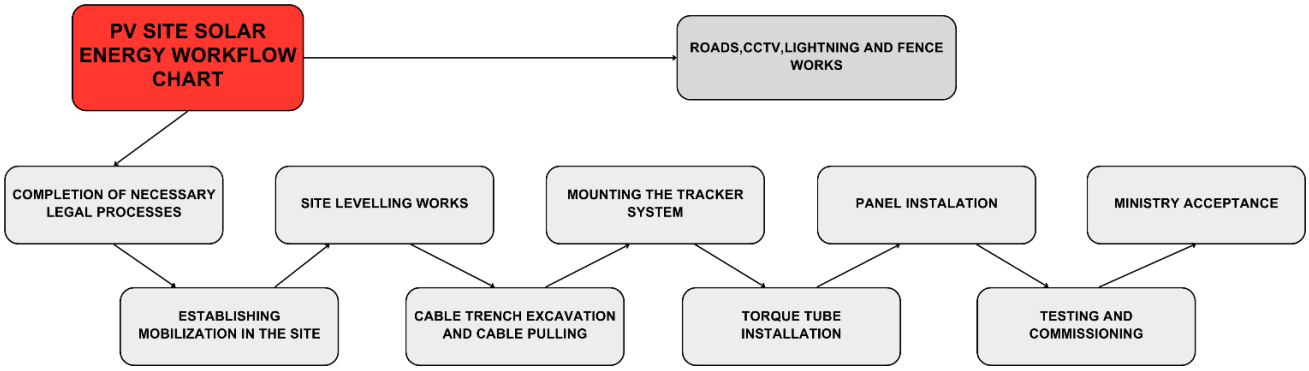


Figure 3-9: Workflow Chart of PV Site Solar Energy

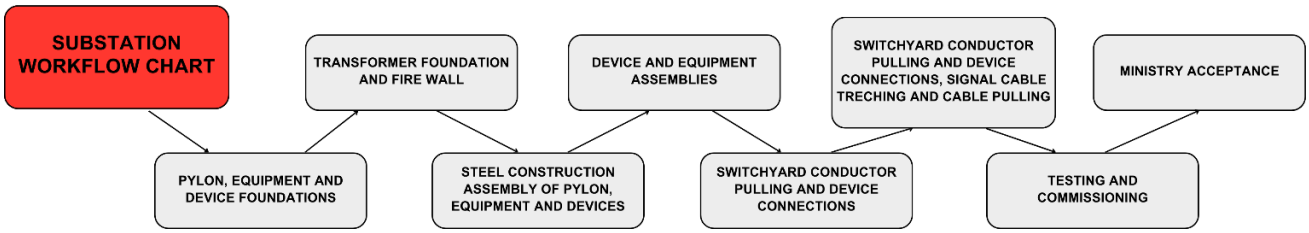


Figure 3-10: Workflow Chart of Substation

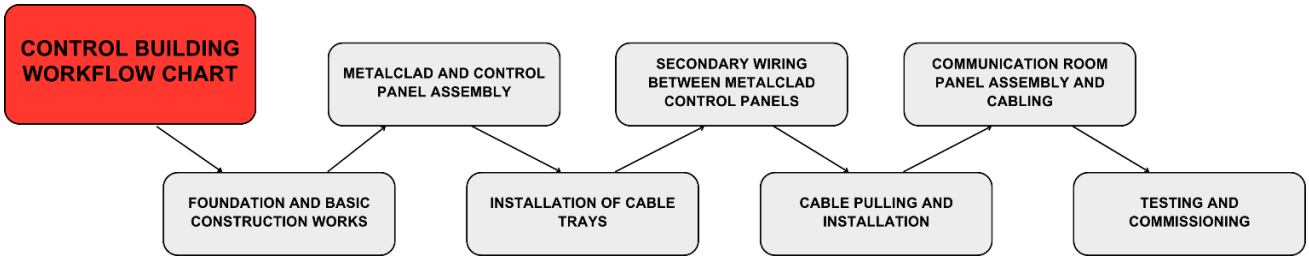


Figure 3-11: Workflow Chart of Control Building

3.3.2 Operation Phase

Maintenance will be necessary during the Project's operation phase to ensure an 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 to 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. 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 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, once the Solar Power Plant is put into operation, the electricity produced will be connected to two separate 1272 MCM OHTLs namely Polateli ~100 m 154 kV OHTL and Abdülhamit Han ~100 m 154 kV OHTL. The OHTL is passing through the project area and already under construction by the TEİAŞ. There will be no OHTL construction of concern in the scope of the project.

3.4.2 Water Pipeline

There will be no water pipeline is required in the scope of the Project for supply of the potable water since the required potable water is planned to be supplied from GASKİ via water trucks.

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 and 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 favourable 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.

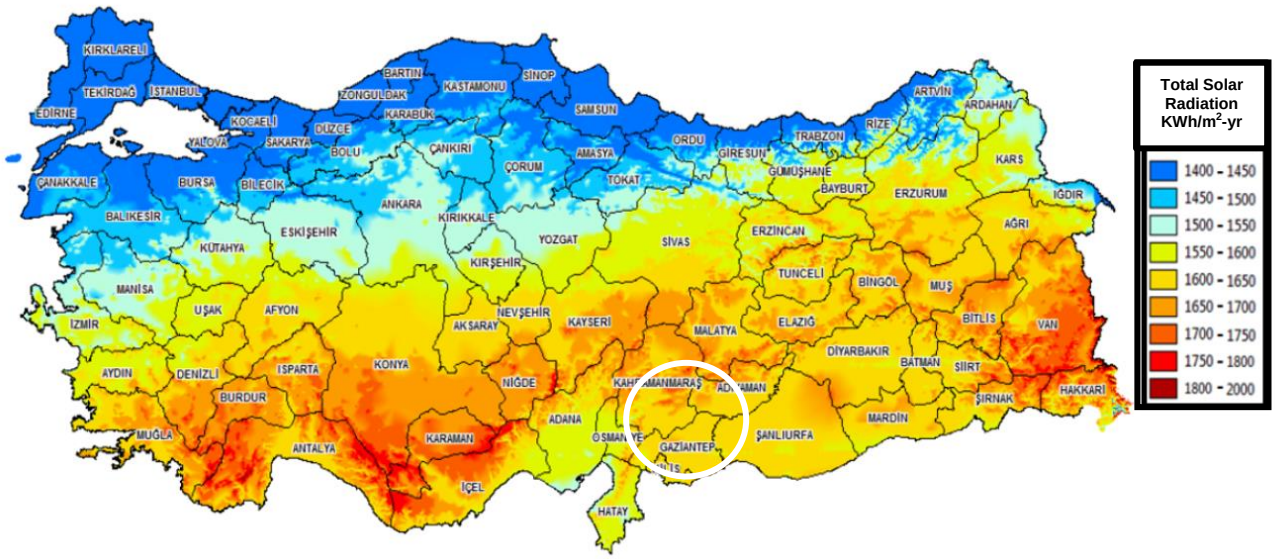


Figure 3-12: Türkiye's Monthly Average Global Radiation Distribution

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 and greenhouse gas emissions from power generation 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.

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

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

[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.

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 centres to be established within the scope of the Allocation in Return for Domestic Production (APL) model will provide significant employment and technology transfer.

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 centre with its logistics advantage, economic power and qualified personnel competence.

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.

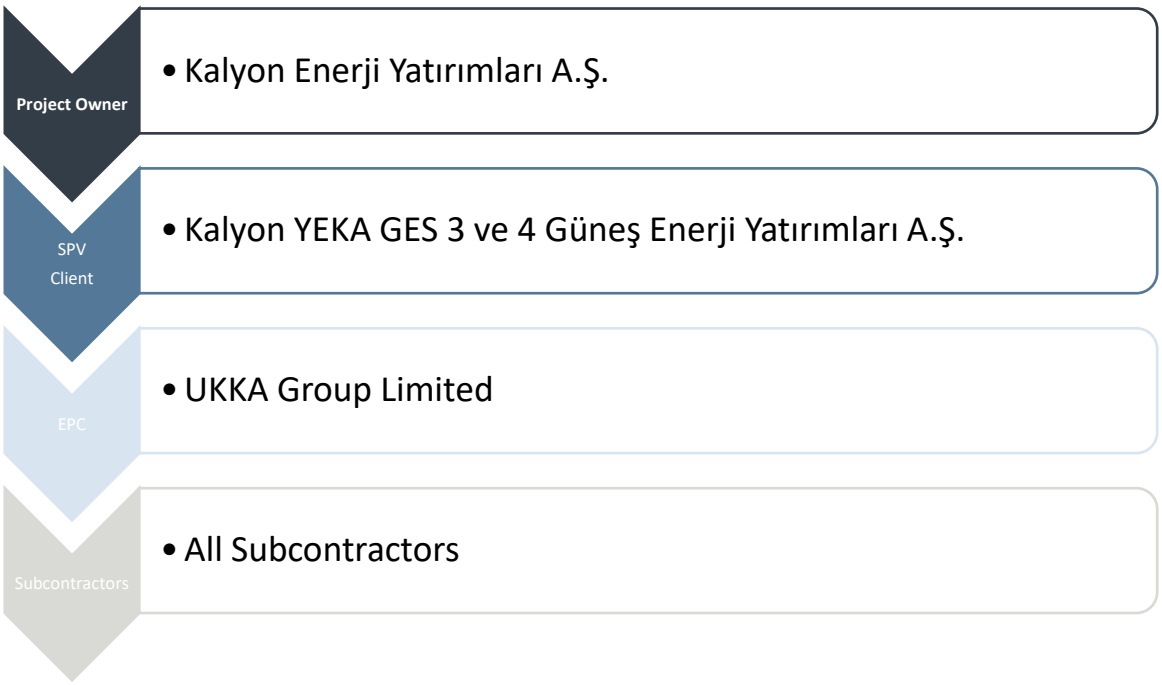


Figure 3-13: Illustration of Project Parties

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 6 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		
Ministry Approval of Design	15-Jan-23	17-Feb-23
Construction Permit	19-Aug-23	21-Aug-23
Final Delivery Acceptance Certificate Application & Issuance	07-Oct-23	11-Oct-23
The signing of the YEKA Contract	01-Jul-21	-
Master Plan Approval	14-Apr-22	01-Jul-23
EMRA (EPDK) Pre-License Approval	01-Jul-22	21-Jul-22
Base Plan Approval of the Site	01-Apr-22	25-May-22
Environmental Impact Assessment Approval	01-Mar-22	25-Nov-22
Signing TEİAŞ Connection Agreement	16-Nov-22	19-Apr-23
Transfer of Land Ownership	18-Nov-22	18-Aug-23
Land Allocation Approval	21-Jul-23	20-Sep-23
Electricity Generation License Approval	19-Aug-23	28-Aug-23
Baseline Studies (Physical Measurements & Biodiversity Monitoring)	01-May-23	30-Jun-23
Engineering	**06-Sep-22**	**26-Aug-23**
SPP Engineering	28-Sep-22	24-Jun-23
Substation Contracting & Engineering	06-Sep-22	01-Jul-23
OHTL Contracting, Engineering	04-Oct-22	31-Mar-23
CCTV & Lighting Engineering	24-Jul-23	26-Aug-23
Procurement	**09-May-23**	**24-Nov-23**
Early Works	**24-Jul-23**	**03-Sep-23**
Earthworks on Site Surface	24-Jul-23	15-Aug-23
Reptile & Mammal Burrow Monitoring Prior to Earthworks	24-Jul-23	20-Aug-23
Mobilization Works	05-Aug-23	03-Sep-23
Construction	**27-Jul-23**	**05-Feb-24**
Solar System	27-Jul-23	05-Feb-24
Substation	01-Aug-23	08-Dec-23
OHTL	09-Nov-23	08-Dec-23
Test & Commissioning & Provisional Acceptance	**11-Sep-23**	**17-Feb-24**
Final Acceptance & Commercial Operation of SPP	-	17-Feb-24
Solar System	11-Sep-23	17-Feb-24
Substation	09-Dec-23	23-Dec-23
OHTL	19-Dec-23	23-Dec-23

3.8 Project Location and Ownership

The Project will be located in Gaziantep Province, Şahinbey District, Kürüm neighborhood in Türkiye. Project location map is given below.

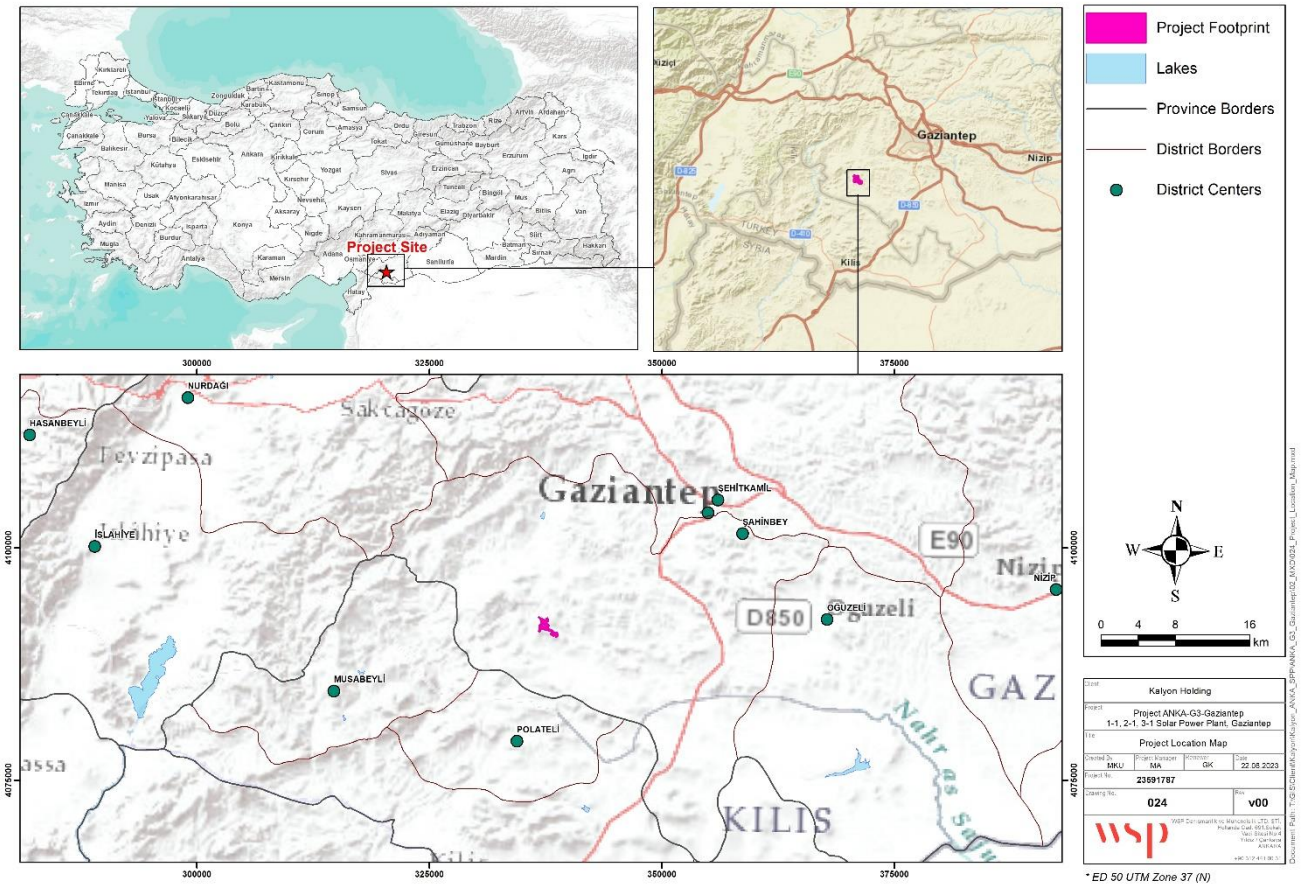


Figure 3-14: Project Location Map

The Project will be established on a pastureland with a size of 122.96 hectares. According to the Official Letter dated 29.06.2022 and numbered E-88108382-754-105533 from Gaziantep Metropolitan Municipality, Gaziantep 2040 1/100.000 scaled Provincial Environmental Plan has been canceled with the judicial decision of Gaziantep (2nd) Administrative Court dated 13.03.2020 and numbered E:2018/3825-K:2020/236. After the judicial decision, it was decided to replan with the decision of the Gaziantep Metropolitan Municipality Council dated 17.07.2020 and numbered 329, and it was unplanned in terms of the Environmental Plan. As per this official letter, Provincial Environmental Planning continues throughout the borders of Gaziantep Metropolitan Municipality.

Preparation and Approval of 1/25000 and 1/5000 Master Development Plan and 1/1000 Implementation Development Plan Approval has been completed and cadastral controls are in progress . Site selection process is detailed in Section 4.1 of this ESIA report.

The existing road used by the villagers of Ozanlı Village to reach their gardens will be used as it is the most distant route from the settlement and has the least interaction with it.

The closest settlements to the SPP site are Kürüm Neighborhood at 0.33 km, Ozanlı Neighborhood at 1.15 km and Çörekli Neighborhood at 1.75 km, and the nearest residence is located 350 m east of Kürüm Neighborhood. Nearest settlements to the Project site are shown in Figure 3-15.

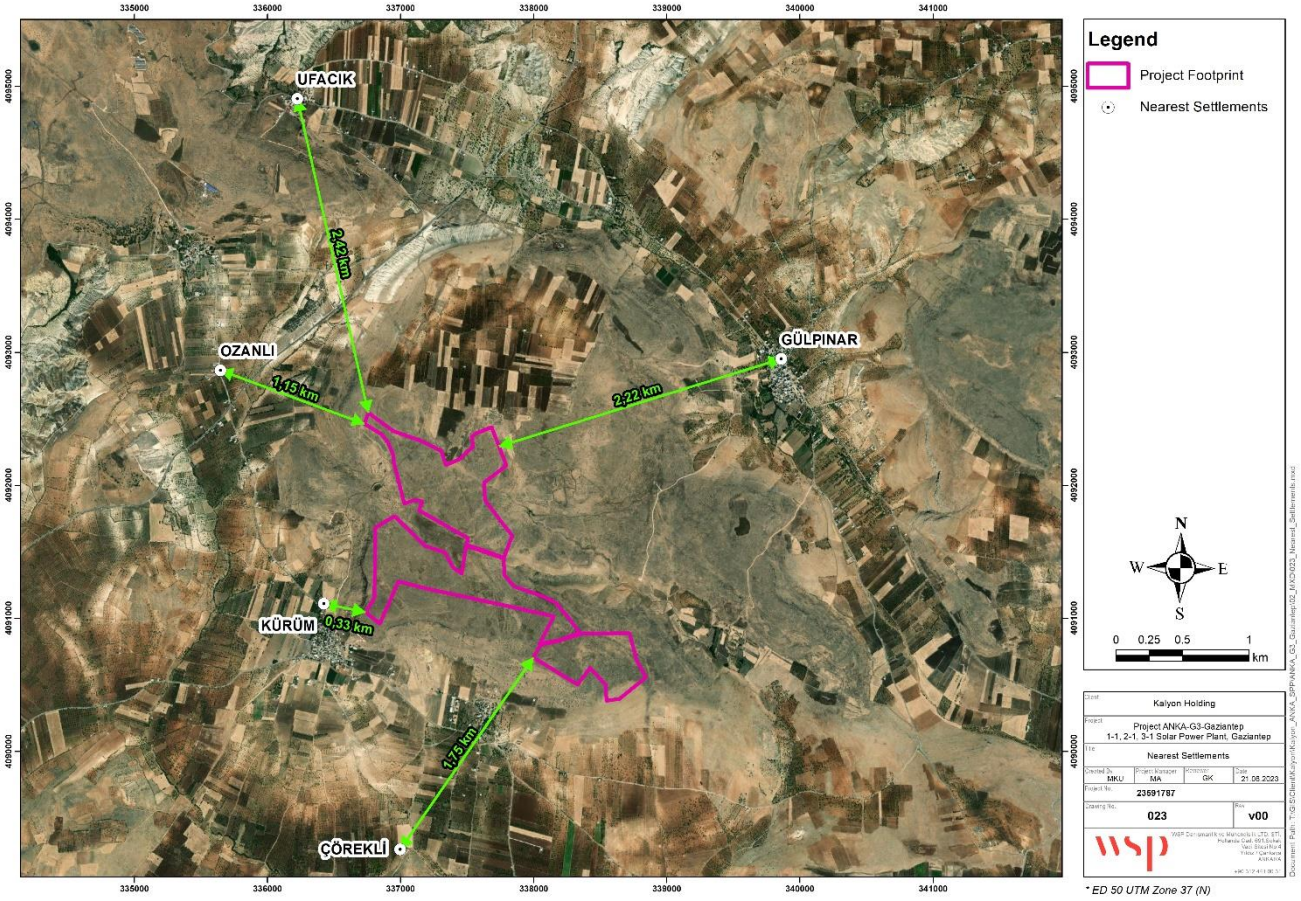


Figure 3-15: Map Showing Nearest Settlements to the Project Site

3.9 Project Labor and Working Conditions

Workforce

It is planned to employ 172 people during the construction phase of the Project and 19 people during the operation phase. It is projected that among 172 people to be worked during construction period, 42 of the employees will be from Kalyon Enerji, 70 of the employees will be mechanical personnel and 30 of the employees will be electrical personal, 25 of the employees will be construction personnel, while 5 of the employees will be HSE personnel. Where possible workforce is being sourced from local communities during the Project construction phase.

Temporary Worker Accommodation

60 workers will be accommodated inside the Project site borders (see Figure 3-2). The rest (approximately 18 workers, skilled) will be accommodated in rental houses and hotels in in Şahinbey District and Gaziantep Province. The main construction camps will provide at least the following facilities:

- Dormitory for 60 workers 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
- Dining rooms where will also be used for recreational activities
- Laundry
- Medical treatment room
- Offices with telephones, data and postal services
- Diesel generators
- External lighting to roads and walkways
- Waste accumulation and storage area
- Emergency muster point

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.

There will be no kitchen or cold storage area for food and an out-sourced catering services will be taken for the meals of the personnel.

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 with 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 Gaziantep Province is given below.

Table 3-2: Waste Management Facilities in Gaziantep

Facility Type	Number
Landfill (Municipality)	2
Licensed Packaging Waste Collection, Separation and Recycling Facilities	103
Hazardous Waste Recovery Facilities	11
Waste Oil Recovery Facility	1
Vegetable Waste Oil Recovery Facility	-
Waste Battery and Accumulator Recovery Facility	4
End-of-life Tire Recovery Facility	-
End-of-life Vehicle Temporary Storage Area	1
End-of-life Vehicle Process Facility Area	-

Facility Type	Number
Medical Waste Sterilization Facility	1
Non-Hazardous Waste Recovery Facility	154
Waste Electrical and Electronic Equipment Processing Facility	1
Mine Waste Disposal Facility	1

Source: Gaziantep Provincial Environmental Status Report for 2021 (2022) (https://webdosya.csb.gov.tr/db/ced/icerikler/gaz-antep_-cdr2021-20230217144632.pdf).

Wastewater Infrastructure

Urban wastewater management facilities in Gaziantep are listed below.

Table 3-3: Urban wastewater Management Facilities in Gaziantep

Settlement	Treatment Facility	Capacity (ton/day)
Şahinbey Municipality	Wastewater Treatment Plant (Biological)	**248,000**
Central District	Wastewater Treatment Plant (Advanced)	200,000
Kızılhisar Municipality	Wastewater Treatment Plant (Biological)	46,500
GASKİ Burç Municipality	Wastewater Treatment Plant (Biological)	1,000
Gaskispor Municipality	Wastewater Treatment Plant (Biological)	500

Source: Gaziantep Provincial Environmental Status Report for 2021 (2022) (https://webdosya.csb.gov.tr/db/ced/icerikler/gaz-antep_-cdr2021-20230217144632.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	7000 m^3
Steel	3576 tons (such as torque tube, I-H profile, and C profile)
Filling Material	20000 m^3 Broken Stones 6000 m^3 Fine Sand 240000 pcs Pumice Block 2000 m^3 stabilized filling material
Wire/Fence	13000 m

The material needed for the construction activities, including bedding, padding, back filling and aggregate, concrete will be provided from companies in Gaziantep province 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*	162378 pcs	Türkiye (Kalyon PV)	By road
DC Combiner Box	253	India	By sea and road
Inverter Station	13 pcs	Inverter: United Kingdom Transformer: Türkiye RMU: Türkiye	Inverter: By road Transformer: By road RMU: By road
Substation and Switchyard	-	Türkiye	By road
Cable	481050 m DC Cable 22664 m MV Cable 25.800 m Fiber Cable	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	3
Pile Driving Machine	5
Excavator	3
Dozer	2
Earthmoving Trucks	10
Loader	1
JCB	8
Grader	1
Cylinder Machine	2
SUVs	2
septic tanker	1
Mobile Crane	2
Telehandler	10
Lowbet	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 1000 liters and electrical energy required for the rest of the construction phase when the connection to electricity grid is completed is estimated as 200 MWh.

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 refilling fuels 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 150,000 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. 172 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 = 172 individuals x 228 L/person day = 39,216 L/day ≈ 39.22 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 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 m3/day and it will be supplied from GASKİ via water trucks. .

Total potable and dust suppression water requirement for the construction phase is estimated to be 39.22 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 operation phase.

Estimated amounts of 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

Chemical	Amount
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 ne 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 when there is no irradiation (during night time) and when there is irradiation (during day time), electricity demand will be supplied through the electricity generated in SPPs. The amount of electrical energy required for the facility was calculated as 80000 kW/h annually during daytime and 85000 kW/h annually during night time, 165000 kW/h annually, in total.

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. 19 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 = 19 individuals x 228 L/person day = 4332 L/day ≈ 4.33 m^3/day.

The drinking water of the personnel will be bottled water. For the potable water, it will be supplied with transported water from GASKİ via water trucks.

- 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 130 m^3 according 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 in emergency situations and construction equipment that will be operated during land preparation / construction activities.

For air conditioning activities and hot water needs, electrical air conditioners and water heaters will be used.

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 water consumption by personnel;

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 39.22 m^3/day including offsite accommodation and construction camp. Domestic wastewater generated by personnel at the camp site will be collected in septic tanks and periodically transported via vacuum tanks to the closest licensed wastewater treatment plant by GASKİ.

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 and excavation wastes.

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 water consumption personnel;

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 4.33 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

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 will be established on a pastureland of 122.96 hectares. The Project Area was announced as a Renewable Energy Resource Area (YEKA) by the Ministry of Energy and Natural Resources. Scope of the "Contest Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" published in the Official Gazette dated 03/07/2020 and numbered 31174; YEKA G3-GAZİANTEP-1-1/2-1/3-1 competitions were won by the Project Sponsor. YEKA Right of Use Contract were signed on 01.07.2021 between the winner of the competition, Kalyon Enerji Yatırımları A.Ş and the Ministry of Energy and Natural Resources. Pre-license was given by the Ministry of Industry and Technology, numbered ÖN/11080-30/05183 and 28.07.2022.

During the selection of the project area, following criteria were followed:

- The YEKA GES-3 Specification Article 4.3 stipulates that GES (Renewable Energy Resource Area) can be determined on public and treasury immovables or immovables subject to private ownership.
- According to Article 4.5 of the YEKA GES-3 Specification, the Proposed CANDIDATE YEKAs cannot be located within the following given areas:
  - Forest,
  - Large plain conservation areas,
  - Absolute Agricultural Lands,
  - Special Product Lands,
  - Planted Agricultural Lands,
  - Irrigated Agricultural Lands, and
  - Lands within environmental areas that will not disrupt the integrity of agricultural use.
- In accordance with Article 4.6 of the YEKA GES-3 Specification, "4.6. Candidate YEKA cannot be proposed on areas declared as YEKA or Candidate YEKA." A portion of the Hatay-Erzin YEKA area declared by the Ministry in the year 2018 is located within the Osmaniye province.
- Restrictions based on our own assessment outside of the YEKA GES-3 Specification:
  - National Parks,
  - Nature reserves,
  - Wildlife development areas,
  - Wetlands,
  - Licensed Wind Power Plants, Unlicensed GES (Renewable Energy Resource Areas),
  - Distances to ENH (Electricity Transmission Substations) and Transformer centers,

- Land Slope/Land Aspect,
- Lands' GHI (Global Horizontal Irradiance), Albedo values,
- Average temperature values of lands (for South/Southeast regions), and
- Horizon (Project horizon and daylight line).

Apart from this, Solar Radiation Maps of the potential project areas, detailed studies in Gaziantep Province, identification of suitable areas based on slope and project horizon and sunlight line are also considered during selection process of the project area. (See Figure 4-1 –Figure 4-3).

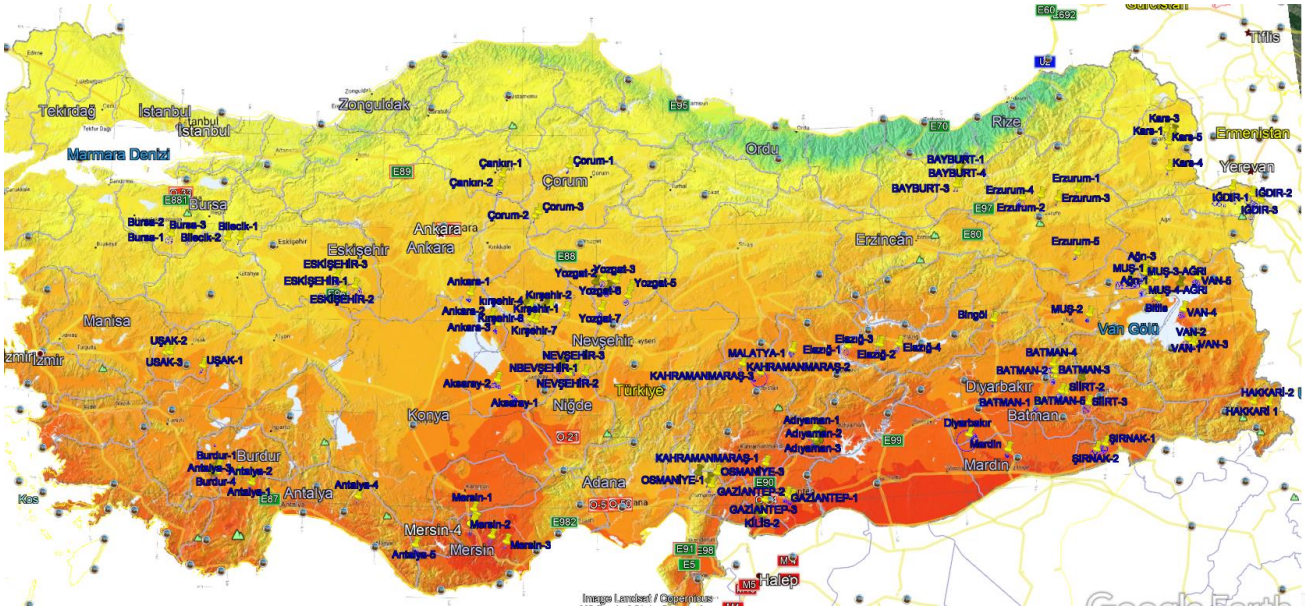


Figure 4-1: Solar Radiation Maps of the Potential Project Areas

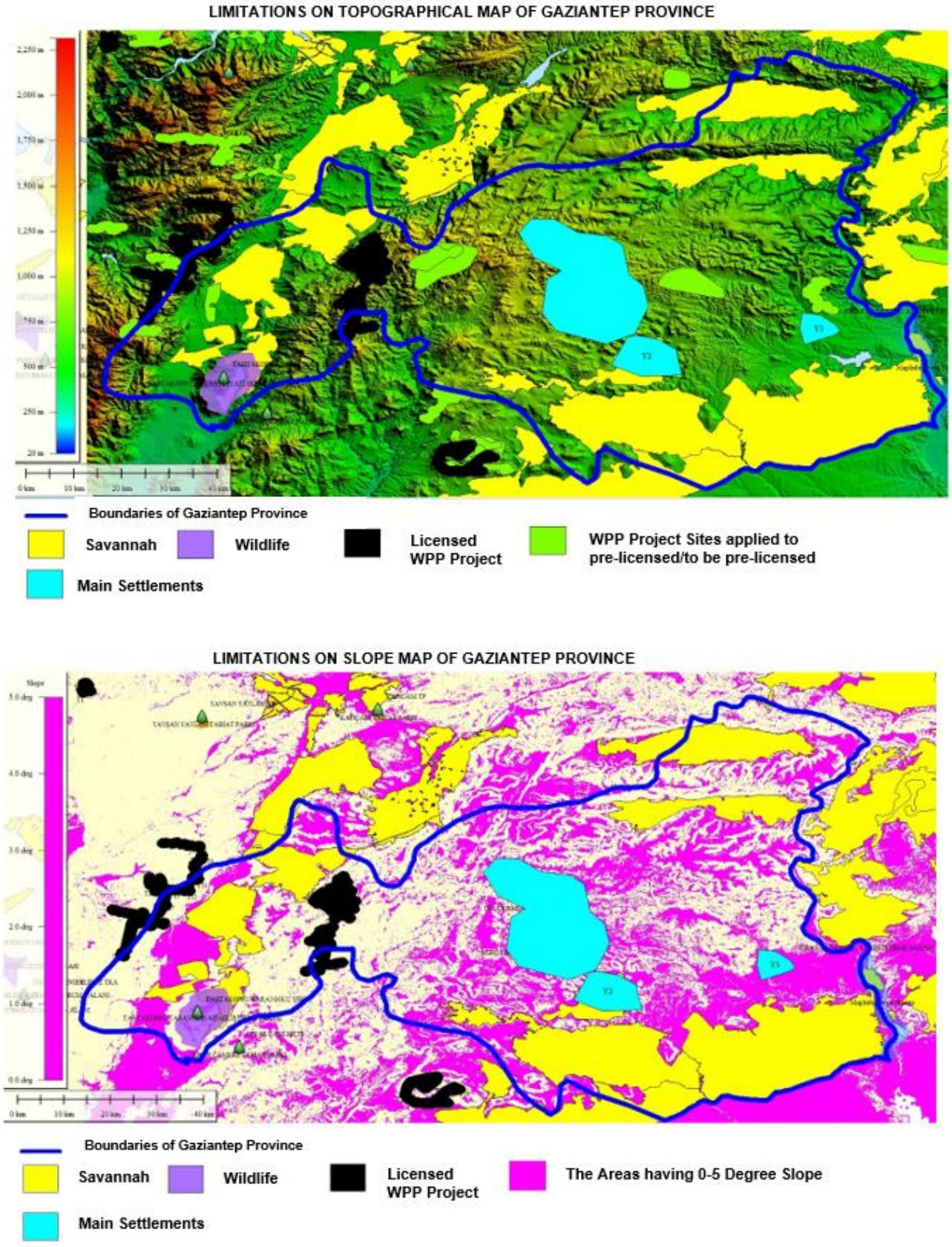


Figure 4-2: Detailed Topographical and Slope Studies in Gaziantep Province

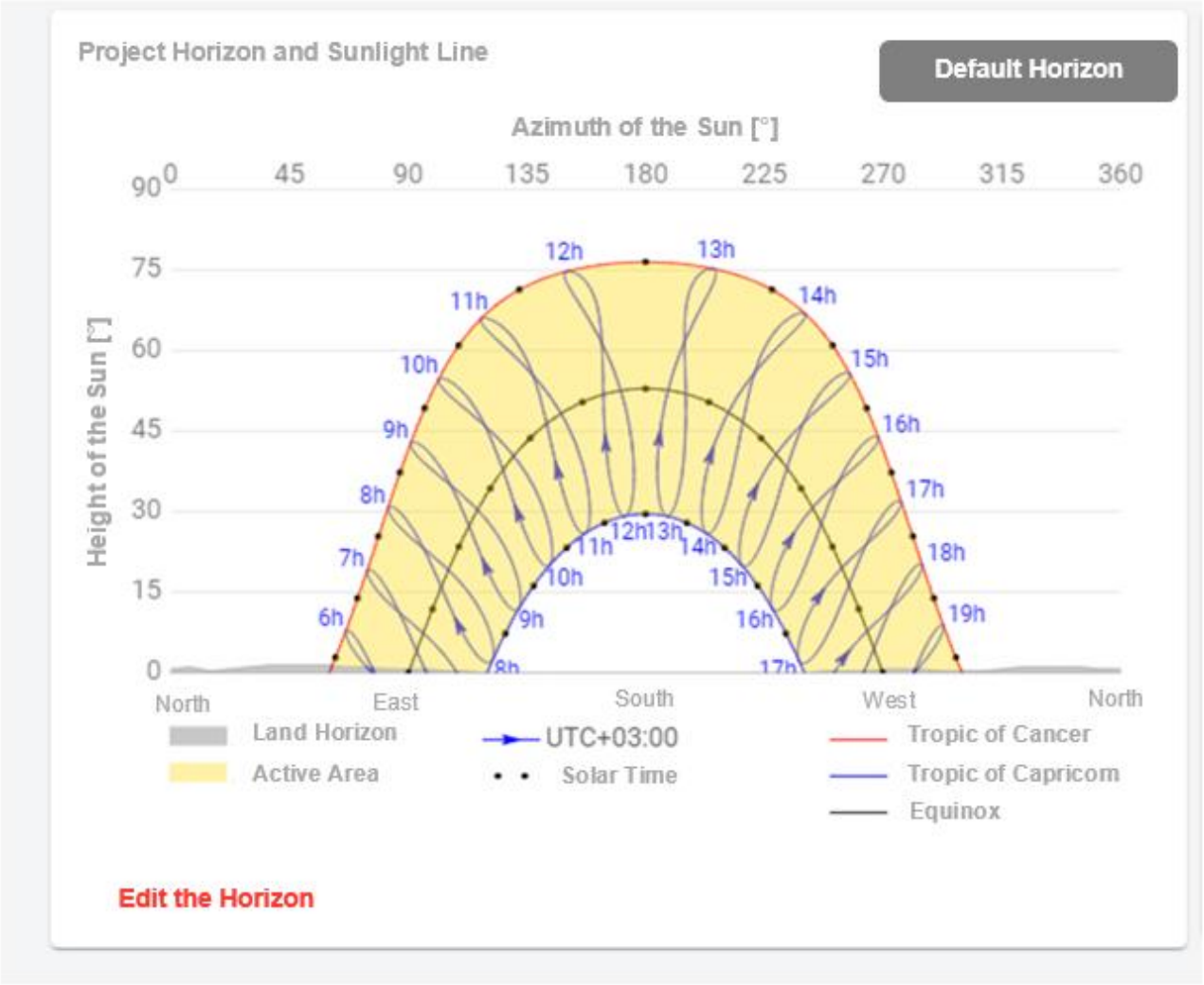


Figure 4-3: Project Horizon and Sunlight Line

In the conducted land assessment studies, due to the favourable land conditions between projects in different connection regions, it is possible to design the projects side by side. With the consideration of selection criteria stated in technical specification of YEKA GES-3, topographical conditions and slope, solar radiation ratios and project horizon and sunlight line, current location of the Project area was selected.

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

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

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 is available for the Project.

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 environmental (especially in terms of GHG emissions and climate change) and socio-economic outcomes, economic benefit to local and national stakeholders and contribution to a sustainable environment would not happen. With the realization of the Project, annual amount of electricity to be generated by the Project is estimated as 99,745.6 MWh/year. Within this regard, based on the Turkish National Electricity Grid Emission Factor (0.6488 t CO_2/MWh) defined by the Turkish Ministry of Energy and Natural Resources, 64,714.95 tonne CO_2/year of GHG emissions will be avoided in annual basis in the energy sector with the realization of the Project. 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 of other companies if the "No Project" option was chosen.

5.0 ESIA METHODOLOGY

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;

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

- **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.

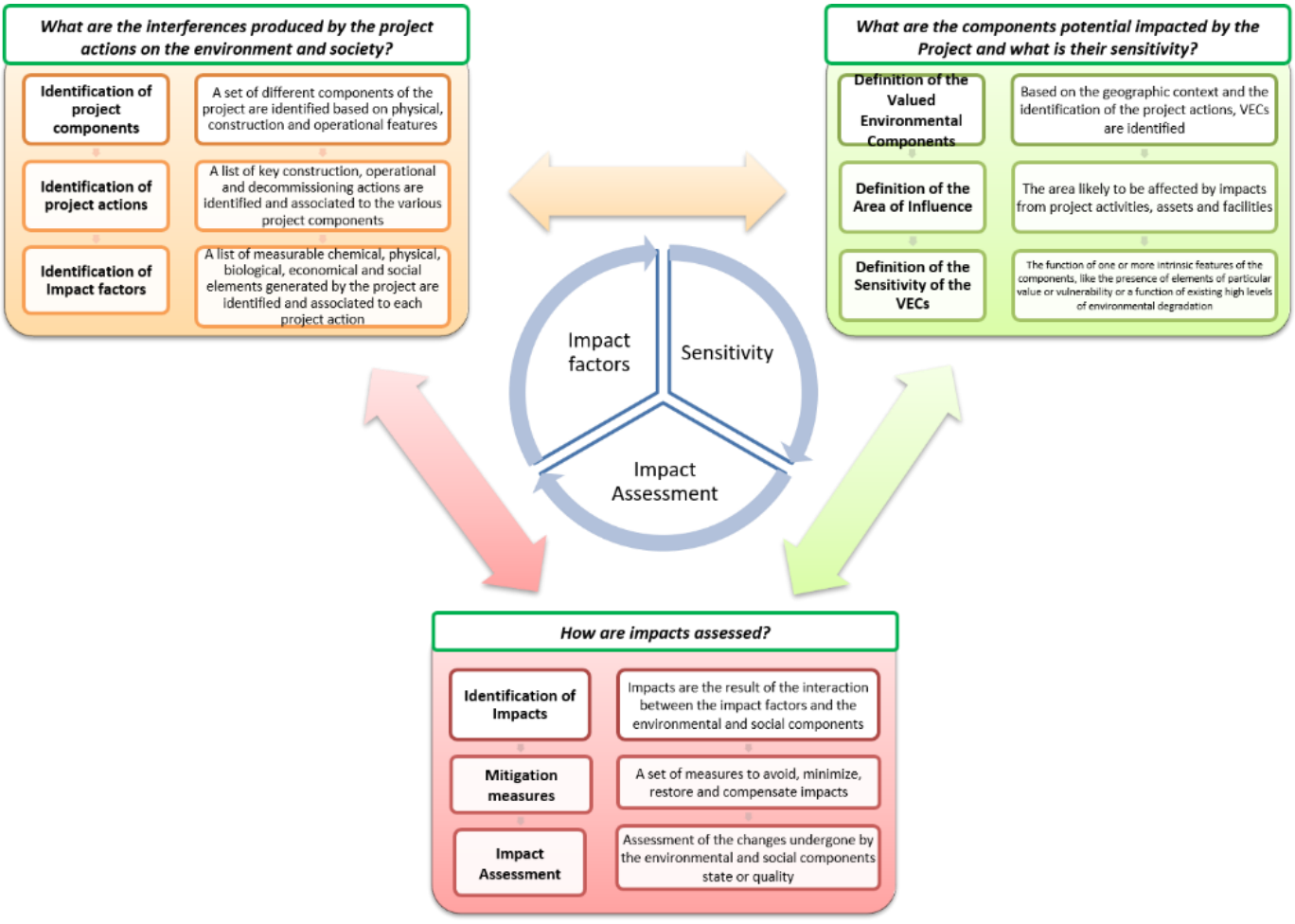


Figure 5-1: Three Phases of ESIA Process

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

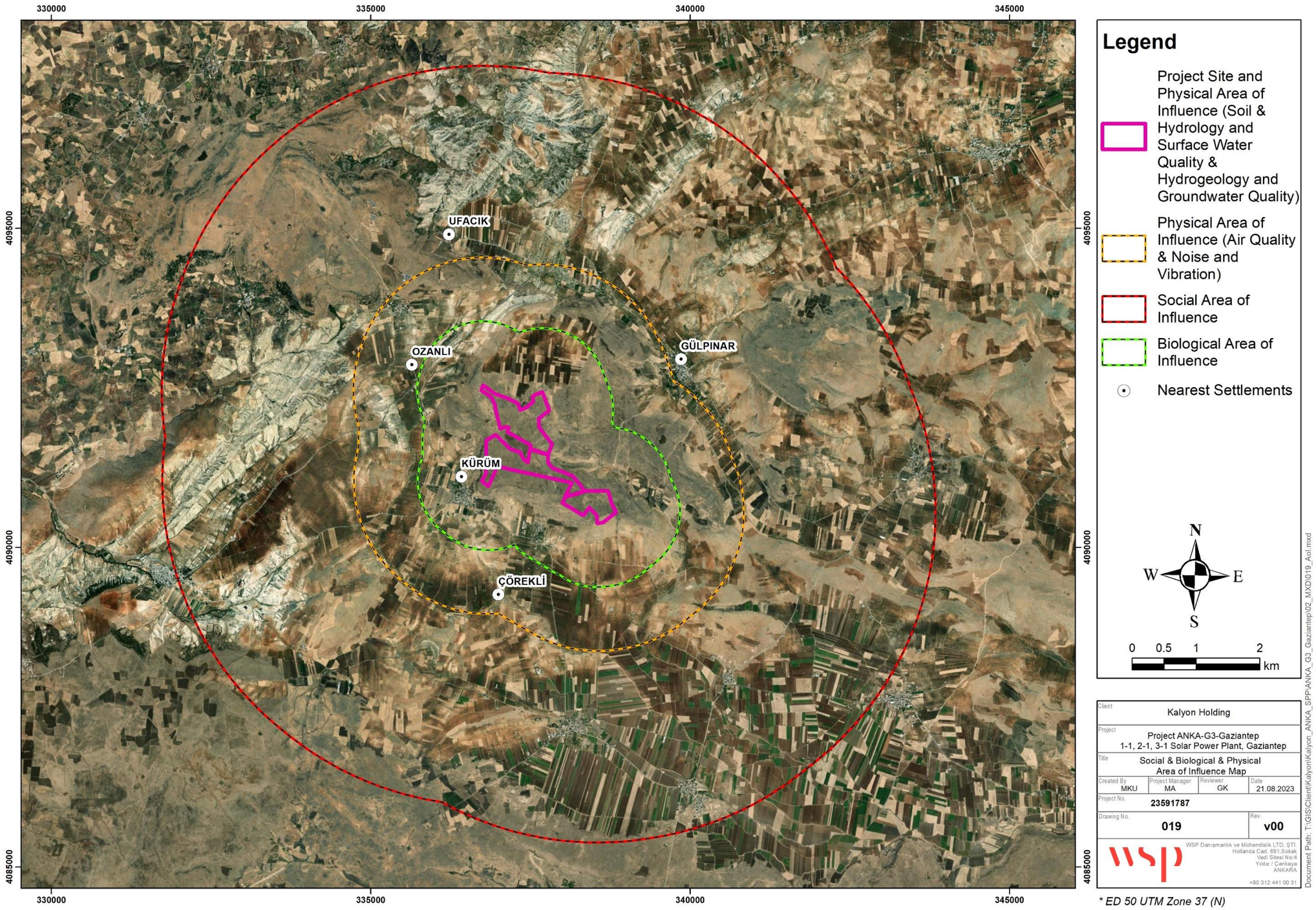
ESIA Component	AoI
Soil and Subsoil	AoI includes the Project footprint
Hydrology and Surface Water Quality	AoI includes the Project footprint
Hydrogeology and Groundwater Quality	AoI includes the Project footprint. In case of groundwater use within the scope of the Project, AoI will include the cone 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 Kürüm, Çörekli, Ozanlı Gülpınar and Ufacık neighbourhoods
Cultural Heritage	AoI includes the Project footprint



* ED 50 UTM Zone 37 (N)

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 Introduction of alien species (potential risk) Land occupation (Loss of Income, soil) Demand for workforce Change in population influx Demand for goods, materials and services Access to ecosystem services Risk of Increasing Communicable Diseases and Waste Change in traffic load 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 Emission of light
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 Change in traffic load Introduction of buildings/infrastructures
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 Change in population Benefit to national economy Labour and working conditions related impacts Change in traffic load 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 Introduction of alien species (potential risk) Land occupation (Loss of Income) 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 Change in traffic load 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:

[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.

- 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).

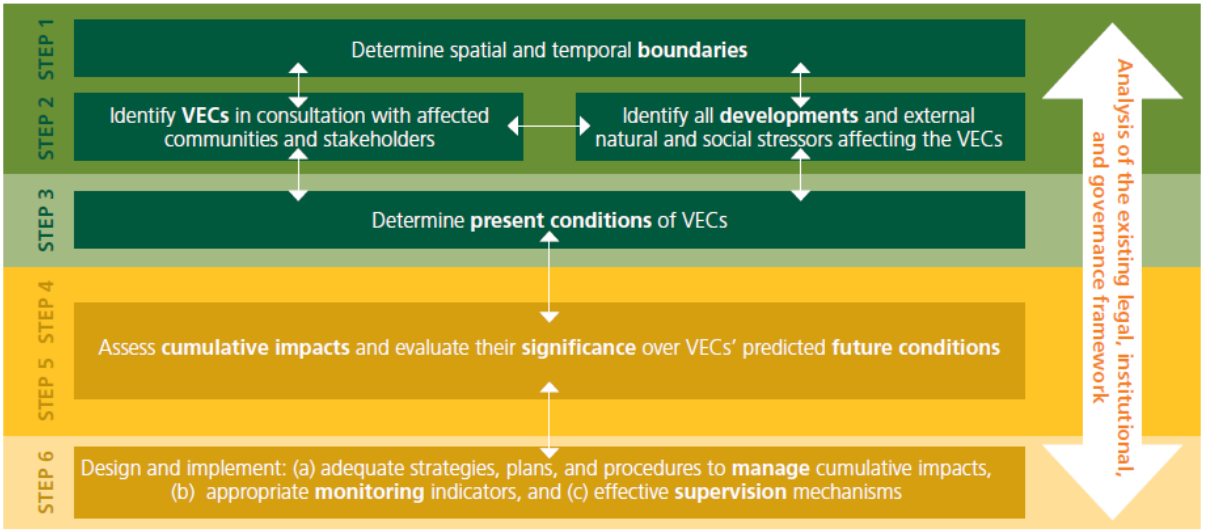


Figure 5-3: RCIA: Six-Step Approach

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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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 12th of April 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 Kürüm, Çörekli, Gülpınar, Ozanlı and Ufacık 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 Gaziantep 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 Gaziantep 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 Gaziantep province and winters are warm, and summers are hot and dry.

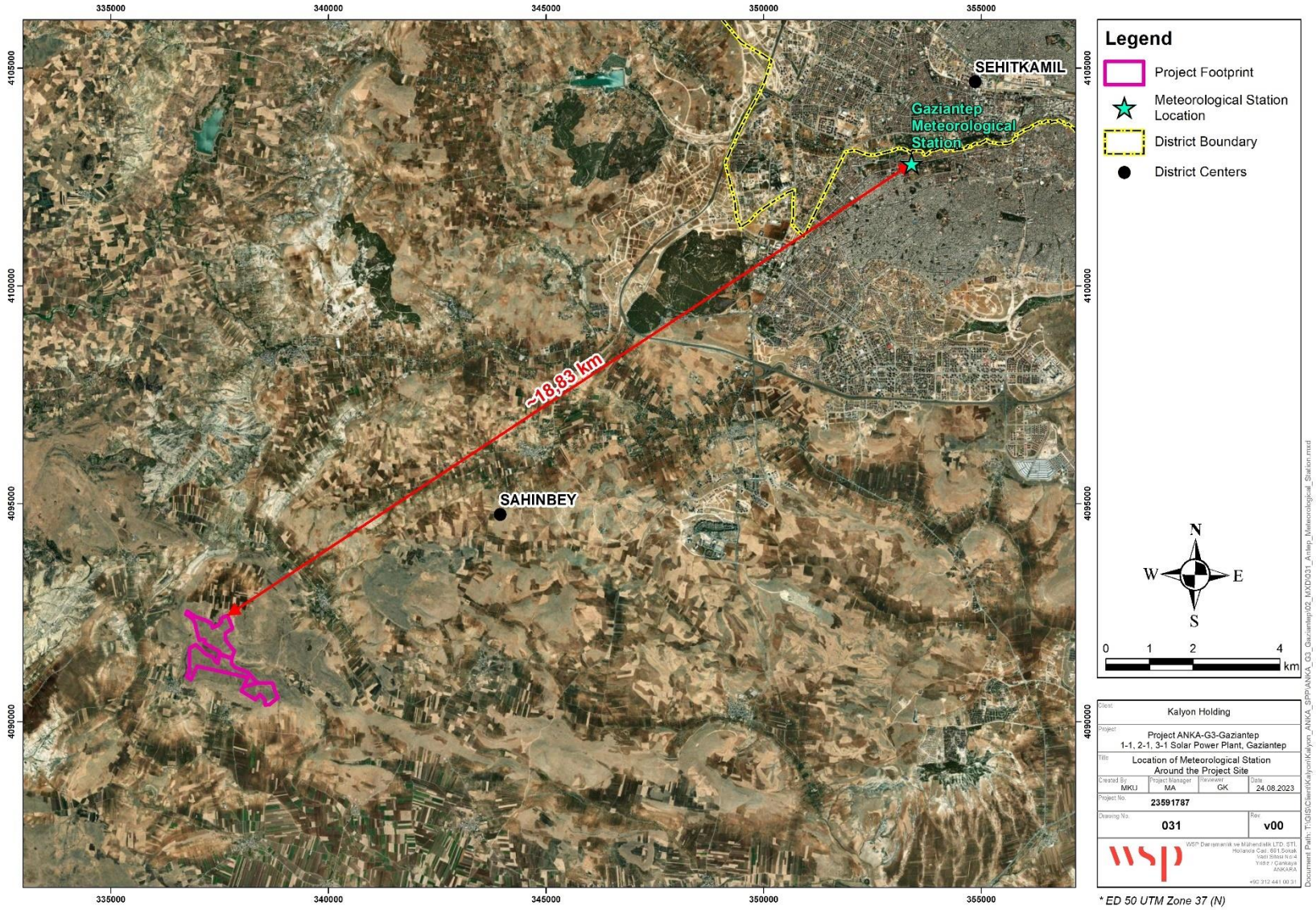


Figure 6-1: Location of Gaziantep Meteorological Station with respect to project Area

Pressure

According to the long term (1960-2021) observation records of Gaziantep Meteorology Station, the average pressure is 916.23 hPa per year, the maximum pressure is observed as 939.5 hPa, and the minimum pressure is 894.6 hPa (see Table 6-1 and Figure 6-2).

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

Months	Average Pressure (hPa)	Maximum Pressure (hPa)	Minimum Pressure (hPa)
January	919.7	935.2	897.1
February	918.3	939.5	895.1
March	916.4	930.5	894.6
April	915.4	927.5	896.1
May	914.9	927.4	899.9
June	912.6	921.6	900.8
July	910.0	922.0	902.0
August	911.3	918.0	902.9
September	915.4	923.1	906.5
October	919.3	935.6	904.4
November	920.8	933.2	898.6
December	920.6	933.7	899.1
Annual	**916.2**	**939.5**	**894.6**

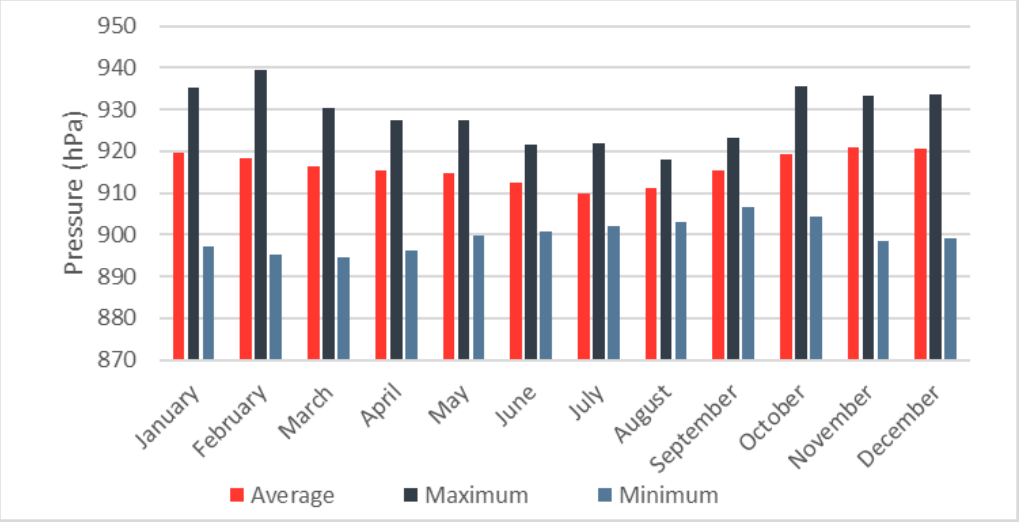


Figure 6-2: Gaziantep Meteorological Station - Pressure Measurements (1960 - 2021)

Temperature

According to the observation records of Gaziantep Meteorology Station between 1960 and 2021, the annual average temperature is 15.4°C. The highest temperature was recorded in July with 44°C, and the lowest temperature was measured in January with -16.8°C. Temperature values for 1960-2021 are presented in Table 6-2 and Figure 6-3.

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

Months	Average Temperature (°C)	Maximum Temperature (°C)	Minimum Temperature (°C)
January	3.3	19.0	-16.8
February	4.6	24.3	-15.6
March	8.6	27.4	-11.0
April	13.5	34.0	-3.7
May	18.9	37.8	2.5
June	24.2	40.2	4.5
July	28.1	44.0	11.6
August	28.0	42.7	12.2
September	23.6	40.8	6.4
October	17.0	34.4	-2.8
November	9.9	27.3	-7.5
December	5.2	25.2	-13.4
Annual	**15.4**	**44.0**	**-16.8**

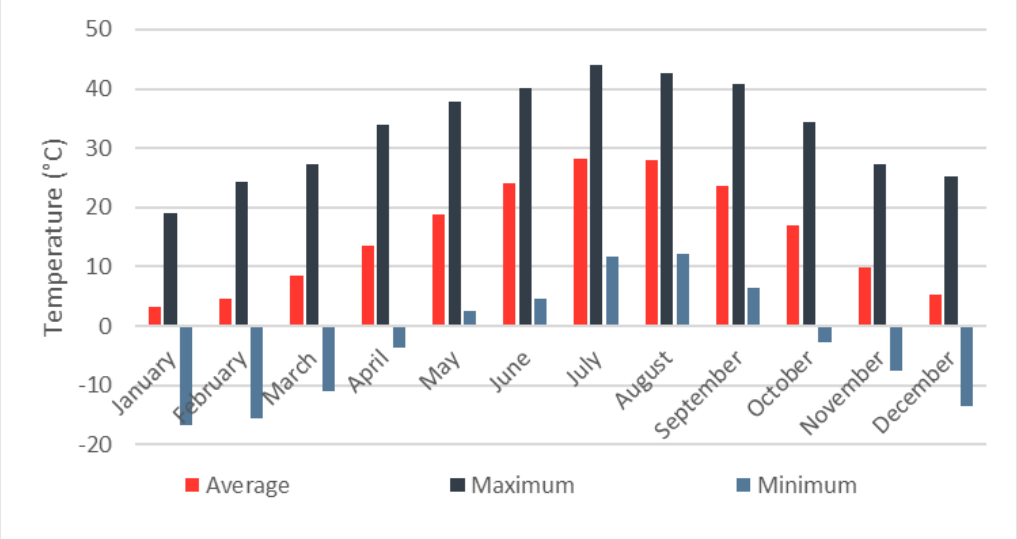


Figure 6-3: Gaziantep Meteorological Station - Temperature Measurements (°C) (1960 - 2021)

Precipitation

According to the observation records of Gaziantep Meteorology Station between 1960 and 2021, the annual total precipitation is 573.3 mm. The maximum amount of precipitation per day was measured in December with 66.5 mm. Precipitation values for 1960-2021 are presented in Table 6-3 and Figure 6-4.

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

Months	Average Total Precipitation (mm)	Maximum Precipitation (mm)
January	100.8	62.6
February	81.6	49.5
March	74.3	64.2
April	53.2	54.2
May	31.7	37.8
June	7.5	28.6
July	7.5	46
August	5.6	42.8
September	8	27.4
October	39	60.8
November	64.2	58
December	99.9	66.5
Annual	**573.3**	**66.5**

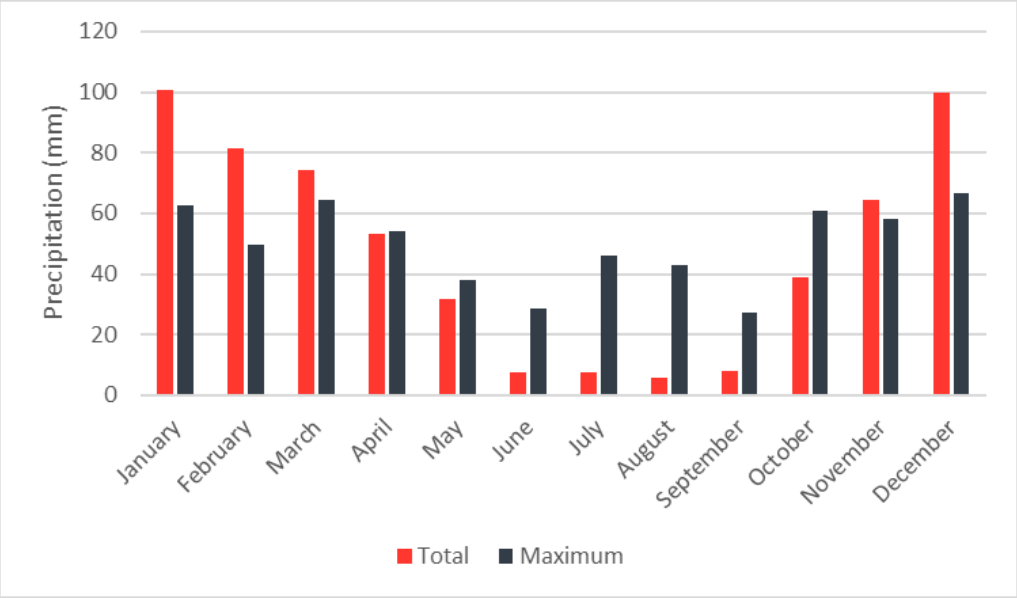


Figure 6-4: Gaziantep Meteorological Station - Precipitation Measurements (mm) (1960 - 2021)

Relative Humidity

According to the observation records of Gaziantep Meteorology Station between 1960 and 2021, the annual average relative humidity is 59.3% and annual minimum relative humidity is 13.9%. Relative humidity values for 1960-2021 are presented in Table 6-4 and Figure 6-5.

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

Months	Average Relative Humidity (%)	Minimum Relative Humidity (%)
January	75.1	26.2
February	72.3	26.0
March	66.4	20.3
April	62.1	19.7
May	54.7	18.1
June	46.2	15.1
July	42.6	14.0
August	45.0	13.9
September	47.5	13.8
October	57.1	16.9
November	68.2	21.6
December	74.4	25.7
Annual	**59.3**	**13.8**

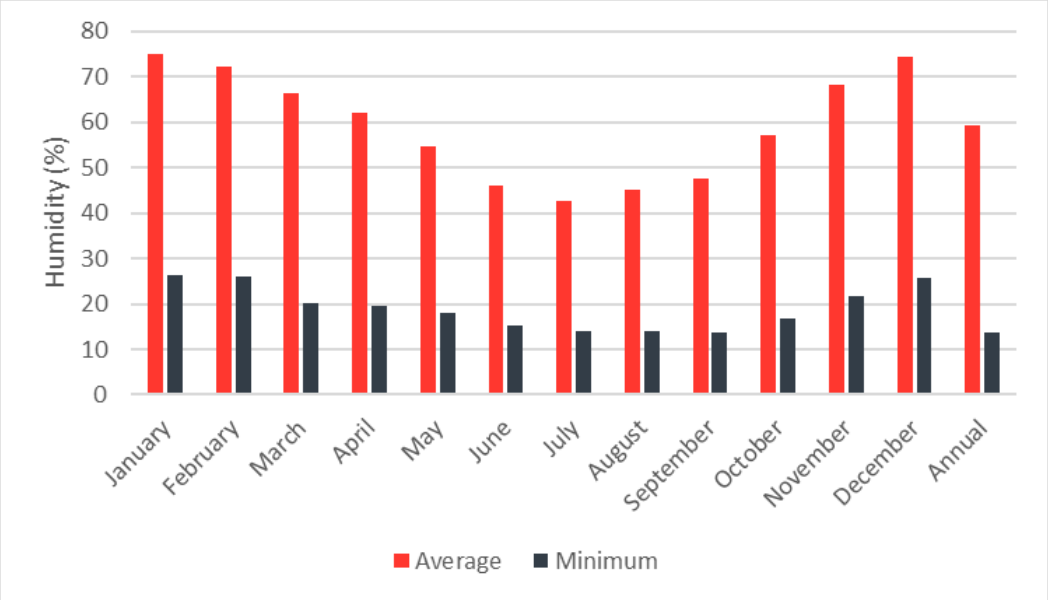


Figure 6-5: Gaziantep Meteorological Station - Relative Humidity Measurements (%) (1960 - 2021)

Evaporation

According to the observation records of Gaziantep Meteorology Station between 1960 and 2021, the total evaporation was 1463.2 mm, and the daily maximum evaporation was 19 mm in August. Evaporation Values for 1960-2021 are presented in Table 6-5 and Figure 6-6.

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

Months	Total Evaporation (mm)	Daily Maximum Evaporation (mm)
January	0.0	0.0
February	0.4	0.0
March	13.3	5.6
April	106.5	11.0
May	173.3	12.1
June	247.8	14.0
July	302.4	16.5
August	277.8	19.0
September	193.7	16.0
October	108.7	9.3
November	35.9	8.5
December	3.4	2.5
Annual	**1463.2**	**19.0**

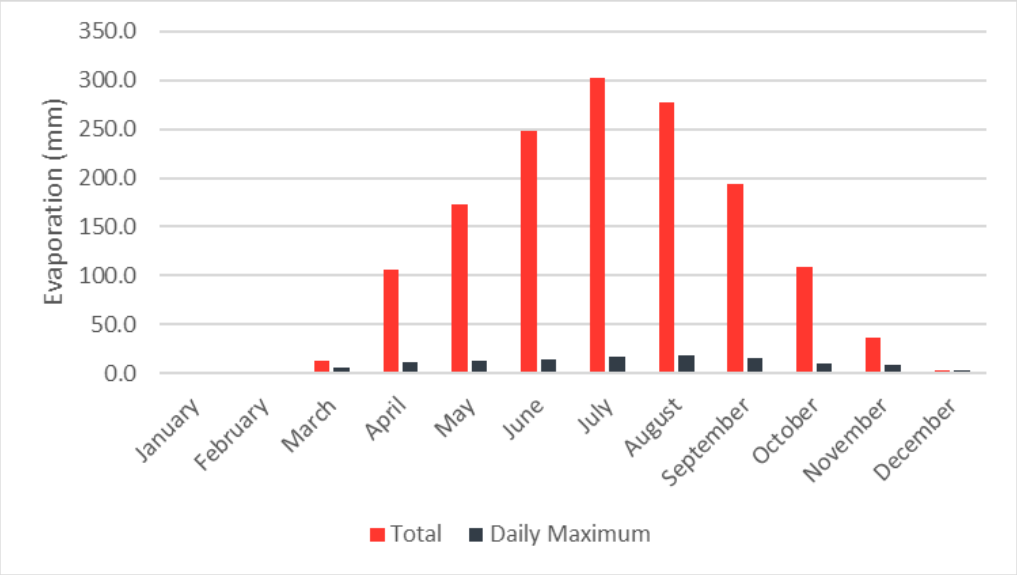


Figure 6-6: Gaziantep Meteorological Station - Evaporation Measurements (mm) (1960 - 2021)

Wind Distribution

Number of Winds

The total number of the wind blowing measured at Gaziantep 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: Gaziantep Meteorological Station - Wind Direction Measurements (1960 - 2021) (blowing from)

Direction	Annual Total Wind
N	22055
NNE	22124
NE	25652
ENE	33622
E	17300
ESE	12924
SE	8225
SSE	10295
S	13467
SSW	23771
SW	40922
WSW	56117
W	54876
WNW	73423
NW	43425
NNW	41008

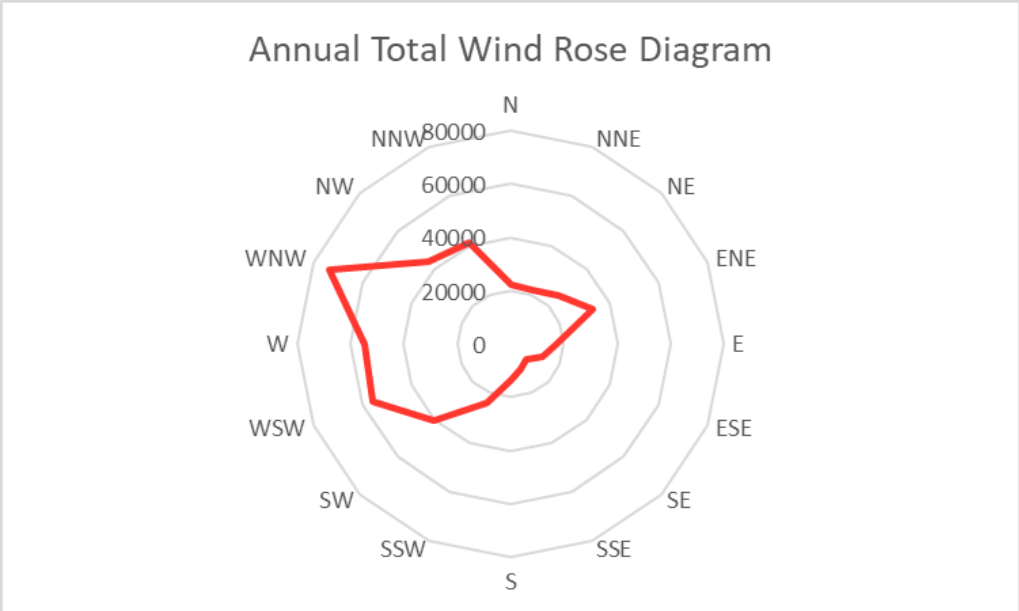


Figure 6-7: Gaziantep Meteorological Station - Wind Direction Measurements (mm) (1960 - 2021) (blowing from)

Wind Speed

According to data from Gaziantep 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/s blowing from south-southeast (SSE) direction (see Table 6-7)

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

	Average Monthly Wind Speed (m/s)	Maximum Monthly Wind Speed (m/s) and Direction
January	1.3	26.4 S
February	1.4	32.1 N
March	1.5	32.1 N
April	1.6	24 NW
May	1.6	24.6 NW
June	2.0	26.3 NNW
July	2.2	24.1 N
August	1.9	23.1 NW
September	1.4	22.2 WSW
October	1.0	21.5 ENE
November	1.0	20.4 SSW
December	1.2	25.4 N
Annual	**1.5**	**32.1 N**

Other parameters

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

- the average annual number of snow days is 7.12, the number of snow-covered days is 10.34, the number of foggy days is 1.71, the number of hail days is 2.79, the number of frosty days was 18.34, and the number of thunderstorm days was 5.02.
- The maximum snow thickness was measured as 100 cm in February 1968.
- The number of strong windy days is 34.85 days per year, and the number of stormy days is 5.02 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 Gaziantep Province ■ Secondary data from scientific papers, grey literature, and databases.

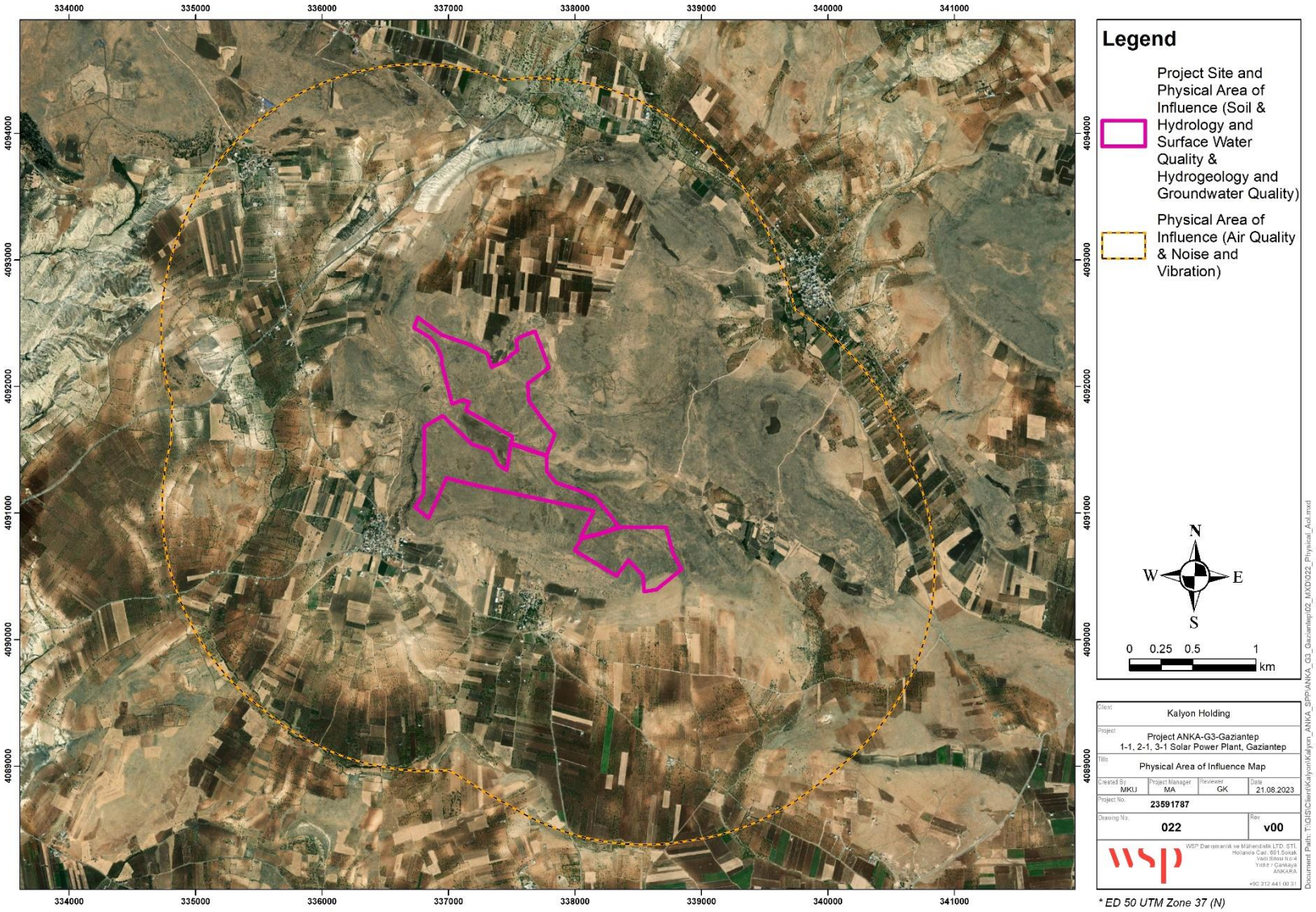


Figure 6-8: Map Showing Physical Area of Influence of Air Quality and Noise Components

Methodological Approach

Air Quality Monitoring Stations

Information about the air quality in the RSA is provided from the National Air Quality Monitoring Stations in Gaziantep. The air quality data at this station are published on the website of the Continuous Monitoring Center (CMC) of MoEUCC. There are six CMCs in Gaziantep, namely Gaziantep, Beydilli, Fevzi Çakmak, GASKI D6, Nizip, and Atapark. The closest CMC (GASKİ D6) is approximately 16 km distance to the project area. Therefore, GASKİ D6 CMC data is used for RC data and 2022 data is summarized. The air quality monitoring stations are 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 72 hours in 11 measurement points. Settled dust measurements were conducted for 2-months at 11 points.

Table 6-8: PM10 Measurement Coordinates and Periods

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
PM10-1	337690°	4090317°	72 hours, 1-4.05.2023
PM10-2	337571°	4090185°	72 hours, 1-4.05.2023

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
PM10-3	339702°	4092592°	72 hours, 1-4.05.2023
PM10-4	336636°	4090594°	72 hours, 4-7.05.2023
PM10-5	336612°	4090821°	72 hours, 4-7.05.2023
PM10-6	336460°	4090710°	72 hours, 4-7.05.2023
PM10-7	335944°	4091950°	72 hours, 1-4.05.2023
PM10-8	335511°	4093255°	72 hours, 1-4.05.2023
PM10-9	337989°	4090204°	72 hours, 1-4.05.2023
PM10-10	336605°	4091436°	72 hours, 4-7.05.2023
PM10-11	337472°	4092666°	72 hours, 4-7.05.2023

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

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
PM2.5-1	337690°	4090317°	72 hours, 1-4.05.2023
PM2.5-2	337571°	4090185°	72 hours, 1-4.05.2023
PM2.5-3	339702°	4092592°	72 hours, 1-4.05.2023
PM2.5-4	336636°	4090594°	72 hours, 4-7.05.2023
PM2.5-5	336612°	4090821°	72 hours, 4-7.05.2023
PM2.5-6	336460°	4090710°	72 hours, 4-7.05.2023
PM2.5-7	335944°	4091950°	72 hours, 1-4.05.2023
PM2.5-8	335511°	4093255°	72 hours, 1-4.05.2023
PM2.5-9	337989°	4090204°	72 hours, 1-4.05.2023
PM2.5-10	336605°	4091436°	72 hours, 4-7.05.2023
PM2.5-11	337472°	4092666°	72 hours, 4-7.05.2023

Table 6-10: Settled Dust Measurement Coordinates and Period

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
SD-1	337707°	4090301°	2 months – 1.05.2023-30.06.2023
SD-2	337578°	4090180°	2 months – 1.05.2023-30.06.2023

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
SD-3	339712°	4092590°	2 months – 1.05.2023-30.06.2023
SD-4	336609°	4090590°	2 months – 1.05.2023-30.06.2023
SD-5	336603°	4090822°	2 months – 1.05.2023-30.06.2023
SD-6	336458°	4090699°	2 months – 1.05.2023-30.06.2023
SD-7	335952°	4091936°	2 months – 1.05.2023-30.06.2023
SD-8	335481°	4093260°	2 months – 1.05.2023-30.06.2023
SD-9	337989°	4090197°	2 months – 1.05.2023-30.06.2023
SD-10	336599°	4091436°	2 months – 1.05.2023-30.06.2023
SD-11	337492°	4092684°	2 months – 1.05.2023-30.06.2023

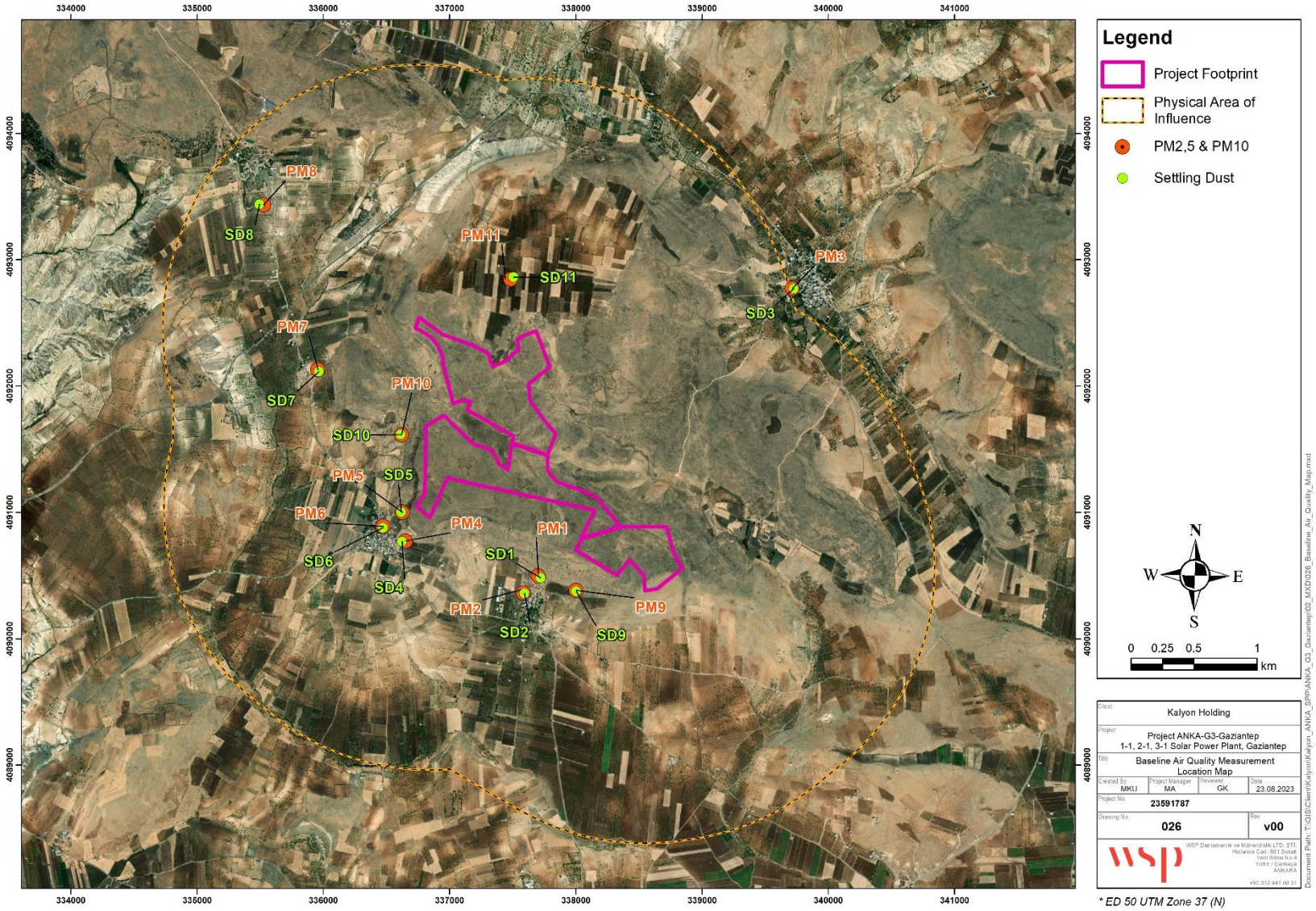


Figure 6-10: Baseline Air Quality Measurement Points

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 72 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 GASKİ D6 CMC of the Ministry of Environment, Urbanization and Climate Change is presented in Table 6-11.

Table 6-11: Air Quality from GASKİ CMC*

Parameter	Unit	Minimum Value	Minimum Date	Maximum Value	Maximum Date	Average Value	Turkish Air Quality Standards ($\mu g/Nm^{3)}$
PM_{10}	$\mu g/m^3$	0.58	22.04.2022	2,584.12	02.06.2022	85.44	20
SO_2	$\mu g/m^3$	1.56	12.03.2022	207.02	29.03.2022	20.68	20
CO	$\mu g/m^3$	39.78	16.08.2022	6,270.86	04.01.2022	1,141.00	10,000
NO_2	$\mu g/m^3$	12.93	12.04.2022	218.76	28.01.2022	58.03	40
NO_x	$\mu g/m^3$	13.01	12.04.2022	444.19	04.01.2022	74.45	-
NO	$\mu g/m^3$	0.08	12.04.2022	243.58	04.01.2022	16.41	-
O_3	$\mu g/m^3$	0.91	21.05.2022	127.45	17.08.2022	42.57	-

Source: (MoEUCC, 2022)

Area of Influence

Within the scope of the ESIA, $PM_{2.5}$, PM_{10} and settled dust, measurements were conducted. The results and evaluations are given in the following sub-sections. It should be noted that, during baseline studies, Material transportation and construction of the Energy Transmission Line close to the Project site was ongoing by TEİAŞ.

PM_{10} Measurement Results

The results of PM_{10} measurements are given in Table 6-12. As can be seen from the results, the PM_{10} concentration around the Project area is below the Turkish and IFC Air Quality Standards. The highest PM_{10} concentration was measured as 19.22 $\mu g/Nm^3$ at PM10-3 sampling point.

Table 6-12: PM10 Measurement Results

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards[1] (µg/Nm^3)	IFC Air Quality Standards (µg/Nm3)[2]
PM10-1	1-4.05.2023	17.05	50	50
PM10-2	1-4.05.2024	17.11		
PM10-3	1-4.05.2025	19.22		
PM10-4	4-7.05.2023	14.41		
PM10-5	4-7.05.2023	14.16		
PM10-6	4-7.05.2023	17.11		
PM10-7	1-4.05.2024	13.59		
PM10-8	1-4.05.2024	15.59		
PM10-9	1-4.05.2024	13.54		
PM10-10	4-7.05.2023	14.23		
PM10-11	4-7.05.2023	12.69		

[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 6-13. The PM2.5 measurement results around the Project area are below the IFC Air Quality Standards. The highest $PM_{2.5}$ concentration was measured as 8.35 µg/Nm^3 at PM2.5-6 sampling point.

Table 6-13: $PM_{2.5}$ Measurement Results

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (µg/Nm^3)	IFC Air Quality Standards (µg/Nm^3)[1]
PM2.5-1	1-4.05.2023	6.76	-	25
PM2.5-2	1-4.05.2024	5.53		
PM2.5-3	1-4.05.2025	8.02		
PM2.5-4	4-7.05.2023	5.43		
PM2.5-5	4-7.05.2023	4.08		

Sampling Point	Measurement Date	PM10 Measurement Results	Turkish Air Quality Standards (µg/Nm^3)	IFC Air Quality Standards (µg/Nm^3)[1]
PM2.5-6	4-7.05.2023	8.35		
PM2.5-7	1-4.05.2024	5.66		
PM2.5-8	1-4.05.2024	5.54		
PM2.5-9	1-4.05.2024	5.48		
PM2.5-10	4-7.05.2023	5.57		
PM2.5-11	4-7.05.2023	4.47		

[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 96 mg/m^2-day, at SD-3 air quality measurement point.

Table 6-14: Settled Dust Measurement Results (01.05.2023-30.06.2023)

Points	Settled dust Measurement Results (mg/m^2-day)		Turkish Air Quality Standards (mg/m^2-day)		IFC Air Quality Standards
	01.05.2023 - 31.05. 2023 (1st Period)	01.06.2023- 30.06.2023 (2nd Period)	Long Term Limit	Short Term Limit	
SD-1	85	91	210	390	-
SD-2	63	67			
SD-3	96	89			
SD-4	50	57			
SD-5	47	55			
SD-6	67	63			
SD-7	44	49			
SD-8	49	57			
SD-9	41	40			
SD-10	46	52			
SD-11	39	44			

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) 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 11 points for 48 hours continuously between 05-06.05.2023 and 07-08.05.2023 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 3 locations in 05.05.2023.

Measurement locations were presented in Table 6-15, Table 6-16 and Figure 6-11.

Table 6-15: Noise Level Measurement Coordinates and Periods

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
N-1	337709°	4090330°	48 hours – 05-07.05.2023
N-2	337570°	4090177°	48 hours – 05-07.05.2023
N-3	339694°	4092610°	48 hours – 05-07.05.2023
N-4	336613°	4090612°	48 hours – 05-07.05.2023
N-5	336607°	4090812°	48 hours – 05-07.05.2023
N-6	336475°	4090723°	48 hours – 05-07.05.2023
N-7	335943°	4091936°	48 hours – 05-07.05.2023
N-8	335495°	4093257°	48 hours – 05-07.05.2023
N-9	337996°	4090200°	48 hours – 05-07.05.2023
N-10	336602°	4091443°	48 hours – 05-07.05.2023
N-11	337440°	4092688°	48 hours – 05-07.05.2023

Table 6-16: Vibration Level Measurement Coordinates and Periods

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
V-1	337703°	4090288°	Instantaneous measurement – 14.01.2023
V-2	336623°	4090831°	Instantaneous measurement – 14.01.2023
V-3	339677°	4092592°	Instantaneous measurement – 14.01.2023

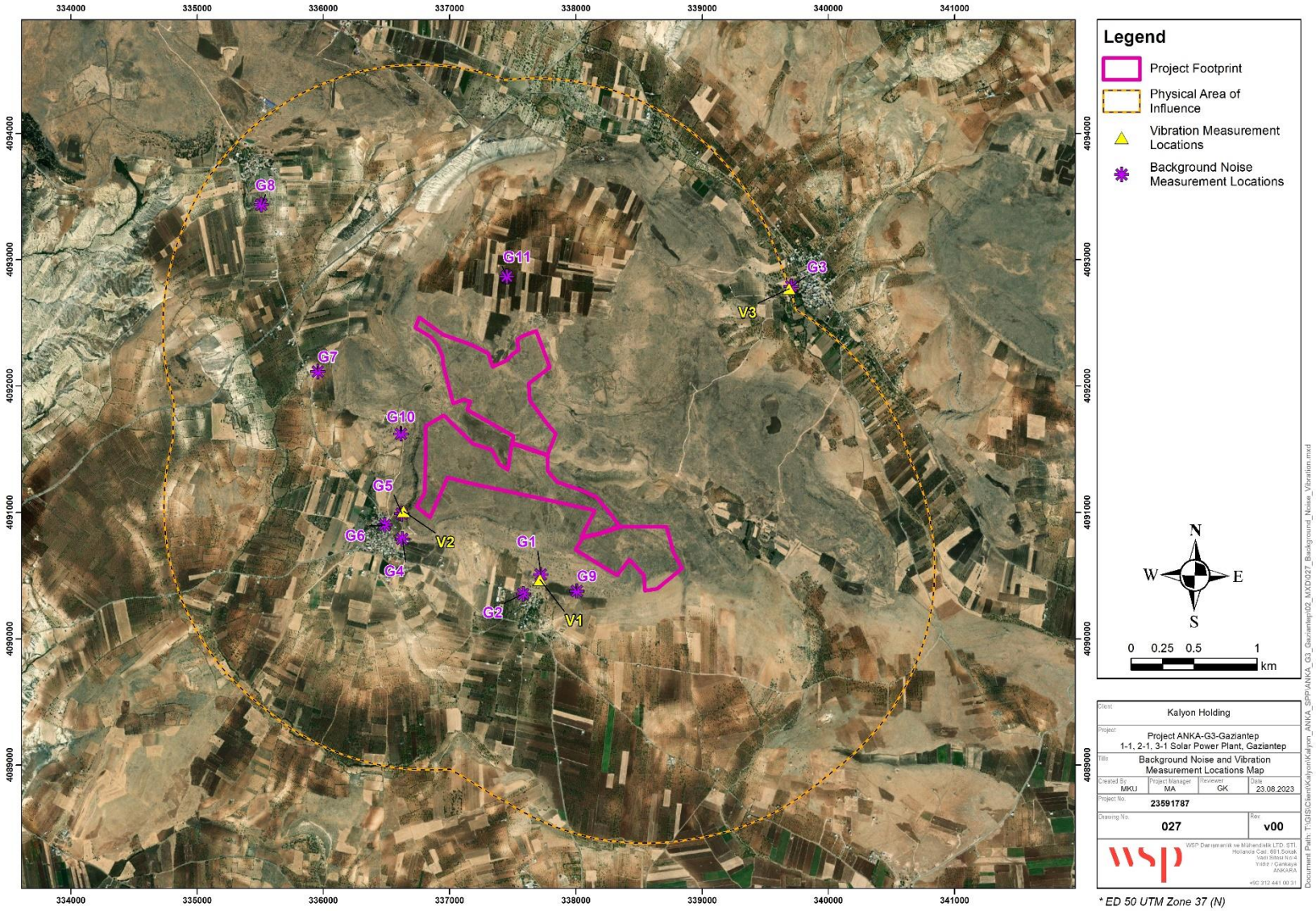


Figure 6-11: Map Showing Background Noise and Baseline Vibration Measurement Points

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 6-17. The results do not exceed Turkish Legislation and IFC Guideline Limits. As can be seen from the Table 6-18, baseline vibration measurements are well below the regulatory limits. It should be noted that, during baseline studies, Material transportation and construction of the Energy Transmission Line close to the Project site was ongoing by TEİAŞ.

Table 6-17: 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	5-6.05.2023	39.8	38.3	36.1	39.1	37.1
	6-7.05.2023	40.4	39.3	37.7	39.5	37.9
	Average	**40.1**	**38.8**	**36.9**	**39.3**	**37.5**
N-2	5-6.05.2023	44.7	41.9	38.1	43.9	38.9
	6-7.05.2023	45.5	39.7	39.7	40.7	40.1
	Average	**45.1**	**40.8**	**38.9**	**42.3**	**39.5**
N-3	5-6.05.2023	46.5	40.9	38.5	46.0	39.1
	6-7.05.2023	45.7	39.1	36.9	45.8	37.9
	Average	**46.1**	**40.0**	**37.7**	**45.9**	**38.5**
N-4	5-6.05.2023	44.1	36.9	36.1	43.8	35.1
	6-7.05.2023	47.7	40.3	35.5	45.8	36.5
	Average	**45.9**	**38.6**	**35.8**	**44.8**	**35.8**
N-5	5-6.05.2023	41.7	34.1	32.2	42.2	33.1
	6-7.05.2023	43.3	35.5	32.6	40.4	32.5
	Average	**42.5**	**34.8**	**32.4**	**41.3**	**32.8**
N-6	5-6.05.2023	41.7	35.5	33.1	40.2	31.9
	6-7.05.2023	43.9	36.5	32.7	42.2	33.9
	Average	**42.8**	**36.0**	**32.9**	**41.2**	**32.9**
N-7	7-8.05.2023	41.2	35.1	34.3	39.3	33.9
	8-9.05.2023	42.8	38.1	34.5	40.7	35.9
	Average	**42.0**	**36.6**	**34.4**	**40.0**	**34.9**
N-8	7-8.05.2023	45.7	38.4	34.4	43.4	38.6
	8-9.05.2023	43.5	34.8	33.4	43.8	35.6

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)
	Average	**44.6**	**36.6**	**33.9**	**43.6**	**37.1**
N-9	7-8.05.2023	42.9	40.1	38.3	41.5	39.2
	8-9.05.2023	40.7	39.1	37.1	39.9	38.0
	Average	**41.8**	**39.6**	**37.7**	**40.7**	**38.6**
N-10	7-8.05.2023	41.3	35.9	32.9	40.9	33.1
	8-9.05.2023	42.1	35.3	31.9	39.9	31.1
	Average	**41.7**	**35.6**	**32.4**	**40.4**	**32.1**
N-11	7-8.05.2023	40.1	32.7	29.1	37.5	28.5
	8-9.05.2023	38.5	33.5	29.7	36.9	30.1
	Average	**39.3**	**33.1**	**29.4**	**37.2**	**29.3**
Limit Values	-	65	55	45	55	45

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

Table 6-18: Vibration Measurement Results

Sampling Point	Sampling Date	Vibration Measurement Results (mm/s)		
		X direction	Y direction	Z direction
V-1	5.05.2023	0.108	0.934	0.509
V-2	5.05.2023	0.100	1.140	0.679
V-3	5.05.2023	0.096	0.598	0.204
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
Baseline 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	Primary and secondary data	Medium

Sensitivity features	Supported by	Sensitivity value
Other ongoing projects (under construction) around the Project site.		

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 Gaziantep SPP (July 2022)
	Secondary Sources: ■ Academic Journals, Grey Literature and Government Agency Reports & Databases. ■ National EIA Report dated December 2022

6.1.5.1 Geomorphology and Geology

The Project Site is located southeastern of Şahinbey where the topography is hilly and undulating. On the south of the Project Site, there are Amanos Mountains which is also the border between Hatay, Osmaniye and Gaziantep provinces. The elevation above the sea level rises up to 1527 m around this region. The Nur Mountains begins in Syria and extend northward to the border of Kahramanmaraş. In addition, the other mountainous parts lie along Kahramanmaraş and Adıyaman until the Euphrates River in the east. In the region between the Nur Mountains and Ayntab, low-lying areas are predominant. The main peaks in this region are Dormik Mountain (1250m), İlkikiz Mountain (1200m), Kas Mountain (1250m), Sarıkaya Mountain (1250m) and Gülecik Mountain (1400m) from south to north. In the eastern part, along the Karasu and Merzimen Streams, which discharge from these mountains and flow into the Euphrates River, the valley floor and foothill areas stand out. In addition to the corrugated lands in the remaining south and southeast of Gaziantep province, there are flat and low-tilted areas known as the Barak plain, with the Euphrates River in the east and the Syrian border in the south.

6.1.5.1.1 Stratigraphy

The units surfaced in and around Gaziantep can be classified into four groups. Their ages are between the Eocene and Quaternary (see Figure 6-12).

Aslansuyu Formation (Ta)

This Eocene-aged unit starts with clayey-pebble limestones which are grey-beige, medium-thick-bedded, cherty and pebbly, followed by beige-whitish grey, medium-thick-bedded, chalky limestones with abundant microfauna and yellow-black chert bands. The uppermost level of this unit consists of white, thick and loose chalk and was deposited in the basin margin and deep shelf margin microfacies. It has a thickness between 100 and 500 metres.

Gaziantep Formation (Tmga)

The unit consists of clayey limestone and chalk. The Formation's typical outcrops are observed and described in Gaziantep Province. This formation, which consists of clayey limestone, chalky limestone and limestone, is observed as clayey limestone and chalky limestone showing soft topography. In some places, thick-bedded limestones are seen instead of these clayey and chalky limestones. The clayey limestones are whitish, grey, cream, dirty yellow; loose; thin- to medium-bedded and sometimes marl interbedded with very little chert and chalky levels.

Gaziantep Formation shows lateral and vertical facies changes. As it moves from south to north, the depositional environment changes from a deep-water environment to a turbulent shallow water environment.

The unit is Upper Eocene - Lower Oligocene aged.

Fırat (Euphrates) Formation (Tmf)

The Euphrates Formation is frequently observed especially along the highway routes from Gaziantep to Kahramanmaraş, Yavuzeli, Şanlıurfa and Kilis.

The unit consists of reefal limestones in places. The formation starts at the bottom with cream, whitish, dirty yellow, medium-thickly stratified and sometimes unstratified limestone, which is overlain by dirty yellow, medium-thickly stratified limestone with abundant chert punch and abundant fossil inclusions. The uppermost part consists of whitish, cream and dirty yellow coloured, thick-very thick-bedded bioclastic limestones with few chert nodules, abundant echinites, ostrea, gastropods and lamellae. The limestones are generally fractured and the fractures are filled with calcite. The limestones forming the formation are observed with the same characteristics everywhere without showing a lateral and vertical facies change.

Fırat Formation was deposited in the Lower Oligocene - Lower Miocene ages.

Yavuzeli Basalt (Ty)

Upper-Miocene aged Yavuzeli formation consists of basalt lava, which is reddish, dark brown, dark grey and blackish coloured, unlayered, sometimes very thick layered, porous, calcite filled between the pores and generally formed from a lava flow. Although it is generally widely surfaced, it presents very small thicknesses, varying between 0 - 50 m. Although Yavuzeli basalt shows a monotonous characteristic, in very few places agglomerates and tuff can be observed.

Alluvium (Qal)

The Quaternary Alluvium are generally found in old riverbeds and on plains surrounded by high hills. These surface deposits consisting of unconsolidated gravel, sand and mud are used for agriculture or as sand and gravel deposits.

According to the 1/25.000 scale geological map, the study area consists of Upper-Miocene-aged Yavuzeli Basalts. The 1/25.000 scale geological map showing the project area and its vicinity is given in Figure 6-14.

A Geotechnical Report for the Project was prepared in October 2022. To determine the properties of the subsurface soils, 20 boreholes were drilled to a depth of 8 m. RQD values indicate that most of the rock units are Very Weak to Weak in strength. Medium to good-quality rocks were encountered in places. Uniaxial strength tests show that rocks are mostly very low strength. The local soil class is ZC (very compact sand, gravel and hard clay layers or weathered, highly fractured weak rocks) in weathered basalt, while it is ZB (poorly weathered, moderately consolidated rocks) in massive units.

PERIOD	EPOCH		FORMATION		LITHOLOGY	EXPLANATION
QUATERNARY			ALLUVIUM	Qa		Sand, silt, clay
						Unconformity
TERTIARY	MIOCENE	Upper	YAVUZELİ	Ty		Reddish, dark brown, dark grey and blackish, unlayered, sometimes very thick layered, porous basalt
						Unconformity
		Lower	FIRAT (EUPHRATES)	Tmf		Alternation of cream, whitish, dirty yellow, medium-thickly stratified and sometimes unstratified reefal limestone and dirty yellow, medium-thickly stratified limestone with abundant chert punch and abundant fossil inclusions
	OLIGOCENE	Middle				
		Lower	GAZİANTEP	Tmga		Whitish, grey, cream, dirty yellow clayey limestone; loose; thin- to medium-bedded and sometimes marl interbedded with very little chert and chalky levels
	EOCENE	Upper				
		Middle	ASLANSUYU	Ta		Starts with gravelly clayey limestone on the bottom, then continues with chalky limestone including chert levels
		Lower				

Figure 6-12: Stratigraphy of the Project Area

Structural Geology and Tectonism

The African Plate has been constantly moving northwards due to the mobility of the divergent plate boundaries on the surrounding mid-ocean ridges. Due to the Red Sea Rift, the Arabian Plate moved even faster and shifted northwards. As a result of the north-south convergence of the African-Arabian and Eurasian plates, the Tethys Sea, which is considered to be the ancient ancestor of the Mediterranean Sea, was closed in the Lower-Middle Maastrichtian, followed by the collision of the Arabian and Eurasian plates along the Bitlis-Zagros Fond and Thrust Belt (BZKK) or the South-eastern Anatolian Thrust in the Tortonian (about 10 million years ago)[1]. From this period until the Pliocene (2-5 million years ago), north-south compressions were met by naps and folds with axis orientations approximately east-west and parallel to the BZKK.

In the Late Pliocene, these stresses could not be met by thrust faults and folds and lateral thrust faults became dominant[2]. Meanwhile, the North Anatolian Fault Zone (NAFZ) and the East Anatolian Fault Zone (EAFZ) formed and the Anatolian Block started moving westwards along these fault zones. During this movement, right-lateral strike along the NAFZ and left-lateral strike along the EAFZ occurred in accordance with strike-slip fault modelling.

The tectonic features of Gaziantep and its region reflect the tectonic features of the South-eastern Anatolia Region in general. It can be analysed in three phases.

Upper Cretaceous (Pre-Upper Maastrichtian) Tectonics:

This tectonics is not observed in Gaziantep region. It is the first tectonic regime that can be observed regionally and generally reverse faults and occasional strike-slip faults were formed.

Middle Miocene Tectonics:

In the Middle Miocene, it created large faults (especially reverse faults and strike-slip faults, and sometimes normal strike-slip faults) and folds in the rocks deposited between Upper Maastrichtian and Lower Miocene. The directions of these tectonic lines are East-West, Northeast-Southwest.

Today's Tectonics:

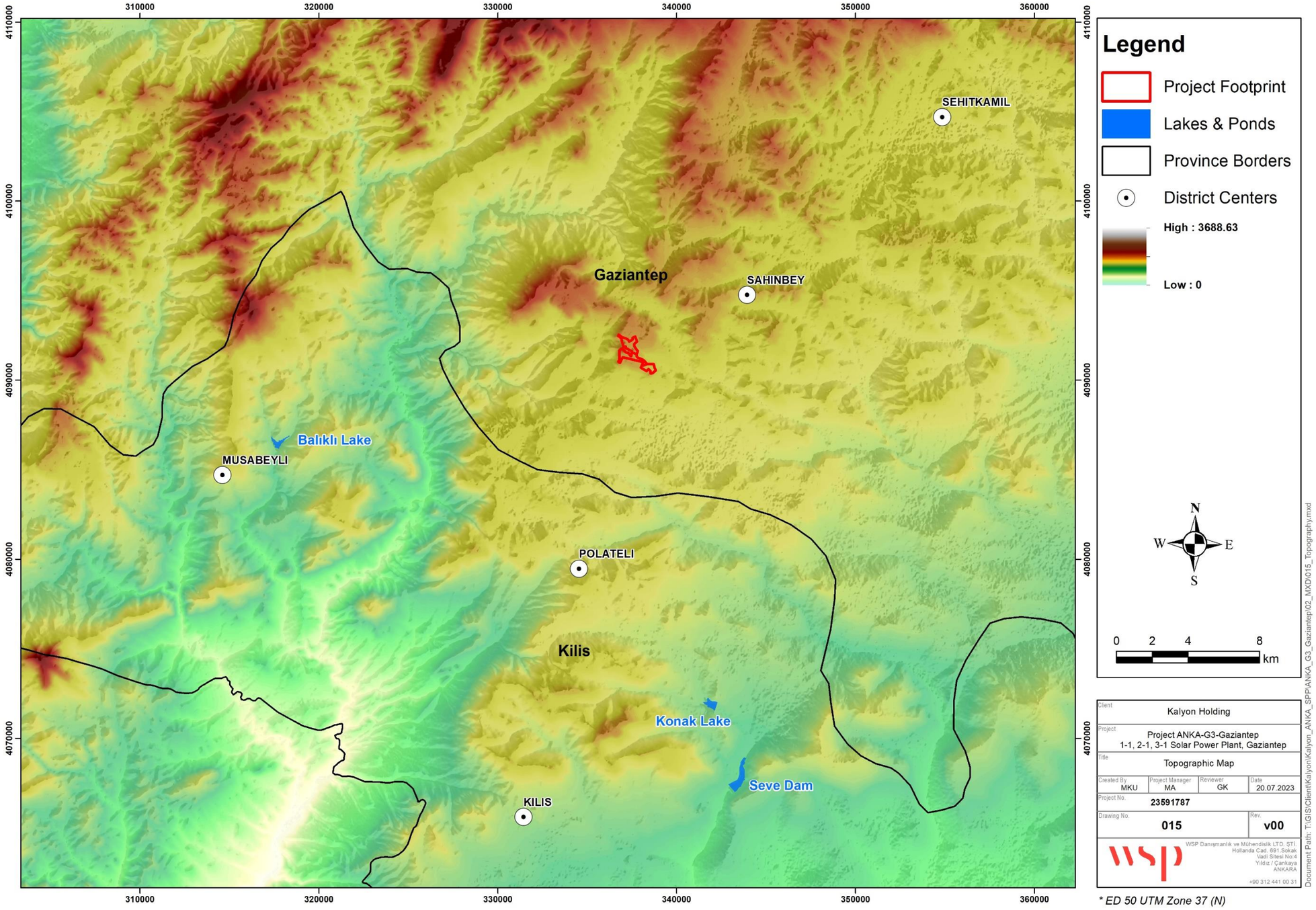
The Eastern Anatolian Fault (EAF), which is one of the most important lines of Türkiye and passes through the northwest of Gaziantep and the Ölüdeniz Rift passing through the west of Gaziantep, continue their activities from time to time today. The effects (earthquakes) of this fault system, which continues its activity, were seriously felt in the earthquakes that occurred in Gaziantep on February 6, 2023.

The study area is located 25.33 km from the fault where the earthquake that occurred on 6 February 2023 at 04.17 with a magnitude of 7.8 Mw was recorded by the USGS (see Figure 6-15).

Topographic Map, Geological Map and Fault Map showing the Project Site and its surroundings are given in Figure 6-13, Figure 6-14, Figure 6-15 respectively.

[1] Şengör, A. M. C., 1980. Fundamentals of the Turkish Neotectonism, TJK.

[2] Herece, E., Akay, E., 1992. East Anatolian Fault between Karlıova and Çelikhan, Türkiye 9th Petroleum Congress, 361-372.



** ED 50 UTM Zone 37 (N)*

Figure 6-13: Topographic Map Showing the Project Site

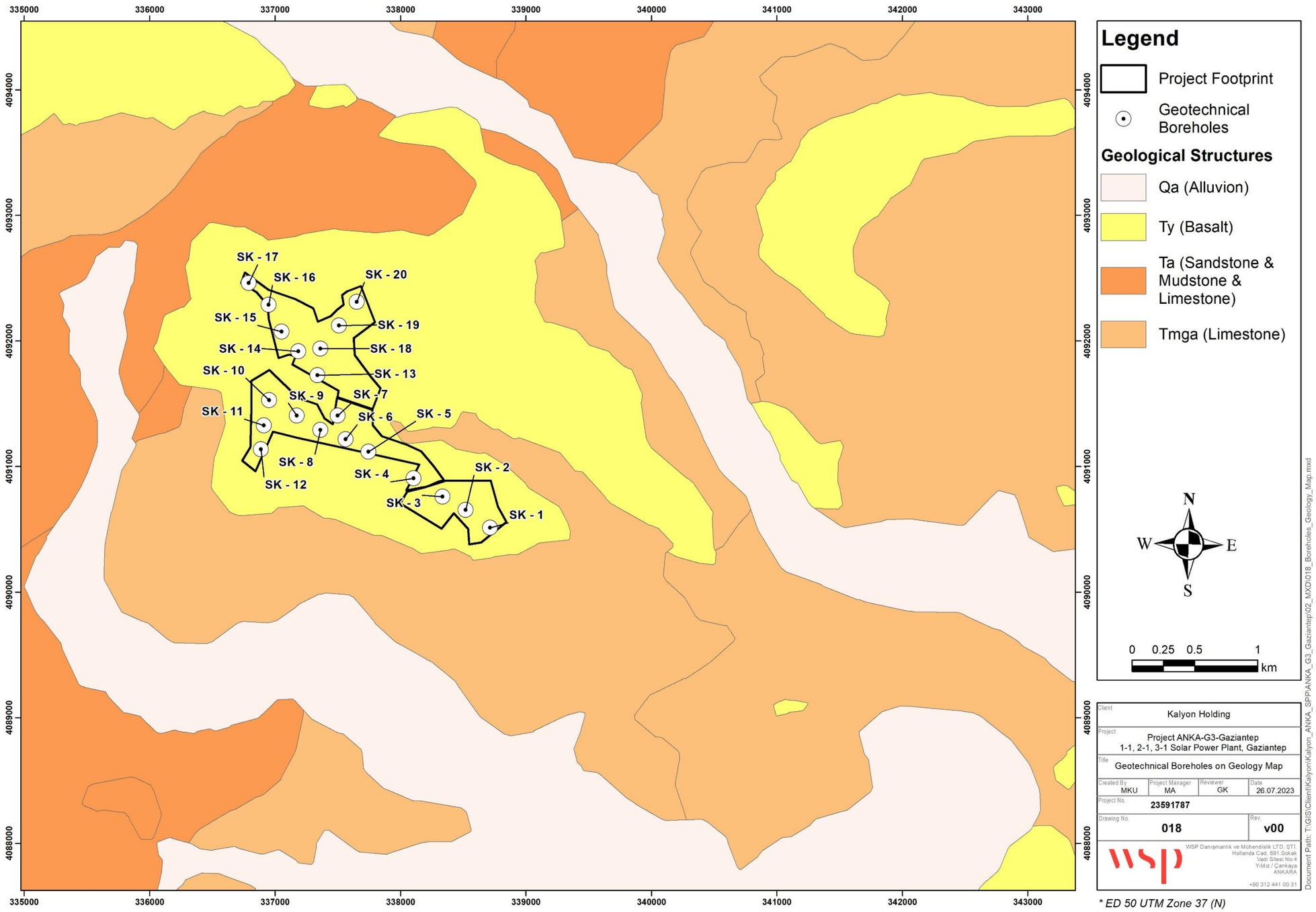


Figure 6-14: 1/25.000 Scale Geological Map of the Regional Study Area (Source: Gaziantep Sheet, MTA)

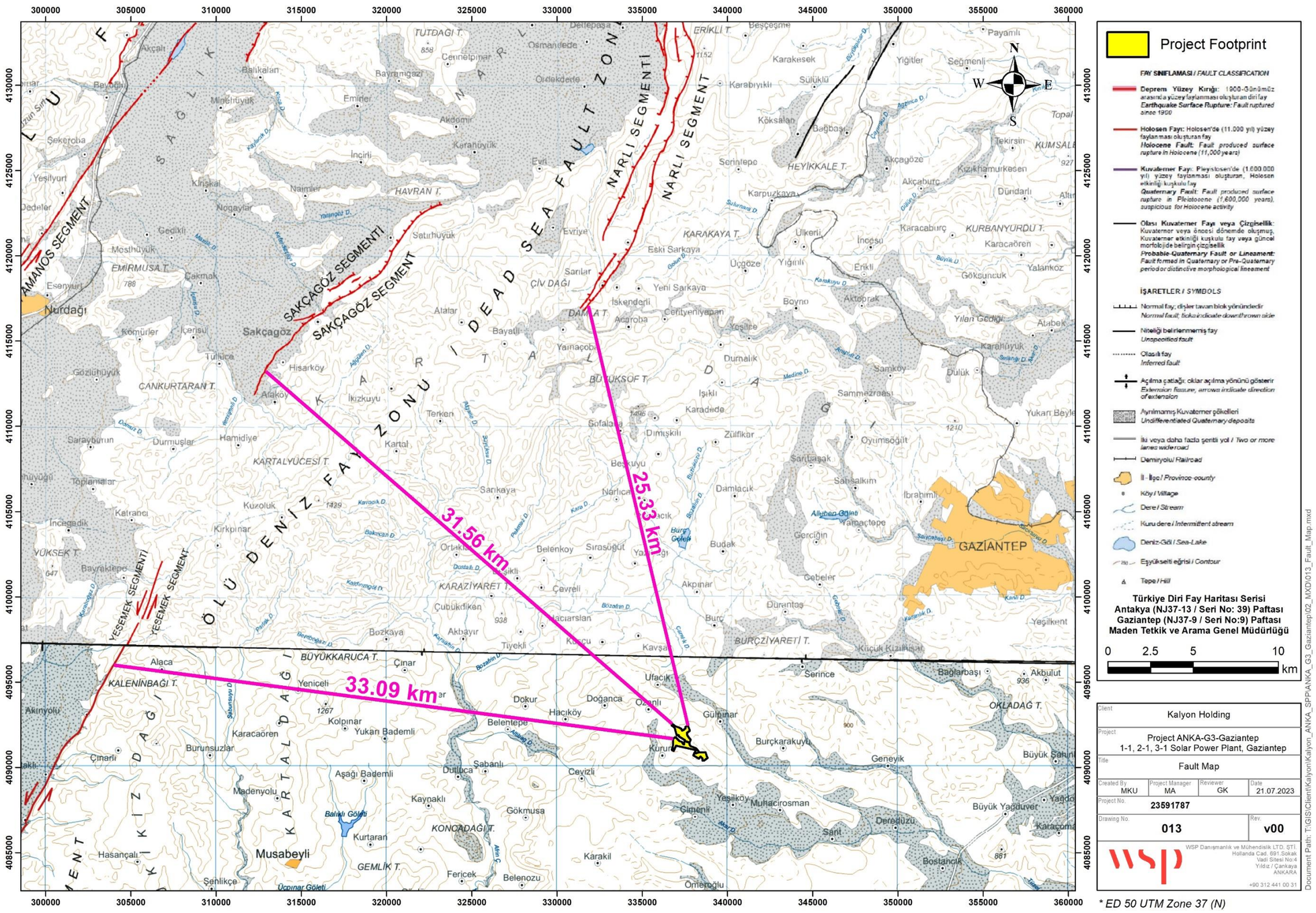


Figure 6-15: 1/250.000 Scale Active Fault Map of the Regional Study Area (Source: Hatay-Gaziantep Sheets, MTA)

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 6-16 shows the Project Site on Türkiye Earthquake Hazard Map developed by the Disaster and Emergency Management Authority (AFAD, 2018). According to this map considering the latest earthquake source parameters, earthquake catalogues and new generation mathematical models, the 475-year return period Peak Ground Acceleration (PGA) was calculated as 0.225 g.

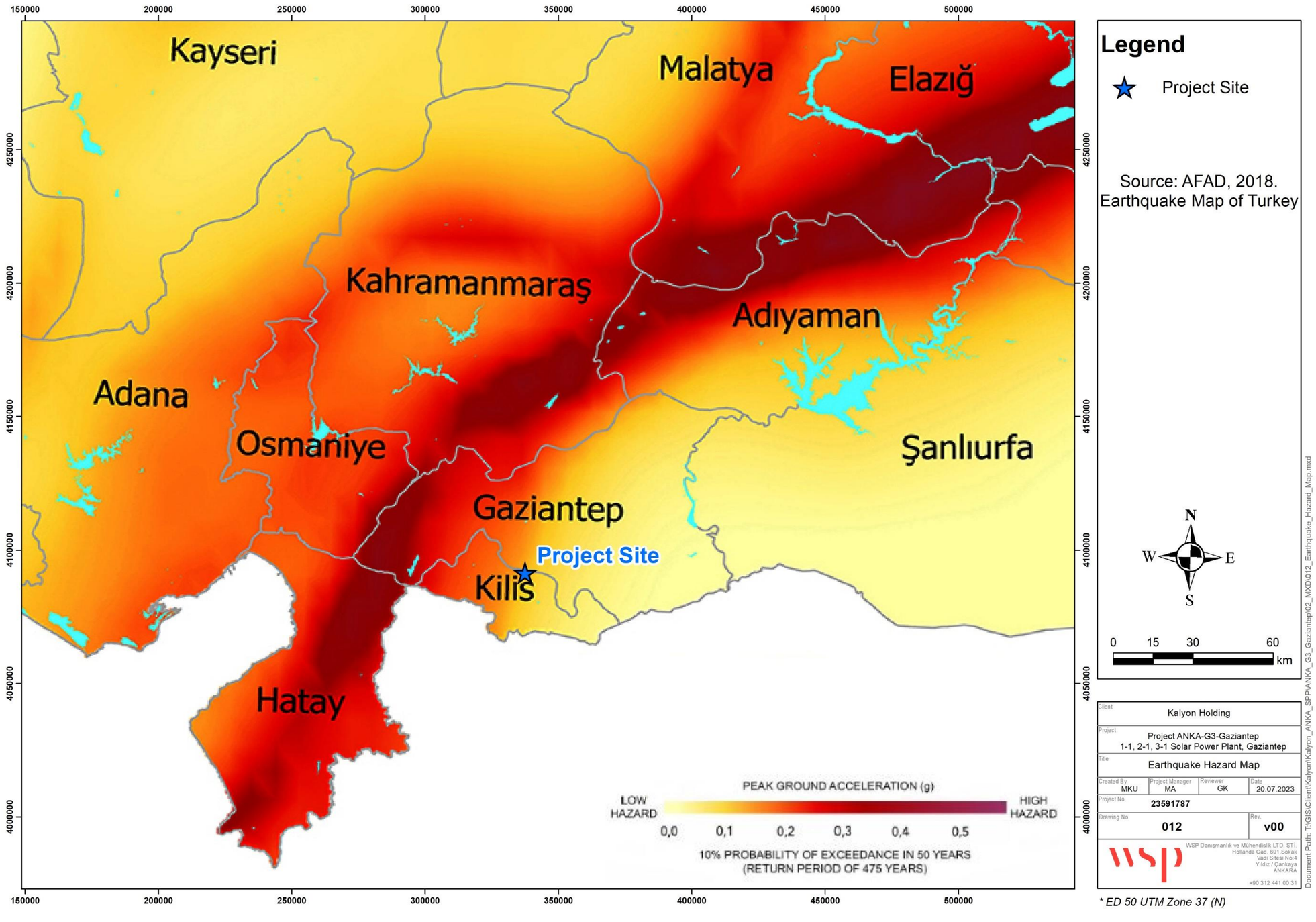


Figure 6-16: Location of the Project Site on the Earthquake Hazard Map

Sensitivity Assessment

Sensitivity Features	Supported by	Sensitivity Value
Geology, Geomorphology and Seismicity	Primary Data and Secondary Data	Medium-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 May 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 Basaltic Soils (see Figure 6-17). The main soil properties of the region are given as follows:

- Large Soil Group: Basaltic Soils
- Combination of Soil Properties: Lithosolic and Slope, 2-6% inclined
- Composition: Basaltic Soil
- Current Land Use: Pasture
- Land Use Ability: VII. Class (Land Cultivated arable land)
- Subclass: Soil insufficiency (stony, salinity and alkalinity) – Slope and erosion damage

Within the scope of the CORINE project, prepared and put into use by the Ministry of Agriculture and Forestry, according to CORINE 2018, the Project area is located on a land principally occupied by agriculture, with significant areas of natural vegetation and natural grasslands. The CORINE 2018 data around the Project area is given in Table 6-19.

Table 6-19: CORINE 2018 Land Cover

CODE	NAMES	Area (ha)	% Area Related to Gaziantep
211	Non-irrigated arable land	0.12	0.10
243	Land principally occupied by agriculture, with significant areas of natural vegetation	68.45	55.64
321	Natural grasslands	53.60	43.57
333	Sparsely vegetated areas	0.85	0.69

CORINE 2018 Map is presented in Figure 6-18.

Basaltic Soils

Basaltic Soils are heavy clay, dark colored soils and their profiles are not well developed. Lime is mostly not found in these soils. The soil reaction ranges from neutral to moderately alkaline. Soils are relatively poor in organic matter. Because of their poor physical properties, their productivity is often low. VII Class Lands are very inclined, eroded, stony and faulty and includes outcrop, dry, swampy or some other unsuitable soils (see Figure 6-17).

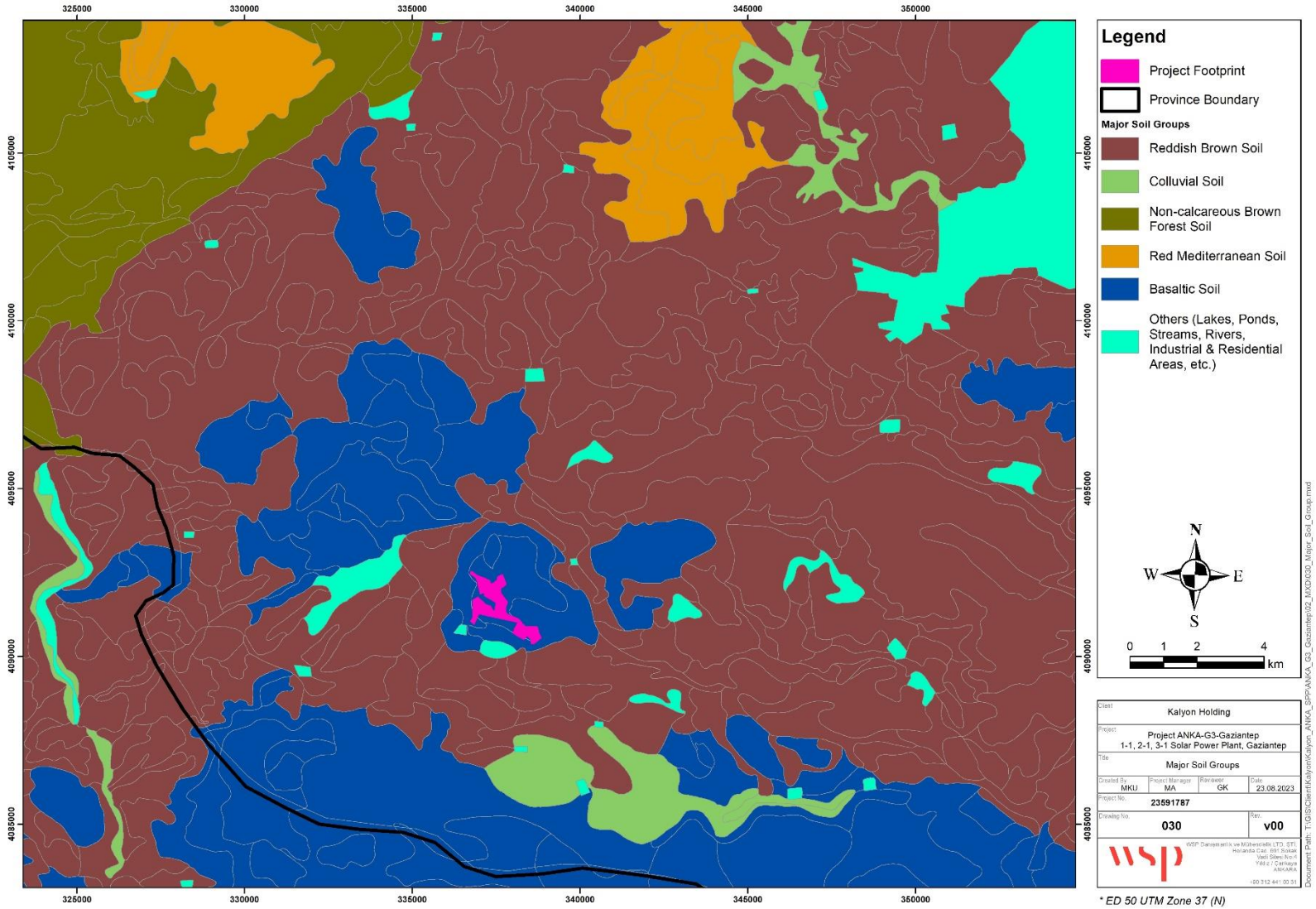


Figure 6-17: Map showing Major Soil Groups around the Project Area

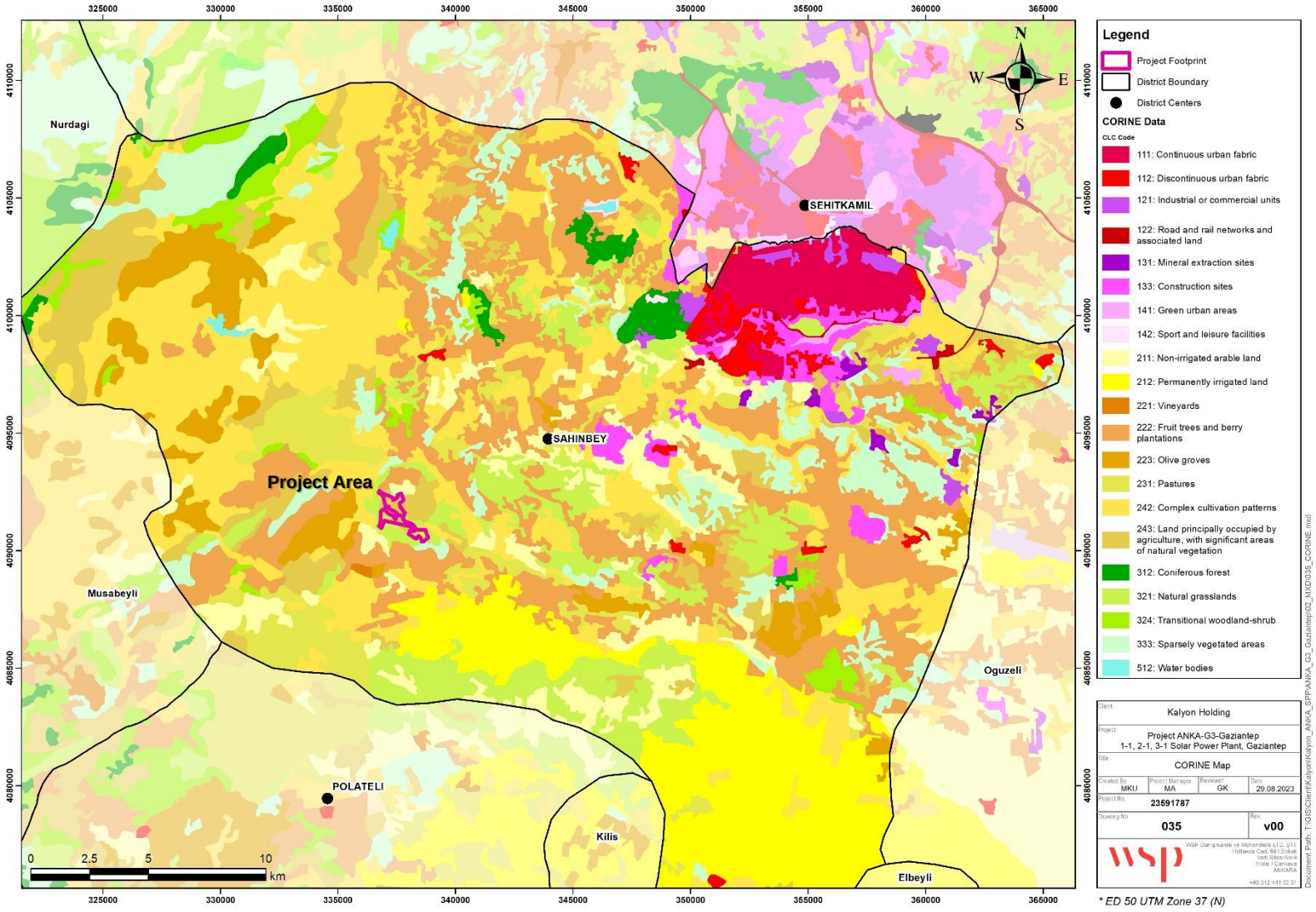


Figure 6-18: CORINE 2018 Map

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, 8 soil samples were taken in May 2023 (see Table 6-20). Based on the current and future activities of the site, the parameters presented in Table 6-21 should be analyzed in soil and samples as required by the Turkish Soil Pollution Control and Sites Polluted by Point Source Contamination Regulation.

Table 6-20: Baseline Soil Sampling Coordinates and Periods

Points	Coordinates (UTM Projection System)		Measurement Period and Date
	East	North	
Baseline Soil-1	338168°	4090130°	02.05.2023
Baseline Soil -2	339053°	4090673°	02.05.2023
Baseline Soil -3	339050°	4090022°	02.05.2023
Baseline Soil -4	337430°	4090513°	02.05.2023
Baseline Soil -5	337284°	4091439°	02.05.2023
Baseline Soil -6	337289°	4092189°	02.05.2023
Baseline Soil -7	336799°	4090553°	02.05.2023
Baseline Soil -8	336477°	4092518°	02.05.2023

Table 6-21: 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 6-19 and the measurement results of the parameters are presented in following tables.

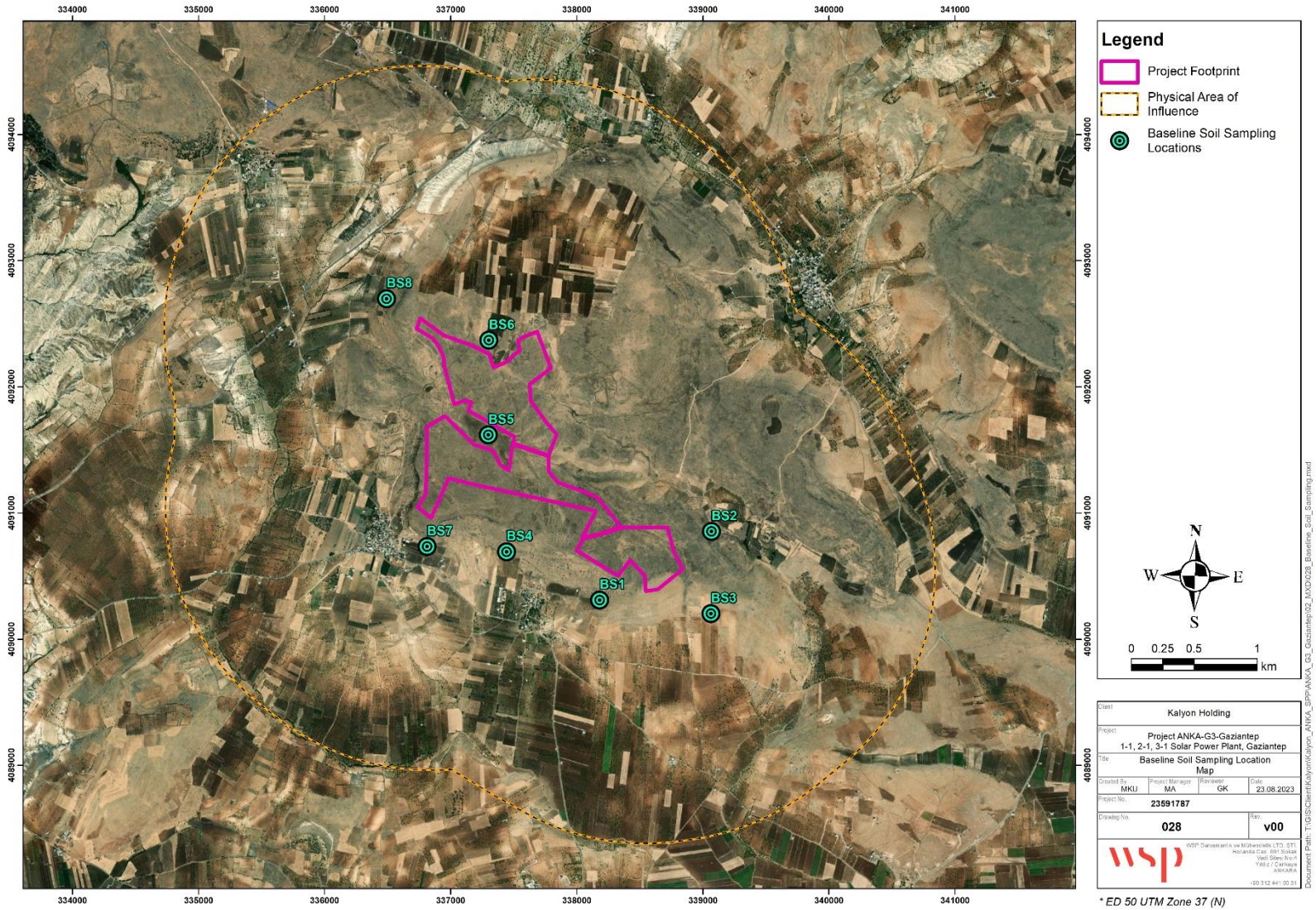


Figure 6-19: Map Showing Baseline Soil Sampling Points

Table 6-22: 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)	Soil-1	Soil-2	Soil-3	Soil-4	Soil-5	Soil-6	Soil-7	Soil-8
TOX (mg/kg)	-	-	10.5	19.2	28.1	43.5	39.1	18.2	25.4	48.2
TPH (mg/kg)	-	-	<100	<100	<100	<100	<100	<100	<100	<100
Arsenic (mg/kg)	0.4	471	3.05	4.08	14	7.23	3.36	9.26	3.06	5.72
Boron (mg/kg)	-	-	<2,5	<2,5	11.2	<2,5	10.8	24.2	24.5	10.4
Barium (mg/kg)	15643	433702	187.8	150.8	146.8	174.3	548.3	276.3	182.2	249.2
Cadmium (mg/kg)	70	1124	0.162	0.23	0.319	0.242	0.235	0.771	0.186	0.247
Chromium (mg/kg)	235	24	42.5	43.4	61.5	43.4	61.4	87.6	57.7	50.3
Copper (mg/kg)	3129	-	10.8	17.5	5.48	9.81	14.8	13.5	18	13
Mercury (mg/kg)	23	-	<0,1	4.85	<0,1	<0,1	<0,1	<0,1	<0,1	<0,1
Molybdenum (mg/kg)	391	-	<0,5	9.31	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5
Lead (mg/kg)	400	-	4.56	3.05	4.6	5.29	4.6	14.4	5.13	4.12
Antimony (mg/kg)	31	-	<0,2	<0,2	6.9	<0,2	<0,2	<0,2	<0,2	<0,2
Selenium (mg/kg)	391	-	0.588	0.804	0.697	<0,1	0.723	0.6	0.672	0.661
Zinc (mg/kg)	23464	-	26.5	40.9	16	25.4	22.3	34.2	29.7	22.6

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 Euphrates-Tigris Basin, which is a large river system in Western Asia that discharges into the Persian Gulf. Its principal rivers are the Tigris and Euphrates, along with smaller tributaries. The Euphrates River is the longest river in Western Asia. The river has three riparian countries, Iraq, Syria and Türkiye, and its basin is distributed among five countries with a total estimated population of 23 million (see Figure 6-20). Most of the Euphrates stream-flow originates from precipitation in the Armenian Highlands; contributions by the remaining riparian countries are generally small. In addition to some intermittent streams, the Sajur, Balikh and Khabour are the main contributors to Euphrates flow in Syria. Water use in the Euphrates Basin in Iraq, Syria and Türkiye focuses on irrigation, hydropower and drinking water supply, with agriculture consuming the largest share of water (more than 70%)[3].

Additionally, the part of the Euphrates-Tigris basin in Türkiye 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. Euphrates Subbasin is between 40°20'26'' and 43°48'10'' north latitudes and 36°39'17'' and 36°46'36'' east longitudes in South-eastern Anatolia. Its surface area is 122,010 square kilometres, which is approximately 16% of Türkiye. The basin is surrounded by Syria in the south and the Asi (Orontes), Ceyhan (Pyramus), Seyhan (Sarus), Kızılırmak (Halys), Yeşilırmak, Çoruh, Aras (Araks), Lake Van and Tigris Basins from its southwestern border (clockwise) [4].

The most important stream in this basin is the Euphrates Stream, which is the river with the highest water potential in Türkiye. It was formed by the merging of the Murat River, which originated from springs discharging at Diyadin, Ağrı, and Karasu River, which originated from springs discharging at Dumludağ, Erzurum. After passing through Erzincan, Tunceli, Elazığ, Malatya, Diyarbakır, Adıyaman and Gaziantep, it enters Syria, then Iraq. Euphrates merges with Tigris at the Shatt al-Arab, ultimately emptying into the Persian Gulf. The most significant tributaries of the Euphrates are the Murat River, Karasu River, Tohma Creek, Peri Creek, Çaltı Creek and Munzur Creek.

According to the national EIA Report of the Project, there are no streams and water resources with the natural flow in and around the Project Area and its vicinity[5]. The nearest water source is the Kuyubaşı Creek, which is 1.66 km southwest of the Project Area, and the creek named Kelpinboğazı afterwards, which is 1.79 km east of the Project Area. These two seasonal streams are tributaries of Tüzensuyu Creek.

The location map of both basins and surface water bodies is in Figure 6-21.

[3] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. Inventory of Shared Water Resources in Western Asia. Beirut.

[4] General Directorate of Water Management (2022). Flood Management Plan of Euphrates-Tigris Basin, Euphrates Subbasin. Ankara: Republic of Türkiye Ministry of Agriculture and Forestry, General Directorate of Water Management.

[5] EIA Report of the G3-Gaziantep-1-1 Solar Power Plant (26 MWp/26 MWe, 49.98 ha) Project, Gaziantep Province, Şahinbey District, Kürüm Neighbourhood.

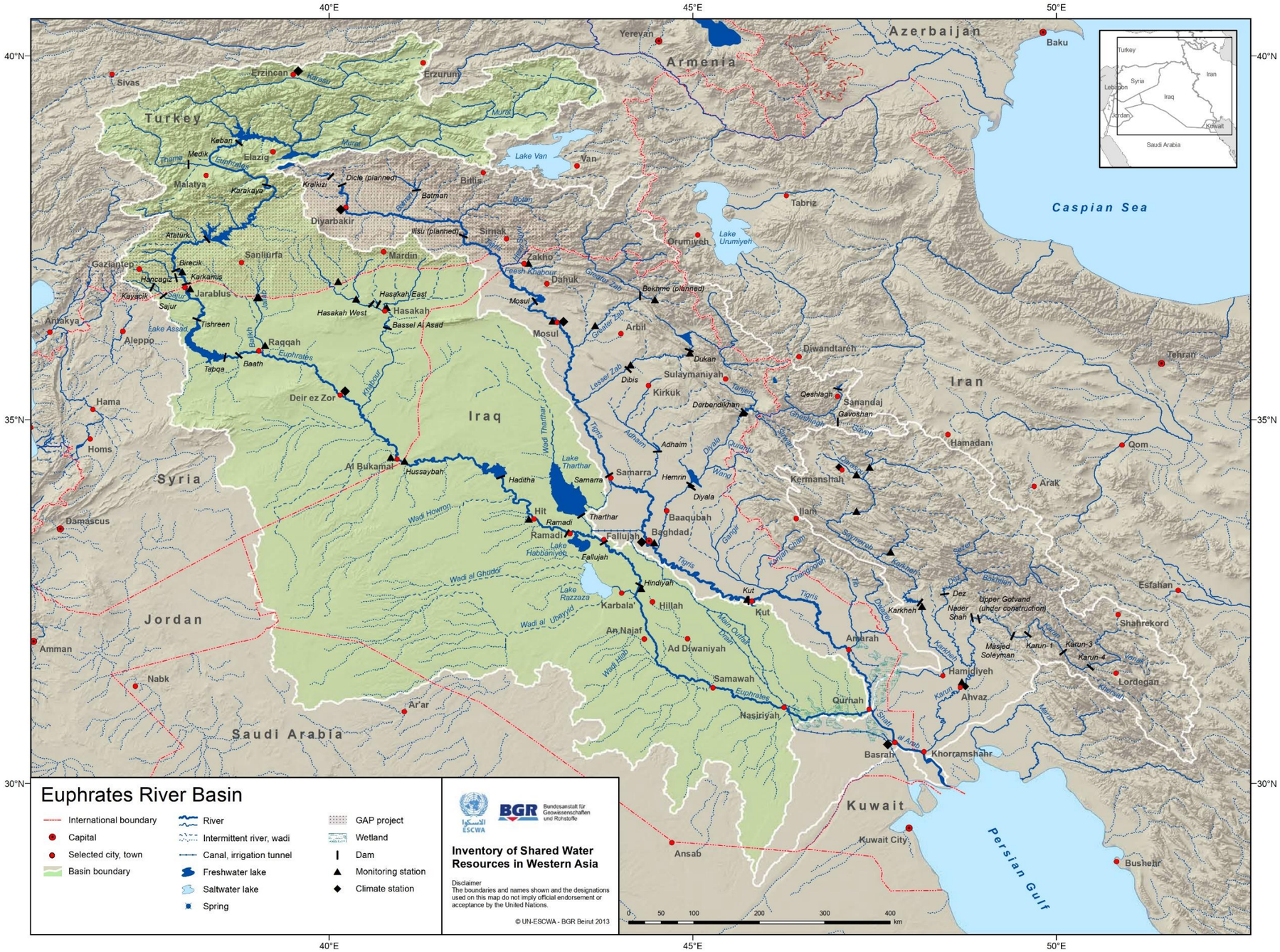


Figure 6-20: Euphrates River Basin[6]

[6] UN-ESCWA and BGR (United Nations Economic and Social Commission for Western Asia; Bundesanstalt für Geowissenschaften und Rohstoffe). 2013. Inventory of Shared Water Resources in Western Asia. Beirut.

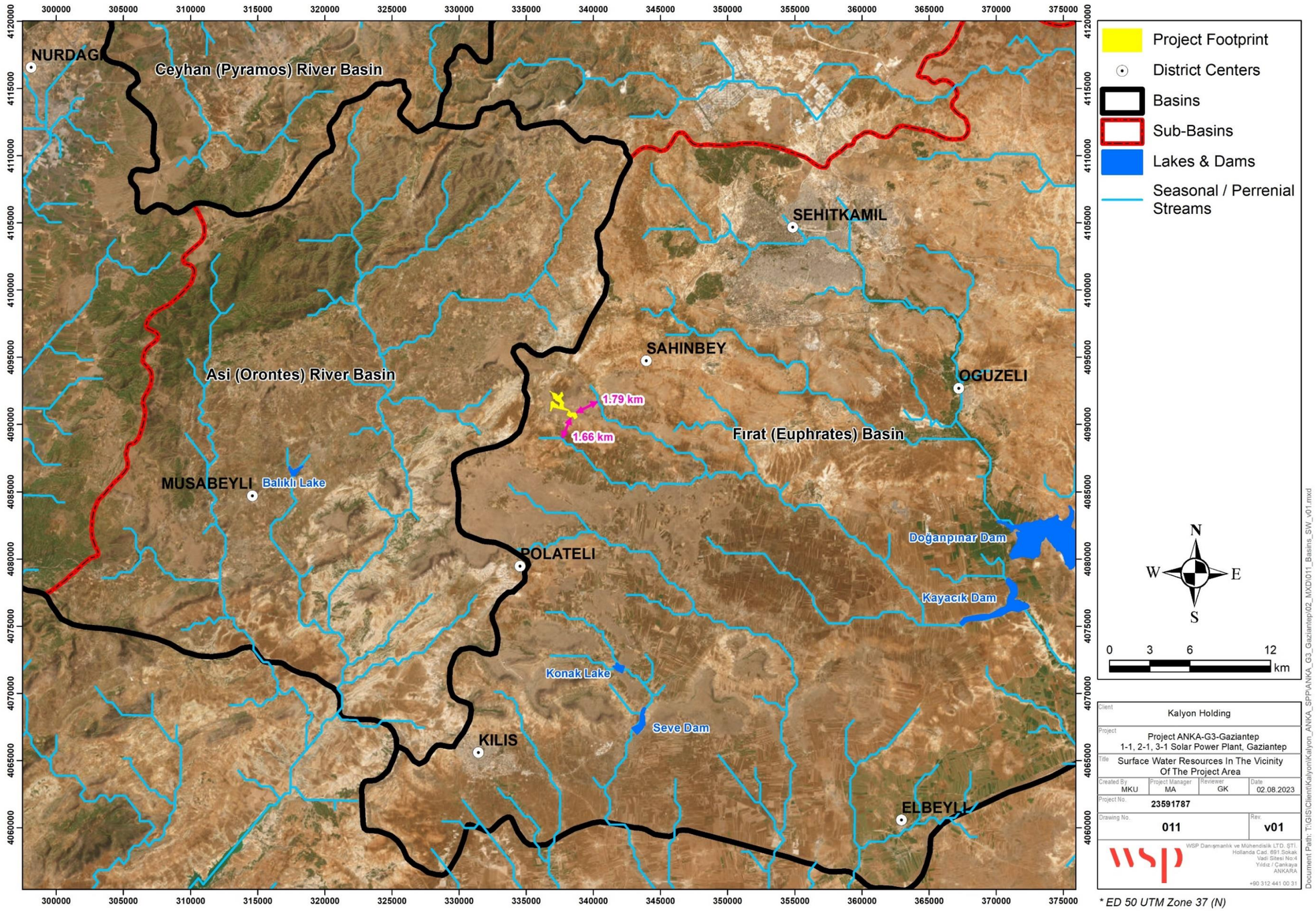


Figure 6-21: The Most Significant Surface Waters Near to the Project Area

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 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 Euphrates-Tigris Basin among these basins. According to the “Official Water Resources Statistics” published by State Hydraulic Works (SHW) in 2019, 4994.8 hm3/year of Türkiye’s total 23,032.3 hm3/year groundwater recharge comes from the Konya Closed Basin. Furthermore, 3763.7 hm3/year of Türkiye’s 17,815.3 hm3/year groundwater operating reserve comes from this basin (Table 6-23).

The geological units in the study area were examined in four different groups in terms of their physical and hydrogeological properties and water-bearing potential: porous permeable units, karstic permeable units, semi-permeable units and impermeable units. Alluviums are classified as the most efficient aquifer units because of their high specific yield even though most of them are shallow. Eocene and Miocene-aged limestone units are also defined as aquifer units since they are karstified as a result of the dissolution of limestone by rainwater after tectonic movements. Despite the fact that Miocene-Pliocene aged basalt units in the basin are generally impermeable, some of the basalts near Tüzelsuyu Creek, which is around 2 kilometres away from the Project Area, are local aquifers due to their 80-100 meters of thickness and high secondary porosity[7]. The hydrostratigraphical map of the Project Area and its vicinity according to the geological map is given in Figure 6-22.

According to the Geotechnical Report for the Project, in order to determine the vertical and horizontal distribution of the soil, 20 boreholes with a depth of 8 m were drilled and different rock mechanics tests were applied.

[7]Şener, Ş., Şener, E., & Er, A. (2021). Hydrogeochemistry and Water Quality of the Groundwaters of Gaziantep Province. Journal of Engineering Sciences and Design, 9(4), 1253-1266. doi:10.21923/jesd.927408

Although slotted PVC pipelines were installed to these wells after drilling operations were completed in order for monitoring groundwater levels, all wells were observed dry.

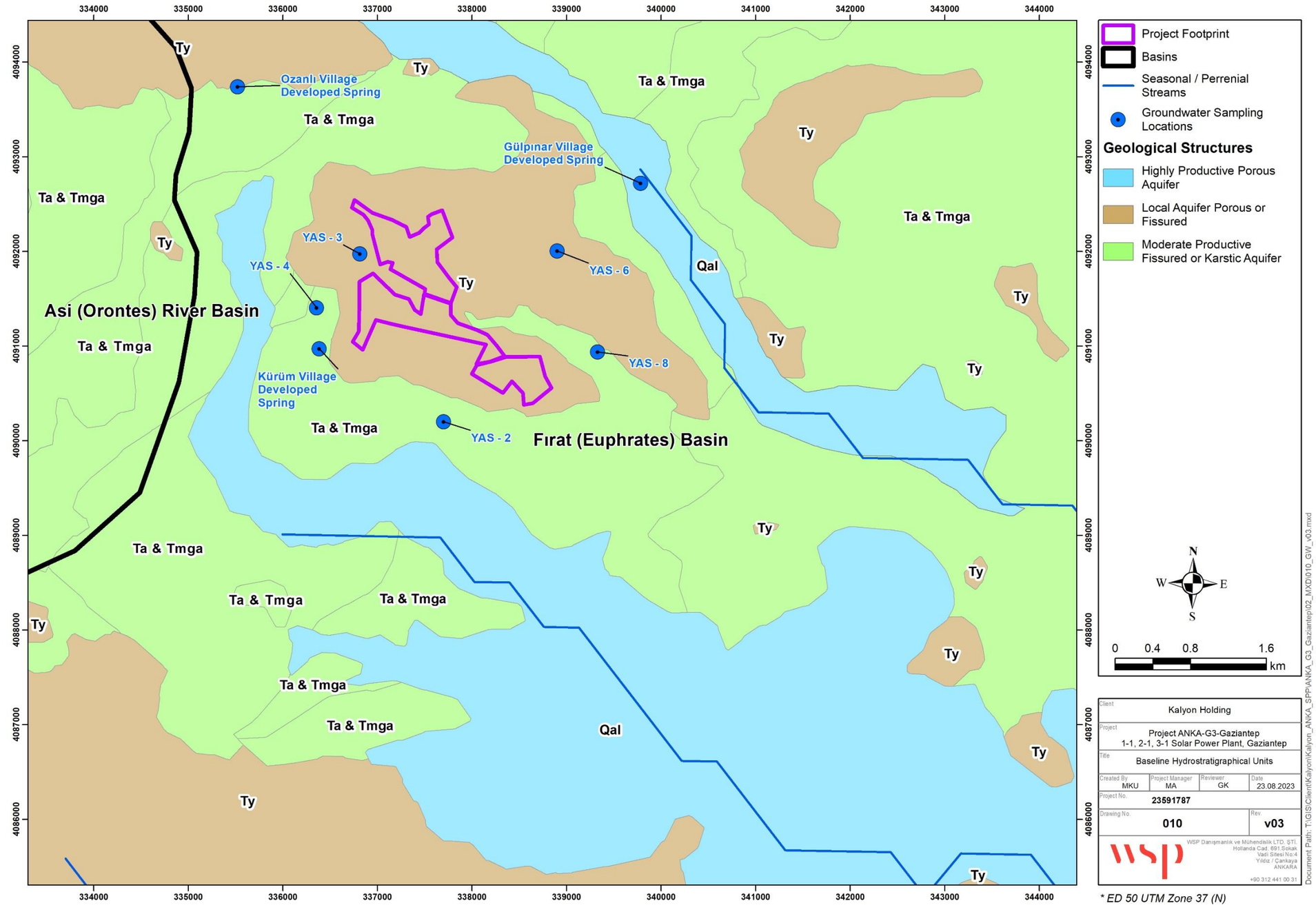
Table 6-23: Basic Information on Groundwater Basins of Türkiye

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

6.1.8.1 Baseline Groundwater Quality

For the quality of the groundwater, water samples were taken from eight (8) different locations. Five (5) of these samples are from different water wells using for domestic usage, whereas other three (3) sampling locations are fountains built for tapping springs (Figure 6-22). Monitored parameters were compared with groundwater quality standards. Laboratory analyses were conducted by TÜRKAK accredited SEGAL Laboratory. All measurements and samples were collected by trained personnel who completed the Water and Wastewater Sampling Training organized by the Ministry of Environment, Urbanization, and Climate Change.

To assess the quality of groundwater, only groundwater quality criteria are considered, since it is not used for drinking or irrigation. For this reason, as well as in-situ parameters such as electrical conductance, Dissolved Oxygen, pH, the parameters stated in “Regulation on the Protection of Groundwater against Pollution and Deterioration, issued by the Ministry of Agriculture and Ministry, which was published in the Official Gazette dated 07.04.2012 and numbered 28257 (Revised: RG-12/05/2015-29363), were monitored.



** ED 50 UTM Zone 37 (N)*

Figure 6-22: Hydrostratigraphical Map of the Project Area and Its Vicinity[8]

[8] Şener, Ş., Şener, E., & Er, A. (2021). Hydrogeochemistry and Water Quality of the Groundwaters of Gaziantep Province. Journal of Engineering Sciences and Design, 9(4), 1253-1266. doi:10.21923/jesd.927408

In-Situ Measurements

pH, Temperature, Electrical Conductivity and Dissolved Oxygen were measured by using a multiparameter water quality meter (Table 6-24). According to these measurements, the average temperature recorded was 19.0°C, with the lowest and highest values being 18.1°C and 21.6°C, respectively. pH values ranged from 7.20 to 8.64, which indicates that all waters collected were alkaline. The range of electrical conductance at 25 °C (EC_{25}) values are between 170 and 514 µS/cm, with an average of 377.2 µS/cm. Dissolved oxygen (DO) values varied between 6.50 and 9.04 mg/L.

Table 6-24: In-Situ Parameters Measured from Groundwater Monitoring Locations

Sampling Location	X (WGS84, Decimal Degrees)	Y (WGS84, Decimal Degrees)	Temperature (°C)	pH	Electrical Conductance @ 25 °C (µS/cm)	Salinity ‰	Dissolved Oxygen (mg/L)	Oxygen Saturation %
YAS-2	36.9423	37.1772	18.1	7.20	448	0.22	8.24	91.5
YAS-3	36.9581	37.1669	19.1	8.64	170	0.08	9.04	98.7
YAS-4	36.9529	37.1619	18.4	7.36	460	0.20	6.50	74
YAS-6	36.9587	37.1903	21.6	8.10	306	0.15	7.81	97.3
YAS-8	36.9492	37.1954	19.2	7.45	352	0.17	7.69	95.3
Ozanlı Village Developed Spring	36.9738	37.1520	18.6	7.40	286	0.14	7.2	86.4
Kürüm Village Developed Spring	36.9490	37.1623	18.2	6.90	514	0.25	7.83	97.1
Gülpınar Village Developed Spring	36.9653	37.2001	18.8	6.91	482	0.23	7.79	96.5

Water Quality

The quality of the groundwater was determined by considering whether the measured values of the specified parameters exceed the quality standards. Within the scope of this study, groundwater quality standards were used to examine the groundwater quality.

- For the quality standards,
  - "Regulation on the Protection of Groundwater against Pollution and Deterioration" (herein after referred as "Groundwater Protection Regulation, GPR") issued by the Ministry of Forestry and Water Affairs, which was published in the Official Gazette dated 07.04.2012 and numbered 28257 (Revised: RG-12/05/2015-29363)
  - Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the Protection of Groundwater Against Pollution and Deterioration

The Groundwater Protection Regulation states that the number and the types of parameters, and the threshold value to be determined for each parameter, will predicate on the groundwater body itself, taking into account the specific conditions that prevail at each groundwater body. According to the regulation, the groundwater quality standards and the threshold values, which indicate that the groundwater is in good status, are determined by the General Directorate of Water Management.

The analysis results of the list of minimum parameters to be taken into consideration are presented in Table 6-25

Table 6-25: Parameters Measured According to the Groundwater Protection Regulation

Parameter	Unit	YAS-2	YAS-3	YAS-4	YAS-6	YAS-8	Ozanlı Village Developed Spring	Kürüm Village Developed Spring	Gülpınar Village Developed Spring
Ammonium	mg/l	<0.026	0.041	<0.026	<0.026	<0.026	<0.026	<0.026	<0.026
Arsenic	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Cadmium	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chloride	mg/l	7.51	2.03	5.72	5.81	5	3.5	13.32	4.98
Electrical Conductance at 20°C (EC_{20})	µS/cm	407.27	154.55	418.18	278.18	320	260	467.27	438.18
Lead	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Mercury	µg/L	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate (as NO_3^-)	mg/l	10.9	<0.44	7.35	6	6.05	10.8	42.6	8.59
Sulphate	mg/l	21.39	10.06	9.21	12.87	10.74	12.94	24.31	12.78
Tetrachloroethylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Total Phosphorus (mg P/L)	mg/L	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31	<0.31
Trichloroethylene	µg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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 can be reached by connecting the Gaziantep Ring Road (O-54) to Şahinbey District, Burç and Kürüm neighborhood roads. Kürüm road is approximately 1.1 km far from the project area. In addition, road improvement works will be carried out for access to the project area. Information about the distance to the highways around the Project Area is given in Table 6-26 and Figure 6-23.

Table 6-26: Highways around the Project Area

Name of the Highway	Direction	Distance to the Project Area (km)
Gaziantep Ring Road (O-54)	NW	14
Gaziantep-Kilis Road (D850)	SW	16

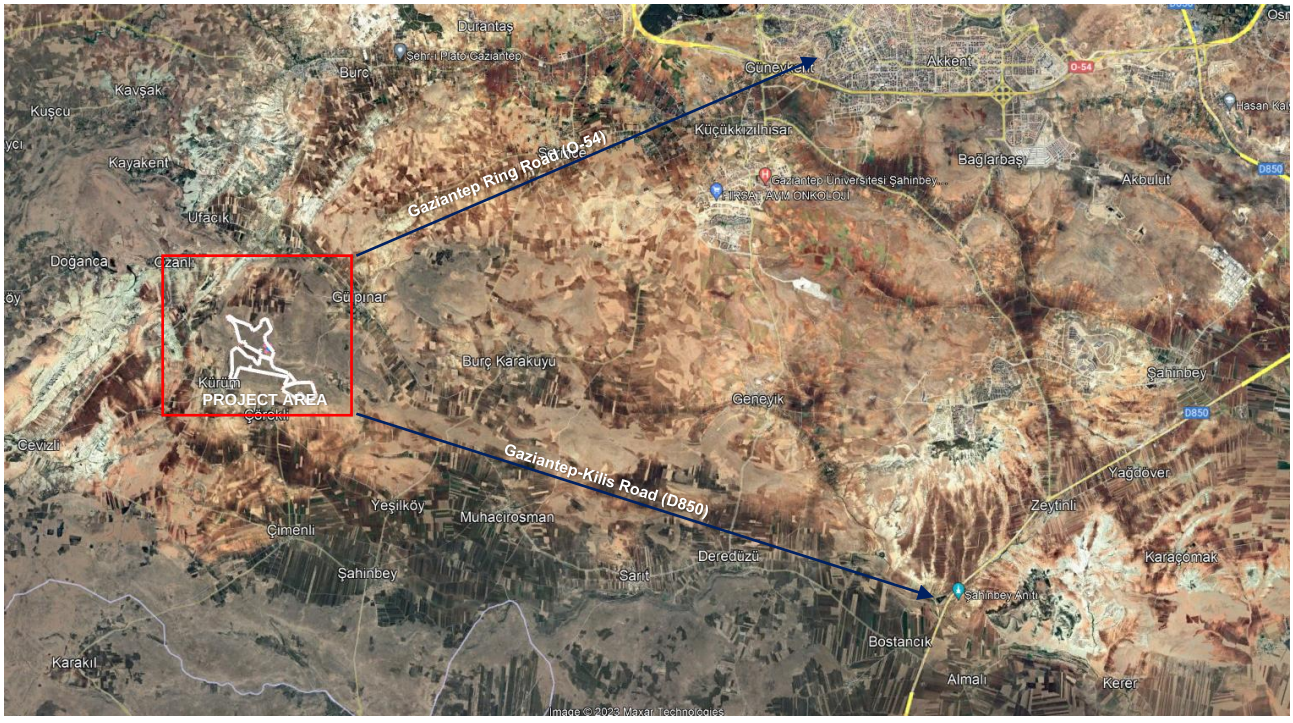


Figure 6-23: Satellite Image Showing the Highways around the Project Area

Within the scope of the Project, it is planned to use the O-54 Highway with a connection road to be built from the northwestern corner of the Project area to the Kürüm and Burç neighborhood roads. The existing access routes to O-54 Highway are given in the Figure 6-24.

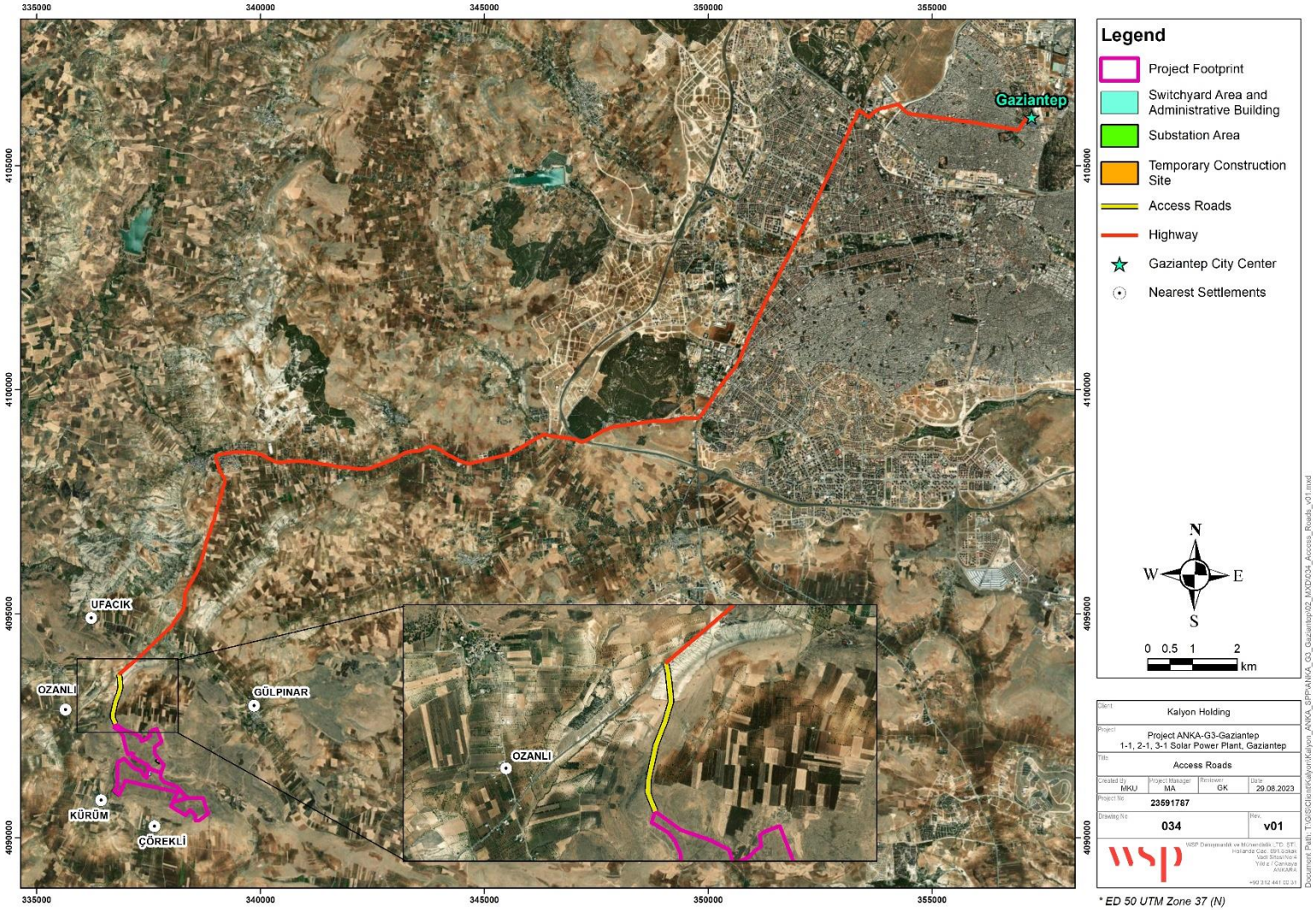


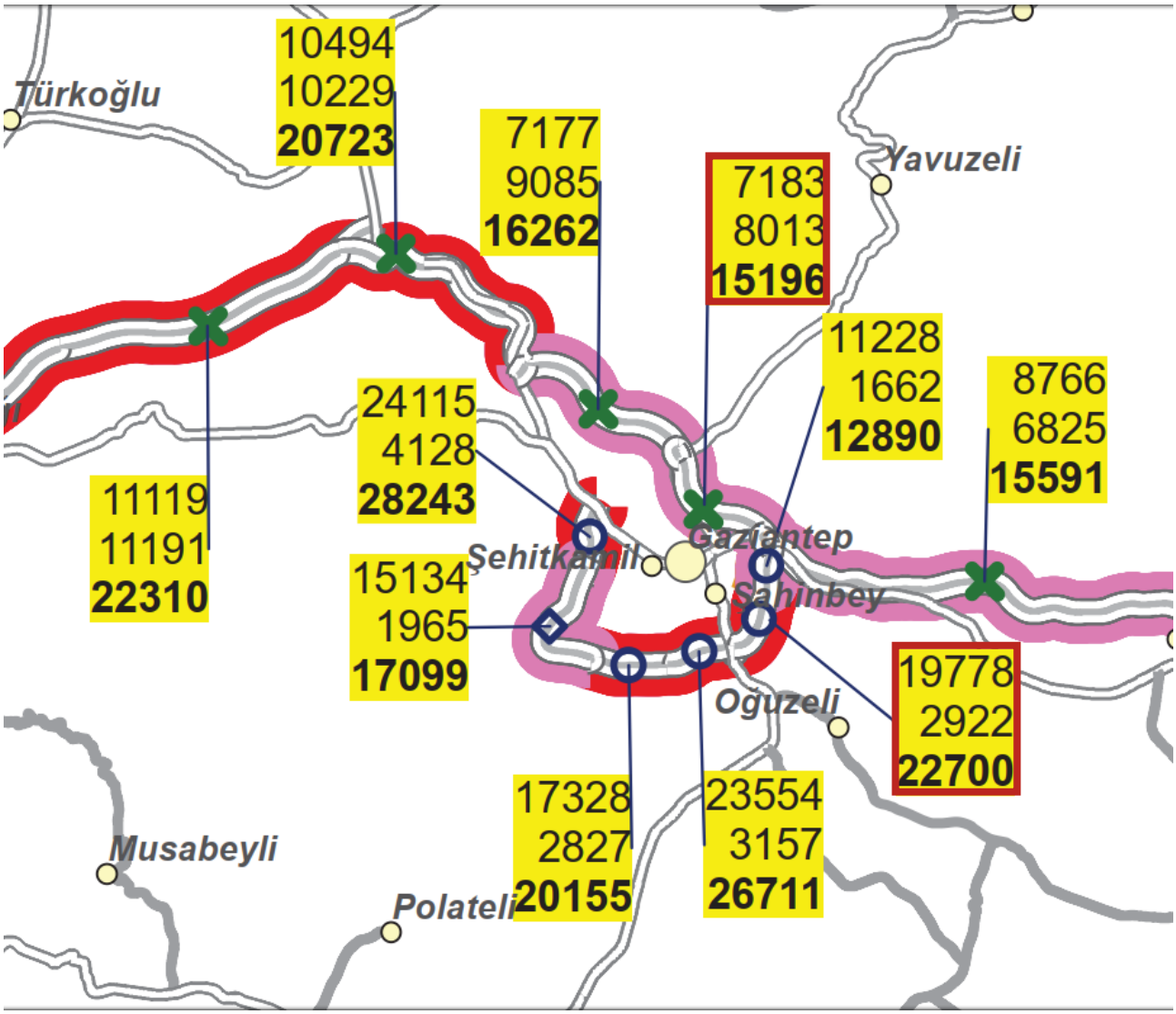
Figure 6-24: Existing Access Roads to the Highways

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 2022. The traffic volumes of the nearby highways are given in Table 6-27 and Figure 6-25

Table 6-27: The Annual Average Daily Traffic Data of Nearby Highways

Roadway	Light Vehicle	Heavy Vehicle	Total
O-54	7183	8013	**15196**
D850	19778	2922	**22700**

Source: https://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Istatistikler/TrafikveUlasimBilgileri/22TrafikUlasimBilgileri.pdf



Source:https://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Istatistikler/TrafikveUlasimBilgileri/22TrafikUlasimBilgileri.pdfb

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

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[9].

(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[10]. Please refer to Figure 6-26 in this regard.

[9]

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

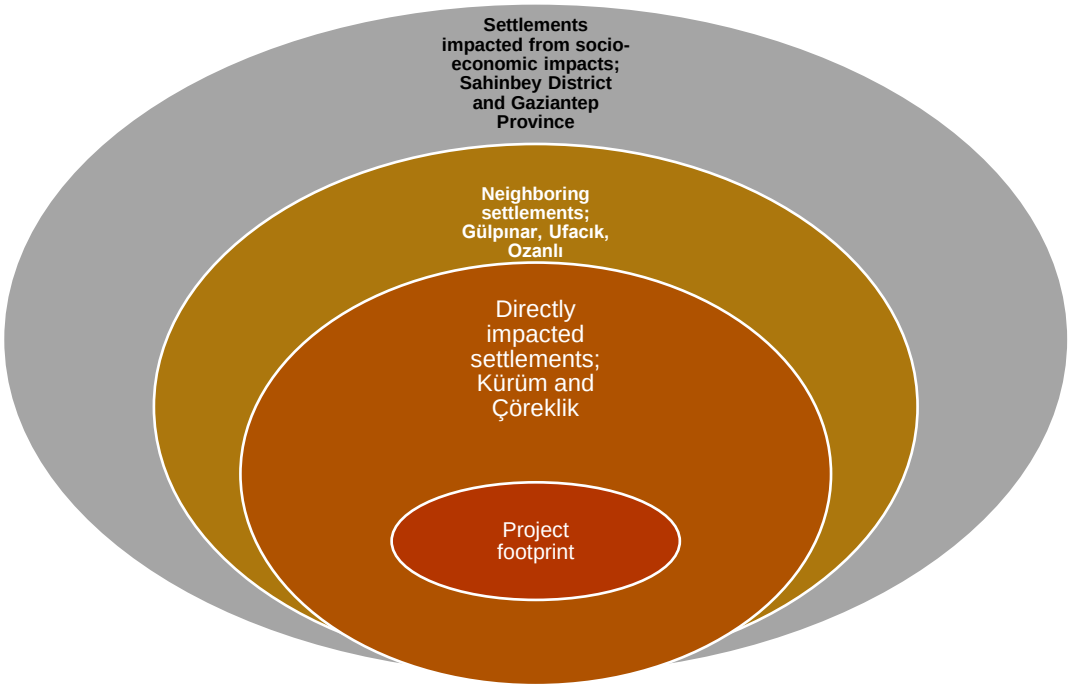


Figure 6-26 Project Area Of Influence For "G3-GAZİANTEP-1-1 Solar Power Plant, G3-GAZİANTEP-2-1 Solar Power Plant And G3-GAZİANTEP-3-1 Solar Power Plant, Şahinbey District, Gaziantep Province

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.

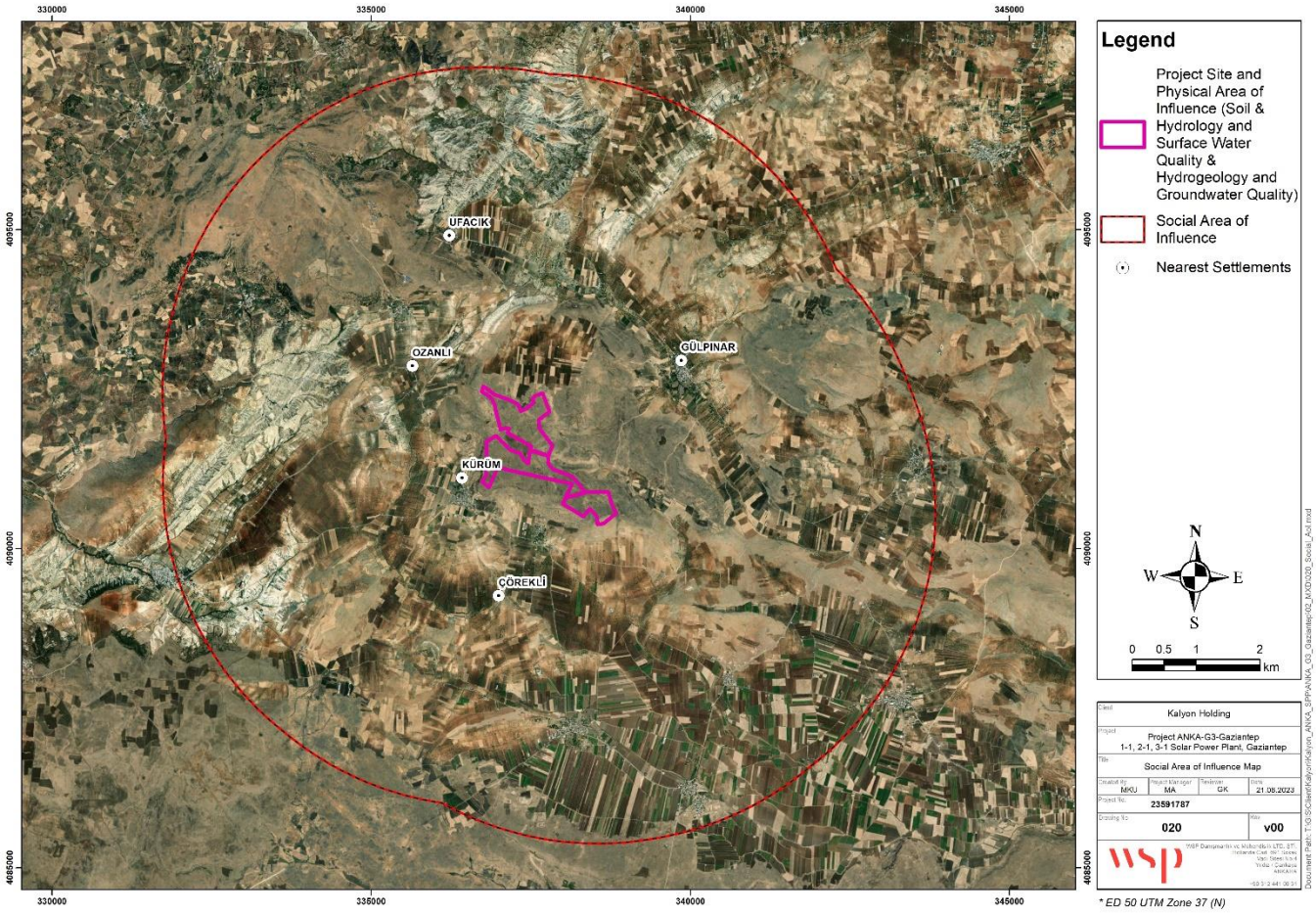


Figure 6-27: Social Area of Influence

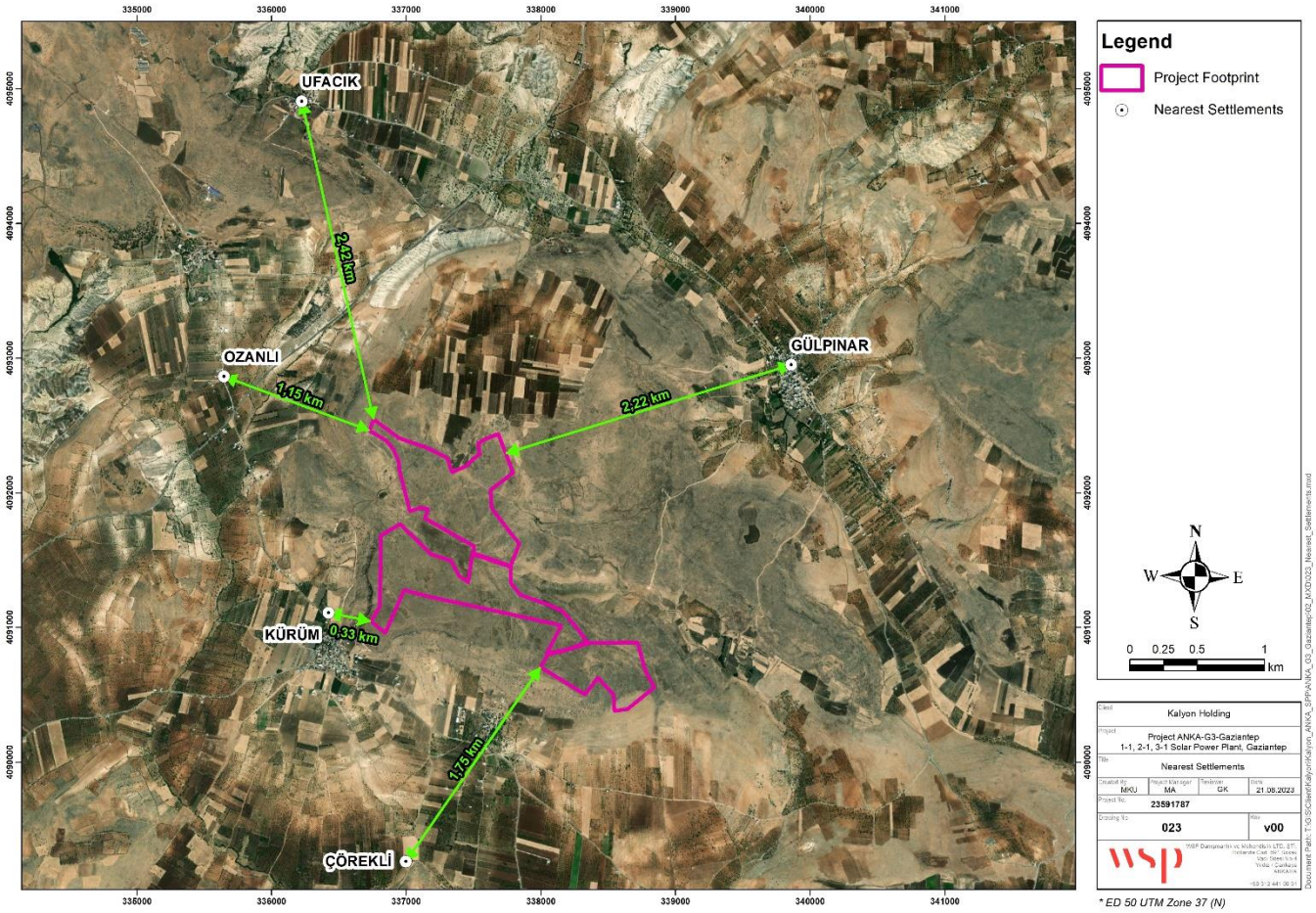


Figure 6-28: Nearest Settlements

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:

- Gaziantep Governorship
- Gaziantep Municipality
- Turkish Statistical Institution,
- Gaziantep Provincial Directorate of Environment and Urbanization and Climate Change
- Gaziantep 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:

- Five settlements were determined for G3-Gaziantep-1-1, 2-1, 3-1 Solar Power Plant located in Şahinbey District of Gaziantep including; Kürüm, Çörekli, Gülpınar, Ufacık and Ozanlı.
- 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 992 households in the Gaziantep Project impact area. With the sample determination formulation developed by WSP in Excel, it was planned to interview 76 households in Gaziantem 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 6-28: Sample Size Calculation

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%	
Toal Target Population Number	340	
AS= sample size for known population **AS=(S)/1+((S-1)/population)**		**76**

Details of the household surveys held in the Şahinbey District is presented in Table below.

Table 6-29: Performed Household Surveys

Name of the Village	Performed Household Surveys
Çörekli	5
Gülpınar	16
Kürüm	13
Ozanlı	5
Ufacık	3
Total	42

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 and decreased after the earthquake occurred in February 2023 and although the social team did their best to reach the calculated sample size, the total number of surveys conducted is 42 and 5 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 in the village of Ufacık.

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 neighbourhoods according to the respective rural or urban setting. 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/neighbourhoods are the sub administrative units of the districts. The following sections describe the details and responsibilities of these administrative structures. Figure below presents the administrative structure as found in the AoI.

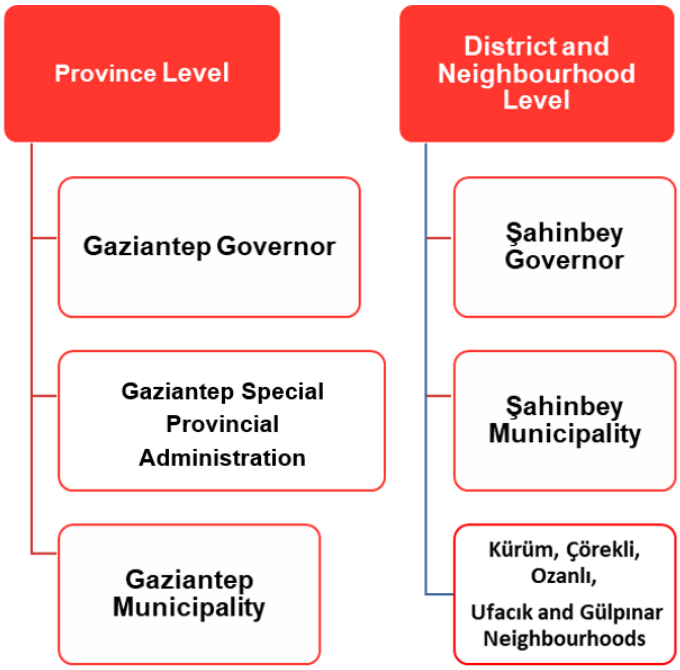


Figure 6-29: Administrative Structure

In reference to Figure above 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 Gaziantep 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 organizations 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.

Even though the administrative structure of the settlements located in the AoI are officially neighborhood considering the connection of the settlements to the metropolitan municipality, it has been observed that, The AoI is mainly composed of rural settlements. The Gaziantep 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. Fatma Şahin is elected as the head of Gaziantep Municipality, and Mehmet Tahmazoğlu is elected as the head of Şahinbey Municipality.

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/Neighborhoods

Mukhtars represent the villages and the neighborhoods. Mukhtars are elected by the residents 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 Şahinbey district of the Gaziantep province. Population and demography are key components to having a good understanding of the characteristics of a community. Information on demographic profiles at the provincial and district levels was obtained from secondary resources including the latest census of Turkish Statistical Instutition (TURKSTAT). The demographic information of the villages and the neighborhoods were collected through the community-level surveys held with the Mukhtars of each settlement.

6.2.3.2 Province and District Level

According to TURKSTAT data for 2022, the total population of Gaziantep was recorded as 2,154,051. The men population of Gaziantep is 1,087,763 while the women population is 1.066.288. The average household size of the province is 3.97 with a net migration rate of -2.55. There are 9 districts and 781 neighborhoods in Gaziantep.

. On February 6, 2023, two earthquakes with the magnitude of 7.8 and 7.5 occurred in Turkey and Gaziantep is among the provinces most affected by these earthquakes due to its proximity to the centers of the earthquakes. According to the governmental records, after the earthquake, 3,857 people died and 3600 buildings were destroyed, and 12,000 buildings were severely damaged in Gaziantep. Therefore, 2022 data may not reflect the actual situation correctly.

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

Table 6-30: Population Distribution of the Gaziantep province

Gaziantep	Number
Total Population	2,154,051
Men population	1,087,763
Women population	1,066,288
Net migration rate	-2.55
Population growth rate	11.03
Population Density (person/km^2)	316

Source: TURKSTAT, 2022

As of 2022, the annual population growth rate of Gaziantep is 11.03 in thousands, while it is 5.01 in thousands for the Şahinbey district. This rate is 7.05 for Türkiye in general, which means Gaziantep has faster population growth compared to Türkiye, whereas Şahinbey has a lower population growth rate compared to both Gaziantep and Türkiye.

Gaziantep's population has increased every year in the last 5 years. The biggest reason for this increase is immigration. According to the TUIK 2022, Gaziantep has received an annual average of 47,881 people in the last 5 years.

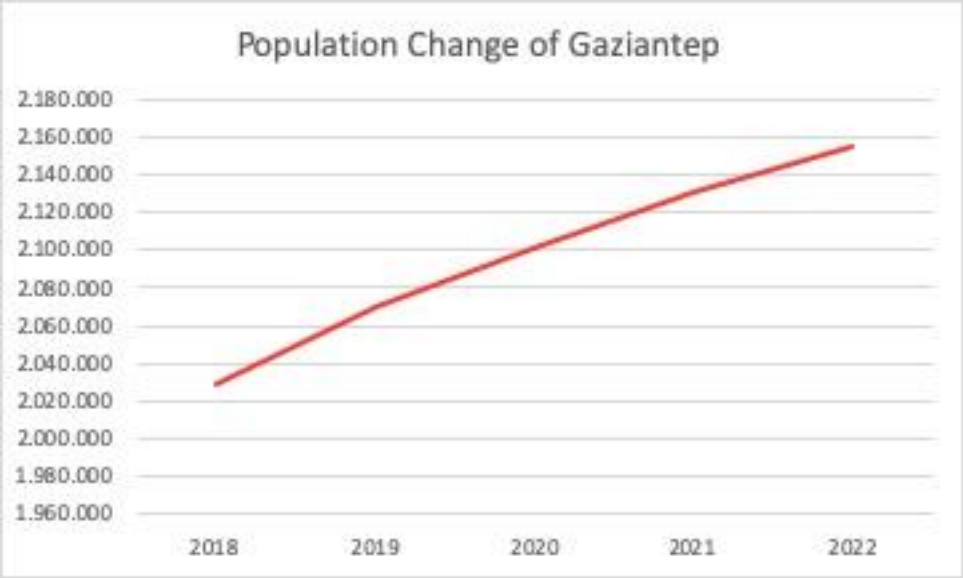


Figure 6-30: Population change of Gaziantep in the last 5 years

Table 6-31 shows the population distribution by district. Gaziantep receives a lot of migration from Syria due to its geographical location. According to the August 2023 data of the Directorate of Migration Management, Gaziantep is the second province with the highest number of Syrian migrants. As of August 2023, there are 434,045 Syrian migrants in the province. However, these data show registered migrants. Therefore, when unregistered migrants are also considered, it is estimated that the number of migrants in the province is higher than the official data. This is the most important factor in the continuous increase in the population. By analyzing data for 2022, it is seen that Şahinbey district, the central district of Gaziantep, is the most populous in the province, followed by the Şahinbey district in which the Project area is located.

Table 6-31:Population Figures of Districts of Gaziantep as of 2022

District	Population	Men Population (%)	Women Population (%)	Urban Population (%)	Population Density (person/km2)
Araban	32,933	50.3	49.7	100%	47.25
Şahinbey	**941,055**	**50.2**	**49.8**	**100%**	**479.64**
İslahiye	67,650	51.3	48.7	100%	64.31
Nizip	148,386	50.2	49.8	100%	143.78
Oğuzeli	33,397	51.4	48.6	100%	40.78
Yavuzeli	22,762	51.1	48.9	100%	33.47
Şehitkamil	857,167	50.6	49.4	100%	278.48
Karkamış	9,379	52.2	47.8	100%	30.65

District	Population	Men Population (%)	Women Population (%)	Urban Population (%)	Population Density (person/km2)
Nurdağı	41,322	50.6	49.4	100%	46.53

Source: TURKSTAT, 2022

Table 6-32 presents the key population information on the Şahinbey district. According to the TURKSTAT data of 2022, 941,055 people reside in the Şahinbey district, in which the total men and women population is equal. Şahinbey has 181 neighborhoods within the district borders.

Table 6-32: Şahinbey District Population Information

Şahinbey District	Population Indicator
Total population	941,055
Total men population	473,254
Total women population	467,801
Number of villages within district borders	0
Number of neighborhoods within district borders	181

Source: TURKSTAT, 2022

The change in the Şahinbey population in the last five years is given in the figure below.

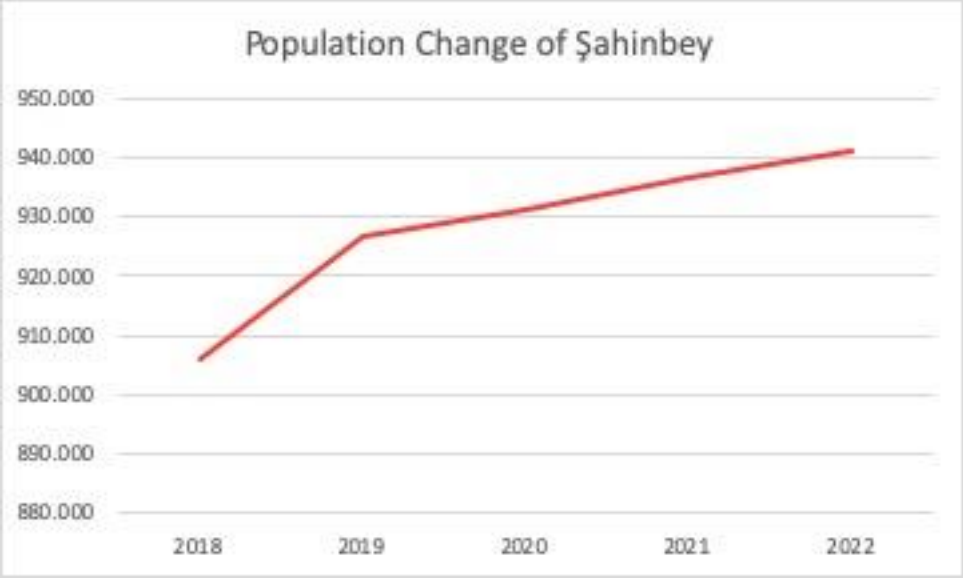


Figure 6-31: Population change of Şahinbey in the last 5 years

In the Şahinbey District, Population growth has been observed in the last 5 years. There was a rapid population growth between 2018-2019. The population of Şahinbey district, like the population of Gaziantep, has been

increasing continuously in the last 5 years. The main reason for this increase is thought to be immigrants from Syria. Especially Şahinbey district is the district with the highest Syrian population in Gaziantep.

Age and gender distribution

The tables below present the age distribution of the population of the Gaziantep province and the Şahinbey district.

The age distribution of the Gaziantep population in numbers and by percentage is given in the table below.

Table 6-33: Age Distribution of Gaziantep Population, as of 2022

Age Group	Population	Population by percentage (%)
0-4	205,739	9.55
5-9	236,786	10.99
10-14	220,938	10.25
15-19	196,455	9.12
20-24	177,004	8.21
25-29	170,010	7.89
30-34	158,357	7.35
35-39	155,436	7.21
40-44	147,373	6.84
45-49	121,926	5.66
50-54	95,178	4.41
55-59	83,079	3.85
60-64	61,343	2.84
65+	124,427	5.77

Source: TURKSTAT, 2022

In Gaziantep, the population aged between 5-9 is the largest group compared to others, while the population aged between 60-64 is the smallest. Apart from that, younger generations aged between 10-14 to 0-4 are also predominant in the area compared to middle-aged population. According to official data, 15% of the Syrian migrant population is between the ages of 5-9 and 11% is between the ages of 10-14 in Turkey. In Gaziantep, the population between the ages of 10-14 is well above the average of Turkey. Considering the Syrian migrant population in Gaziantep, it can be considered that the population in this age range is related to the migrant population.

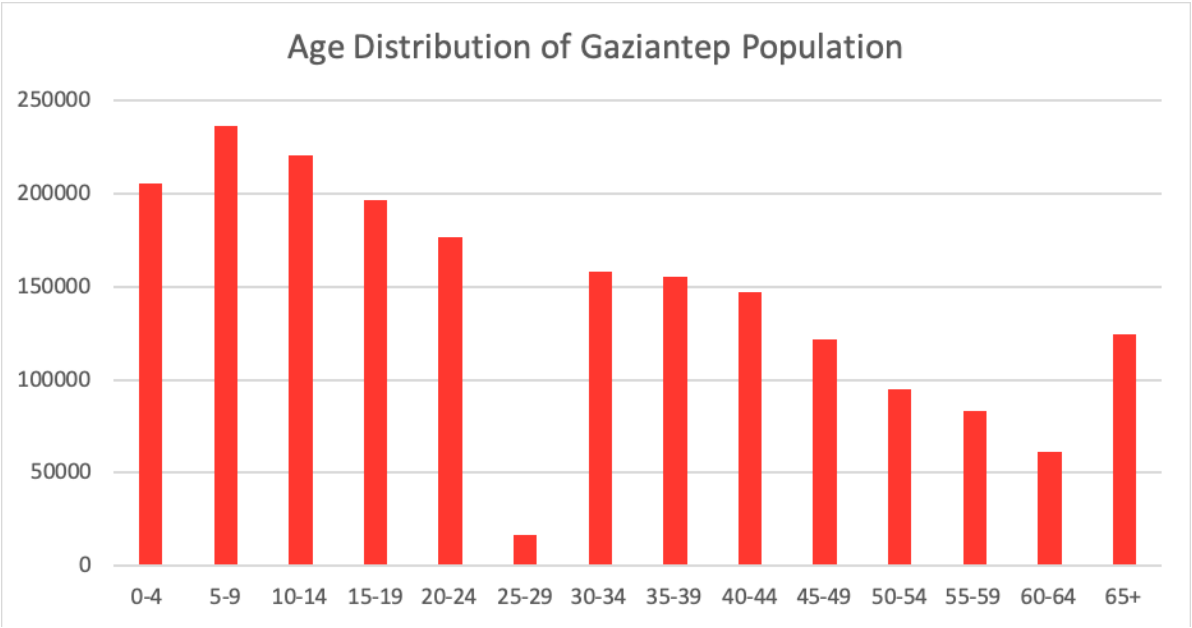


Figure 6-32: Age Distribution of Gaziantep Population

The age distribution of the Şahinbey population in numbers and by percentage is given in the table below.

Table 6-34: Age distribution of Şahinbey population, as of 2022

Age Group	Population	Population by percentage (%)
0-4	88,791	9.4
5-9	103,197	10.9
10-14	95,959	10.1
15-19	84,761	9.0
20-24	76,108	8.0
25-29	76,262	8.1
30-34	70,742	7.5
35-39	69,325	7.3
40-44	66,272	7.0
45-49	54,730	5.8
50-54	42,197	4.4
55-59	36,441	3.8

Age Group	Population	Population by percentage (%)
60-64	26,457	2.5
65+	49,813	5.2

The population between the ages of 5-9 has the highest rate in Şahinbey district. Apart from this, the distribution in other age groups is similar to Gaziantep.

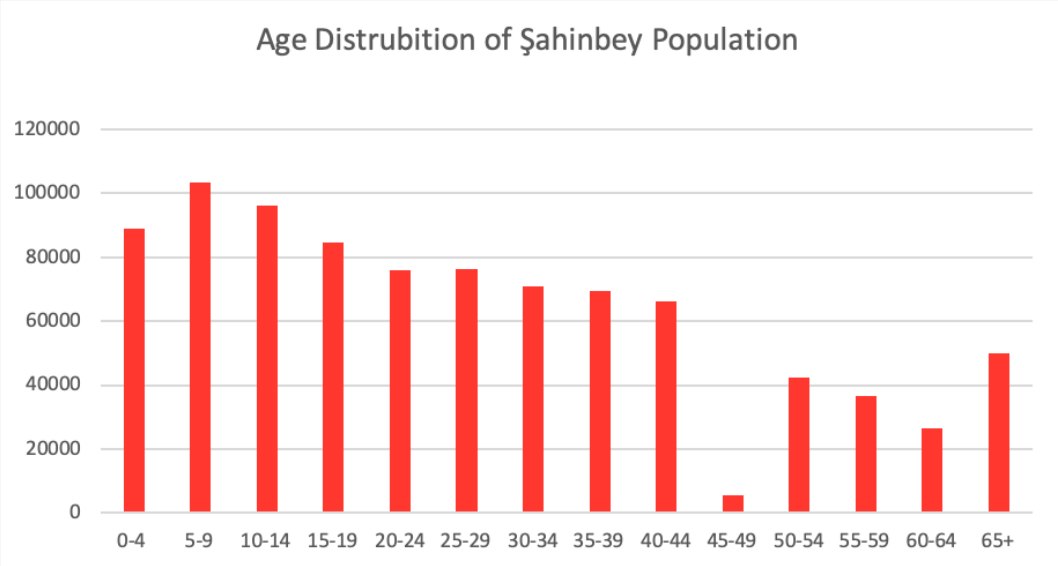
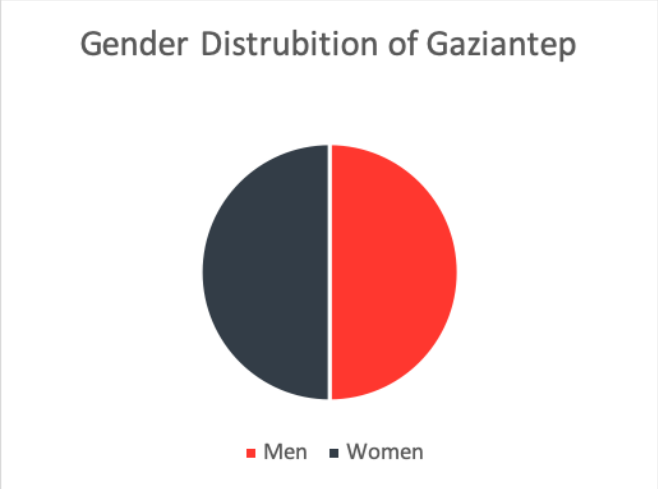


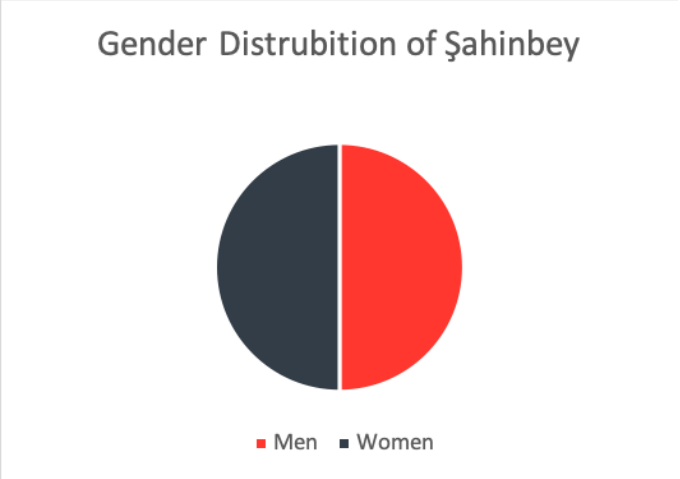
Figure 6-33: Age Distribution of Şahinbey Population

The distributions of population by gender in Gaziantep and Şahinbey are presented in the figures below.



- In Gaziantep, as of 2022, the women and men populations have an equal population distribution.

Figure 6-34: Gender distribution of Gaziantep population



- Şahinbey district shows similar tendency as Gaziantep population—as of 2022, the women and men populations have an equal distribution.

Figure 6-35: Gender distribution of Şahinbey population

6.2.3.3 Village and Neighborhood Level

The total population and the number of households in the settlements collected through the Community Level Surveys are presented in the table below.

Table 6-35: Total population and number of households of the villages

Province	District	Village/Neighbourhood	Total Population	Number of Households	Average Household Size
Gaziantep	**Şahinbey**	Kürüm	100	40	2.5
		Çörekli	30	10	3
		Gülpınar	600	130	4.6
		Ufacık	150	35	4.3
		Ozanlı	160	55	2.9

Seasonal Change

Seasonal change in population of the villages is presented in the table below.

According to the results of the CLS, it has been observed that there is seasonal population change o in the Çörekli, Gülpınar, Ufacık and Ozanlı villages. Mostly, people are coming from the city in the summer season to their summer houses.

Table 6-36: Seasonal population change in the villages in the last five years

Province	District	Village/Neighbourhood	Additional Population	Additional number of households	Reason of seasonal population change
Gaziantep	**Şahinbey**	Kürüm	0	0	-
		Çörekli	100	18	Summer season
		Gülpınar	200	40	Summer season
		Ufacık	150	50	Summer season
		Ozanlı	150	50	Summer season

Migration

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

- In Kürüm, there has been a population decrease in the village in the late years. Generally, young people migrate to cities. Also, the population of the village decreased due to the earthquake on February 6, 2023. Among these villages, Kürüm suffered the most from the earthquake. Due to the earthquake, 30 houses in the village were destroyed, 167 were heavily damaged and 15 were slightly damaged. It is stated that while the population of Kürüm was 300 before the earthquake, 200 people migrated from the village due to the earthquake.
- In Çörekli, there is no notable population change in the last five years.
- In Gülpınar, there has been a population increase in the village in the late years. Because of the earthquake, people are coming from cities to rural areas.
- In Ufacık, there has been a population decreased in the village in the late years. Young people migrate to cities.
- In Ozanlı, there has been a population increase in the village in the late years. Because of the pandemic and earthquake, people are coming from cities to rural areas.

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

Table 6-37: Population change in the V/N in the last five years

Province	District	Village/Neighbourhood	Change	Reason of population change	Target population group of change
Gaziantep	**Şahinbey**	Kürüm	↓	Earthquake	No specific target population group
		Çörekli	Same		

Province	District	Village/Neighbourhood	Change	Reason of population change	Target population group of change
		Gülpınar	↑	Earthquake	No specific target population group
		Ufacık	↓	Young people migrate to cities from rural areas	Young population
		Ozanlı	↑	Pandemic and earthquake	No specific target population group

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 Gaziantep and Şahinbey 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 Cadastre.

6.2.4.2 Province and District Level

Land tenure and ownership

The total land use area in Gaziantep Province is 680,356,47 hectares. Of the total area 64% is agricultural areas, 31% is semi-natural areas, 4% is artificial areas and 1% is wetlands.

Land use patterns

The latest information available on land use of Gaziantep is based on the 2018 data of CORINE Land Use Classification System. The distribution of land use of Gaziantep according to the latest data available is provided in the figure below.

In Gaziantep, forest, semi-natural, and agricultural areas comprise almost all of the land.

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

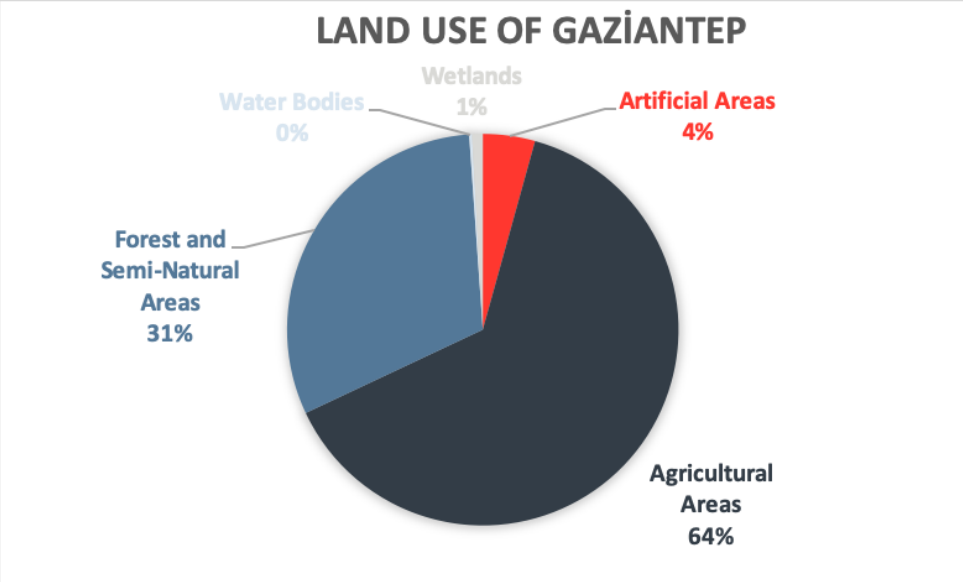


Figure 6-36: Land Use of Gaziantep

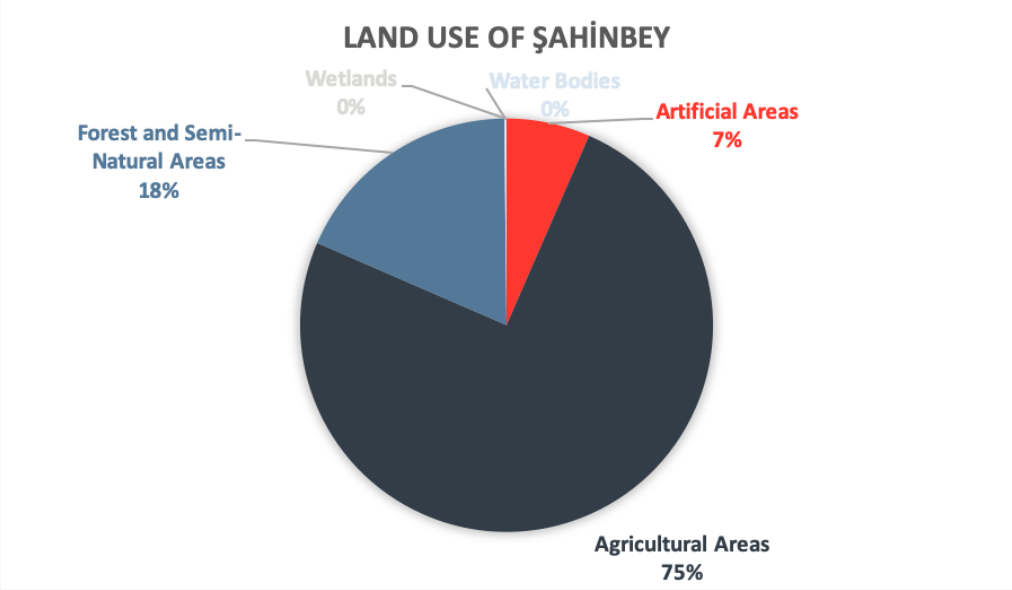


Figure 6-37: Land use of Şahinbey

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

Please refer to the table below for the detailed land type of the Gaziantep province.

Table 6-38: Land Types of Gaziantep

Layer	Area (ha)	Percent (%)
Sparse Plant Areas	32063.14	4.71
Natural Grasslands	77269.46	11.36
Unirrigated Arable Lands	62384.73	9.17
Continuously Irrigated Areas	92686.49	13.62
Mixed Agricultural Fields with Natural Vegetation	43556.72	6.40
Bare Cliff	616.53	0.09
Pasture Lands	16363.63	2.41
Plant Exchange Areas	76001.08	11.17
Irrigated Mixed Agricultural Fields	14605.13	2.15
Unirrigated Mixed Agricultural Lands	62384.73	9.17
Irrigated Fruit Areas	10998.46	1.62
Non-Continuous Settlements	3730.00	0.55
Vineyards	1433.87	0.21
Coniferous Forests	14241.88	2.09
Non-Continuous Rural Settlements	3764.35	0.55
Mineral Extraction Sites	1253.07	0.18
Broad Leaf Forests	3399.70	0.50
Industrial and Commercial Units	5432.47	0.80
Construction Sites	6977.91	1.03
Mixed Forests	6126.58	0.90
Marshes	1610.02	0.24
Highways, Railways and Related Fields	2556.69	0.38
Water Bodies	4971.25	0.73
Unirrigated Fruit Fields	113518.82	16.69
Continuous City Structure	4611.56	0.68

Layer	Area (ha)	Percent (%)
Waterways	1047.25	0.15

Source: (Gaziantep Land Use, 2018)

The total land use area in the Şahinbey district is 96,034,17 hectares, with 6292,34 hectares of settlement area. About all of the Şahinbey district is composed of forest and semi-natural areas (18%) and agricultural lands (75%). The detailed land distribution of the district is given in the table below.

Table 6-39: Land Distribution of Şahinbey District

Layer	Area (ha)	Percent (%)
Sparse Plant Areas	6686.20	6.96
Unirrigated Arable Lands	7446.19	7.75
Natural Grasslands	7119.96	7.41
Pasture Lands	5331.98	5.55
Continuously Irrigated Areas	10638.14	11.08
Mixed Agricultural Fields with Natural Vegetation	7037.98	7.33
Irrigated Mixed Agricultural Fields	3555.87	3.70
Vineyards	51.80	0.05
Irrigated Fruit Areas	2375.06	2.47
Plant Exchange Areas	2686.40	2.80
Unirrigated Mixed Agricultural Lands	15953.14	16.61
Discontinued Rural Settlements	817.33	0.85
Non-Continuous Settlements	221.22	0.23
Industrial and Commercial Units	460.69	0.48
Mineral Extraction Sites	206.15	0.21
Highways, Railways and Related Fields	177.66	0.18
Construction Sites	1748.85	1.82
Unirrigated Fruit Fields	15705.01	16.35

Source: (Gaziantep Land Use, 2018)

6.2.4.3 Village and Neighborhood Level

No information is available at the village level.

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 Gaziantep province and the Şahinbey district are presented.

6.2.5.2 Province and District Level

Economic activities and sectors

Gaziantep is the most developed province of Southeastern Anatolia. The majority of Gaziantep's economy is based on industry. Industry and exports are one of the provinces that contribute greatly to Turkey's economy. Especially in the manufacturing sector, the industry is highly developed. It is one of the cities where pistachio and grapes are grown the most in agriculture. Especially pistachio production contributes to the national economy.

Table 6-40: Land shares in total agricultural land of Şahinbey

Land	Share in total agricultural land (decares)	Percentage
Fruit land	246,232	50
Vegetable land	26,999	5.4
Cereals and others	219,922	44.5

Source: (TURKSTAT, Plant Production Statistics, 2022)

According to the TURKSTAT, Plant Production Statistics, 2022, In Şahinbey, the ratios of agricultural products in agricultural lands are as follows:

- Wheat: 104,485 decares with 48.9%
- Barley: 65,651 decares with 30.7%
- Chickpea: 12,698 decares with 5.9%
- Lentil: 25,819 decares with 12%
- Silage Corn: 4,900 decares with 2.3

Most of the lands in Şahinbey are used as fruit land. Therefore, fruit production is widespread. The lands are fertile for growing many fruits. The most grown fruits are olives, pistachios and grapes.

- Apple: 7,000 decares with 2.8%
- Vineyard Land: 30,300 decares with 12.3%

- Pistachio: 63,484 decares with 25.8%
- Cherry: 5,182 decares with 2.1%
- Olive: 115,776 decares with 47.1%
- Walnut: 11,500 decares with 4.6%
- Almond: 3,600 decares with 1.4%
- Fig: 7,000 decares with 2.8%
- Pomegranate: 1,500 decares with 0.6%

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

- Watermelon: 1,300 decares with 5.7%
- Melon: 4,300 decares with 18.9%
- Tomato: 1,600 decares with 7%
- Pepper: 7,150 decares with 31.4%
- Cucumber: 1,200 decares with 5.2%
- Eggplant: 3,150 decares with 13.8%
- Garlic: 5,000 decares with 21.9%
- Onion: 2,190 decares with 9.6%

The number of bovines, sheep, goats, egg poultry businesses, and beehives in the Şahinbey district are given in the table below.

Table 6-41: Number of animals in the Şahinbey district

District	Bovines	Sheep	Goats	Egg Poultry	Beekeeping Business
Şahinbey	33,505	81,731	28,800	75,200	80

Source: (TURKSTAT, Plant Production Statistics, 2022)

Employment

As of 2022, the labour force participation rate of Gaziantep for the population aged 15 and higher is 50%, and the employment rate is 45% whereas the unemployment rate of Gaziantep is 10,1% (TURKSTAT, 2022). Employment data is based only on official records. The high number of Syrian migrants in the province and the presence of unregistered migrants also affect the employment data. Unregistered employment is not included in this data. Therefore, official data may not fully respond to the reality.

Table 6-42: Gaziantep Labour Force Indicators

TR71	Total	Men	Women
Labour force participation rate (%)	50	74	25.9
Employment rate (%)	45	67.2	22.6
Unemployment rate (%)	10.1	9.2	12.8

Source: TURKSTAT, 2022

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

6.2.5.3 Village and Neighborhood Level

Information on the economic structure of the villages/neighborhood 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 V/N and changes in income in the last five years and the reasons behind the change are provided in the table below.

Table 6-43: Average household income in V/N

Province	District	V/N	Average household income (TRY)	Changes in income in the last five years	Reasons of change
Gaziantep	**Şahinbey**	Çörekli	5,500	unknown	-
		Kürüm	8,000	↓	Animal husbandry and beekeeping declined.
		Gülpınar	10,000-15,000	Same	-
		Ozanlı	5,000	Same	-
		Ufacık	15,000	↓	Climate change and drought

The minimum wage in Türkiye at the time of the social field study was 8,506 TRY. Meanwhile, the average income in the villages of AoI is 9,500 TRY. As of July 2023, the minimum wage has been updated to 11,402 TRY. Considering the increase in prices and the inflation rate, the increase in the minimum wage does not increase the purchasing power, on the contrary, there is a decrease in the purchasing power.

Economic activities

The primary, secondary and tertiary income sources of the settlements located in the Area of Influence of the Project are given in the table below.

Table 6-44: Income sources of the villages/neighbourhoods of the AoI

Province	District	V/N	Primary Income Source	Secondary Income Source	Tertiary Income Source
Gaziantep	**Şahinbey**	Çörekli	Retirement pension	Agricultural production	Animal husbandry
		Kürüm	Animal husbandry	Agricultural production	Retirement pension
		Gülpınar	Agricultural production	Animal husbandry	Retirement pension
		Ozanlı	Animal husbandry	Agricultural production	Retirement pension
		Ufacık	Animal husbandry	Agricultural production	Retirement pension

In all five villages, people engage in animal husbandry and most people are retired at the same time. Although their main source of income is animal husbandry, they stated that animal husbandry does not provide sufficient income due to problems such as inflation and increase in animal husbandry expenses. Pension is seen as a supportive income besides animal husbandry. In Gülpınar, agricultural production is the primary income source. Goat breeding as animal husbandry is dominant. In Gülpınar, some of the villagers work as daily agricultural workers and live on daily allowances.

Occupational Distribution

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

Table 6-45: The distribution of V/N population by occupation

Province	District	V/N	Farmer (%)	Salaried employee (%)	Retired (%)	Business owner (%)	Casual worker (%)	Unemployed (%)
Gaziantep	**Şahinbey**	Çörekli	47%	0%	53%	0%	0%	0%
		Kürüm	62%	8%	30%	0%	0%	0%
		Gülpınar	60%	5%	15%	1.2%	20%	2.3%
		Ozanlı	45%	5%	40%	0%	0%	10%
		Ufacık	87%	0%	13%	0%	0%	0%

A large part of the population in all villages, except Çörekli, is farmers. Only in Çörekli village, most of the population is retired. There are only casual workers in Gülpınar village.

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

Table 6-46: Changes in job opportunities in the V/Ns in the last five years

Province	District	V/N	Change
Gaziantep	**Şahinbey**	Çörekli	Same
		Kürüm	Same
		Gülpınar	Same
		Ozanlı	Same
		Ufacık	Same

In Kürüm village, 20-25 goats and 6 cattle died due to the earthquake. In addition, some of the people in the village sold their animals and left the village due to the damages caused by the earthquake. In the interview with the headman, it was stated that Şahinbey District Directorate of Agriculture paid the money for the cattle that died due to the earthquake, but they did not pay the money for the goats.

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 are engaged in both cattle breeding and sheep and goat breeding. In the Gülpınar, Ozanlı and Ufacık villages, there are also beehives. In the Ozanlı, Şahinbey Municipality gave 50 beehives for support purposes. Some people in the village of Ufacık received beekeeping training from the Public Education Center.

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

Table 6-47: The numbers of animals for animal husbandry in the V/Ns

Province	District	V/N	Number of cattle	Number of sheep and goats	Number of poultry	Number of beehives
Gaziantep	**Şahinbey**	Çörekli	5	40	unknown	0
		Kürüm	200	2000	unknown	0
		Gülpınar	400	2000	200-300	150-200
		Ozanlı	150-200	1000	unknown	50
		Ufacık	500	300	unknown	700

They stated that there were around 500 cattle in the Kürüm village before the earthquake. Since the barns were destroyed due to the earthquake, people had to sell their animals. Currently, there are 200 cattle in the village.

Agricultural Production

The annual number of agricultural products produced in the villages/neighborhoods are presented in the table below.

Table 6-48: The number of agricultural products produced in the V/Ns annually (kg)

V/N	Wheat	Barley	Chickpea	Lentil	Olive	Peanut	Grape	Fig	Walnut
Çörekli	0	0	0	0	10,000	10,000	0	0	12,500
Kürüm	0	0	0	0	40,000	30,000	10,000	5000	0
Gülpınar	25,000	25,000	unknown	unknown	0	0	0	0	0
Ozanlı	0	0	4000	4000	50,000	10,000	2000	0	0
Ufacık	45,000	45,000	15,000	0	0	0	0	0	0

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.

Table 6-49: 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)		
Şahinbey	**Çörekli**	No	-	-	-	-	No	-	-	-	-	No	-	-	No	-	-	No	No	-	Yes	All	Yes	Drinking, irrigation, potable water	All	Yes	Grazing	5
	Kürüm	No	-	-	-	-	No	-	-	-	-	No	-	-	Yes	7	Quail, partridge rabbit	No	Yes	Shrine, mosque	Yes	All	Yes	Irrigation		Yes	Grazing	40
	Gülpınar	No	-	-	-	-	No	-	-	-	-	No	-	-	No	-	-	No	Yes	Shrine	Yes		Yes			Yes	Grazing	
	Ozanlı	No	-	-	-	-	No	-	-	-	-	No	-	-	No	-	-	No	No	-	Yes		Yes			Yes	Grazing	30
	Ufacık	No	-	-	-	-	Yes	Wood picking	Yes	No	Yes	No	-	-	No	-	-	No	No	-	No	-	Yes	Irrigation		Yes	Grazing	30

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/neighbourhoods. 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 Gaziantep 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 Gaziantep province are as follows:

- Şahinbey Social Assistance and Solidarity Foundation (SYDV)
- Social Assistance and Solidarity Foundation (SYDV)
- Araban Social Assistance and Solidarity Foundation (SYDV)
- İslahiye Social Assistance and Solidarity Foundation (SYDV)
- Karkamış Social Assistance and Solidarity Foundation (SYDV)
- Nizip Social Assistance and Solidarity Foundation (SYDV)
- Nurdağı Social Assistance and Solidarity Foundation (SYDV)
- Oğuzeli Social Assistance and Solidarity Foundation (SYDV)
- Yavuzeli 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.

Various projects are organized so that the elderly can receive the necessary services. One of them is the Elderly Support Program (YADES). YADES is a program that provides the protection and support of the elderly over the age of 65 who reside in Turkey and need service, and care for those who need care in the places where they live. With the Elderly Support Program (YADES), social services are provided primarily to the elderly who live alone at home or live with their spouse or a relative and need home care and social support services. YADES is a project carried out by the Ministry of Family and Social Services.

With the project called Alzheimer's Patients and Relatives Meeting Center (Morale House), which is supported by YADES and implemented by Gaziantep Municipality, studies are carried out to slow down and rehabilitate the disease for the elderly with first and second-stage Alzheimer's disease in Gaziantep. The Morale House Project aims to contribute to individuals' active ageing by slowing the disease's progression rate. In the garden part of the centre, there are walking and sports facilities and recreation areas. Within the Morale House's scope are an occupational therapy area, sleeping room, prayer room, meeting room, hobby garden, sports room, music room, handicraft workshop, physical activity area, walking path, fully equipped emergency room, and games suitable for illness.

Another project carried out by Gaziantep Municipality for the elderly is "Evim Dünyalara Bedel Akıllı Yaşlı Destek Uygulaması". This project aims to facilitate the lives of people aged 65 and over who need service without removing them from their living spaces. Within the project's scope, elderly people can quickly benefit from municipal services with the buttons in the EDB Elderly Support Application installed on the phones of elderly and disabled citizens. These buttons are:

Emergency Button: It is followed by a professional team 24/7 for emergencies and directed to an ambulance or contracted health institution according to the relevant alarm and need.

Call Button: According to their needs, the elderly can connect to the call centre via the call button.

Video Call Button: Disabled and Elderly citizens can make video calls for psychosocial support and other requests.

Demand and Support Button: Services are regularly provided by the municipality's relevant units according to the users' demands.

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 Gaziantep, there are 2 public institution that provide assisted living for older adults. One is Gaziantep Elderly Care and Rehabilitation Center located in Şahinbey district and the other is Gaziantep Nizip Nursing Home located in Nizip district. Both are affiliated to the Gaziantep Provincial Directorate of the Ministry of Family and Social Services.

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 Şahinbey, affiliated with The Ministry of Family and Social Services Provincial Directorate.

The Gaziantep Provincial Directorate of the Ministry of Family and Social Policies and Gaziantep University implemented a project for the children of martyrs. There are 24 martyr children of education age in Gaziantep City Center. Psycho-social support work is carried out for the student groups determined within the project's scope. Counselling is provided on behavioral problems identified after individual interviews by experts. Interviews and trainings are given on personality problems such as the integrity of children with the family, the sense of physical and psychological integrity, self-confidence-self-esteem damage, distrust towards family and society, and future anxiety.

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.

According to the 2022 data of the Ministry of Family and Social Policies, the rate of disabled population in Gaziantep is 0.02%.In addition, Gaziantep is among the top 5 cities with the lowest rate of disabled population.

In Gaziantep, there is a Disabled Coordination Center affiliated to Gaziantep Municipality. This centre is affiliated to Gaziantep Municipality. The Disability Coordination Center aims to enable disabled people to participate in social activities, help develop their professional skills, facilitate the daily lives of families with disabilities, raise awareness of disability in society, to contribute to a sensitive structure that protects the rights of disabled people, and to strengthen communication between disabled and non-disabled individuals operates to.

In addition, there are 2 barrier-free living centres in Gaziantep. These institutions are as follows:

- Gaziantep Municipality Barrier-Free Living Centre
- Oğuzeli Barrier-Free Living Centre

Unemployed people and people living in poverty

According to the Labour Market Research Gaziantep Province 2022 Result Report by Turkish Employment Agency, as of September 2022, the number of registered unemployed people in Gaziantep is 86,940. 39.2% of this number consisted of women, and the unemployment rate of young people aged 18-24 is 31.1 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 80,060 (Turkish Employment Agency, 2021). However, the percentage of unemployed younger population has increased from 45% in 2021 to 31.1% in 2022 despite the decreased number of registered unemployed people.

As of May 2023, the poverty line is determined as 34,838 TRY, and the hunger threshold is 10,072 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). TRC1 Region (Gaziantep, Adıyaman, Kilis) has the ratio of relative at-risk-of-poverty-rate 8.38% (TURKSTAT, 2022). There are houses damaged by the earthquake in the villages. People whose houses were damaged in the earthquake live in containers. Especially Kürüm village is the most damaged village from the earthquake. In the village, 30 houses were destroyed and 167 houses were severely damaged. In the interview with the mukhtar, it was stated that there are 29 containers in the village and the people whose houses were destroyed and heavily damaged live in the containers. However, it was stated that the number of containers was not enough. The photographs of the conterner city in the village of Kürüm are given below.

Figure 6-38: Container city in Kürüm

Figure 6-39: Container city in Kürüm

Figure 6-40: Container city in Kürüm

6.2.6.3 Village and Neighborhood Level

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

Table 6-50: Vulnerable groups in the V/Ns

District	Settlement	Illiterate	Cannot speak Turkish	Seasonal worker	Mobile beekeeper	Refugee	Woman headed households	Living with social aid	At education age but not involved in education	Bedridden Patients	Living alone over 70 years old	People with physical disabilities	People with mental disabilities	Earthquake victims (number of household)	Persons engaged in unauthorized agricultural activities on public lands	Persons with unauthorized structures on public lands (house, workplace, barn, hut, etc.)
Şahinbey	Çörekli	1	0	0	0	7	0	2 (household)	0	0	0	0	0	2	0	0
	Kürüm	4	0	0	0	0	0	15 (household)	0	5	0	1	2	30	0	0
	Gülpınar	0	0	0	0	0	3	15 (ind)	0	0	2	0	3	23	0	0
	Ozanlı	0	0	0	0	2	0	3 (household)	0	0	0	0	0	0	0	0
	Ufacık	8	0	0	0	1	0	1 (household) 7 (ind)	0	0	0	1	0	2	0	0

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 1539 schools, 708,054 students, 35,049 teachers and 22,777 classrooms in Gaziantep. The selected education indicators of the province are presented in the table below.

Table 6-51: Formal Education Indicators of Gaziantep

2021-2022 Academic Year	Public	Private
Total Number of Students	681,031	27,023
Total Number of Teachers	32,058	2891
Total Number of Schools	1805	249
Total Number of Classrooms	19,983	2764
Number of Schools with Boarding Houses	56	
Number of Boarding Students	6199	
Preschool		
Number of Students	56,024	4063
Number of Teachers	2337	396
Number of Schools	675	93
Number of Classrooms	1627	522
Number of Students Falling to Schools	82	43
Number of Students Falling to Teachers	23	10
Number of Students Falling on The Classroom	34	7
Primary school		
Number of Students	222,369	5449
Number of Teachers	9676	574
Number of Schools	535	36
Number of Classrooms	7149	613
Number of Students Per Schools	399	151
Number of Students Falling to Teachers	22	9

2021-2022 Academic Year	Public	Private
Number of Students Falling on The Classroom	30*	8
Lower Secondary School		
Number of Students	203,227	6062
Number of Teachers	11,263	601
Number of Schools	371	37
Number of Classrooms	5838	577
Number of Students Falling to Schools	498	163
Number of Students Falling to Teachers	17	10
Number of Students Falling on The Classroom	30*	10
General Secondary Education (High School)		
Number of Students	140,160	9582
Number of Teachers	5772	1221
Number of Schools	183	79
Number of Classrooms	3711	942
Number of Students Falling to Schools	502	121
Number of Students Falling to Teachers	16	7
Number of Students Falling on The Classroom	25	10
Vocational and Technical Secondary Education		
Number of Students	54189	1867
Number of Teachers	3263	99
Number of Schools	83	4
Number of Classrooms	1745	110
Number of Students Falling to Schools	570	466
Number of Students Falling to Teachers	16	18
Number of Students Falling on The Classroom	26	17
Special Education		
Number of Students (Primary School)	13565	50
Number of Students (Lower Secondary School)	13359	37
Number of Allocated Classrooms (Primary School)	1180	289
Transporting and Transported Education (Primary+Lower Secondary School)		
Number of Transporting Central Schools	169	
Number of Transported Schools and Transported Settlement Places without a School	676	

2021-2022 Academic Year	Public	Private
Number of Total Transported Primary School Students	3365	
Number of Total Transported Lower Secondary School Students	9945	
Transporting and Transported Education (Upper Secondary Education)		
Number of Transporting Central Schools	65	
Number of Transported Students (Upper Secondary Education)	8578	

Source: The Ministry of National Education, 2022

**As the number of students per classroom is calculated on primary schools and lower secondary schools, primary schools and lower secondary schools are assessed together because they use the same classroom generally.*

According to the data obtained from the website of the Ministry of National Education, as of 2023:

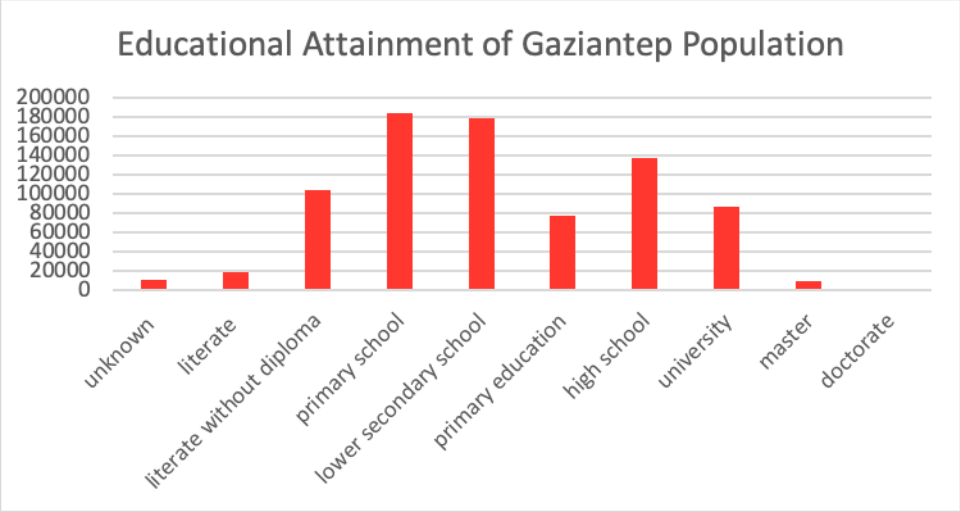
- In Şahinbey, there are 106 public preschools, 2 special education preschools, 132 public primary schools, 1 special education primary school, 98 public lower secondary schools, 1 special education public lower secondary school, 83 high schools, and 2 public education centres.

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

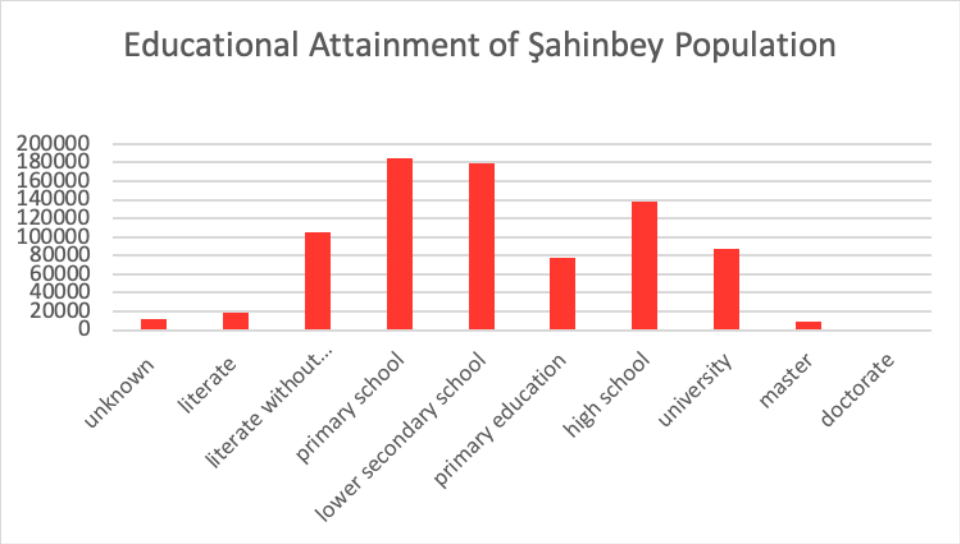
The proportion of both province and district population by literacy and educational levels are presented in the figures and tables below.



- In Gaziantep, 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 6-41: Educational Attainment of Gaziantep Population

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



- Şahinbey has a similar picture to Gaziantep 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 6-42: Educational Attainment of Şahinbey Population

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

Access to higher education

There are 4 universities in Gaziantep. These are Gaziantep University, Hasan Kalyoncu University, Gaziantep Islam, Science and Technology University and Sanko University. Gaziantep University and Gaziantep Islam, Science and Technology University are state universities. The other two are foundation universities. Hasan Kalyoncu University and Gaziantep Islam, Science and Technology University located in the AoI, Şahinbey district.

Gaziantep University: The total number of students as of 2022-2023 academic year is 46,440, and the total number of academics is 1772. The university has 22 faculties, 5 institutes, 11 vocational schools of higher education. There are 70 undergraduate and 191 graduate programs at the university.

Hasan Kalyoncu University: The total number of students as of 2022-2023 academic year is 7885, and the total number of academics is 266. The university has 9 faculties, 1 institute, 1 vocational schools of higher education. There are 27 undergraduate and 64 graduate programs at the university.

Gaziantep Islam, Science and Technology University: The total number of students as of 2022-2023 academic year is 2883, and the total number of academics is 161. The university has 8 faculties, 1 institute, 2 vocational schools of higher education. There are 14 undergraduate and 5 graduate programs at the university.

Sanko University: The total number of students as of 2022,2023 academic year is 1611, and the total number of academics is 154. The university has 2 faculties, 1 institute, and 2 vocational schools of higher education. There are 4 undergraduate programs and 8 graduate programs at the university.

6.2.7.3 Village and Neighborhood Level

Education facilities and personnel

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

Table 6-52: 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
Şahinbey	**Kürüm**	No	Cevizli – 7 km	Yes	-	No	Cevizli – 7 km	No	Burç – 7 km
	Gülpınar	Yes	-	Yes	-	No	Burç — 7 km	No	Burç – 7 km
	Ozanlı	No	Cevizli – 7 km	Yes	-	No	Cevizli – 7 km	No	Burç – 7 km
	Çörekli	No	Cevizli – 6 km	No	Cevizli – 6 km	No	Cevizli – 6 km	No	Burç – 13 km
	Ufacık	No	Cevizli – 7 km	No	Cevizli	No	Cevizli	No	Burç – 7km

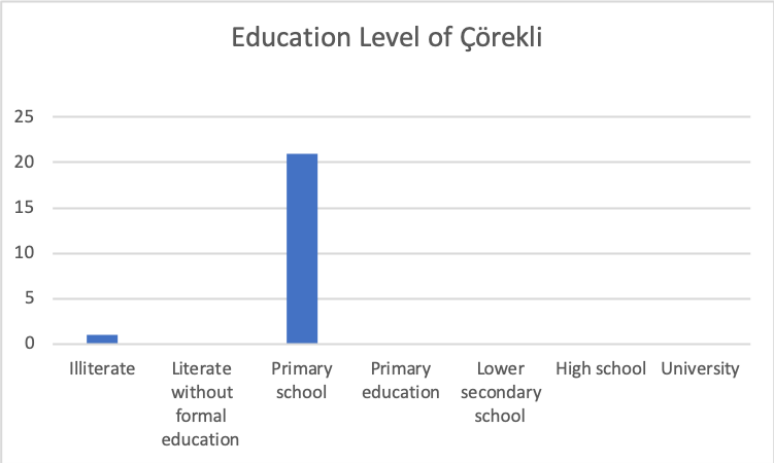
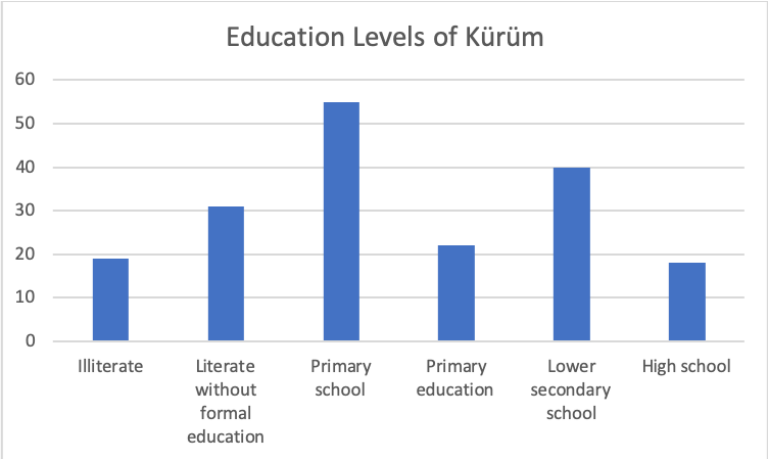
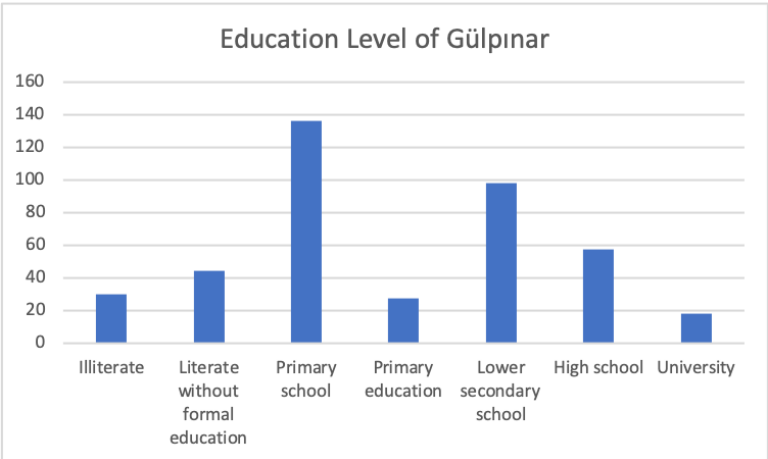
Transported education is the education carried out in villages with low populations and dispersed settlements by the daily transportation of students within the scope of compulsory education to central schools in larger settlements such as districts and provinces (The Ministry of National Education, 2022). The transported education has advantages and disadvantages for the state and the individual. According to the data obtained, the problems transported students face are mainly being late for class, insomnia, parents being away from school, dissatisfaction with service vehicles and food (Üstün, Bayar, & Keskin, 2020).

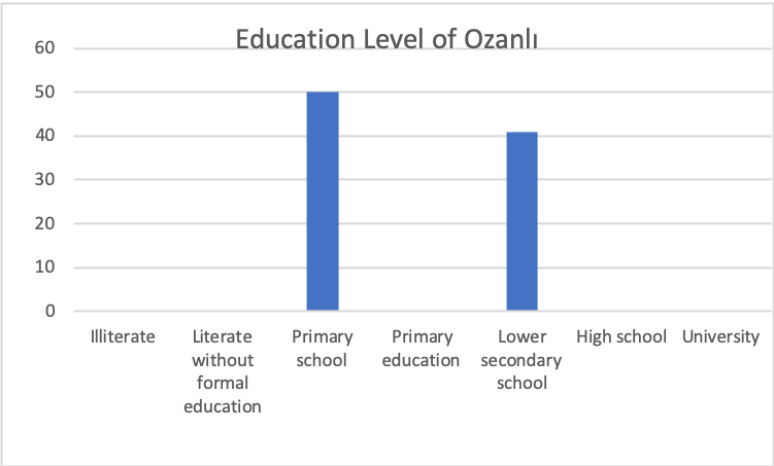
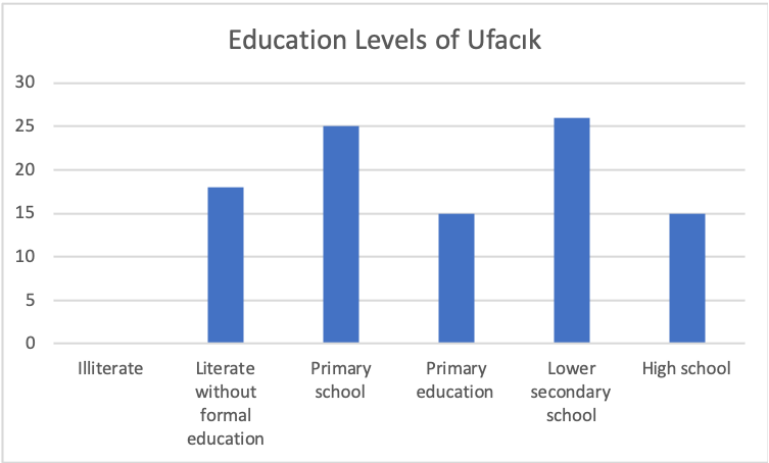
As transported education became widespread, the village schools within its sphere of influence were also closed. The absence of schools and teachers in the villages has led to migration, the education level of the individuals living in the villages decreased, and the children travel constantly, and encounter problems related to public health and safety.

Education Levels

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

Table 6-53: Education levels of the V/N population

District	V/N	Education Levels
Şahinbey	Çörekli	
	Kürüm	
	Gülpınar	

District	V/N	Education Levels
	Ozanlı	
	Ufacık	

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

- In Çörekli village, the majority of the population graduated from primary school. No one in the village has graduated from an education level other than primary school. At the same time, there are also people in the village who have never received any education and are illiterate.
- In Kürüm village, the majority of the population is primary school graduates. After primary school graduates, lower secondary school graduates constitute the majority. There are illiterate people in the village.
- In Gülpınar village, the majority of the population graduated from primary school. After primary school, lower secondary school graduates constitute the majority. Unlike other villages, there are university graduates in the village. In addition, there are illiterate people in the village.
- In Ozanlı village, the population consists of only primary and lower secondary school graduates. There are no illiterate people in the village.
- In Ufacık village, the majority of the population graduated from secondary school. The number of secondary school and primary school graduates is close to each other. There are no illiterate people in the village.

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 Gaziantep, Şahinbey, 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 Gaziantep, 55 institutions provide health services in Gaziantep. The city has 7 State Hospitals, 16 Private Hospital, 3 Oral and Dental Health Centre, 6 Dialysis Centres, 2 Medical Centre, 3 Physical Therapy and Rehabilitation Training and Research Hospital and 2 Training and Research Hospital. The total number of beds in the province is 6656. A total of 15,076 health personnel work in Gaziantep and there are 2 doctors per thousand people.

Some selected health-related statistics of Gaziantep Province are presented in the table below.

Table 6-54: Health Indicators of Gaziantep

Health Indicators	Quantity
Number of Hospitals	33
Number of Bed	6656
Number of Hospital Bed per 10,000 Population	31,2
Number of Qualified Bed	3442
Number of Intensive Care Unit Bed	1626
Proportion of Qualified Bed	68,4
Intensive Care Unit Bed per 10,000 Population	7,6
Number of Family Medicine Unit	747
Population per Family Medicine Unit	2852

Source: (General Directorate of Health Service & General Directorate of Public Health, 2021)

There are 4 state hospitals located in the AoI, the Şahinbey district:

- Gaziantep Dr.Ersin Arslan Training and Research Hospital
- Gaziantep University Şahinbey Research and Implementation Hospital
- Gaziantep University Children's Hospital
- Gaziantep University Oncology Hospital

There are 9 Private Hospitals, 1 Oral and Dental Health Centre, 1 Medical Centre, 2 Physical Therapy and Rehabilitation Centre, 2 Dialysis Centre, 1 IVF Centre, and 1 Eye Disease Hospital in the AoI, Şahinbey.

6.2.8.3 Village and Neighborhood Level

Most of the villages do not have primary health care units; in Kürüm village, It turned out that the primary health care unit was unusable as the earthquake heavily damaged it. These primary health care units only meet the basic health needs of the communities, and for more complex health problems, local people use city hospitals if possible. In V/Ns that do not have a health unit, they go to Cevizli or Burç villages for primary health care. For secondary health care, the Şahinbey district centre is visited.

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 Gaziantep and Şahinbey district located in the AoI through the information gathered through the secondary and the primary data.

6.2.9.2 Province and District Level

Housing

The data for the building permit statistics of the Gaziantep Province according to 2022 Building Permit Statistics is presented in the table below.

Table 6-55: Data for the Building Permit Statistics of the Gaziantep 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
2520	22,534	5,440,127	1590	15,186	3,473,306

Source: (TURKSTAT, Building Permit Statistics, 2022)

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

Table 6-56: Number of Households by Ownership Status of Housing Unit

Province	Number of households residing in dwellings	Owner (%)	Tenant (%)	Other (%)	Unknown
Gaziantep	522,947	55.5	36.1	7.6	0.9

Source: Turkish Statistical Institute, 2023

Table 6-57: 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+
Gaziantep	522,947	3.3	13.9	43.6	37.1	5.4

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 Gaziantep province is presented in the table below.

Table 6-58: Rivers of Gaziantep Province

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

Source: Gaziantep Province Environmental Status Report, 2021

According to the Gaziantep Province 2021 Year Environmental Status Report (2022), In Gaziantep, drinking water is supplied from Kartalkaya Dam, Mizmilli Groundwater springs and City centre drilling wells. From Birecik Dam Lake and Karpuzatan Spring to Nizip district; Drinking water is provided to Karkamış district from Karkamış Dam Lake and underground water source. Drinking water is supplied to the district centres of Araban and Yavuzeli from Karapınar natural spring waters and the rural neighbourhoods of these districts from underground water sources. In all other districts and sub-districts, drinking water is supplied from underground water sources.

Wastewater and Sanitation

In Gaziantep, there are a total of 15 wastewater treatment plants including 1 biological, 4 advanced biological and 10 package wastewater treatment plants. GASKİ Central WWTP 1.000.000 person/day, Kızılhisar WWTP 150.000 person/day, Oğuzeli WWTP 40.000 person/day Araban WWTP 19.000 person/day, Nurdağı 30.000 person/day capacity.

Gaziantep is in the 5th place in industry and commerce across the country. It has Turkey's largest industrial site. There are five Organized Industrial Zones.

The water used in Gaziantep Organized Industrial Zone is supplied from Kartalkaya Dam and wells. Wastewater is treated at the Organized Industrial Zone Wastewater Treatment Plant and discharged to Samözü Stream, a dry stream. The capacity of the wastewater treatment plant is 20,075,000 m³/year (Gaziantep Province 2021 Environmental Status Report, 2022).

The infrastructure data for wastewater, drinking water, potable water, and sanitation of the Gaziantep province as of 2020 are presented in the tables below.

Table 6-59: The Infrastructure Data for Wastewater and Sanitation of Gaziantep 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 (%)
6	89.1	200	98

Source: Turkish Statistical Institute, 2020

Table 6-60: The Infrastructure Data for Drinking and Potable Water and Sanitation of the Gaziantep 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 M3/Year)
4	95	183,839	72	139,858

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 Gaziantep Province, the supply and the distribution company are Toroslar Electricity Distribution Inc. Co. (Toroslar EDAŞ)

Toroslar Electricity Distribution Inc. Co. distributes electricity to Adana, Gaziantep, Hatay, Kilis, Mersin and Osmaniye provinces to a population of 8.5 million. In 2021, approximately 16.62 TWh of electricity was distributed with 46,492 transformers on its 143.346 km long distribution line. This rate constitutes 9.1% of the total electrical energy consumed in Turkey. (Toroslar, 2021)

The total electricity consumption is 9,120,716 megawatt-hour (MWh), and the total electricity consumption per capita is 4,281 kilowatt-hours (Kwh) in the Gaziantep province (TURKSTAT, Energy Statistics, 2021).

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 Turkey.

In 2022, 782.455 million Sm^3 of pipe gas, 2.300 million Sm^3 of liquefied natural gas (LNG), 1.795 million Sm^3 of Compressed Natural Gas (CNG), and a total of 786,550 million Sm^3 of natural gas were consumed in Gaziantep (Energy Market Regulatory Agency, 2021).

Waste disposal

The wastes are disposed of in the Solid Waste Landfill Facility in Mazmahor Uzundere Locality, 11 km away from the city centre. Solid Waste Landfill Facility has a capacity of 30 million m^3. The surface area of the used area of the site is 1.5 million m2, and approximately 5 million m2 of land has been allocated as a sanitary landfill.

The number of waste treatment facilities in Gaziantep province as of 2021 is presented in the table below.

Table 6-61: Waste Management Facilities in Gaziantep

Facility Type	Number
Solid Waste Disposal Facilities (Municipal)	2
Licensed Packaging Waste Collection, Separation and Recovery Facilities	103
Hazardous Waste Recovery Facilities	11
Waste Oil Recovery Facilities	1
Waste Vegetable Oil Recovery Facilities	0
Waste Battery and Accumulator Recovery Facilities	4
End-of-Life Tire Recovery Facilities	0
Medical Waste Sterilization Facilities	1
Non-Hazardous Waste Recovery Facilities	154
Waste Electrical and Electronic Goods Processing Plants	1
Mine Waste Disposal Facilities	1

Source: (Gaziantep Province 2021 Environmental Status Report, 2022)

Fire service

According to the Laws of Municipalities, it is the duty of municipalities to establish fire organizations. Under this law, Municipality of Gaziantep and district municipalities has fire organizations. According to the Gaziantep Municipality 2022 Year Activity Report, the Gaziantep Fire Department intervened a total of 7466 incidents, including 4623 fires and 2843 rescues, in 2022 with 392 personnel.

The services provided by the Gaziantep 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 Gaziantep Provincial Police Department, and Şahinbey 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 Şahinbey District Gendarmerie Command in the Şahinbey 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. Gaziantep 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

Gaziantep is affiliated with the 5th Regional Directorate of Highways, which has a coverage area of 61,683 km² and includes Adana, Gaziantep, Hatay, Mersin, Kahramanmaraş, Kilis and Osmaniye provinces within its borders and parts of Malatya, Kayseri, and Adıyaman. According to the website of the 5th Regional Directorate of the General Directorate of Highways, 631 km motorway, 2073 km state road, 2576 km provincial road, and a total of 5280 km of road are within the region of responsibility of the 5th Regional Directorate of Highways. The population of the region is 9,915,392. There are 161 people per km². The number of registered vehicles within the borders of the region is 3,187,911.

Table 6-62: Road Network in Gaziantep Province

Road Network by Surface Type (km)								
	Asphalt Roads			Parquet	Stabilize	Soil	Other Roads	Network Length
	Asphalt Concrete	Surface Coating	Total					
Motorway	631	-	631	-	-	-	-	631
State Road	1246	827	2073	3	-	-	70	2146
Provincial Road	229	2347	2576	17	17	15	48	2673
Total	2106	3174	5280	20	17	15	118	5450

Source: (General Directorate of Highways, 2023)

Railway

Gaziray, which provides modern suburban service between Başpınar and Oduncular in Gaziantep, was laid on April 21, 2018. Gaziray Project, carried out in cooperation between TCDD and Gaziantep Metropolitan Municipality, was opened on November 5 2022. Within the scope of the Gaziray Project, 112 km of railways were built, including 2 suburban lines and 2 high-speed train lines, within a 25.5 km route.

Airway

Gaziantep Oğuzeli Airport is located within the Oğuzeli district's borders and 20 km southeast of Gaziantep province. The airport came into service in 1976. In December 2021, a new terminal building was opened next to the old terminal building of the airport, which will appeal to 6 million people annually.

Public space and recreation

According to the latest data of Turkish Statistical Institute (Library and Museum Statistics, 2021), in Gaziantep as of 2022 there are:

- 6 theatres with a total of 4576 seats
- 21 cinema halls with a total of 1986 seats
- 13 Public libraries with a total of 244,352 books inside
- 3 museums affiliated with the Ministry of Culture and Tourism with a total of 114,731 artifacts
- 12 private museums with a total of 1869 artifacts
- 4 ruins

According to the Gaziantep Province 2022 Year Environmental Status Report (2022) there is no national park in Gaziantep. There are two national parks in the Şahinbey District of Gaziantep, which are the Burç National Park and the Allaben National Park. There are also two national parks in the Şehitkamil and the İslahiye Districts of Gaziantep, which are the Düllükbaba National Park and the Huzurlu Terapi National Park.

6.2.9.3 Village and Neighbourhood 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 6-63: 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	
Şahinbey	Çörekli	Yes	IN	Yes	S	Yes	S	Yes	S	No	IN	Stove	S	Yes	S	Yes	IN	Yes	IN	Yes	S	No	IN	No	IN	Yes	S	Yes	IN	Yes	S
	Kürüm	Yes	IN	Yes	S	Yes	S	Yes	S	Yes	IN	Stove	S	Yes	S	Yes	S	Yes	S	Yes	IN	Yes	IN	Yes	IN	No	IN	Yes	S	Yes	S
	Gülpınar	Yes	IN	Yes	S	Yes	S	Yes	IN	Yes	S	Stove	S	Yes	S	Yes	S	Yes	S	Yes	IN	Yes	NA	Yes	IN	Yes	S	Yes	S	Yes	IN
	Ozanlı	Yes	IN	Yes	S	Yes	S	Yes	S	Yes	S	Stove	S	Yes	S	Yes	S	No	IN	Yes	S	Yes	S	No	IN	Yes	S	Yes	S	Yes	S
	Ufacık	Yes	S	Yes	S	Yes	S	Yes	S	Yes	S	Stove	S	Yes	S	Yes	IN	No	IN	Yes	S	No	IN	Yes	NA	Yes	S	Yes	S	Yes	S

*S: Sufficient; IN: Insufficient; NA: Not Applicable

Çörekli

- There are electricity cuts frequently.
- There are no sewage system in the village. They conveyed their complaints to CIMER, but because the village is small, the sewerage system was not built.
- There are telecommunication problems in the village.
- There are no health units in the village. The nearest health unit to the village is in the Cevizli, which is 6 km away.
- There are no schools in the village. The nearest preschool, primary and lower secondary schools are in the Cevizli village, which is 6 km away; the nearest high school is in the Burç town, which is 13 km away.
- There is a cemetery in the village but it is not enough.

Kürüm

- There are electricity cuts 3-4 times a week.
- There is a sewage system in the village, but it is not sufficient.
- The roads are narrow and they want the roads to be paved with asphalt.
- There is a health centre, but it was heavily damaged due to the earthquake on February 6, 2023. For this reason, the health centre cannot be used.
- There is only a primary school in the village. The school became unusable as it was heavily damaged due to the earthquake. Students continue their education at the prefabricated school. There are no lower secondary and high schools in the village. The nearest lower secondary school in the Cevizli; which is 7 km away, and the nearest high school is in the Burç; which is 7 km away.
- The mosque was destroyed due to the earthquake. There is currently no mosque in the village.
- Kürüm is one of the villages most affected by the earthquake. Due to the earthquake, 30 houses were destroyed, 167 houses were heavily damaged, and 15 houses were slightly damaged.

Gülpınar

- There are electricity cuts frequently.
- The irrigation water capacity is not enough for the village due to drought.
- The roads are narrow and broken in the village.
- There is a health unit but it is not used. They go to the city centre to get health services.
- There are no lower secondary and high school in the village. The nearest lower secondary school and high school are in the Burç; which is 7 km away.
- Public transport frequency is not sufficient.

Ozanlı

- There are electricity cuts frequently.
- There is no internet infrastructure in the village.
- There are no lower secondary and high school in the village. The nearest lower secondary school is in the Cevizli; which is 7 km away, and the nearest high school is in the Burç; which is 7 km away.

Ufacık

- Telecommunication services are not sufficient in the village and there is no internet infrastructure.
- There is a primary school in the village but it is not used. The nearest primary, lower secondary and high school are in the Cevizli; which is 9 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.

According to the official correspondence dated 19.04.2022 and numbered 2423592 from Gaziantep Cultural Heritage Preservation Regional Board Directorate of the Ministry of Culture and Tourism, General Directorate of Cultural Heritage and Museums, there is Çörekli Stone Quarry, which is registered as a 1st Degree Archaeological Site, approximately 200 meters south of the project area, and attention will be paid to this area during the construction works.

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".
- However, during the construction and physical interventions to be made, in accordance with the provision of "obligation To inform" in Article 4 of the Law numbered 2863, if any finds or relics that are immovable cultural property to be protected as specified in Article 6 of the same law are found, it is obligatory to immediately stop the work and report this to the nearest Museum Directorate or to the headman in the village or to the local authorities in other places within 3 (three) days at the latest. Regarding the legal and private persons who do not notify, action will be taken within the scope of Article 9 of the Law No. 2863.

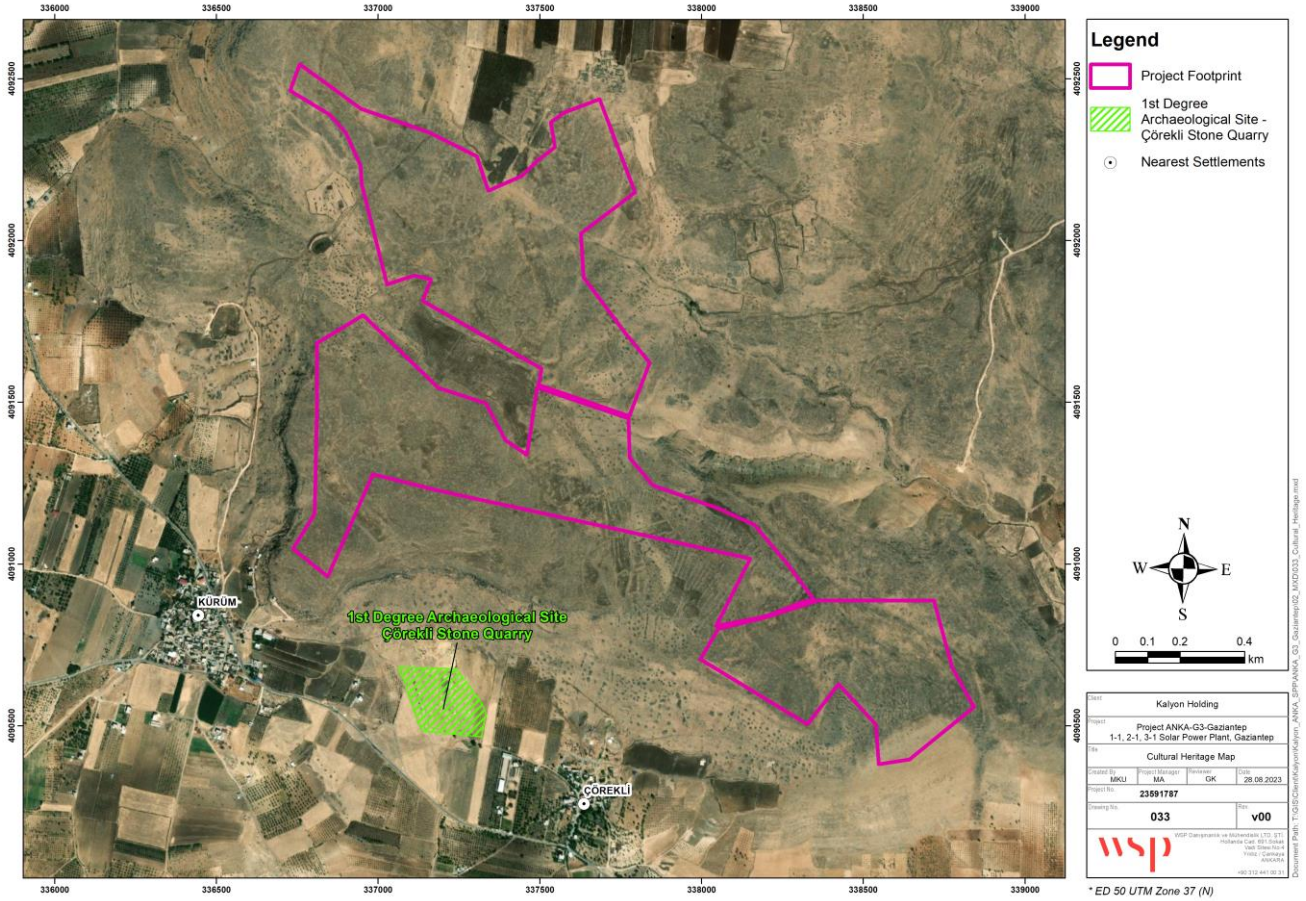


Figure 6-43: Cultural Heritage around the Project Area

Sensitivity assessment

Sensitivity features	Supported by	Sensitivity value
Absence of archaeological heritage in the AoI	Official Letters	Low-Medium

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 3 neighbourhoods within 2 km of Project area, namely Kürüm, Ozanlı and Çörekli 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 6-64 and Figure 6-44). The pictures from these areas were taken towards to Project area (see Figure 6-45 - Figure 6-49)

Table 6-64: Selected Viewpoints

No	Description	Distance to the Project Area
1	Nearest Residential Area in Kürüm Neighbourhood	~100 m
2	Kürümlü Elementary School	~260 m
3	Nearest Residential Area in Ozanlı Neighbourhood	~850 m
4	Ozanlı Social Facilities	~1900 m
5	Nearest Residential Area in Çörekli Neighbourhood	~350 m

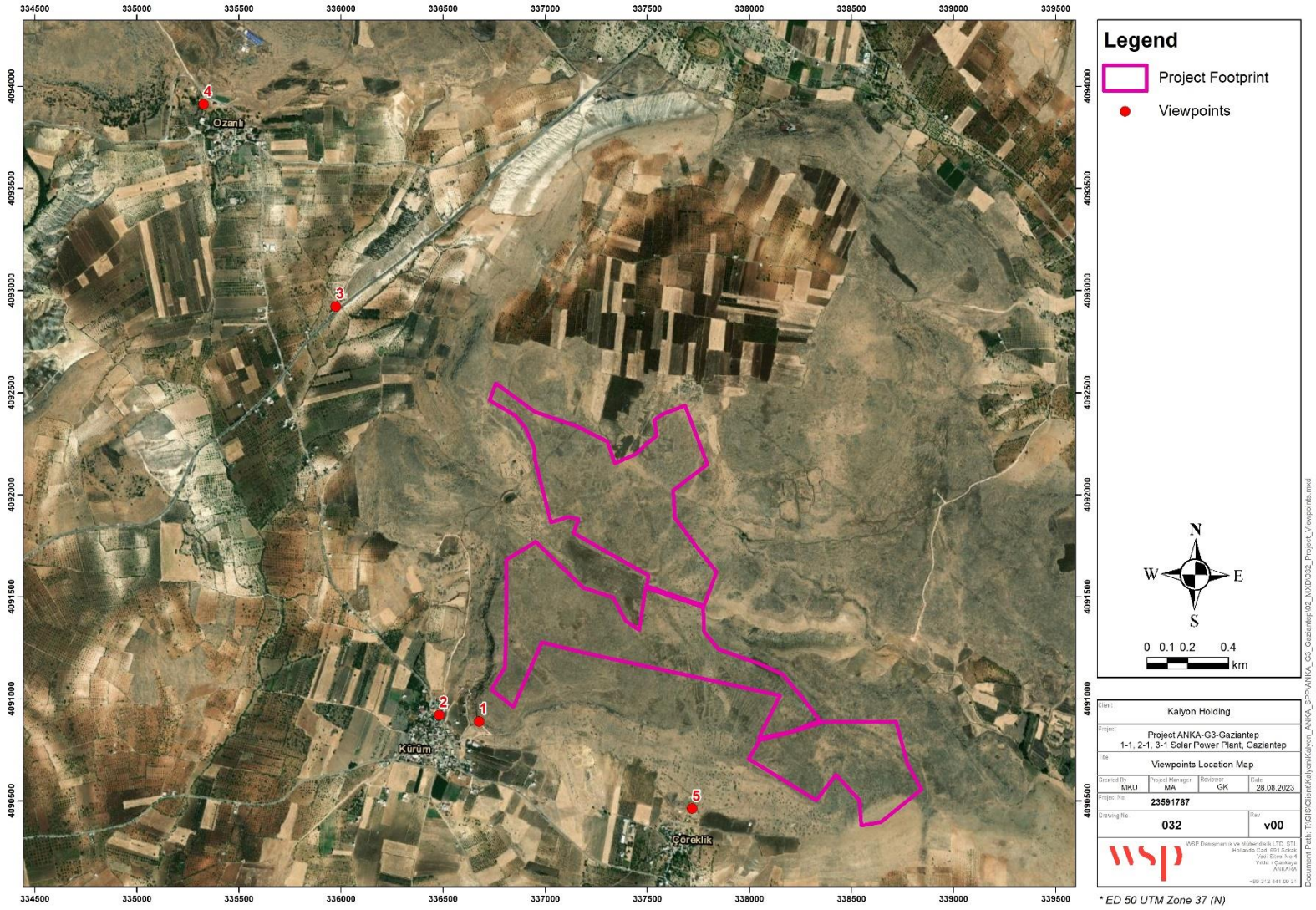


Figure 6-44: Selected Viewpoints

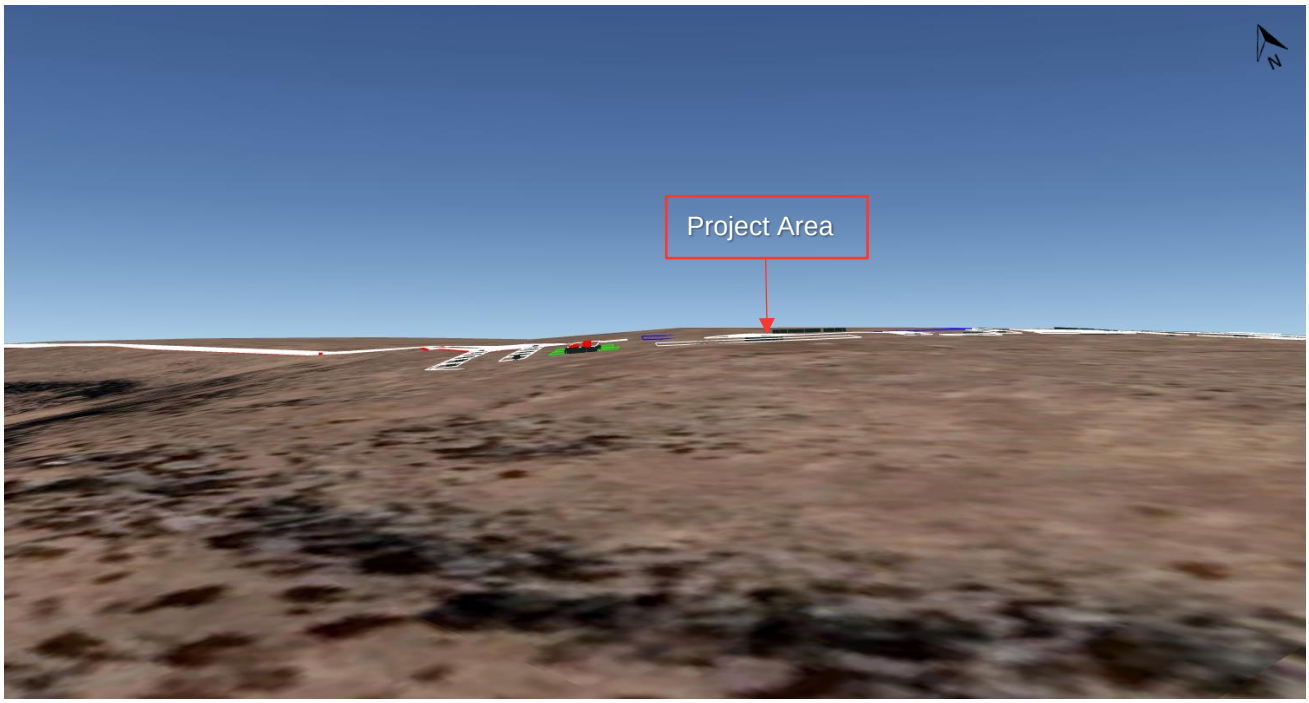


Figure 6-45: Project area View from Viewpoint 1

Figure 6-46: Project area View from Viewpoint 2

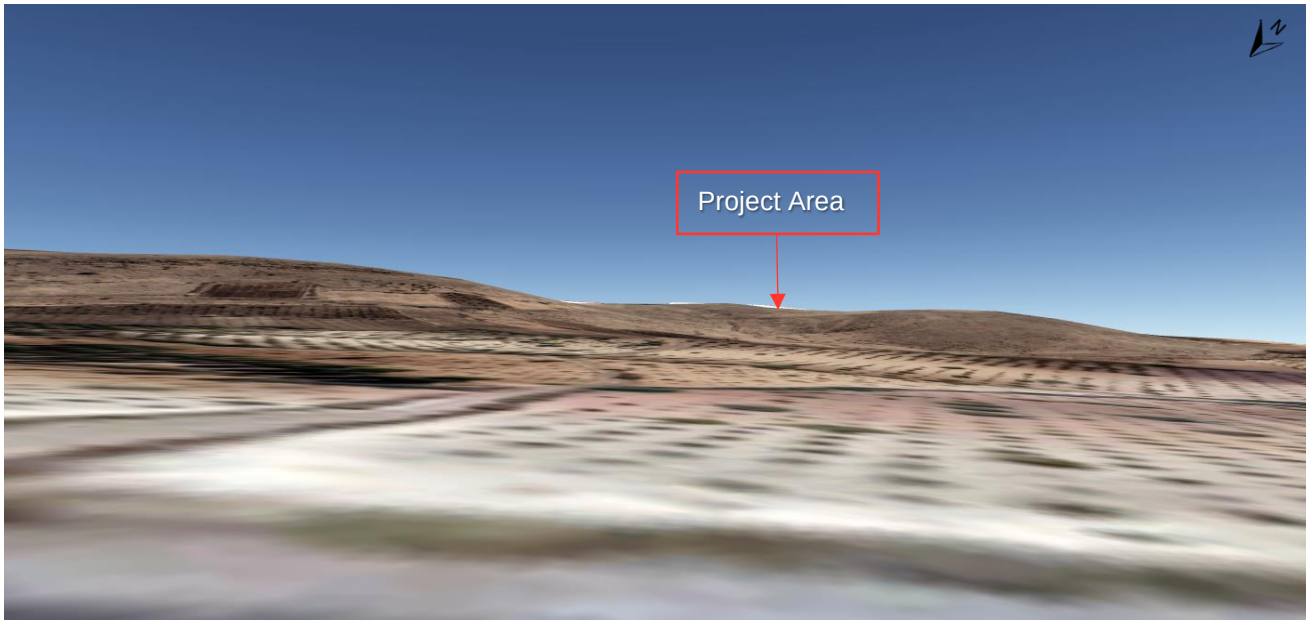


Figure 6-47: Project area View from Viewpoint 3

Figure 6-48: Project area View from Viewpoint 4

Figure 6-49: 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 literature review to determine the species and habitats potentially occurring within and in the vicinity of the project.

For this Project the RSA have been identified based bio-geographic characteristics corresponds to the **"Eastern Mediterranean conifer-sclerophyllous-broadleaf forests-PA1207"** terrestrial ecoregion which is considered part of the broader "Mediterranean Forests, woodlands and scrubs" biome category (Olson et al., 2001[11]) (see Figure 6-50)

[11] Olson, David M., et al. "Terrestrial Ecoregions of the World: A New Map of Life on Earth. A new global map of terrestrial ecoregions provides an innovative tool for conserving biodiversity." BioScience 51.11 (2001): 933-938.

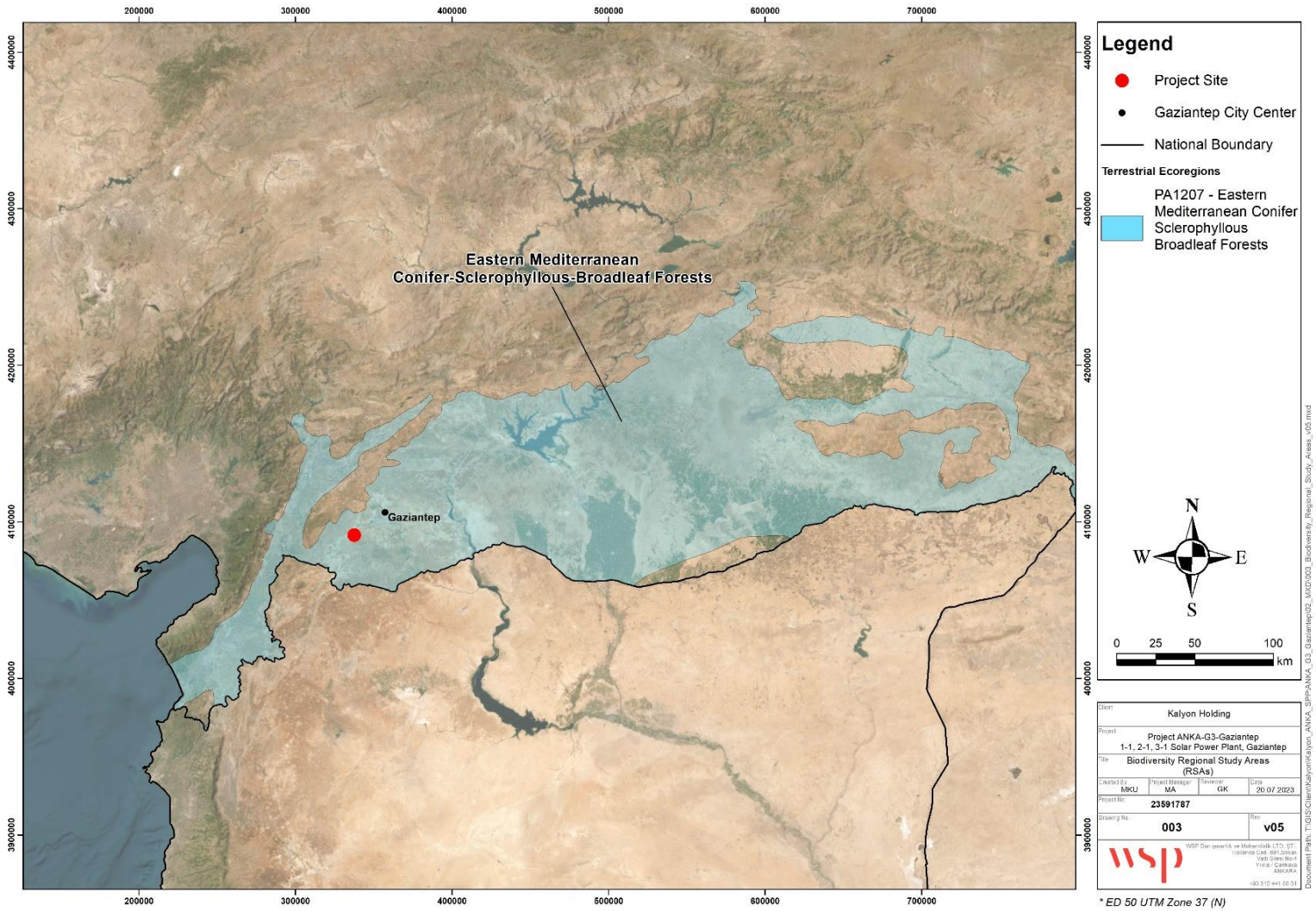


Figure 6-50: Biodiversity Regional Study Area (RSA)

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 1.236,51 ha within the provinces of Gaziantep.

The Project biodiversity AoI is illustrated in Figure 6-51.Biodiversity terrestrial area of influence (AoI) below. The biodiversity AoI is included in the wider RSA.

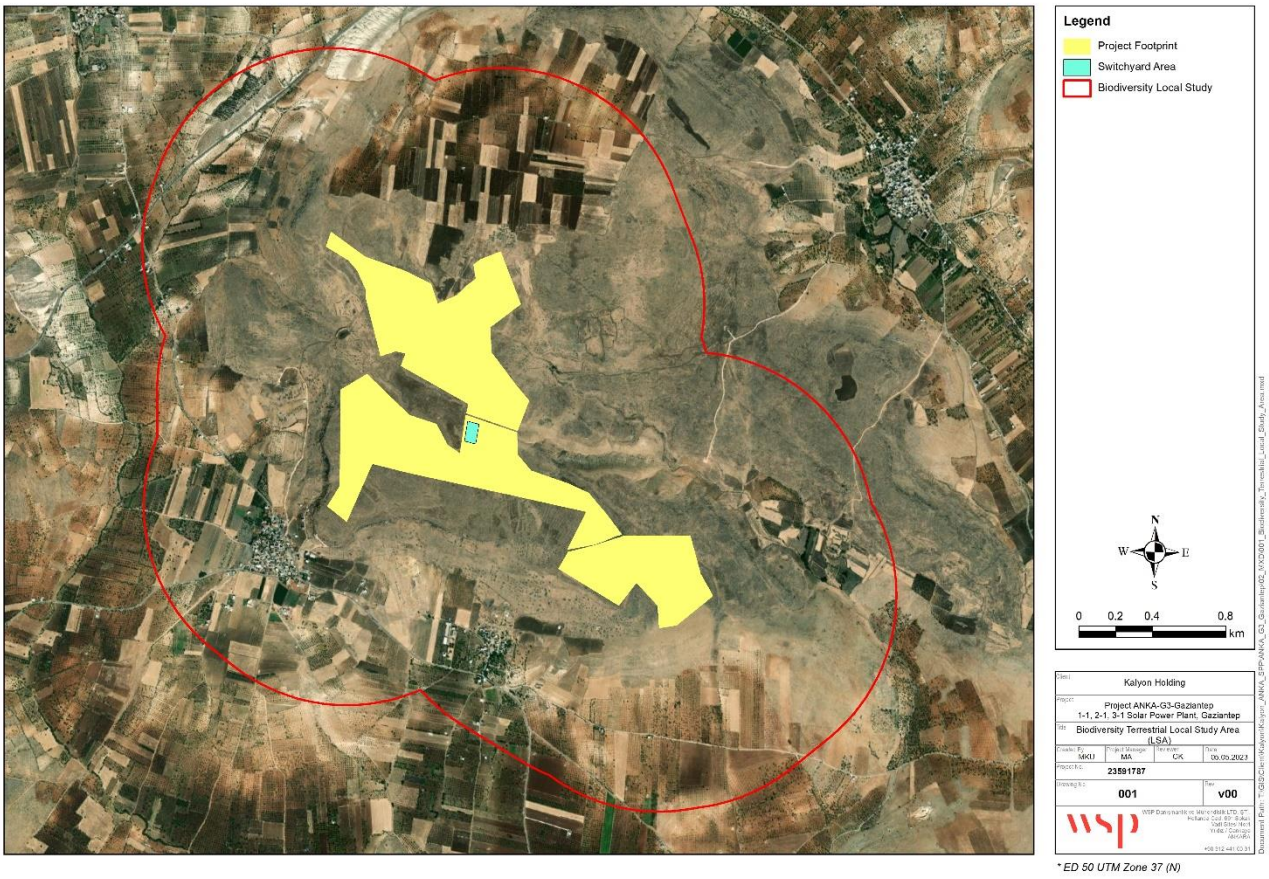


Figure 6-51: Biodiversity terrestrial area of influence (AoI)

6.3.2 Methodology

6.3.2.1 Desktop studies

Literature review focused on the terrestrial RSA in order to document available data on terrestrial 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**
  - G3-Gaziantep-1-1, 2-1, 3-1 SPP (26 MWp/26 MWm/ 20 MWe-49,98 ha) Project- Local EIA report, 2022
- **Scientific publications and other official publications used for desktop analysis.**

  - 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 Türkiye: 122 Key Turkish Botanical Sites. WWF Türkiye, Istanbul.
  - Davis, P.H. (ed.). (1965-1988) Flora of Türkiye and the East Aegean Islands, vol. 1-10, Edinburgh Univ. Press: Edinburgh.
  - Edmonson, J. (2002) Türkiye bitkileri kırmızı kitabi (eğrelti ve tohumlu bitkiler)/Red Data Book of Turkish Plants (Pteridophyta and Spermatophyta). Edited by T. Ekim, M. Koyuncu, M. Vural, H. Duman, Z. Aytaç & N. Adıgüzel. Ankara: Turkish Association for the Conservation of Nature, and Van Centennial University. 2000. ix+ 246pp., 96 colour plates. ISBN 975 93611 0 8. $54.00 (hardback). Edinburgh Journal of Botany, 59(3), 459-466.
  - Eken G., Bozdogan M., Isfendiyaroglu S., Kilic DT., Lise Y. (editors) 2006. Key Biodiversity Areas of Türkiye, Nature Society, Ankara.
  - Ekim, T. et al. (2000). Turkiye Bitkileri Kirmizi Kitabı (Red Data Book of Turkish Plants). Turkiye Tabiatını Koruma Dernegi. Yayın No:18.
  - Kibaroglu, A., Klaphake, A., Kramer, A., Scheumann, W., & Carius, A. (2005) Cooperation on Türkiye's transboundary waters. Status Report commissioned by the German Federal Ministry for Environment Nature Conservation and Nuclear Safety, F+ E. Project, (903), 19.
  - Kirwan, G.M, K.A. Boyla, P. Castell, B. Demirci, M. Ozen, H. Welch and T. Marlow., 2008. The birds of Türkiye: a study of the distribution, taxonomy and breeding of Turkish birds. Christopher Helm. London.
  - 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
  - Takhtajan, A. (1986) Floristic regions of the world. University of California Press, Berkley/Los Angeles/London.
  - Zohary, M. (1973) Geobotanical foundations of the Middle East, 2 vols. Gustav Fischer Verlag, Stuttgart.
  - 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.
  - 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.

- **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 in May 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. Within the scope of EIA studies, in order to determine the existing flora and fauna elements in the G3-Gaziantep SPP Projects area or its immediate surroundings within the borders of Şahinbey district of Gaziantep province, in October 2021, March and April 2022 were carried out by Expert Biologist Mehmet GÜL and Expert Biologist Mert Oktay BAYKAN. Within the scope of these studies, the SPP Activities Evaluation Report was prepared and presented in EIA Report-Annex-13. 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 10 different sampling points (SPs) within the AoI on 10th of May 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 37N) 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 6-65, while their location is shown in Figure 6-52.

Previous filed studies were also conducted in 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 Türkiye and East Aegen Islands*[12] piece of work.

Table 6-65: Terrestrial flora and habitats, sampling points and coordinates

Field ID	Coordinates (Decimal Degrees, WGS84 UTM Zone 37N)	
	Longitude	Latitude
SP01	37.191005693	36.947954683
SP02	37.18584747	36.94685372
SP03	37.18137295	36.947338236
SP04	37.17894346	36.95080067
SP05	37.18153649	36.95356188
SP06	37.174899363	36.95667982
SP07	37.169672325	36.9605334

[12] Davis, P.H. (ed.). (1965-1988) Flora of Türkiye and the East Aegean Islands, vol. 1-10, Edinburgh Univ. Press: Edinburgh.

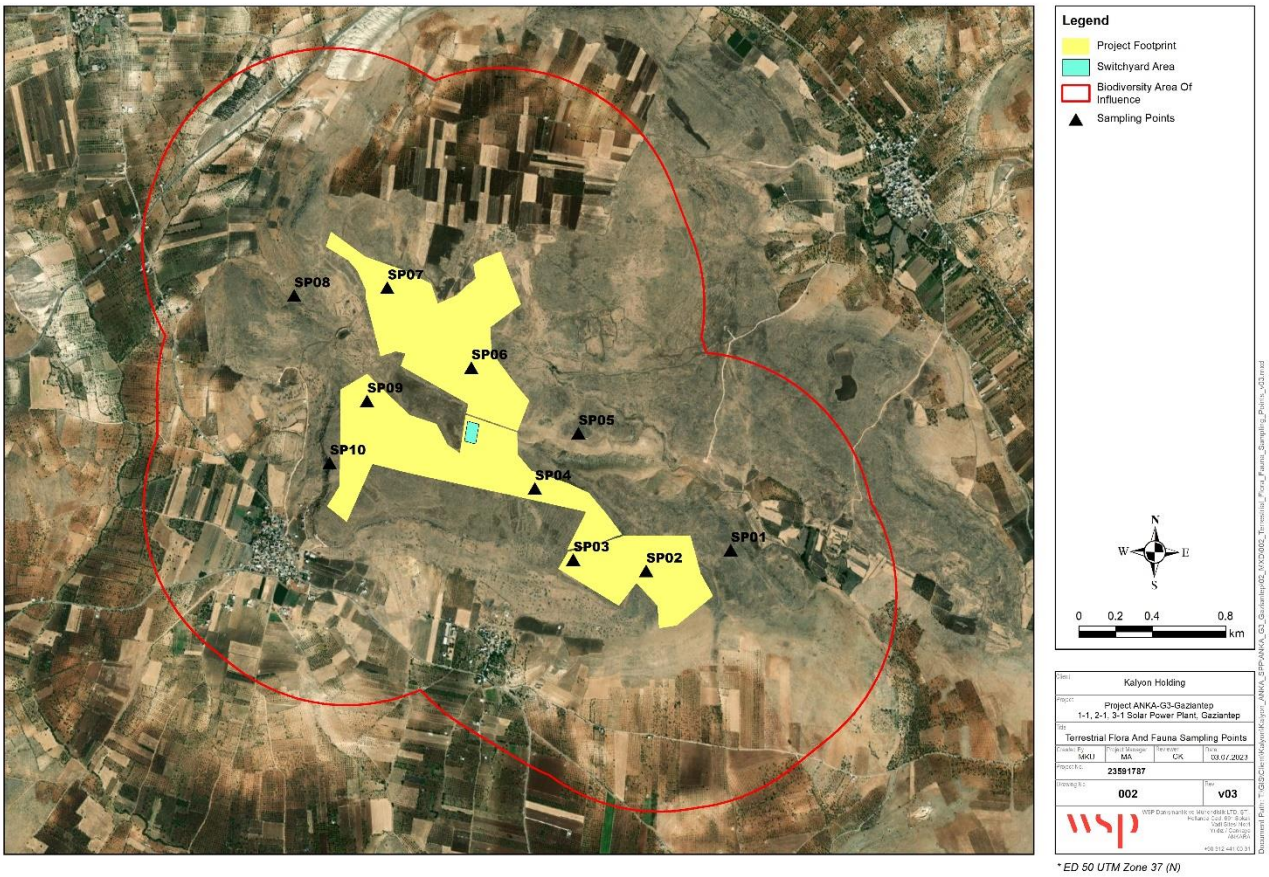


Figure 6-52: Terrestrial flora, fauna and habitats sampling points during June 2023 surveys

6.3.2.2.2 Terrestrial fauna survey

Field studies on terrestrial fauna were performed within the Aol by expert zoologists Asst. Prof. Safak Bulut on 10th May 2023 and Asst. Prof. Onur Candan on 17th May 2023.

Walk over surveys were carried out in the vicinity of ten sampling points 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 6-52.

6.3.2.3 Habitat mapping

Habitat types were identified and mapped in the entire Area of Influence (Aol) 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 May 2023 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 Area of Influence is located within the "**Eastern Mediterranean conifer-sclerophyllous-broadleaf forests**" **(PA1207)** terrestrial ecoregion (Olson et al., 2001)[13] which is part of the broader biome category "Mediterranean Forests, woodlands and scrubs". In Türkiye, it covers the coastal lowlands between the mountains and the Mediterranean, extending from Antalya to Iskenderun and including the Çukurova plain in between. It then extends eastwards through southern Türkiye including the Harran plain (Şanlıurfa) It then extends eastwards through southern Türkiye to where the borders of Iraq, Syria, and Türkiye meet, and southwards along the eastern Mediterranean through the Levant – western Syria, Palestine, Lebanon, and the Jordanian Highlands. The ecoregion has a Mediterranean climate, with a mild, rainy winter and hot dry summer. Pine forests are dominated by Turkish pine (*Pinus brutia*) in artificial form. Kermes oak (*Quercus coccifera*) is abundant and often replaces Turkish and Aleppo pine forests where they have degraded.

Generally, the maquis vegetation abounds, characterized by species such as olive (*Olea europea*), carob (*Cerotonia siliqua*), Palestine oak (*Quercus calliprinos*), turpentine tree (*Pistacia terebinthus*), lentisk (*P. lenticus*) and *Arbutus andrachne*. Much of the maquis has been degraded by frequent fires and over-grazing (Ministry of Environment Urbanization and Climate Change, 2020)[14].

The Project AoI is not located within the boundaries of a legally protected area. An internationally recognized area of importance for biodiversity situated within 17 km from the AoI is Yeşilce Key Biodiversity Area (KBA) and Important Bird Area (IBA) (Figure 6-53). Burç and Dülükbaba Nature Parks are also located northeastern of the AoI about 13 and 18 km respectively, however, these areas are created for recreational purposes, not for the protection of biodiversity and include many artificial facilities such as a safari zoo, an adventure park and various restaurants and facilities.

Yeşilce KBA and IBA

Yeşilce KBA covers the northern part of the Sof (West) Mountains lying to the west and northwest of Gaziantep Province and the hills near the provincial centre. These hills are separated from each other by the tributaries of

[13] 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.

14 Ministry of Environment Urbanization and Climate Change. (2020). Provincial Environmental Status Report. Gaziantep.

Afrin Stream. Çanakçı and Bozaltı streams, which are tributaries of the Euphrates River, originate from the northeast of the KBA. Yeşilce KBA covers a 44.458 ha area.

The KBA has a vegetation consisted of Mediterranean plant species and Iranian-Turanian phytogeographic region. In the western part of the area, hills are characterized by open kermes oak and mountain steppe. Partially opened oak communities characteristically lie between limestone plains and hills. The eastern part of the area is covered with pistachio orchards and plantations. It is considered one of the richest areas in terms of number of species of plants and butterflies of Southern-east Anatolia.

In 2004 the area was recognized as an IBA due to the presence of 20-30 breeding pairs of Cinereous Bunting (*Emberiza cineracea*, NT).

The main treats for these areas are due to the expansion of pistachio cultivation, farming and animal husbandry as well as lime quarries and crushed stone production facilities.

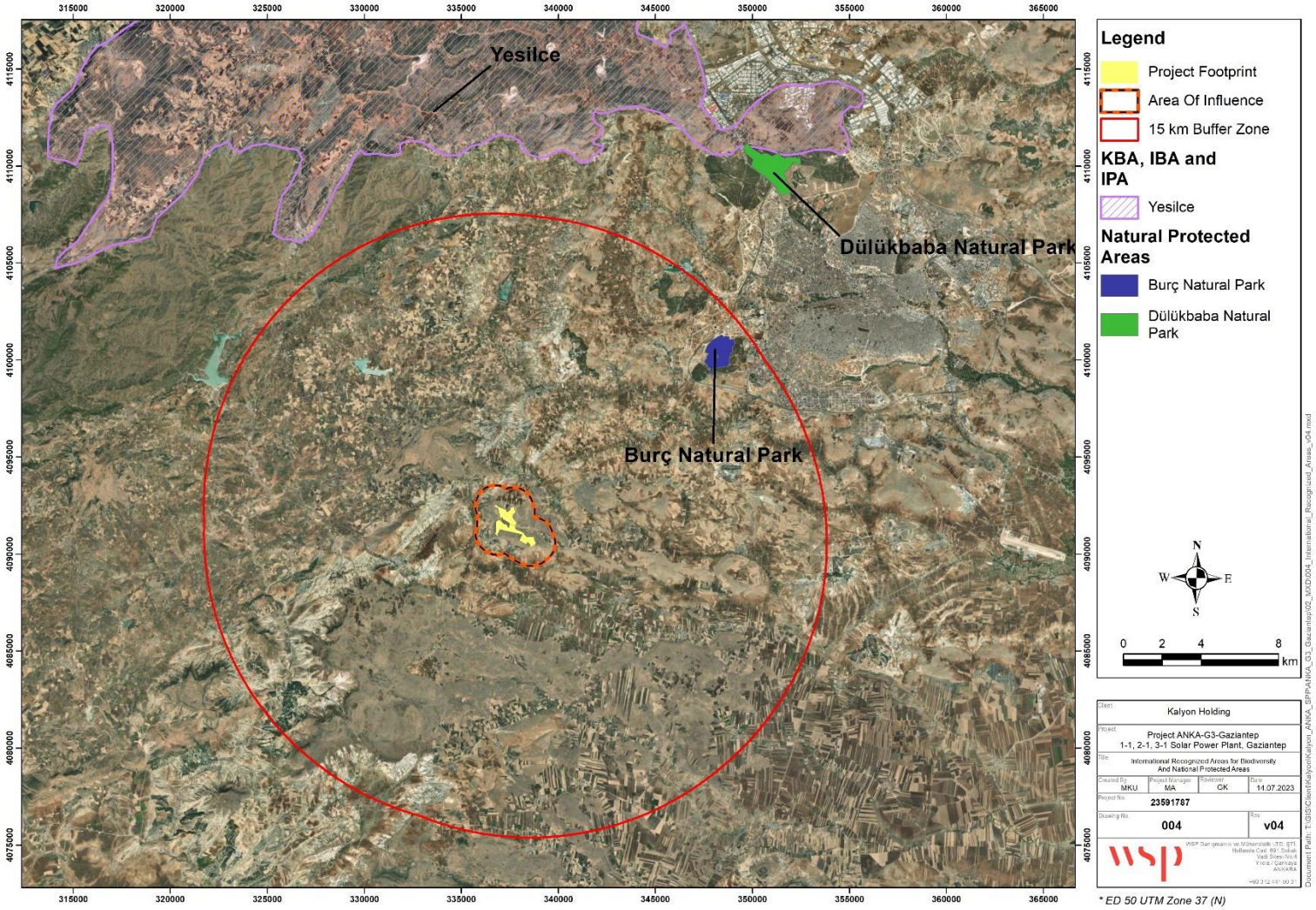


Figure 6-53: International recognized areas for biodiversity and national protected areas in the proximity (15 km) of the Project footprint

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 May 2023 during flora field studies.

The Natural Habitats present in the AoI account for 52%of the total area and are mainly characterized Mediterranean Xeric Grassland (E1.3, 50%) and Basic and Ultra-Basic Inland Cliffs (H3.2, 2%). The basic and ultra-basic inland cliffs (H3.2) are characterized by the presence of endemic species (flora) and it is also sensitive to anthropic disturbance. This habitat type is mainly concentrated in the southern and western part of the AoI.

Natural habitats present in the AoI are characterized by medium to high anthropic disturbance levels, mainly due to grazing pressure grassland.

Modified habitats represent 48% of the AoI and are characterized by mixed crops of market gardens and horticulture (I1.2) and scattered residential buildings (J2.1).

The habitat map of the AoI according to EUNIS habitat classification system is available in Figure 6-54 and the calculations are presented in Table 6-66. A brief description for each EUNIS natural habitat identified in the area is reported below.

Table 6-66: EUNIS habitat types present in the AoI

EUNIS Habitat Type		Total AoI	
		ha	%
Natural habitat			
E 1.3	Mediterranean Xeric Grassland	614.91	50
H 3.2	Basic and Ultra-Basic Inland Cliffs	24.75	2
	Subtotal	**639.66**	**52**
Modified habitat			
J 2.1	Scattered Residential Buildings	20.44	2
I 1.2	Mixed Crops of Market Gardens and Horticulture	576.07	47
J 5.1	Highly Artificial Non-Saline Standing Waters	0.35	<1
	Subtotal	**596.85**	**48**
	Total	**1236.52**	**100**

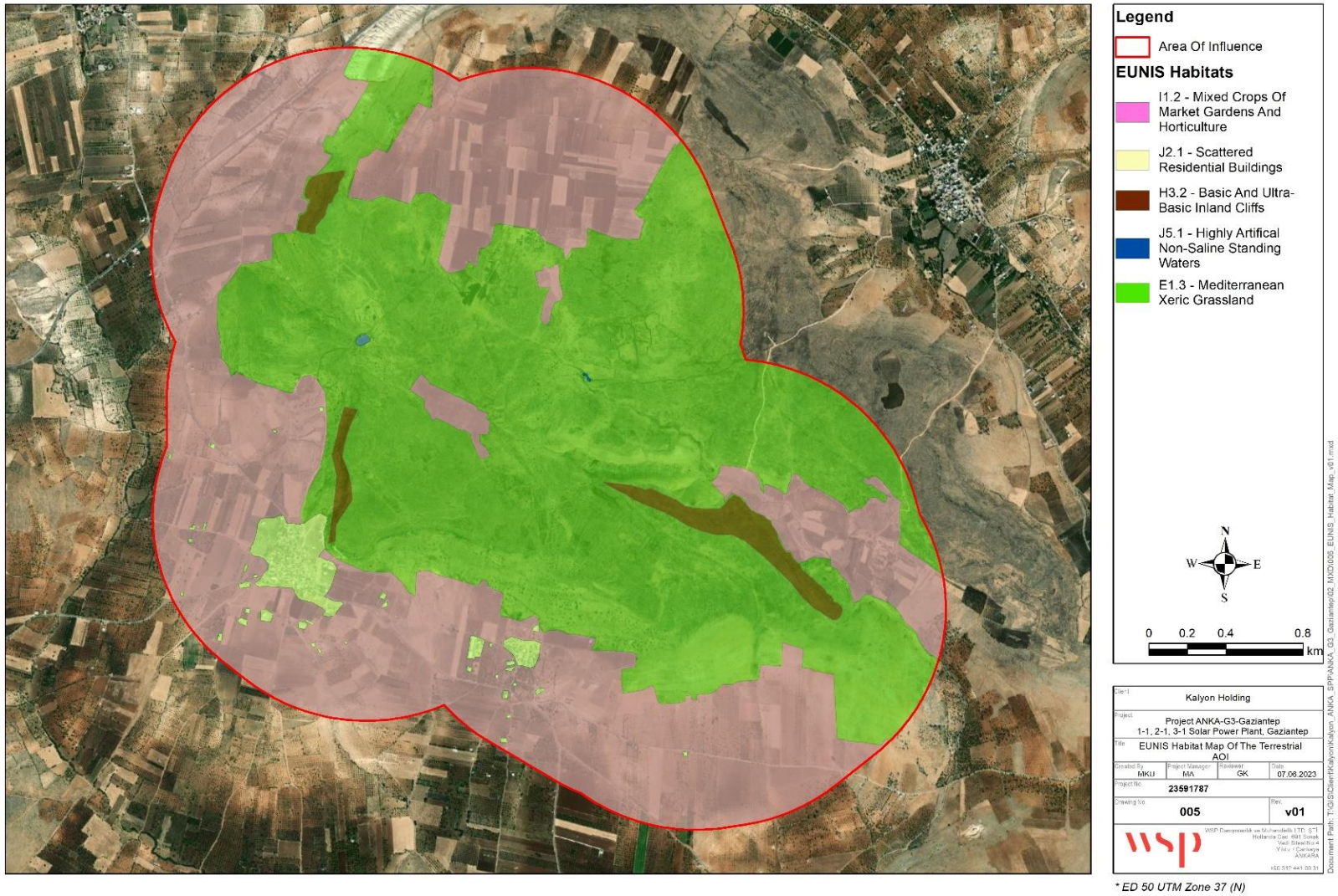


Figure 6-54: EUNIS habitat map of the terrestrial AoI

E1.3 - Mediterranean xeric grassland

Meso- and thermo-Mediterranean xerophile, mostly open, short-grass perennial grasslands rich in therophytes; therophyte communities of oligotrophic soils on base-rich, often calcareous substrates with vegetation of the class Thero-Brachypodietea.

This habitat type represents the habitat dominated by annual herbaceous species in the low altitude Mediterranean region and was encountered at all flora sampling station. The characteristic types of habitats in the project area are herbaceous species such as *Hordeum bulbosum, Aegilops* sp., *Poa bulbosa, Cornucopia cucullata, Trifolium stellatum, Parentucellia* sp., *Lagoecia cuminoides, Phlomis* sp., *Festuca valesiaca* (Figure 6-55).

Figure 6-55: Mediterranean xeric grassland within the Aol

H3.2 - Mediterranean basaltic and ultra-basic cliffs

Dry, calcareous inland cliffs. Specific plant associations colonize montane and Mediterranean cliffs. Most of the subdivisions refer to them. Northern lowland cliffs usually support fragments of other less specialized communities.

It represents a dry sparsely vegetated cliff in the Mediterranean region. Ceterach officinarum, Asplenium sp., Sedum sp. species are distributed in this habitat.

Figure 6-56: Mediterranean basaltic and ultra-basic cliffs within the Aol

6.3.3.3 Flora species

Based on literature review and field work conducted by Prof. Dr. Hayri Duman on the 10st of May2023, 39 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 considered threatened or endemic species are 3 and are listed in the Table 6-67. The complete list of species is available in Appendix D.

According to the National Red List (Turkish Red Data Book of Plants – TRDB) re-evaluated by the local expert (Prof. Dr. Hayri Duman) based on the latest available information on the species distribution and IUCN 2001 criteria, *Symphytum aintabicum* (Figure 6-57) is classified as Vulnerable (VU), *Alopecurus utriculatus* subsp. *gaziantepicus* (Figure 6-58) as Critically Endangered (CR), *Anthemis tricornis* (Figure 6-59) as Near Threatened (NT). *Symphytum aintabicum* and *Alopecurus utriculatus* subsp. *gaziantepicus* are also considered as local endemic and Restricted Range* species.

Table 6-67: Flora species of conservation concern present within the AoI.

Family	Species	Global IUCN	National IUCN status (TRDB, 2000)	End./RR.	Station code	Lit./Ob.
Boraginaceae	*Symphytum aintabicum**	NE	VU	Restricted Range	SP1	O (2023)
Fabaceae	*Alopecurus utriculatus* subsp. *gaziantepicus**	NE	CR	Restricted Range	SP2, SP8	O (2023)
Asteraceae	*Anthemis tricornis*	NE	NT	Regional Endemic	SP6, SP7, SP9	O (2023)

** In absence of more precise data of distribution, the EOO of Symphytum aintabicum and Alopecurus utriculatus subsp. gaziantepicus are conservatively identified as the floristic ecoregion "(7a) Orta Fırat Section", where the species is found. However, it is likely that the species range is smaller in reality and potentially below 50.000 km2. Therefore, using a precautionary approach the species is considered as Restricted Range.*

Figure 6-57: *Symphytum aintabicum* within the AoI

Figure 6-58: *Alopecurus utriculatus subsp. gaziantepicus* within the AoI

Figure 6-59: *Anthemis tricornis* within the AoI

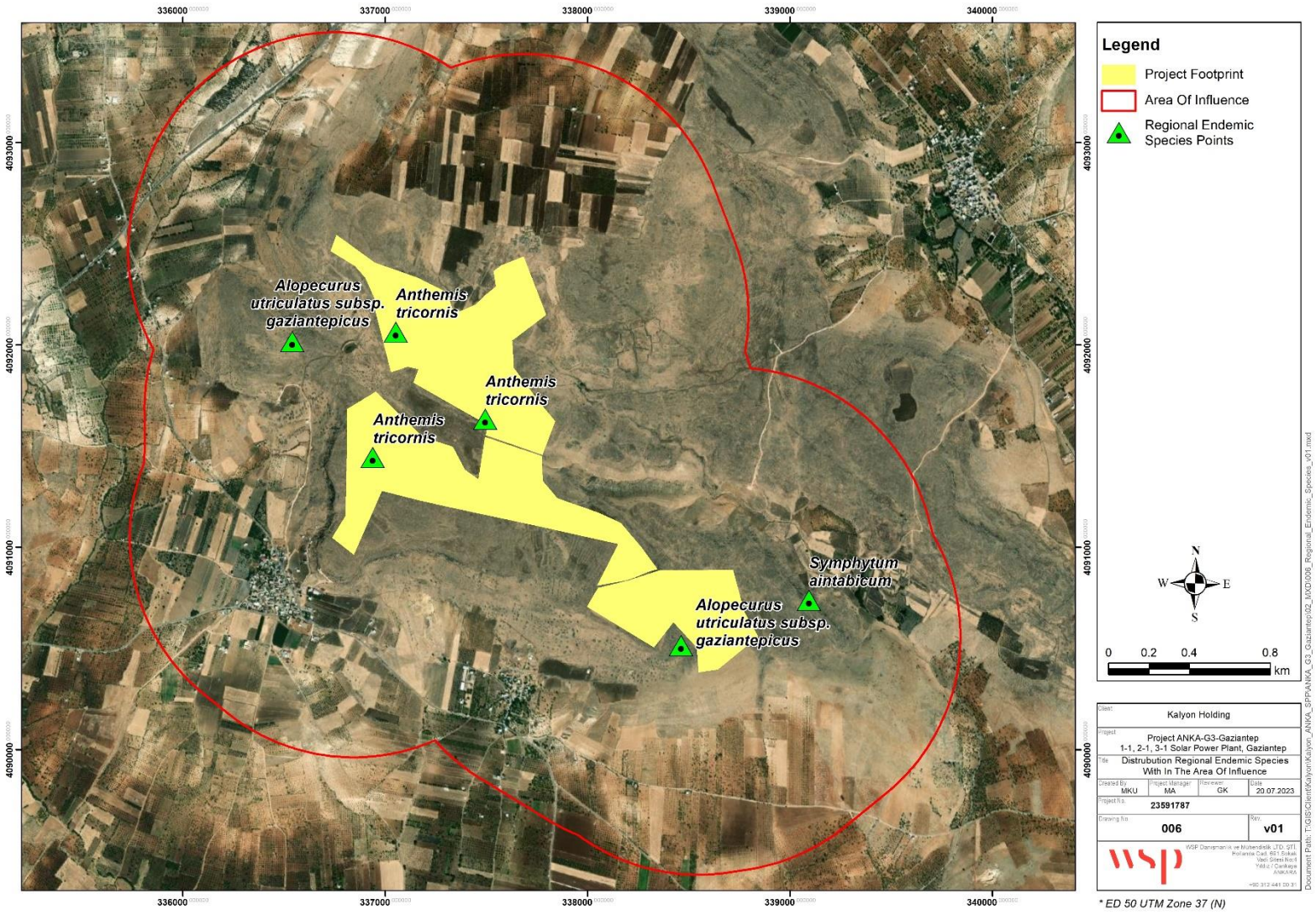


Figure 6-60: Endemic and threatened species locations within the AoI

6.3.3.4 Fauna species

The fauna species observed or potentially present within the AoI include 121 vertebrate species of which 2 amphibians, 10 reptiles, 36 mammals, of which 12 bats, and 74 birds.

Among the fauna species identified as present or potentially present within the AoI, 1 reptile species (*Testudo graeca)* and 3 bird species *(Aquila heliaca, Falco vespertinus, Streptopelia turtur*) are classified as Vulnerable (VU), while 2 bird species (*Aquila nipalensis* and *Neophron percnopterus*) are classified as Endangered (EN) and 3 mammal species (*Vormela peregusna, Mesocricetus auratus* and *Rhinolophus mehelyi)* are classified as Vulnerable (VU) according to Global IUCN Red List categories.

Only one mammal species, *Mesocricetus auratus*, is considered a restricted-range species. This species didn't observe not only current field studies but also EIA studies. Since the fauna expert considered the habitat type of the project area may be suitable for *Mesocricetus auratus*, it was included in the fauna list.

6.3.3.4.1 Amphibian

According to literature review and fieldworks, 2 species were determined as present or potentially present in the terrestrial AoI, of which all species were directly observed during field studies carried out on May 17th, 2023.

One species (*Bufotes viridis sitibundus*) is classified as Data Deficient (DD), the other one (*Pelophylax ridibundus*) is classified as Least Concern (LC) according to the Global IUCN Red List.

No endemic species were identified. The complete list of the species is reported in the Table 6-68

Table 6-68: Amphibian species present or potentially present within the AoI

Order	Species	Turkish Name	English Name	IUCN Global	End./RR	Obs./Lit.
Anura	Pelophylax ridibundus	Ova Kurbağası	Marsh Frog	LC	-	O (2023)
Anura	Bufotes viridis sitibundus	-	Variable Toad	DD	-	O (2023)

6.3.3.4.2 Reptile

According to literature review and fieldworks, 10 species were determined as present or potentially present in the terrestrial AoI, of which 8 species were directly observed during field studies carried out on May 17th, 2023.

As previously mentioned, 1 species *(Testudo graeca*) is Vulnerable (VU); all the other species are Least Concern (LC) according to the Global IUCN Red List.

The list of reptile species of conservation interest is reported in the Table 6-69, while the complete list of the species is reported in Appendix D.

Table 6-69: Reptile species present or potentially present within the AoI

Order	Species	Turkish Name	English Name	IUCN Global	End./ RR	Obs./Lit.
Testudines	*Testudo graeca*	Tosbağa	Mediterranean Spur-thighed Tortoise	VU	-	O (2022, 2023)
Squamata	*Ophisops elegans*	Tarla Kertenkelesi	Snake-eyed Lizard	LC		O (2022, 2023)
	Apathya cappadocica	Kapadokya Kertenkelesi	Cappadocian Lizard	LC		O (2023)
	Stellagama stellio	Dikenli Keler	Roughtail Rock Agama	LC		O (2023)
	Heremites auratus	Tıknaz Kertenkele	Golden Grass Mabuya	LC		O (2023)
	Mediodactylus orientalis	İnce Parmaklı Şark Keleri	Mediterranean Thin-toed gecko	LC		O (2023)
	Natrix tessellata	Su Yılanı	Dice Snake	LC		O (2023)
	Eirenis eiselti	Eiselt Uysal Yılanı	Eiselt's Dwarf Racer	LC		O (2023)
	Platyceps najadum	Ok Yılanı	Dahl's Whip Snake	LC		G (2023)
	Macrovipera lebetinus	Koca Engerek	Blunt-nosed Viper	LC		G (2023)

Figure 6-61: Testudo graeca within the AoI

6.3.3.4.3 Birds

Türkiye is crossed by the Black Sea/Mediterranean flyway, a major global flyway for migratory land and water birds[15]. This important flyway is divided into three major migratory routes through Türkiye, which are shown in Figure 6-62.

The Project site is not within any IBA. The closest IBA to the project area is Yesilce IBA, located approximately 20 km to the northeast of the area (see section 6.3.3.1).

During the field surveys conducted on May 10th, no migratory birds were observed directly crossing the AoI, despite the migration period.

Figure 6-62: Bird Migratory Route in Türkiye (Source: CBD, 2014) : Project site

A total of 74 bird species have been identified as present or potentially present within the AoI and its vicinity. Among them, the species directly observed during field studies in 2023 are 46.

According to the Global IUCN Red List, 3 bird species *(Aquila heliaca, Falco vespertinus,* and *Streptopelia turtur*) are classified as Vulnerable (VU), while 2 bird species (*Aquila nipalensis* and *Neophron percnopterus*) are classified as Endangered (EN). Also, one species (*Vanellus gregarious*) is classified as Critically Endangered (CR) and all the remaining species are Least Concern (LC). No endemic species have been identified.

Bird identified species of conservation interest are reported in the Table 6-70, while the complete list of the species is reported in Appendix D.

[15] http://datazone.birdlife.org/home

Table 6-70: Bird species of conservation concern present or potentially present within the AoI.

Order	Species	English Name	IUCN Global	Phenology	End./RR.	Obs./Lit.
Accipitriformes	*Aquila nipalensis*	Steppe Eagle	EN	Extant (non-breeding)	-	L
Accipitriformes	*Aquila heliaca*	Eastern Imperial Eagle	VU	Extant (non-breeding)	-	L
Falconiformes	*Falco vespertinus*	Red-footed Falcon	VU	Extant (non-breeding)	-	H
Accipitriformes	*Neophron percnopterus*	Egyptian Vulture	EN	Extant (breeding)	-	L
Columbiformes	*Streptopelia turtur*	European Turtle-dove	VU	Extant (breeding)	-	(O, 2023)
Charadriiformes	*Vanellus gregarius*	Sociable Lapwing	CR	Extant (non-breeding)	-	L

6.3.3.4.4 Mammals

According to the literature review and field study, 36 species were determined as present or potentially present in the terrestrial AoI. However, the presence of only 9 species was confirmed based on signs of presence or direct observations.

According to the Global IUCN Red List, 1 species (*Mesocricetus auratus*) is classified as Endangered (EN), 3 species (*Myotis capaccinii, Rhinolophus mehelyi,* and *Vormela peregusna*) as Vulnerable (VU), *Nannospalax ehrenbergi* and *Microtus elbeyli* as Data Deficient (DD), while 2 species (*Miniopterus schreibersii* and *Rhinolophus euryale*) as Near Threatened (NT) and all remaining species as Least Concern (LC). No endemic species have been identified.

During the field surveys, many burrows belonging to the Rodentia group within the AoI were observed within the AoI (Figure 6-63).

Chiroptera represent an important mammal group listed for the AoI. Although there are no structures such as old buildings, caves, houses with roofs, old trees with holes in their trunks that the bats could use as shelter or for nesting, it is possible that they use the area for feeding, flying at night because of suitable habitat.

The mammal species of conservation concern are reported in the Table 6-71.

Table 6-71: Mammal species present or potentially present within the AoI.

Order	Species	English Name	IUCN Global	End./RR.	Obs./Lit.
Chiroptera	*Rhinolophus euryale*	Mediterranean Horseshoe Bat	NT	-	L
Chiroptera	*Rhinolophus mehelyi*	Mehelyi's Horseshoe Bat	VU	-	L

Order	Species	English Name	IUCN Global	End./RR.	Obs./Lit.
Chiroptera	*Miniopterus schreibersii*	Schreiber's Bent-winged Bat	NT	-	L
Rodentia	*Mesocricetus auratus*	Golden Hamster	EN	Restricted Range	L
Carnivora	*Vormela peregusna*	European Marbled Polecat	VU	-	L

Figure 6-63: The burrow belonging to the Rodentia group within the Aol

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. Dr. Hayri Duman) based on the latest available information on the species distribution and IUCN 2001 criteria.

As a result, 2 species were identified as potentially triggering CH based on this criterion. These species include:

- 2 flora species:
  - *Symphytum aintabicum* (VU Restricted Range);
  - *Alopecurus utriculatus* subsp. *gaziantepicus* (CR, Restricted Range);
- 3 bird species:
  - Egyptian Vulture (*Neophron percnopterus*, EN*);*
  - Steppe Eagle (*Aquila nipalensis,* EN).
  - Sociable Lapwing (*Vanellus gregarius,* CR)
- 1 mammals species;
  - *Mesocricetus auratus* (EN) Restricted Range

Of the above species only the two flora species were observed within the AoI during the field survey performed in May 2023. The three bird species and the mammal species 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 1 a) thresholds were applied on all fauna and flora 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 very 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 Extend of Occurrence (EOO) been identified for each species according to the following principles:

- for flora species: in the absence of clear geographical boundaries, the EAAA is identified to determine the presence of a critical habitat for flora species. The EAAA and EOO were conservatively defined based on the flora biogeographic ecoregion in which the Project fells grassland and rocky area in “(7a) Middle Fırat-Dicle Section” corresponding to 4.639 km^2 (Figure 6-64);
- for bird species the EAAA was defined to include a sufficient ecologically homogeneous area around the AoI to support the presence of the species assessed (Figure 6-65). The defined EAAA reaches an extension of 1.111 km^2.
- for mammal species the EAAA is defined to include catchment area in the vicinity of the Project triggered by *Mesocricetus auratus* (Figure 6-66). The defined EAAA reaches an extension of 50 km^2.

The results of the critical habitat assessment for Criterion 1 are detailed in Table 6-72. Species that could trigger critical habitats but that are considered only potentially present based on literature information and/or species for which insufficient data are available are identified as triggering “Potential Critical Habitat” (PCH). Where the critical habitat has been confirmed in at least one occasion it is identified as “Critical Habitat” (CH).

The ecology of species screened as triggering CH is described in detail in section.

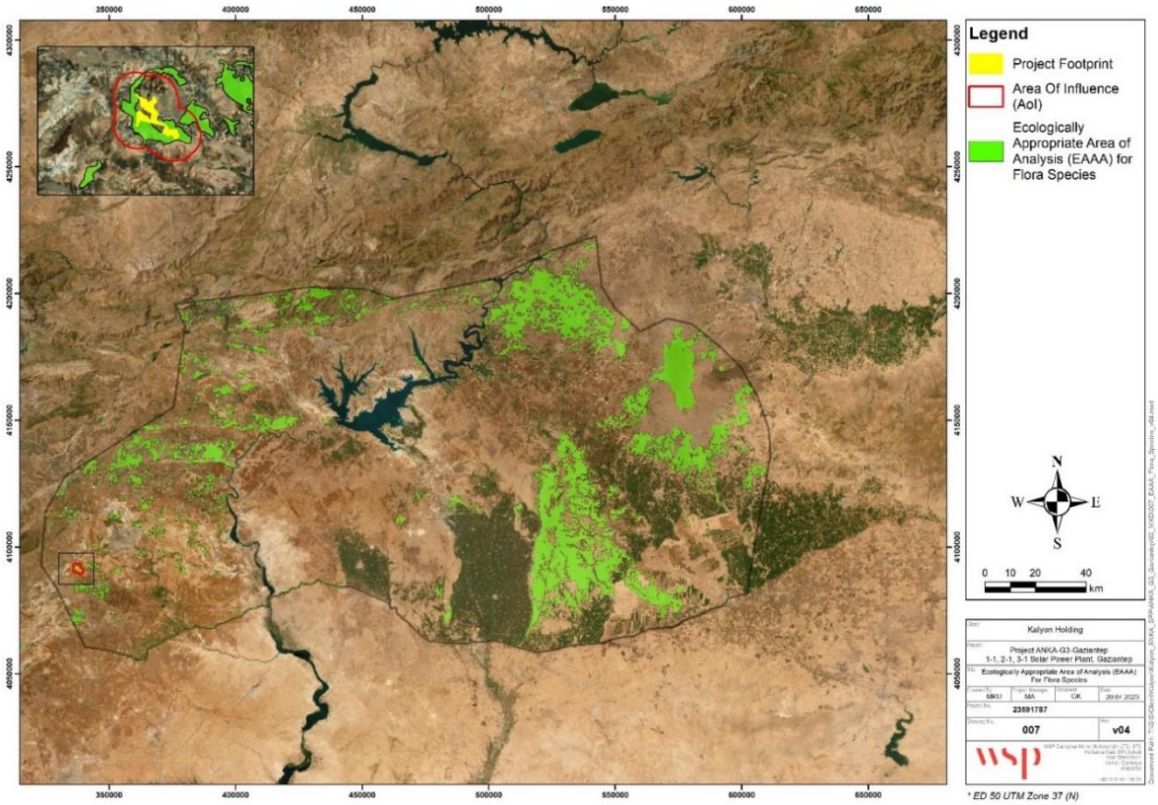


Figure 6-64: Ecologically appropriate area of analysis (EAAA) for flora species

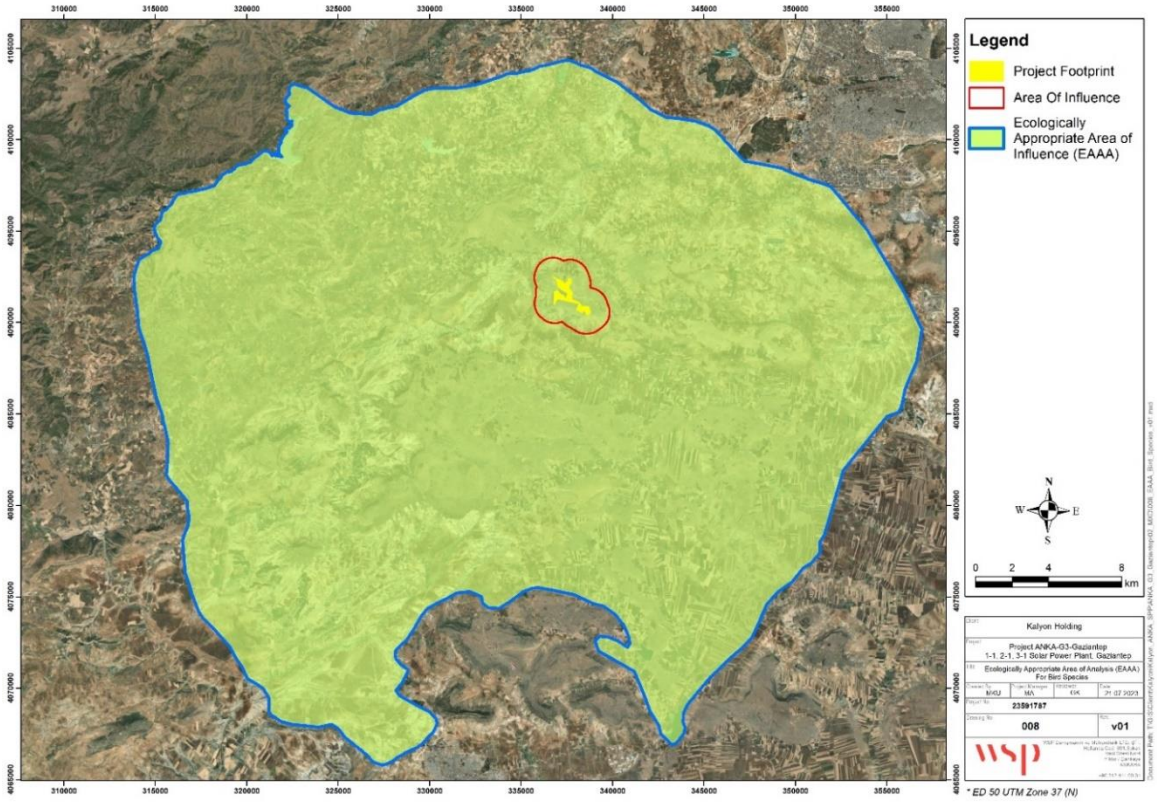


Figure 6-65: Ecologically appropriate area of analysis (EAAA) for bird species

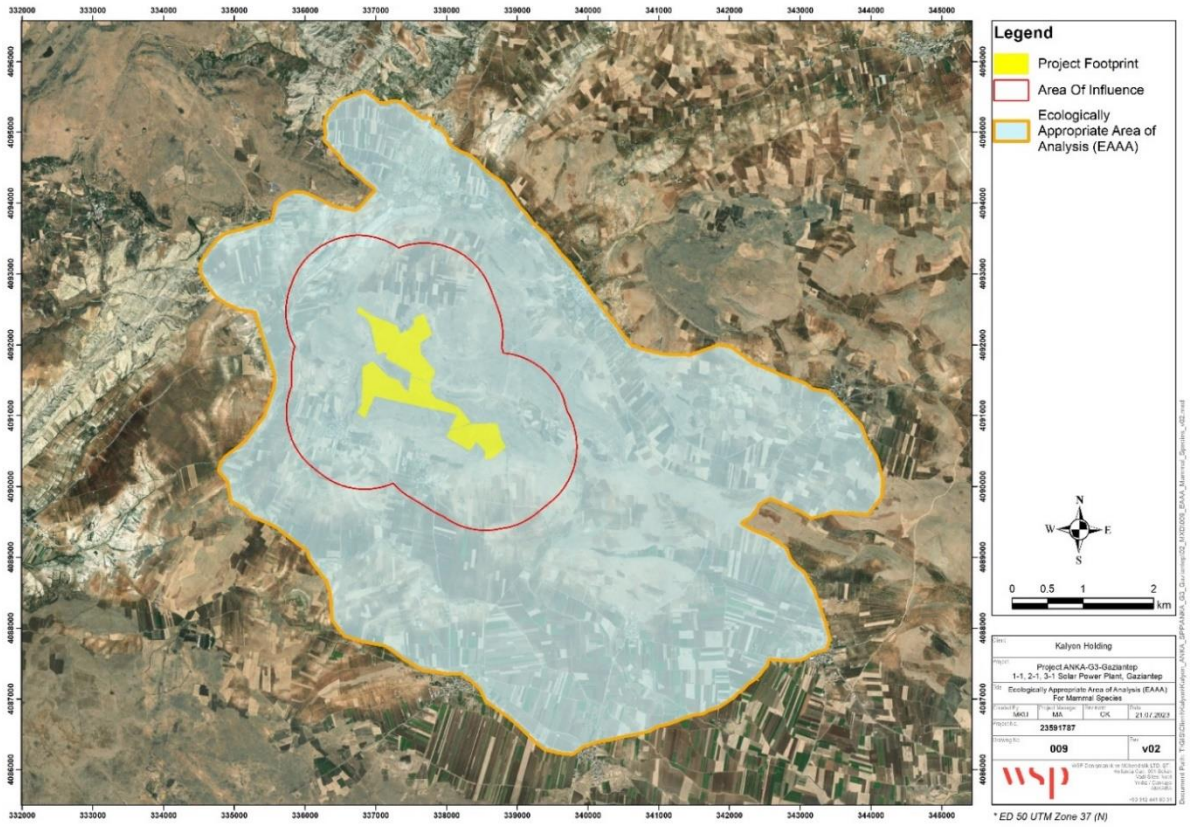


Figure 6-66: Ecologically appropriate area of analysis (EAAA) for *Mesocricetus auratus* mammal species

Table 6-72: Screening of flora and fauna species potentially triggering Critical Habitat according to Criterion 1 (IFC, 2019)

Taxon	Species	Common name	IUCN Red List	National IUCN status	Endemic/RR	Lit./ Obs.	EOO (km^2)	0.5% of EOO (km^2)	EAAA (km^2)	EAAA is ≥ 0.5% of EOO	Critical Habitat
Flora	*Symphytum aintabicum*	-	-	VU	Restricted Range*	O	4.639	23	4.639	Yes	CH
	Alopecurus utriculatus subsp. *gaziantepicus*	-	-	CR	Restricted Range*	O	4.639	23	4.639	Yes	CH
Bird	*Neophron percnopterus*	Egyptian Vulture	EN	-	-	L	58.000.000	290.000	1.111	No	-
	Vanellus gregarius	Sociable Lapwing	CR	-	-	L	1.670.000	8.350		No	-
	Aquila nipalensis	Steppe Eagle	EN	-	-	L	12.600.000	63.000		No	-
Mammals	*Mesocricetus auratus*	Golden Hamster	EN	-	Restricted Range	L	5.428	27.14	50	Yes	PCH

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.

As a result, 3 species were identified as potentially triggering CH based on this criterion. These species include:

- 2 flora species:
  - *Symphytum aintabicum* (VU, Restricted Range);
  - *Alopecurus utriculatus* subsp. *gaziantepicus* (CR, Restricted Range);
- 1 mammal species
  - *Mesocricetus auratus* (VU, Restricted Range).

Only the two flora species have been directly observed during filed surveys within the AoI, while the mammal species is considered as potentially present based on literature review and presence of suitable habitat for the species.

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.

In order to apply the thresholds identified in Criterion 2a an “Ecologically Appropriate Area of Analysis” (EAAA) and the Extend of Occurrence (EOO) have been identified for each species according to the principles defined in the previous chapter for Criterion 1.

The results of the critical habitat assessment for Criterion 2 are summarized in Table 6-73. Species that could trigger critical habitats but that are considered only potentially present based on literature information and/or species for which not sufficient data are available are identified as triggering “Potential Critical Habitat”. Where the critical habitat has been confirmed in at least one occasion it is identified as “Critical Habitat” and mapped.

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Table 6-73: Screening of species potentially triggering Critical Habitat according to Criterion 2 (IFC PS6, 2019)

Taxon	Species	Common name	IUCN Red List	National IUCN status	Endemic/RR	Lit./ Obs.	EOO (km^2)	10% of EOO (km^2)	EAAA (km^2)	EAAA is ≥ 10% of EOO	Critical Habitat
Flora	*Symphytum aintabicum*	-	-	VU	Restricted Range*	O	4.639	46.39	4.639	Yes	CH
Flora	*Alopecurus utriculatus* subsp. *gaziantepicus*	-	-	CR	Restricted Range*	O					
Reptile	*Mesocricetus auratus*	Golden Hamster	VU	-	Restricted Range	L	5.428	54.28	50	No	-

** In absence of more precise data of distribution, the EOO is conservatively identified as the floristic ecoregion "(7a) Orta Fırat-Dicle Section", where the species is found. However, it is likely that the species range is smaller in reality and potentially below 50.000 km^2. Therefore, using a precautionary approach the species is considered as Restricted Range.*

6.3.4.3 Criterion 3: Habitats supporting globally significant migratory or congregatory species

The presence of Key Biodiversity Areas and Important Bird Areas 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.

The Project site isn't inside an internationally recognized area.

In order to assess the importance of the AoI for these species, the following thresholds were applied (Guidance Note 6, GN78, IFC 2019):

a) 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.

b) areas that predictably support ≥ 10 percent of the global population of a species during periods of environmental stress.

Although the Project AoI does not overlap with the IBAs, using a precautionary approach, all migratory/ congregatory species triggering the IBAs 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".

For bird species the EAAA was defined has been identified according to the principles defined in the previous chapter for Criterion 1.

Since a numerical estimation of the individual of the species does not exist, the EAAA is then compared with the extent of occurrence (EOO) of each species, which represents the global population estimate, in order to identify if that area could potentially meet Criterion 3 threshold: if the EAAA is ≥ 1% of the EOO, 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 6-74.

As a result of the screening, no species potentially triggering Critical Habitat according to Criterion 3 were identified.

Table 6-74: Screening of migratory and congregatory species potentially triggering Critical Habitat according to Criterion 3 (IFC, 2019)

Species	Turkish Name	English Name	IUCN Red List	Lit./ Obs.	EOO (km2)	1% of EOO (km2)	EAAA (km2)	EAAA is ≥ 1%of EOO	Critical Habitat
Ciconia ciconia	Leylek	White Stork	LC	O	52700000000	527000000	1111	No	-
Pernis apivorus	Arı Şahini	European Honey-buzzard	LC	O	1820000	18200			
Neophron percnopterus	Küçük Akbaba	Egyptian Vulture	EN	L	5800000	58000			
Circaetus gallicus	Yılan Kartalı	Short-toed Snake-eagle	LC	O	5800000	58000			
Circus pygargus	Çayır Delicesi	Montagu's Harrier	LC	H	1800000	18000			
Aquila nipalensis	Bozkır Kartalı	Steppe Eagle	EN	L	1260000	12600			
Aquila heliaca	Şah Kartal	Eastern Imperial Eagle	VU	L	1540000	15400			
Hieraaetus pennatus	Küçük Kartal	Booted Eagle	LC	H	7230000	72300			
Falco subbuteo	Delice Doğan	Eurasian Hobby	LC	H	5260000	52600			
Coturnix coturnix	Bıldırcın	Common Quail	LC	A	8790000	87900			
Streptopelia turtur	Üveyik	European Turtle-dove	VU	O	3570000	35700			
Cuculus canorus	Guguk	Common Cuckoo	LC	O	6120000	61200			
Tyto alba	Peçeli Baykuş	Common Barn-owl	LC	H	3300000000	33000000			
Otus scops	İshakkuşu	Eurasian Scops-owl	LC	H	3390000	33900			
Caprimulgus europaeus	Çobanaldatan	European Nightjar	LC	O	3320000	33200			
Apus apus	Ebabil	Common Swift	LC	O	3980000	39800			
Tachymarptis melba	Ak Karınlı Ebabil	Alpine Swiftift	LC	O	6110000	61100			
Merops apiaster	-	European Bee-eater	LC	O	5570000	55700			
Coracias garrulus	Gökkuzgun	European Roller	LC	O	1990000	19900			

Species	Turkish Name	English Name	IUCN Red List	Lit./ Obs.	EOO (km2)	1% of EOO (km2)	EAAA (km2)	EAAA is ≥ 1%of EOO	Critical Habitat
Upupa epops	İbibik	Common Hoopoe	LC	O	10400000	104000			
Ptyonoprogne rupestris	Kaya Kırlangıcı	Eurasian Crag-martin	LC	O	2930000	29300			
Hirundo rustica	Kır Kırlangıcı	Barn Swallow	LC	O	25100000	251000			
Hirundo daurica	Kızıl Kırlangıç	Red-rumped Swallow	LC	O	9990000	99900			
Cercotrichas galactotes	Çalı Bülbülü	Rufous-tailed Scrub-robin	LC	H	3290000	32900			
Saxicola rubetra	Çayır Taşkuşu	Whinchat	LC	O	2050000	20500			
Oenanthe isabellina	Boz Kuyrukkakan	Isabelline Wheatear	LC	O	1600000	16000			
Oenanthe oenanthe	Kuyrukkakan	Northern Wheatear	LC	O	7950000	79500			
Oenanthe hispanica	Kara Kulaklı Kuyrukkakan	Black-eared Wheatear	LC	O	1160000	11600			
Curruca communis	Ak Gerdanlı Ötleğen	Common Whitethroat Werbler	LC	O	2510000	25100			
Muscicapa striata	Benekli Sinekkapan	Spotted Flycatcher	LC	O	3240000	32400			
Lanius collurio	Kızıl Sırtlı Örümcekkuşu	Red-backed Shrike	LC	O	1890000	18900			
Lanius senator	Kızıl Başlı Örümcekkuşu	Woodchat Shrike	LC	O	1200000	12000			
Emberiza hortulana	Kirazkuşu	Ortolan Bunting	NT	O	2020000	20200			
Emberiza melanocephala	Kara Başlı Çinte	Black-headed Bunting	LC	O	612000	6120			
Emberiza calandra	Tarla Çintesi	Corn Bunting	LC	O	2370000	23700			

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 Türkiye as shown in the IUCN RLE Database[16]. Therefore, this system cannot be used at present. Instead, the "European Red List of Habitats" (European Union, 2016) 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)[17], combined with elements of the IUCN Red List of Ecosystems approach for ecosystem risk assessment (Keith *et al*. 2013[18], 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.

Two natural habitat type was identified within the AoI, EUNIS habitat "E1.3-Mediterranean Xeric Grassland" and H 3.2 Basic and Ultra-Basic Inland Cliffs. These habitats are classified as Least Concern (LC) 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 processes.

Therefore, **no Critical Habitat is expected to be present in the AoI according to this criterion**.

[16] http://assessments.iucnrle.org/

[17] 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.

[18] 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

6.3.5 Ecology of species potentially triggering CH

The table below summarizes the species of flora and fauna identified as triggering “Potential Critical Habitats” (PCHs) and the IFC criteria for which they were considered. Species that could trigger CH but that are considered only potentially present based on literature information and/or species for which insufficient data are available are identified as triggering “Potential Critical Habitat”. Where the critical habitat has been confirmed in at least one occasion it is identified as “Critical habitat”.

The ecology of fauna species identified as potentially triggering CH is described in detail below.

Table 6-75: Fauna species identified as potentially triggering Critical Habitats within the AoI.

Taxon	Species	Common name	Global IUCN Status	Local IUCN Status	End./ RR	Lit./ Obs.	IFC criteria
Flora	*Symphytum aintabicum*	-	-	VU	End./RR	Obs.	Criterion 1a, 2a
Flora	*Alopecurus utriculatus* subsp. *gaziantepicus*	-	-	CR	End./RR	Obs.	Criterion 1a, 2a
Fauna	*Mesocricetus auratus*	Golden Hamster	-	EN	RR		Criterion 1a, 2a

***Symphytum aintabicum* (VU Restricted Range)**

Symphytum aintabicum also known as Antep Kafesotu, is classified as local endemic in Turkey and it can be found in Gaziantep province. *S. aintabicum* is an annual grass of the Boraginaceae family. Perennial, puberulous and subhispid, 30-40 cm. Leaves oblong-ovate to oblong lanceolate, lower petiolate, upper sessile, auriculate. Flowers 10-15. Calyx 6 mm, accrescent to 15 mm in fruit, divided to ¼-1/3, lobes lanceolate, obtuse. Corolla white, rose or blue, 12 mm; scales oblong-lanceolate, equalling stamens. Nutlets 3 mm, erect, constricted at base, areolate, tuberculate. Fl. 4-5. Shady woods, limestone rocks, 900-1700 m.

The biogeographical range of this species corresponds to the flora ecoregion of “(7a) Orta Fırat Section” where the project is located[19] (Figure 6-67).

S. aintabicum occurs in shady groves, limestone cliffs. During the flora survey in May 2023, the species has been noted in stations S1 (Figure 6-60).

The stations were characterized by EUNIS habitat E 1.3 “Mediterranean Xeric Grassland” and H 3.2 “Basic and Ultra-Basic Inland Cliffs” respectively. In particular, SP1 is located in an area dry, calcareous inland cliff. Specific plant associations colonize montane and Mediterranean cliffs. The species is, listed as Vulnerable (VU) in the local assessment re-evaluated by the local expert (Prof. Dr. Hayri Duman) based on the latest available information on the species distribution and IUCN 2001 criteria.

[19] Güner, A., Aslan, S., Ekim, T., Vural, M. and Babaç, M.T., 2012. List of Plants of Turkey (Veinous Plants). Nezahat Gökyiğit Botanical Garden and Flora Research Association Publication. Istanbul.

Figure 6-67: *Symphytum aintabicum* known distribution range (source: https://www.bizimbitkiler.org.tr/)

***Alopecurus utriculatus* subsp. *gaziantepicus* (CR, Restricted Range)**

Alopecurus utriculatus subsp. *gaziantepicus*, also known as Antep Tilkikuyruğu, is classified as local endemic in Turkey and it can be found in Gaziantep. *A. gaziantepicus* is an annual grass of the Poaceae family. It shows acuminate and smooth blades 9.5-18 cm long. The sheaths are glabrous, smooth and uppermost inflated. The inflorescence is a cylindrical and purplish panicle with urceolate spikelets with yellow anthers. The palea is absent.

The biogeographical range of this species corresponds to the flora ecoregion of "(7a) Orta Fırat Section" where the project is located[20] (Figure 6-67).

A. gaziantepicus occurs in sandy limestone rocks. During the flora survey in May 2023, the species has been noted in stations SP2 and SP8 (Figure 6-60).

The stations were characterized by EUNIS habitat E 1.3 "Mediterranean Xeric Grassland" and H 3.2 "Basic and Ultra-Basic Inland Cliffs" respectively. In particular, SP2 and SP8 are located in grassland and rocky area. The species is, listed as Critically Endangered (CR) in the local assessment re-evaluated by the local expert (Prof. Dr. Hayri Duman) based on the latest available information on the species distribution and IUCN 2001 criteria.

***Mesocricetus auratus* (EN, Endangered)**

Mesocricetus auratus, commonly known as the Golden Hamster, is a restricted range species. In Turkey, it is found only in the area close to the east of Gaziantep an Kilis districts as well as in Syria. Most of the geographic range of the species is found in Syria.

[20] Güner, A., Aslan, S., Ekim, T., Vural, M. and Babaç, M.T., 2012. List of Plants of Turkey (Veinous Plants). Nezahat Gökyiğit Botanical Garden and Flora Research Association Publication. Istanbul.

M. auratus is a Rodentia species part of the Cricetidae' family. Like most members of the subfamily, the golden hamster has expandable cheek pouches, which extend from its cheeks to its shoulders. In the wild, hamsters are larder hoarders; they use their cheek pouches to transport food to their burrows. However, this species was not directly observed during the field surveys.

This species has a small range (its extent of occurrence is estimated to be 4,743 km²) and is restricted to a small, fragmented area on the Turkish/Syrian border. The species is undergoing continuing decline due to habitat loss (agricultural practices) and persecution. Population densities are believed to be low. In Turkey, the species is very rare; only three localities are known. Due to threats from expanding human settlements and agriculture (including habitat loss, degradation and direct poisoning of the species) the population is declining and its range is shrinking. It is not known if the distribution is severely fragmented, but it is likely that there are fewer than 10 locations. Currently it qualifies for Endangered B1ab(iii). There may be fewer than 2,500 mature individuals in the population, but more data are required to confirm this (Yigit, 2007). Research is underway for this species, but there is a need for more focus on monitoring to determine population trends. However, captive breeding programs are well-established, and captive-bred golden hamsters are often kept as small house pets. They are also used as scientific research animals [21].

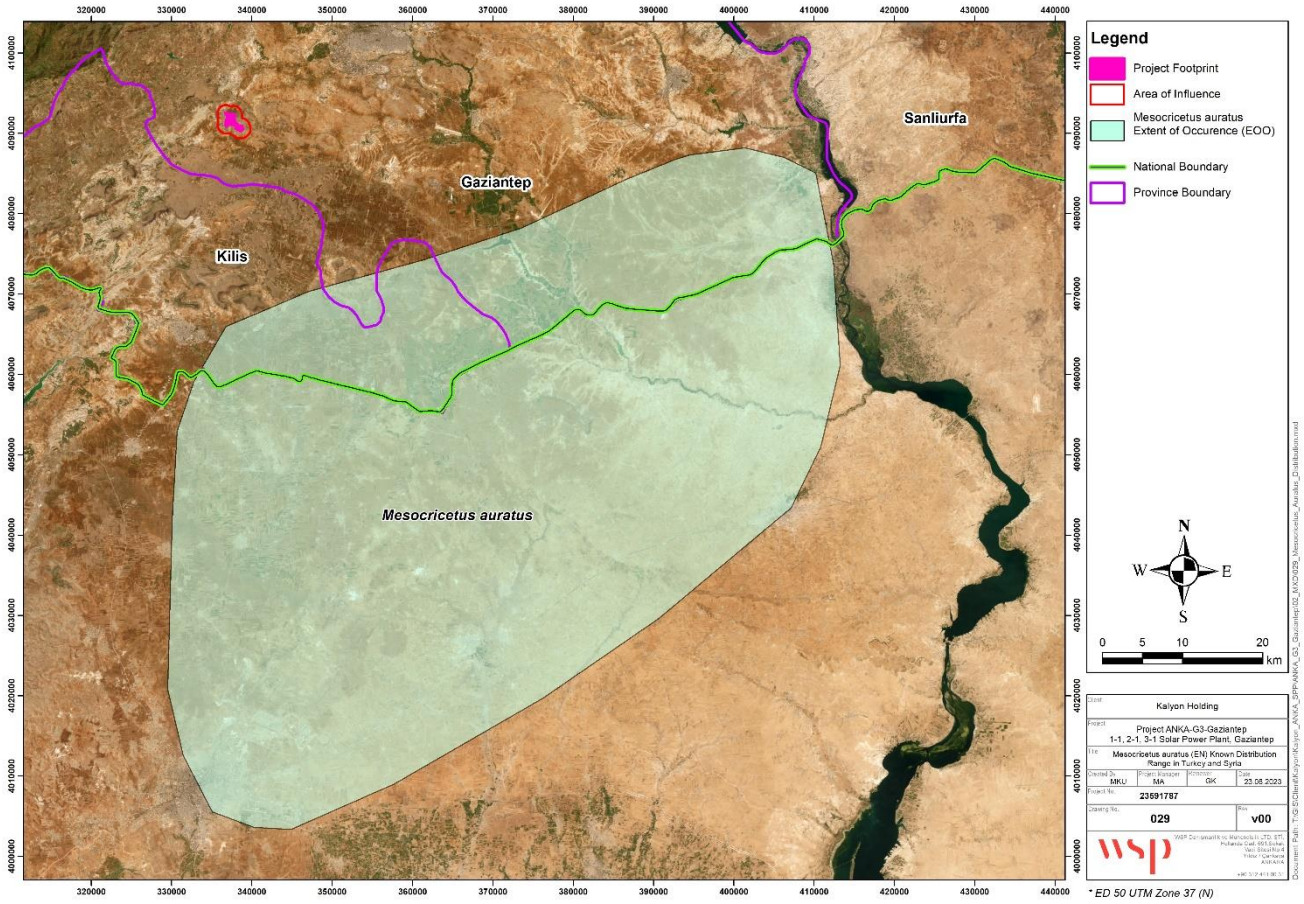

Figure 6-68: *Mesocricetus auratus* (EN) known distribution range in Turkey and Syria

(Source: The IUCN Red List of Threatened Species, 2009)

[21] **The IUCN Red List of Threatened Species – Golden Hamster"**. IUCN Red List of Threatened Species. Retrieved 11 April 2019.

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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
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	16,160 m^3
Bulk density of soil	1.80 ton/m^3
Mass of excavated soil	16,160 m^3 x 1.80 ton/m^3 = 29,088 ton
Duration of earth works	194 days
Daily working time (2 shifts)	16 h/day

Hourly excavation amount	29,088 ton / (194 days x 16 h/day) = 9.37 ton/h
Dust emission due to excavation (under controlled conditions)	9.37 ton/h x 0.0125 kg/ton = **0.12 kg/h**
Dust Emission due to unloading of backfill material:	
Backfilling amount	16,160 m^3
Bulk density of soil	1.80 ton/m^3
Mass of backfilling material	16,160 m^3 x 1.80 ton/m^3 = 29,088 ton
Duration of earth works	194 days
Daily working time (2 shifts)	16 h/day
Hourly backfilling amount	29,088 ton / (194 days x 16 h/day) = 9.37 ton/h
Dust emission due to unloading of backfill (under controlled conditions)	9.37 ton/h x 0.005 kg/ton = **0.05 kg/h**

Table 7-4: Dust Emission Estimation – Access Road Construction

Dust Emission due to excavation works:	
Excavation amount	46,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of excavated soil	46,000 m^3 x 1.80 ton/m^3 = 82,800 ton
Duration of earth works	194 days
Daily working time (2 shifts)	16 h/day
Hourly excavation amount	82,800 ton / (194 days x 16 h/day) = 26.67 ton/h
Dust emission due to excavation (under controlled conditions)	26.67 ton/h x 0.0125 kg/ton = **0.33 kg/h**
Dust Emission due to unloading of backfill material:	
Backfilling amount	15,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of backfilling material	15,000 m^3 x 1.80 ton/m^3 = 27,000 ton
Duration of earth works	194 days

Daily working time (2 shifts)	16 h/day
Hourly backfilling amount	27,000 ton / (194 days x 16 h/day) = 8.70 ton/h
Dust emission due to unloading of backfill (under controlled conditions)	8.70 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	31,000 m^3
Bulk density of soil	1.80 ton/m^3
Mass of Excess Excavation material	31,000 m^3 x 1.80 ton/m^3 = 55,800 ton
Duration of earth works	194 days
Daily working time (2 shifts)	16 h/day
Hourly amount	55,800 ton / (194 days x 16 h/day) = 17.97 ton/h
Dust emission due to loading of material (under controlled conditions)	17.97 ton/h x 0.005 kg/ton = **0.09 kg/h**
Dust Emission due to transportation of excess excavated material:	
Average transport distance within the project area	500 m (one way)
Truck carrying capacity	30 tons/vehicle
Frequency of transports	(17.97 ton/h) / (30 ton/vehicle) = 0.59 vehicle / h
Dust emission due to transportation (under controlled conditions)	0.59 vehicle/h x 0.35 kg/km-vehicle x (1 km (round trip)) = **0.21 kg/h**

Table 7-5: Dust Emission Estimation – Inverter, switchyard and administration building construction

Dust Emission due to excavation works:	
Excavation amount	3,500 m^3
Bulk density of soil	1.80 ton/m^3
Mass of excavated soil	3,500 m^3 x 1.80 ton/m^3 = 6300 ton
Duration of earth works	194 days
Daily working time (2 shifts)	16 h/day
Hourly excavation amount	6,300 ton / (194 days x 16 h/day) = 2.02 ton/h

Dust emission due to excavation (under controlled conditions)	2.02 ton/h x 0.0125 kg/ton = **0.02 kg/h**
Dust Emission due to unloading of backfill material:	
Backfilling amount	1,250 m^3
Bulk density of soil	1.80 ton/m^3
Mass of backfilling material	1,250 m^3 x 1.80 ton/m^3 = 2,250 ton
Duration of earth works	194 days
Daily working time (2 shifts)	16 h/day
Hourly backfilling amount	2,250 ton / (194 days x 16 h/day) = 0.72 ton/h
Dust emission due to unloading of backfill (under controlled conditions)	0.72 ton/h x 0.005 kg/ton = **0.003 kg/h**
Dust Emission due to loading of excess excavated soil to trucks:	
Excess Excavation amount	1,250 m^3
Bulk density of soil	1.80 ton/m^3
Mass of Excess Excavation material	1,250 m^3 x 1.80 ton/m^3 = 2,250 ton
Duration of earth works	194 days
Daily working time (2 shifts)	16 h/day
Hourly amount	2,250 ton / (194 days x 16 h/day) = 0.72 ton/h
Dust emission due to loading of material (under controlled conditions)	0.72 ton/h x 0.005 kg/ton = **0.003 kg/h**
Dust Emission due to transportation of excess excavated material:	
Average transport distance within the project area	500 m (one way)
Truck carrying capacity	30 tons/vehicle
Frequency of transports	(0.78 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 (1 km (round trip)) = **0.007 kg/h**

The total amount of dust to be emerged from the construction activities is calculated as 0.873 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.

Regarding cumulative dust impacts of the other projects inside AoI, which is detailed in Section 9.5.2 of this ESIA report, no additional impact was expected on dust from these projects. Because either they have already been under operation or their constructions works have already been started of which aspects were taken into account with the baseline measurements studies.

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 7-6).

Table 7-6: 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
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

Kalyon will carry out the construction works 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 7-7 and Table 7-8.

[1] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100OA05.pdf

Table 7-7: Pollutant Emissions Originated from the Each Construction Equipment

Construction Equipment	Number of Equipment	Rated Power* (kW)	Parameter	Emission (kg/hour)
Generator	3	50	NMHC	0.029
			NOX	0.060
			PM	0.003
			CO	0.525
Pile Driver	5	35	NMHC	0.033
			NOX	0.070
			PM	0.004
			CO	0.613
Loader	1	153	NMHC	0.029
			NOX	0.061
			PM	0.003
			CO	0.536
Excavator	3	161	NMHC	0.092
			NOX	0.193
			PM	0.010
			CO	1.691
Dozer	2	172	NMHC	0.065
			NOX	0.138
			PM	0.007
			CO	1.204
Grader	1	135	NMHC	0.026
			NOX	0.054
			PM	0.003
			CO	0.473
Earthmoving Trucks	10	210	NMHC	0.399
			NOX	0.840
			PM	0.042
			CO	7.350
JCB	8	81	NMHC	0.123
			NOX	0.259
			PM	0.013
			CO	3.240

Construction Equipment	Number of Equipment	Rated Power* (kW)	Parameter	Emission (kg/hour)
Cylinder	2	110	NMHC	0.042
			NOX	0.088
			PM	0.004
			CO	0.770
Telehandler	10	55	NMHC	0.021
			NOX	0.044
			PM	0.002
			CO	0.385
Septic Tanker	1	164	NMHC	0.031
			NOX	0.066
			PM	0.003
			CO	0.574
Lowbed	1	172	NMHC	0.033
			NOX	0.069
			PM	0.003
			CO	0.602
Crane	2	244	NMHC	0.093
			NOX	0.195
			PM	0.010
			CO	1.708

**Values of similar projects were referenced.*

Table 7-8: 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	1.02	3
NOX	2.14	4
PM	0.11	1
CO	19.67	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.

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:

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,
- Completed earthworks will be covered and sealed - as soon as reasonably practicable after completion;
- In case alternative roads are present, construction traffic will avoid passing through the settlements. If roads through settlements cannot be avoided, necessary measures (i.e., speed limits) will be taken to prevent/minimise transportation related emissions and communities will be informed about the activities and schedule;
- Enforce speed limits and reduce vehicle movements and idling on site;
- 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 idled for short periods during duty, to avoid unnecessary emissions by turning the vehicles off and on frequently;
- Machinery and equipment will be periodically checked and maintained to ensure their good working condition and 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 Environment, Urbanization and Climate Change (PDEUCC) until January 31st 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;
- Electric small-scale mechanization and technical tools will be used when available and feasible;
- Provide dust masks to workers on site 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;
  - the number of the vehicles in this period will be kept at a minimum, 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 7-9: 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					

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 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 7-16.

Table 7-10: 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 of 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;
- number of vehicles operating simultaneously will be kept at a minimum.

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 7-11: Residual impact assessment matrix for the air quality during operation phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Emission of gaseous pollutants from the vehicles	Duration:	Very long	Medium-high	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Negligible					

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;
- A logbook will be maintained 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.

7.1.2 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 receptors and sensitive ecological receptors potentially exposed to noise and vibration emissions; and
- Other ongoing projects (under construction and planning stage) around the Project site.

7.1.2.1 Noise Baseline Summary

In order to determine the baseline noise levels around the Project area, 11 noise receptor locations have been determined. Between May 05th – 09th, 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 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.

7.1.2.2 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) 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.

[1] https://www.soundplan.eu/en/software/soundplanessential/

2) The humidity, temperature, and air pressure data of the Project area were introduced to the model.

3) The noise sources identified for the study area were introduced to the model together with their noise levels (dBA).

4) The receptors have also been digitized in the model.

5) 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) Upon completion of the above, 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 described in the below sections;
- The Project area humidity is taken as 59.3%, temperature as 15.4°C and air pressure as 916.2 hPa by assuming a general average for region as described in Section 6.1.2;
- The ground effect was taken as 0.6 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.

7.1.2.3 Construction Phase

7.1.2.3.1 Impact factors

The impact factor from the Project activities potentially affecting ambient noise during construction phase is listed in Table 7-12.

Table 7-12: 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 night-time.

The list of equipment and machinery that will be used during the construction of the whole Project are presented in Table 7-13. 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.

For the worst-case scenario, the machines and equipment used in the construction activities are assumed to work simultaneously and at maximum sound power levels.

Table 7-13: Construction Machine/Equipment List

Equipment / Vehicle	Number	Sound Power (Lw)*
Generator	3	102
Pile Driving Machine	5	132
Loader	1	116
Excavator	3	112
Dozer	2	117
JCB	8	116
SUVs	2	99
Septic Tanker	1	123
Grader	1	119
Earthmoving Trucks	10	123
Cylinder Machine	2	118
Telehandler	10	104
Lowbed	1	123
Mobile Crane	2	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 7-14. Detailed breakdown of the cumulative results of the assessed receptors are given below:

- IFC day-time noise standard is exceeded at locations N-1, N-2, N-4, N-5, N-6, N-7, N-8, N-9, N-10 and N-11;
- Turkish evening-time noise regulatory limit value is exceeded at locations N-5 and N-11.

During measurement period, there are construction activities such as placement of electric pole legs for the construction of the ETLs by TEİAŞ inside and around the Project area which may cause these high baseline noise levels.

The daytime grid noise map obtained for the construction phase is presented in the Figure 7-1 below.

Table 7-14: 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	Gaziantep	Şahinbey	Çörekli	Residential	330	56.5	-	56.5	56.5	-	39.5	37.9	40.4	39.3	37.7	56.6	37.9	56.6	56.6	37.7	17.1	0.0	16.2	17.3	0.0
N-2	Gaziantep	Şahinbey	Çörekli	Residential	540	56.9	-	56.9	56.9	-	43.9	40.1	45.5	41.9	39.7	57.1	40.1	57.2	57.0	39.7	13.2	0.0	11.7	15.1	0.0
N-3	Gaziantep	Şahinbey	Gülpınar	Residential	2,000	52.9	-	52.9	52.9	-	46.0	39.1	46.5	40.9	38.5	53.7	39.1	53.8	53.2	38.5	7.7	0.0	7.3	12.3	0.0
N-4	Gaziantep	Şahinbey	Kürüm	Residential	270	57.7	-	57.7	57.7	-	45.8	36.5	47.7	40.3	36.1	58.0	36.5	58.1	57.8	36.1	12.2	0.0	10.4	17.5	0.0
N-5	Gaziantep	Şahinbey	Kürüm	Residential	130	61.1	-	61.1	61.1	-	42.2	33.1	43.3	35.5	32.6	61.2	33.1	61.2	61.1	32.6	19.0	0.0	17.9	25.6	0.0
N-6	Gaziantep	Şahinbey	Kürüm	Residential	280	58.4	-	58.4	58.4	-	42.2	33.9	43.9	36.5	33.1	58.5	33.9	58.6	58.4	33.1	16.3	0.0	14.7	21.9	0.0
N-7	Gaziantep	Şahinbey	Kürüm	Residential	840	55.7	-	55.7	55.7	-	40.7	35.9	42.8	38.1	34.5	55.8	35.9	55.9	55.8	34.5	15.1	0.0	13.1	17.7	0.0
N-8	Gaziantep	Şahinbey	Ozanlı	Residential	1,500	54.9	-	54.9	54.9	-	43.8	38.6	45.7	38.4	34.4	55.2	38.6	55.4	55.0	34.4	11.4	0.0	9.7	16.6	0.0
N-9	Gaziantep	Şahinbey	Çörekli	Residential	270	58.1	-	58.1	58.1	-	41.5	39.2	42.9	40.1	38.3	58.2	39.2	58.2	58.2	38.3	16.7	0.0	15.3	18.1	0.0
N-10	Gaziantep	Şahinbey	Kürüm	Residential	190	55.6	-	55.6	55.6	-	40.9	33.1	42.1	35.9	32.9	55.7	33.1	55.8	55.6	32.9	14.8	0.0	13.7	19.7	0.0
N-11	Gaziantep	Şahinbey	Kürüm	Residential	480	63.8	-	63.8	63.8	-	37.5	30.1	40.1	33.5	29.7	63.8	30.1	63.8	63.8	29.7	26.3	0.0	23.7	30.3	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).

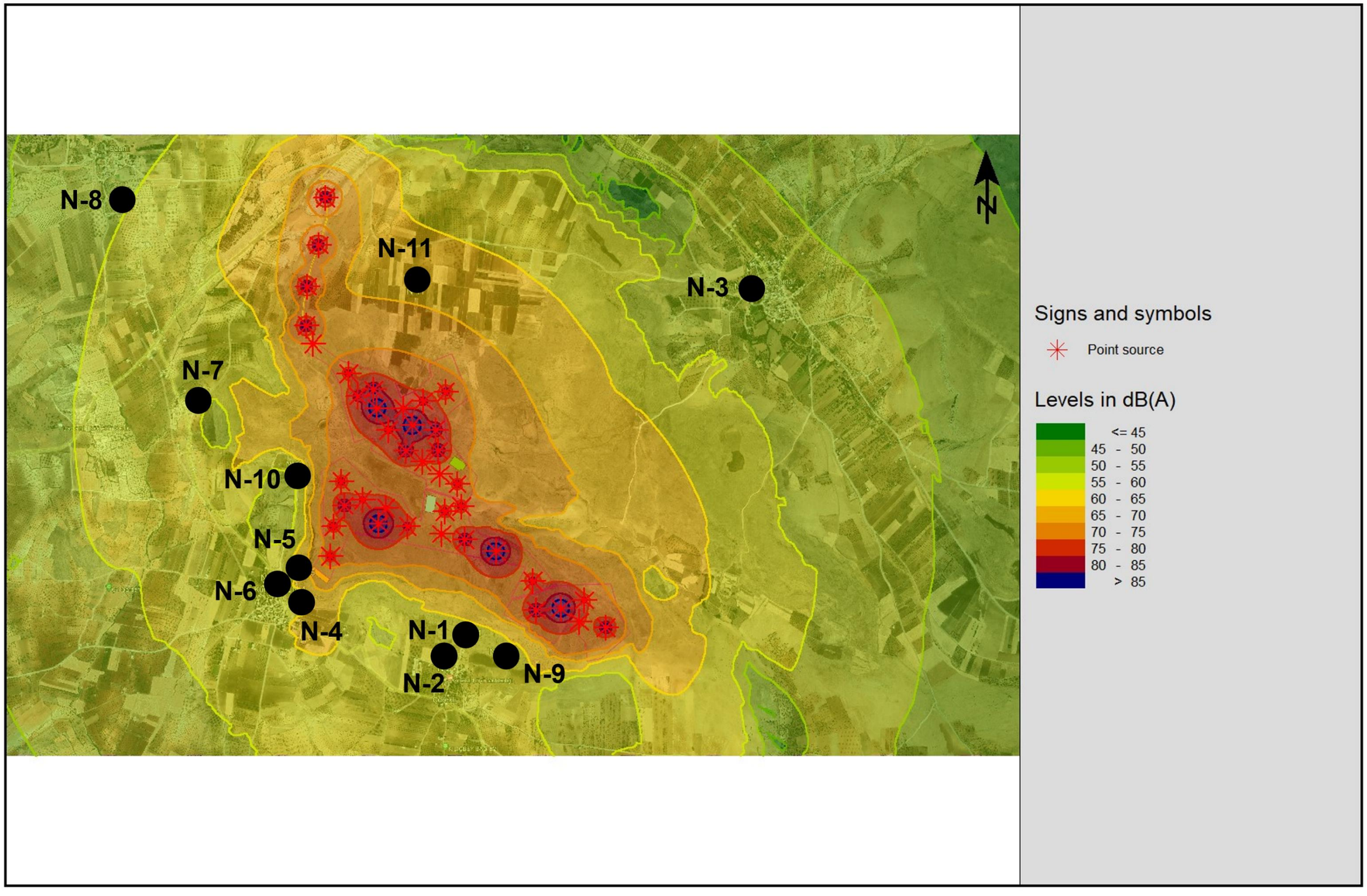

Figure 7-1: Daytime Grid Noise Map for the Construction Phase of the Project

7.1.2.3.2 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 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 limits 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; and
- Performing quarterly monitoring campaigns at the baseline noise measurement locations during the construction phase.

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 it is not possible to revise the construction schedule, noise barriers without any gaps and with a continuous minimum surface density of 10 kg/m^2 could be installed as a second option, 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 will be taken.

7.1.2.3.3 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 7-15: 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					

7.1.2.3.4 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 measuring the noise continuously for 48 hours (quarterly) at the identified locations.

7.1.2.4 Operation Phase

7.1.2.4.1 Impact factors

The impact factor from the Project activities potentially affecting ambient noise during construction phase is listed in Table 7-16.

Table 7-16: 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 in the background noise levels at the closest sensitive receptors.

7.1.2.4.2 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.).

7.1.2.4.3 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.

7.1.2.5 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

7.1.3 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 potential for soil contamination.

7.1.3.1 Construction phase

7.1.3.1.1 Impact factors

The impact factors from the Project activities potentially affecting soil and subsoil during construction phase are listed in Table 7-17.

Table 7-17: Project actions and related impact factors potentially affecting soil and subsoil during construction phase

Project actions	Impact factors
General engineering/construction works;	Removal of topsoil/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 Topsoil/Soil**

According to the geological and geotechnical surveys and site observation, construction activities will involve excavation and removal of topsoil and lower soil. Rocks and stones are present at the upper soil layer of the Project Area. During pre-construction phase, the rocks/stones will be cleared from the site. During the rock removal, stone and topsoil will be separated from each other. After this process, the topsoil will be stripped form the area where permanent structures (i.e. inverter areas, substation and switchyard, administrative buildings), cable trenches and access roads will be placed. The topsoil under the PV panels will not be stripped. Maximization of the topsoil recovery during the land preparation and construction phase is essential to ensure that sufficient topsoil would be available for use in restoration works. The stripped topsoil will be stored at the dedicated topsoil storage area and will be used during rehabilitation of temporary camp site location.

It is planned to re-use the excavated material as much as possible, when technically feasible.

Soil will be removed 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. Exposed working areas will be rehabilitated without delay to prevent soil erosion after completion of construction activities. 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;

- accidental spill of any hazardous materials that are used during the construction;
- oil and fuel leakage from vehicles and generators;
- 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;
- accidental spill of untreated wastewater (e.g., domestic) to soil.
- flooding secondary containments caused by heavy precipitation;

- **Discharge of Wastewater**

During construction phase, domestic wastewater generation due to personnel working per day is calculated as 39.22 m^3/day including offsite accommodation and construction camp. Domestic wastewater generated by personnel at the camp site will be collected in septic tanks and periodically transported via vacuum tanks to the closest licensed wastewater treatment plant by GASKİ.

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.

7.1.3.1.2 Mitigation measures

The following mitigation measures shall be implemented to mitigate the effects of the impact factors.

- **Removal of Topsoil/Soil**
  - Project Soil Management and Erosion Control Plan will be developed and implemented.
  - Topsoil management will be prioritized and in case vegetated/uncontaminated land is expected to be permanently removed, the topsoil will be properly stored in accordance with the Regulation on Excavation, Construction and Demolition Wastes issued on March 18, 2004, at Official Gazette no.25406 and re-used for reclamation as necessary.
  - Subsoil removal 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.
  - Soil stripping will not be carried out during construction activities unless necessary, to minimize disturbance to vegetation, ground species and soils.
  - Licensed quarries will be used to purchase bedding, padding, backfilling, and aggregate materials.
  - Any 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 disposal facility is not available, Kalyon 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.
- Limits of clearing and construction areas will be clearly marked or fenced in order to avoid impacts outside this area.
- Vegetation covering the topsoil, can cause difficulty in the removal of specific topsoil depths and excessive quantities of vegetative matter in stockpiles may promote chemical and biological degradation of the seed reserves that will be the future source of natural regeneration during rehabilitation process. Therefore, prior to topsoil stripping process, vegetation will be removed or reduced by grazing and/or clearing.
- Prior to the vegetation clearance, weed control will be carried out to prevent the formation of invasive species during the revegetation.
- All cleared vegetative material will be buried in-pit, or if suitable, will be placed as habitat within the conservation areas.
- All machineries to be used in topsoil stripping will be cleared of weeds, plants, and diebacks sticked to them before the machineries brought to the Project area and between the operations, in order to prevent the introduction and spread of weeds, plants and diebacks.
- Dieback and weed infected soil will be sent to landfill in order to minimize the risk of spreading dieback and weed species across the Project area.
- The topsoil will be stripped separately from the subsoil while considering the depth and characteristics of the soil.
- The stripping and handling of topsoil will be carried out when the soil moisture content is optimum for the soil texture class.
- Topsoil stripping will not be conducted during windy and rainy periods. Construction is to be delayed 24 hours following a 24-hour rainfall of 10 mm or more during the preceding day, after which soil condition will be reassessed.
- Appropriate equipment will be used for the topsoil stripping activities. Surface grading of stockpiles will be performed with lightweight tracked vehicles or wheeled vehicles to prevent soil compaction.
- Vehicular traffic will be kept at minimum on the soils to be stripped, in order to prevent soil compaction.
- Topsoil will be stripped progressively in order to reduce erosion.
- Since long storage time of the stockpiled topsoil will lead to the loss of biological fraction, additional soil amelioration, such as seeding and fertilization, will be applied to maximize the recovery of topsoil to be used during the rehabilitation process. If the topsoil and stockpiles are stored for a long period of time (more than 1 years) the topsoil stockpiles shall be seeded with appropriate methods in order to avoid erosion from wind/rain to protect the organic matter content. The revegetation of stockpiles areas will be performed favoring fast growing and ground covering flora species able to minimize soil erosion. In such cases, proper species, and seed mixture ratios (fast growing, local plants) will be selected in consultation with the biodiversity specialists.

- The topsoil stockpiles shall not exceed 2 meters and the lateral slopes of the soil stockpiles shall not exceed 45 degrees.
- The surface of the stockpile will be lightly compacted, as necessary, to restrict rainfall penetration, maintain aerobic conditions, and will be protected from flooding by placing berms around the outside. Topsoil and subsoil piles will be free draining and gaps will be left in linear topsoil piles to permit access and prevent canalization of water that may be held against the stack.
- Area where the topsoil will be stored will have a maximum inclination of 5%.
- All stockpiles will be positioned away from drainage lines if applicable.
- Topsoil will be stored separately from subsoil at designated topsoil storage areas to preserve its vegetative properties.
- The stockpiles will be surrounded by temporary drainage lines or similar erosion control devices to prevent soil erosion.
- Topsoil will not be used as a fill material.
- Topsoil will be respread in even layers at a thickness appropriate for the landform and capability of the area to be rehabilitated.
- Areas where topsoil is spread will be ripped while trying not to bring subsurface materials to the surface (e.g. large rocks).
- Following the respreading, topsoil will be seeded to establish revegetation cover as early as possible.
- Rehabilitated areas will be controlled regarding to diseased plants and weed outbreaks, and significant weed outbreaks will be taken under control by using chemical or mechanical control methods.
- Intercepting, diverting, conveying and discharging concentrated flows will be performed to prevent soil detachment and transport.
- To prevent off-site sediment movement, erosion control measures including drainage channels, settling structures, etc. will be implemented as needed 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.
- High sediment generating activities will be avoided and, exposed surfaces and stored materials will be covered if necessary to reduce erosion of sediments into surface waters.
- Drainage channels will be established to prevent loss of soil and runoff to water bodies around the material storage areas.
- Water spraying against wind erosion will be implemented to prevent migration of sediments especially in dry seasons.
- Drainage from excavations will be collected and settled to remove suspended materials prior to discharge in accordance with required permits. Where practicable, local perimeter drains will be constructed around working areas to collect suspended run-off and direct it to a system of settlement basins before discharge in accordance with required permits.
- Channels, bunds and sandbag barriers will be provided on site to direct run-off to the collection system.

- All of the disturbed sites will be re-vegetated to the most possible extent in a timely manner following the completion of stripping and excavation works.

- **Minor Leakage of Contaminants into Soil**

  - 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 areas, where the hazardous materials (chemicals, liquids etc.) storage tanks are 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 Safety Data Sheet (SDS) requirements etc.).

  - Project Pollution Prevention Plan and Waste Management Plan will be developed and implemented to ensure that the amount of release and spills are avoided or managed in a timely manner before reaching substantial amounts that may potentially affect the soil quality.

  - The temporary waste storage areas will be constructed in accordance with the Regulation on Waste Management issued on April 02, 2015, Official Gazette no: 29314 and GIIP.
    - The area will away from any traffic, the facilities or the buildings.
    - There will be a designated area for the licensed vehicles to receive the wastes.
    - Hazardous wastes and non-hazardous wastes will be stored separately, with separate access.
    - Precautions against possible fires and spills (fire extinguisher, spill kit, etc.) will be available at the storage area.
    - The waste storage areas will be covered at the top and on four sides, shielded from precipitation and the elements. Adequate containment and drainage systems will be installed.
    - Storage area will be closed and locked at all times.
    - The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas.
    - The floor will be concrete, the edges of the floor will be raised with concrete walls/parapets for hazardous waste containment.
    - To ensure impermeability; cured concrete with a minimum thickness of 25 cm will be applied, where the concrete meets C30 (STS) standard. If this condition is not met, impermeability will be ensured by laying a of impermeable layer at least 1 mm between the concrete and the soil floor.
    - All 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.
    - Disposal of wastes at sufficient frequencies will be scheduled in order not to exceed the storage capacities at the temporary waste storage areas/storage compartments.
    - Hazardous wastes (except for the medical waste) will be temporarily stored at the waste storage areas for a maximum of 6 months and non-hazardous waste for a maximum of one year.

  - Industrial Waste Management Plans for all temporary waste storage areas 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 and will be renewed prior to expiry of the approvals.

  - 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.

- 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.
- Hazardous Materials and Hazardous Waste Compulsory Liability Insurance will be available 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;
- Official waste declarations for all waste generated will be submitted to the online system of MoEUCC, starting from January each year until the March of each year at the latest.
- Waste storage outside the designated storage areas will be prohibited. Wastes stored in the interim storage areas will be transferred to the temporary storage area daily;
- 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;
- Secondary containments, ponds and drip trays will be checked regularly, especially during extreme weather conditions;
- Generators will be equipped with drip trays and will be checked regularly to prevent spills;
- Portable spill containment and clean-up materials (spill kits) with instructions will be made available and easily accessible at the construction site;
- Training on spill response, use of containment and clean-up material (spill kits) will be provided to all workers;
- Related Personal Protective Equipment (PPE) will be provided to the personnel handling the excavation soil/waste;
- Accidental spills and leakages will be managed through implementation of the Emergency Preparedness and Response Plan. Procedure for management of contamination will be prepared and in case of any spill/leakage, sampling and analyses will be conducted by accredited laboratories. Provisions of the Soil Pollution Control and Point Source Contaminated Sites Regulation will be implemented for investigation, management and reporting of any contamination;
- Any equipment, machinery, pumps and trans mixers will be washed only at designated concrete plants, concrete slurry will not be discharged into environment.

- **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.
  - 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.

7.1.3.1.3 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 7-18: 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 Topsoil/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:	Recurrent					
	Geo. Extent:	Project Site					
	Intensity:	Medium					

7.1.3.1.4 Monitoring measures

The following monitoring measures will be implemented to evaluate the actual impacts of the Project on the soil and subsoil during construction and to confirm the effectiveness of mitigation measures:

- Regular site inspections will be conducted to ensure that the designated construction boundaries are not extended and that erosion control measures are properly in place.
- Periodic inspections of subcontractors will be carried out to prevent unregulated disposal of excavated materials.
- Visual inspections of stormwater and wastewater drainage networks (if present) and septic tanks will be conducted at regular intervals to confirm their integrity and functionality.
- Site inspections will be performed and documented periodically to detect any potential leaks.
- Regular site inspections will be conducted to identify and report any potential damage in areas designated for hazardous materials storage and waste storage.

- Records of worker training on spill response and the proper use of containment and cleanup materials, including subcontractor employees, will be maintained.
- Site inspections will be periodically conducted to ensure an adequate supply of spill-response materials, such as spill kits and metal trays, on-site and within each heavy machinery, with records kept.
- A routine maintenance program will be established, and maintenance records will be maintained for all vehicles and machinery/equipment.
- Licenses and permits for quarries and excavation material storage/recycling facilities will be documented.
- Subcontractor waste management practices will be monitored through document reviews (e.g., permits, waste recycling/disposal agreements) and visual inspections at their work sites.

7.1.3.2 Operation phase

7.1.3.2.1 Impact factors

The impact factors from the Project activities potentially affecting soil and subsoil during operation phase are listed in Table 7-19.

Table 7-19: 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.

- **Discharge of Wastewater**

During operation phase, domestic wastewater generation due to personnel working per day is calculated as 4.33 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.

- **Occupation of land**

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.

7.1.3.2.2 Mitigation measures

The mitigation measures will be implemented to mitigate the effects of the impact factors.

- **Minor Leakage of Contaminants into Soil**
  - Project Pollution Prevention Plan and Waste Management Plan will be developed and implemented to ensure that the amount of release and spills are avoided or managed in a timely manner before reaching substantial amounts that may potentially affect the soil quality.
  - The areas, where the hazardous materials (chemicals, liquids etc.) storage tanks are 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 Safety Data Sheet (SDS) requirements etc.).
  - The temporary waste storage areas will be constructed in accordance with the Regulation on Waste Management issued on April 02, 2015, Official Gazette no: 29314 and GIIP.
    - The area will away from any traffic, the facilities or the buildings.
    - There will be a designated area for the licensed vehicles to receive the wastes.
    - Hazardous wastes and non-hazardous wastes will be stored separately, with separate access.
    - Precautions against possible fires and spills (fire extinguisher, spill kit, etc.) will be available at the storage area.
    - The waste storage areas will be covered at the top and on four sides, shielded from precipitation and the elements. Adequate containment and drainage systems will be installed.
    - Storage area will be closed and locked at all times.
    - The contact information of the personnel in charge of the waste storage area and warning signs will be posted at the temporary storage areas.
    - The floor will be concrete, the edges of the floor will be raised with concrete walls/parapets for hazardous waste containment.
    - To ensure impermeability; cured concrete with a minimum thickness of 25 cm will be applied, where the concrete meets C30 (STS) standard. If this condition is not met, impermeability will be ensured by laying a of impermeable layer at least 1 mm between the concrete and the soil floor.
    - All 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.
    - Disposal of wastes at sufficient frequencies will be scheduled in order not to exceed the storage capacities at the temporary waste storage areas/storage compartments.
    - Hazardous wastes (except for the medical waste) will be temporarily stored at the waste storage areas for a maximum of 6 months and non-hazardous waste for a maximum of one year.
  - Industrial Waste Management Plans for all temporary waste storage areas 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 and will be renewed prior to expiry of the approvals.

- 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 available 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 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 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**
  - 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;

7.1.3.2.3 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 7-20: 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					

7.1.3.2.4 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.

7.1.3.3 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 topsoil and lower soil 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.

7.1.4 Geology and Geomorphology

Based on the information collected in the baseline (see Chapter 6.1.7), the physical component Geology and Geomorphology was assigned as **negligible** value of sensitivity due to the negligible change on topography and morphology.

7.1.4.1.1 Construction Phase

During the construction phase, impacts will be mainly associated to the following ***impact factor*:**

- Changes in the local morphology

The ***project actions*** related to the abovementioned impact factor are the following: surface levelling and grading (including dismantling of existing structures), temporary stockpiling of material, construction of the service facilities and associated facilities (herein after referred as “construction of the facilities”).

There will be no blasting performed for the Project.

Additional impacts on geology and geomorphology also related to soil, hydrology, and hydrogeology and these are discussed in the relevant sections of this ESIA.

The impact is mainly related to the changes inflicted on the current morphology of the area due to the earthworks and excavations, and for the site preparation (scarified, excavated, filled with proper material, and flattened) and the construction of the structures’ foundations.

7.1.4.1.2 Operation Phase

As a result of the impact screening, no impacts on the geology and the geomorphological components are expected during the operation phase.

7.1.4.1.3 Decommissioning and Closure Phase

The decommissioning activities would comprise the removal of the Project Components and the associated facilities. Also, the foundations of the structures would be removed. The site is expected to be restored for its future use.

As a result of the impact screening, no impacts on the geology and the geomorphological components are expected during the decommissioning and closure phase. Decommissioning of infrastructures could have a positive impact if the natural state of the land is recovered.

7.1.4.2 Mitigation Measures

The mitigation measures, for the impacts of the geology and geomorphology on the Project are listed below for the construction phase:

- Detailed studies on geological and geotechnical components (including seismicity) have already been completed for the Project before the construction phase within the scope of the local EIA. Recommendations in these studies should be implemented.
- Worksite will be minimized to the smallest extent possible in order to meet Project’s works and activities.

- Construction site will be minimized to the smallest extent possible in order to meet Project's works and activities.
- The foundations' footprints and depths have been properly dimensioned; hence the excavations and the consequent physical-mechanical disturbances will be minimized.
- The flattening and excavation operation will be minimized to the extent possible in order to limit the morphological disturbances.
- Part of the removed material will be re-used as a fill material at the Project Area, if it presents the suitable geotechnical characteristics, in order to limit the use of raw material.

7.1.4.3 Residual Impacts

7.1.4.3.1 Construction Phase

The residual impact on the geology and geomorphology component after the application of the above-mentioned mitigation measures during construction phase is presented in the following table (Table 7-21).

Table 7-21: Impact Assessment Matrix for Geology and Geomorphology During Construction Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation Effectiveness	Residual Impact Value
Morphological changes	Duration:	Short	Low	Long-term	**Negligible**	Medium-Low	**Negligible**
	Frequency:	Single Event					
	Geo. Extent:	Project Site					
	Intensity:	Negligible					

7.1.4.3.2 Operation Phase

As stated before, as a result of the impact screening, no impacts are expected on the geology and geomorphology component during the commissioning and operation phase.

7.1.4.3.3 Decommissioning and Closure Phase

As stated before, as a result of the impact screening, no impacts on the geology and the geomorphological components are expected during the decommissioning and closure phase.

7.1.4.4 Monitoring

No specific monitoring activities are required for this component.

7.1.5 Seismicity

7.1.5.1 Impact Analysis

The major natural hazard expected during all phases of the Project would be an earthquake.

In the event of earthquakes, during all phases of the Project, significant impact on the community and the workers' health and safety, such as accidents, fire etc., may arise. Additionally, an earthquake may cause adverse impacts on the environment, such as spills, leakage, and erosion.

According to AFAD, the peak ground acceleration (PGA) values for the Project Area with 475 years return period is defined as approximately 0.225 g. Additionally, the study area is located 25.33 km from the fault where the earthquake that occurred on 6 February 2023 at 04.17 with a magnitude of 7.8 Mw was recorded by the USGS.

On the other hand, landslides, rockfalls, etc., which are evaluated within the scope of Law No. 7269, have not been detected in the Project Area and its vicinity, and there is no "Disaster Exposure Zone" decision taken before regarding these disaster events.

7.1.5.2 Mitigation Measures

The mitigation measures of the impacts caused by the natural hazard and seismology component on the Project are listed below:

- Before and during the construction activities in the study area, the provisions of “Türkiye Building Earthquake Regulation” (OG Number: 30364 Date: 18.03.2018) will be complied with.
- Detailed investigations will be conducted for assessing the stability conditions for the structural elements for both normal operation loads and under seismic loads. Türkiye Building Earthquake Regulation requires certain parameters to be determined prior to the construction. These parameters were determined by the geological and geotechnical investigations for the Project Area.
- Several structures will be developed as part of the Project and these will all be designed according to Turkish and international design standards requiring specific structural characteristics related to slopes of cuts and fills, footing sizes and many other considerations.
- Related studies (geological, geotechnical and hydrological studies, flood risk assessments etc.) are completed for the Project before the construction phase.
- 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 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.

7.1.5.3 Monitoring

No specific monitoring activities are required for this component.

7.1.6 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 the AoI, water/sediment pollution and presence of hydrological changes in sub-catchments of creeks in the AoI.

7.1.6.1 Construction Phase

7.1.6.1.1 Impact factors

The impact factors from the Project activities potentially affecting hydrology and surface water during construction phase are listed in Table 7-22.

Table 7-22: 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 39.22 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 at the camp site will be collected in septic tanks and periodically transported via vacuum tanks to the closest licensed wastewater treatment plant of GASKİ.

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

7.1.6.1.2 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, 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.
- The General Directorate of State Hydraulic Works (abbreviated as DSI in Turkish), and General Directorate of Water Management (abbreviated as SYGM in Turkish) 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).

- Procedure for management of the construction site during periods of heavy rainfall will be developed. Exposed surfaces and stored materials will be covered if necessary to reduce the erosion of sediments into surface waters.
- 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).

7.1.6.1.3 Residual Impacts

The residual impact following the above-mentioned mitigation measures during the construction phase is presented in the following table (Table 7-23). 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 7-23: 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					

7.1.6.1.4 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.

7.1.6.2 Operation Phase

7.1.6.2.1 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 7-24.

Table 7-24: 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.

Surface water pollution

The details related to this Project impact are detailed in the previous section (construction phase).

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 4.33 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).

Wash Water

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.

7.1.6.2.2 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.

7.1.6.2.3 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 7-25).

Table 7-25: 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					

7.1.6.2.4 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.

7.1.6.3 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.

7.1.7 Hydrogeology and Groundwater

Based on the information collected in the baseline (see Chapter 6.1.8), the physical component Hydrogeology and Groundwater was assigned as **low** value of sensitivity due to the relatively low pressures in terms of both quantity and quality in AoI.

7.1.7.1 Construction Phase

7.1.7.1.1 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 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.

The **Project actions** related to the abovementioned impact factor are the following:

- Groundwater exploitation (demand for freshwater)
- 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 7-26.

Table 7-26: 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.

Changes in the Local Hydrogeology

During the construction phase, water will be needed not only for workers as potable water but also for constructional activities such as dust suppression. Although drinking water of the personnel will be bottled water, the potable water needed for personnel needs at the construction camps will be supplied from -GASKİ by water tankers, and the potable water needed for the personnel residing in off-site accommodation will be supplied

through the municipality potable network, the water need for dust suppression during dry periods is estimated to be 50 m^3/day and it will be supplied from a well which is planned to be drilled and constructed for the police station planned to be built near the Project Area. The construction and operation of this well will be under the responsibility of the police station. Even though the well and the water pipeline is not considered as an associated facility, 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, water supply and groundwater usage from this well is considered for the Impact Assessment

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, refueling 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.

7.1.7.1.2 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.

7.1.7.1.3 Residual Impacts

The residual impact on the hydrogeology and groundwater component after the application of the abovementioned mitigation measures during the construction phase is presented in the following table (Table 7-27).

Table 7-27: Impact Evaluation Matrix for Hydrogeology and Groundwater Component During Construction Phase After Mitigation

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Changes in the Local Hydrogeology	Duration:	Medium	Low	Long term	**Low**	High	**Negligible**
	Frequency:	Infrequent					
	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					

7.1.7.1.4 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
  - Periodic monitoring of groundwater quality during the construction period,
- Groundwater monitoring in terms quality will be repeated once at the groundwater monitoring locations given in previous sections of the report (see Section 6.1.8) during the construction phase. . If significant

changes are observed, then potential causes should be investigated, and corrective measures should be taken, as necessary.

- 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).

7.1.7.2 Operation Phase

7.1.7.2.1 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 7-28.

Table 7-28: 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 130 m^3 according to the assumption that 2 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 region.

On the other hand, potable water will be supplied from the same well which is planned to be drilled and constructed for the police station planned to be built near the Project Area. The construction and operation of this well will be under the responsibility of the police station. Even though the well and the water pipeline is not considered as an associated facility, 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, water supply and groundwater usage from this well is considered for the Impact Assessment.

Minor leakage to groundwater

The details related to this impact factor are also detailed in the previous section (construction phase).

7.1.7.2.2 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.

7.1.7.2.3 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 7-29).

Table 7-29: 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
Changes in the Local Hydrogeology	Duration:	Medium	Low	Long term	**Low**	High	**Negligible**
	Frequency:	Infrequent					
	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					

7.1.7.2.4 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 Periodic monitoring of groundwater quality during the operation period,
- Groundwater monitoring in terms of quality 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 annual. Using monitoring data, trends will be analyzed. 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. If significant trends are observed, then potential causes should be investigated, and corrective measures should be taken, as necessary..
- 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).

7.1.7.3 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.

7.1.8 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

7.1.8.1 Construction phase

7.1.8.1.1 Impact factors

The impact factors from the Project activities potentially affecting traffic during construction phase are listed in Table 7-30.

Table 7-30: 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 7-31.

Table 7-31: Traffic Load Increase on O-54 Ring Road during Construction Phase

Vehicle Type	The Annual Average Daily Traffic Data of O-54 Ring Road	Number of Vehicle Increase with the Project's Construction	Traffic Load Increase (%) at State Road
Light Vehicle	7183	2	0.03
Heavy Vehicle	8013	10	0.1
Total	15196	12	0.08

Source: https://www.kgm.gov.tr/SiteCollectionDocuments/KGMdocuments/Istatistikler/TrafikveUlasimBilgileri/22TrafikUlasimBilgileri.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, less than %0.1 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 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.

7.1.8.1.2 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.

7.1.8.1.3 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 traffic during the construction phase.

Table 7-32: 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.

7.1.8.2 Operation phase

7.1.8.2.1 Impact factors

The impact factors from the Project activities potentially affecting traffic during operation phase are listed in Table 7-33.

Table 7-33: Project actions and related impact factors potentially affecting traffic during construction phase

Project actions	Impact factors
Plant/infrastructure operation	Increase of traffic

Impacts potentially affecting this component are assessed here below for the operation phase.

- **Increase of traffic**

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.
- Occupational safety risks with respect to vehicles/worker accidents

7.1.8.2.2 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.

7.1.8.2.3 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 7-34: 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					

7.1.8.2.4 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.

7.1.8.3 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.

7.1.9 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.

7.1.9.1 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.

7.1.9.1.1 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, Kalyon 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] Kalyon 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 Kalyon 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. Kalyon may use national reporting methodologies if they are consistent with the GHG Protocol. They will quantify Scope 1 and Scope 2 Emissions.

The EPFI will require Kalyon 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. Kalyon 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.

[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.

7.1.9.1.2 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.

7.1.9.1.3 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 7-35: 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
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.

7.1.9.2 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) and Mobile Sources that are owned or controlled by the Owner (e.g., emissions from combustion in vehicles, and fugitive emissions).

GHG emissions are assessed based on Project schedules and information provided by Kalyon regarding to amounts of fuel, 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 in Section 7.1.9.2.1 below. Table 7-36 provides a summary of the activities for which GHG emissions are calculated.

Table 7-36: 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
	Electricity Consumption	Indirect emissions due to used electricity
	Loss of Carbon Sink	Reduction of carbon sink due to loss of vegetation
Operation	Electricity Consumption (for lighting, heating and cooling, etc.)	Indirect emissions due to used electricity

[7] Türkiye National Inventory Report (NIR) for UNFCCC, 2023, https://unfccc.int/documents/627786

7.1.9.2.1 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 7-37 provides the GWPs used in the GHG calculations.

Table 7-37: Global Warming Potentials from the Intergovernmental Panel on Climate Change

GHG Compound	GWP
CO_2	1
CH_4	25
N_2O	298

7.1.9.2.2 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.

7.1.9.2.2.1 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 7-38 below.

Table 7-38: 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

* 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.

7.1.9.2.2.2 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 7-39 below.

Table 7-39: 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:

CO_2 Emission Factor:

$$\mathrm{EF}_{\mathrm{CO_2}}\left(\frac{kg\ CO_2}{L}\right) = \text{Energy based EF}\left(\frac{\mathrm{t\ CO_2}}{\mathrm{TJ}}\right) \times \text{Net Calorific Value}\left(\frac{\mathrm{TJ}}{\mathrm{kT}}\right) \times \text{Density of Diesel}\left(\frac{\mathrm{kg}}{\mathrm{m^3}}\right) \times \frac{1{,}000\ \mathrm{kg\ CO_2}}{1\ \mathrm{t\ CO_2}} \times \frac{1\ \mathrm{kT}}{1{,}000{,}000\ \mathrm{kg}} \times \frac{1\ m^3}{1{,}000\ \mathrm{L}}$$

Total CO_2 Emissions from Mobile Equipment:

$$\mathrm{E}_{\mathrm{CO_2}} = \text{Fuel Combustion}\left(\frac{\mathrm{L}}{\mathrm{yr}}\right) \times \text{Emission Factor}\left(\frac{\mathrm{kg\ CO_2}}{\mathrm{L}}\right) \times \frac{1\ \mathrm{tonne}}{1{,}000\ \mathrm{kg}}$$

7.1.9.2.3 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.

7.1.9.2.3.1 Electricity Consumption

The Scope 2-indirect GHG emissions are expected due to electricity consumption. For the emission factor of electricity consumption, Turkish National Electricity Grid Emission Factors calculated by the Turkish Ministry of Energy and Natural Resources are used. The Ministry defines three types of emission factors[8] for electricity consumption:

[8] https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru

- Emission factor for electricity consumption from grid: 0.7424 t CO_2/MWh
- Emission factor defined for a decrease in GHG emissions by utilizing solar and wind power: 0.6488 t CO_2/MWh
- Emission factor defined for a decrease in GHG emissions by utilizing other renewable sources: 0.5558 t CO_2/MWh

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.

7.1.9.2.4 Emissions Not Included in Scope 1 or Scope 2

7.1.9.2.4.1 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 7-40: Carbon Stock Change Values

Parameter	Values	Unit	Reference
	Grassland		
Annual area of Land Converted to Other Land	122.96	ha	IPCC 2006 IPCC Guidelines for National Greenhouse Gas Inventories V4 Chapter 6 – Table 6.4.
Biomass stocks before the conversion	13.5	tonnes dm ha^{-1}	
Biomass stocks after the conversion	0	tonnes dm ha^{-1}	
Carbon fraction of dry matter	0.5	tonnes C (tonne dm)$^{-1}$	

7.1.9.3 Impact Analysis

7.1.9.3.1 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.

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 Kalyon as 3,750 liters.

Then the total Stationary Combustion GHG Emissions were calculated using the equations given in Section 7.1.7.2.2.1. The GHG emissions due to Stationary Combustion during construction phase were calculated as 9.37 tonne CO_2.

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 Kalyon as 150,000 liters. Then the total GHG Emissions from Mobile Combustion were calculated using the equations given in Section 7.1.9.2.2.2. The GHG emissions due to Mobile Combustion during construction phase were calculated as 417.10 tonne CO_2.

Electricity Consumption

During the construction phase, electricity will be utilized for construction activities and heating and hot water needs for the campsite. According to the information provided by Kalyon, electrical energy required when the connection to electricity grid is completed is estimated as 200,000 kWh. The GHG emissions resulting from the electricity consumption during the construction phase was calculated as 148.48 tonne CO_2 using the emission factor and the formula given in Section 7.1.9.2.3.1.

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 (122.96 ha) comprises of 100% grassland. Using the equation given in 7.1.9.2.4.1, the total indirect GHG emissions due to land use change is calculated as 829.98 tonne CO_2.

Total GHG Emissions in Construction Phase

The emissions for construction phase of the Project are presented in Table 7-41. They are based on rough estimates and may significantly overestimate the actual emissions.

Table 7-41: Annual Project GHG Emissions for Construction Phase

Source	Calculated GHG (as t CO_2e)			Total GHG amount	
	t CO_2	t CH_4	t N_2O	t CO_2e	Percentage (%)
Stationary Sources (Generators) – Combustion of Diesel	9.34	0.009	0.022	9.37	0.7
Vehicles – Combustion of Diesel	373.60	0.52	42.97	417.10	29.7
Electricity Consumption	148.48	-	-	148.48	10.6
Loss of Carbon Sink	829.98	-	-	829.98	59.0
TOTAL				1,404.9	100.00

The table above presents the emissions to be originated from the construction activities throughout the whole 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 7.1.9.2.1 above.

Table 7-42: Comparison of Project GHG Emissions to National and Global Emissions

Source	Data
Project GHG Emissions (tonnes CO_2e/year) (during construction)	1,404.9
Comparison to Türkiye-wide Total (%)	0.00026%
Comparison to Global Total (%)	0.0000061%
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 7-42 summarizes the 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.

[9] Obtained from TURKSTAT, Türkiye NIR for the year 2020

[10] Obtained from UNFCCC GHG database, https://di.unfccc.int/time_series

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 GHG emissions from the construction phase of the Project are about **1,404.9 t CO_2e**. This value is below the 25,000 t CO2e threshold defined in IFC PS3 and Equator Principles IV. Therefore, no additional monitoring will be required.

7.1.9.3.2 Operation Phase

Electricity Consumption

During the operation phase, electricity will be utilized for operation activities. According to the information provided by Kalyon, 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 as a total of 165 MWh consisting of 80 MWh/year internal consumption during daytime and 85 MWh/year external consumption (from grid) during night-time. The yearly GHG emissions resulting from the electricity consumption during the operation phase was calculated as 70.6 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 7.1.9.2.3.1. 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 7-43. 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.

Table 7-43: 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)	7.5	-	-	7.5	10.7%
External Electricity Consumption (during night-time)	63.1	-	-	63.1	89.3%
TOTAL				70.6	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 7.1.9.2.1 above.

Table 7-44 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.

[11] https://enerji.gov.tr/evced-cevre-ve-iklim-turkiye-ulusal-elektrik-sebekesi-emisyon-faktoru

Table 7-44: Comparison of Project GHG Emissions to National and Global Emissions

Source	Operational
Project GHG Emissions (tonnes CO_2eq/year)	70.6
Comparison to T-wide Total (%)	0.00001%
Comparison to Global Total (%)	0.0000003%
Türkiye-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 **70.6 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.

7.1.9.3.3 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.

7.1.9.4 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 Kalyon. Therefore, 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 7.1.9.2 describes methodology for estimation of GHG emissions originated from the Project and Section 7.1.9.3 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 very small in scale 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.

[12] Obtained from TURKSTAT, Türkiye NIR for UNFCCC for the year 2020

[13] Obtained from UNFCCC GHG database, https://di.unfccc.int/time_series

- All employees will be provided with 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.
- 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.

7.1.9.5 Residual Impacts

7.1.9.5.1 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 7-45: 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					

7.1.9.5.2 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 7-46: 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					

7.1.9.5.3 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.

7.1.9.6 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 7-47: Resource Efficiency and Energy Management Monitoring Actions

Source Document	Monitoring Action/Measure Description	Frequency/Timing	KPI	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). Records on the data resources (such as fuel invoices that include consumption amounts) must be kept.	Monthly	• Amounts consumed 1. [L] 2. [L] 3. [MWh]	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	Client / EPC
• 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	KPI	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 April 2023,
- Review of the Project national Environmental Impact Assessment Report and other relevant Project documents,
- Social baseline and impact assessment site visit held between 7-9 June 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, 42 households were participated to the household survey representing 138 local people. Female participants constitute approximately 35.7% of the total participants. Gender distribution according to the settlements is provided in the table below.

Table 7-48: Gender of the Participants

Village	Male	Female	Total
Çörekli	3	2	5
Gülpınar	13	3	16
Kürüm	5	8	13
Ozanlı	4	1	5
Ufacık	2	1	3
Total	27	15	42

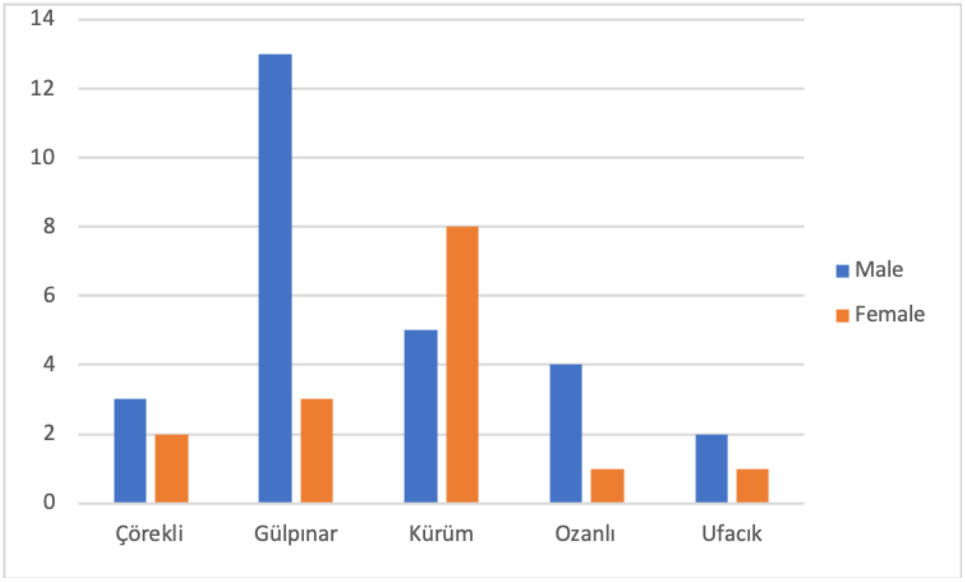

Figure 7-2 Gender Distribution in the Settlements

According to the results of the household surveys, it has been observed that majority of the participants are over 65 years old. Age distribution of the participants according to the village is provided in the table below.

Table 7-49: Age Distribution of the Participants

Age	Çörekli	Gülpınar	Kürüm	Ozanlı	Ufacık	Total
19-25	0	0	0	2	0	2
26-39	0	1	2	0	1	4
40-55	1	3	2	1	0	7
56-65	1	7	4	1	0	13
65+	3	5	5	1	2	16
Total	5	16	13	5	3	42

During the fieldwork, the participants were asked whether they had any information about the Project. 80% of the participants stated that they had information about the Project. The villages with the highest awareness about the Project are Kürüm and Ozanlı. All participants interviewed in these two villages stated that they had information about the Project. In Ufacık village, 3 participants were interviewed and all 3 of them stated that they did not have information about the Project.

Table 7-50: Project Information

Answer	Çörekli	Gülpınar	Kürüm	Ozanlı	Ufacık	Total
Yes	4	15	13	5	0	37
No	1	1	0	0	3	5
Total	5	16	13	5	3	42

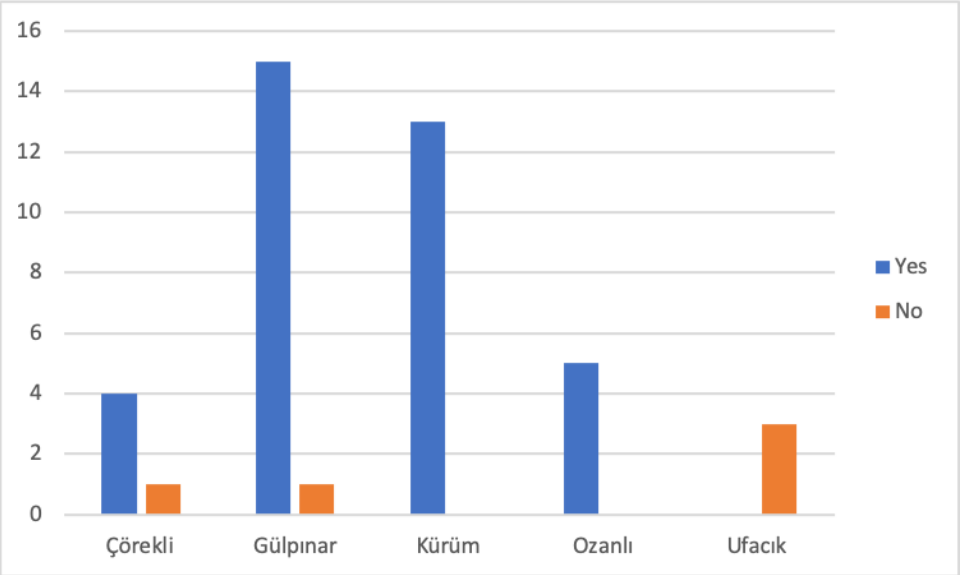

Figure 7-3 Project Information Levels

Participants stated that they accessed information about the Project through mukhtars, Project officers or the public. Most of the participants obtained information about the Project from the public.

Table 7-51: Information Source of the Participants

Row Labels	Public	Mukhtar	Project officers	No Answer	Total
Çörekli	2	1	1	1	5
Gülpınar	12	1	1	2	16
Kürüm	4	1	5	3	13
Ozanlı	4	0	1	0	5
Ufacık	0	0	0	3	3
Total	22	3	8	9	42

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?". 10 of the participants stated that they would report their complaints or suggestions through mukhtars and 11 of the participants stated that they would report their complaints or suggestions through institutions.

Table 7-52: Requested Grievance Mechanism

Village	Through institutions	Through Muhktar
Çörekli	0	3
Gülpınar	3	1
Kürüm	7	3
Ozanlı	0	1
Ufacık	1	2
Total	11	10

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 Çörekli village, 1 of the 4 participants stated that their house was better, 1 stated that it was worse and 2 stated that it was average when compared to other houses in the region. In Gülpınar village, 5 out of 14 participants stated that their house was better, 3 stated that it was worse and 6 stated that it was average when compared to other houses in the region. In Kürüm village, 1 out of 6 participants stated that their house was better compared to other houses in the region, 3 stated that it was worse, and 2 stated that it was average. In Ozanlı village, 2 out of 4 participants stated that their houses were better, 1 stated that it was worse and 1 stated that it was average when compared to other houses in the region. In Ufacık village, 1 out of the 3 participants stated that it was better, 1 stated that it was worse; and 1 stated that it was average when compared to other houses in the region.

Table 7-53: House Conditions

Village	Better	Worse	Average
Çörekli	1	1	2
Gülpınar	5	3	6
Kürüm	1	3	2
Ozanlı	2	1	1
Ufacık	1	1	1

In the household interviews, the participants were asked "in which months of the year do you live here". All participants in Çörekli and Ufacık villages stated that they live in these villages all year round. In the other three villages, there are people living in the village seasonally. 2 participants from Gülpınar village, 2 participants from Kürüm village and 1 participant from Ozanlı village stated that they live in these villages only during the summer season.

Table 7-54: Permanent / Temporary Residency

Village	Residency	Frequency
Çörekli	Permanent	14
Gülpınar	Summer Period	2
	Permanent	9
Kürüm	Permanent	8

Village	Residency	Frequency
	Summer Period	2
Ozanlı	Permanent	4
	Summer Period	1
Ufacık	Permanent	2

During the household interviews, participants were asked about their drinking water sources. In all 5 villages, most of the participants stated that their drinking water source was tap water. In Çörekli village, 2 out of 4 participants stated that the source of drinking water was the tap water, 1 stated that it was well water and 1 stated that it was spring water. In Gülpınar village, 1 of the 16 participants stated that the drinking water source was spring water, 1 stated that it was well water and 14 stated that it was tap water. In Kürüm village, 2 out of 13 participants stated that their drinking water source was spring water, 1 stated that it was transported water, and 10 stated that it was tap water. In Ozanlı village, 3 out of 5 participants stated that their drinking water source was tap water, 1 stated that it was spring water, and 1 stated that it was well water. In Ufacık village, 2 out of 3 respondents stated that their drinking water source was tap water, while 1 stated that it was well water.

Table 7-55: Drinking Water Source

Row Labels	Frequency
Çörekli	
Spring water	1
Well water	1
Tap water	2
Gülpınar	
Spring water	1
Well water	1
Tap water	14
Kürüm	
Spring water	2
Tap water	10
Transported water	1
Ozanlı	
Spring water	1
Well water	1
Tap water	3
Ufacık	
Well water	1
Tap water	2

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 5 villages, most of the participants stated that they obtained irrigation water from well water. In Çörekli village, 1 of the participants stated that they use spring water, 1 well water and 2 tap waters as irrigation water source. In Gülpınar village, 8 of the participants stated that they use well water for irrigation, while 5 of them stated that they use tap water. In Kürüm village, 4 of the participants stated that they use well water, 1 of them use transported water, 1 of them use rainwater, and 3 of them use mains water as irrigation water source. In Ozanlı village, all 5 participants stated that they use well water as irrigation water. In Ufacık village, 2 out of 3 participants stated that their irrigation water source is well water.

Table 7-56: Irrigation Water Source

Water Source	Irrigation Source
Çörekli	
Spring water	1
Well water	1
Tap water	2
No irrigation	1
Gülpınar	
Well water	8
Tap water	5
No irrigation	3
Kürüm	
Well water	4
Transported water	1
Tap water	3
Rain water	1
No irrigation	4
Ozanlı	
Well water	5
Ufacık	
Well water	2
No irrigation	1

During the household interviews, the respondents were asked whether they were engaged in agriculture or not. In Çörekli, Gülpınar, Ozanlı and Ufacık villages, all participants stated that they were engaged in agriculture. In Kürüm village, 6 participants stated that they were engaged in agriculture while 1 participant stated that they were not engaged in agriculture.

Table 7-57: Agricultural Production

Settlements	Agricultural Production	Land Cultivation
Çörekli	Yes	2
Gülpınar	Yes	11
Kürüm	Yes	6
	No	1
Ozanlı	Yes	3
Ufacık	Yes	3
Total		26

People who stated that they were farming were asked what they planted on their land. Barley and olive are common crops cultivated in all 5 villages. Fruit and vegetables and barley are the main crops planted in Çörekli village. In Gülpınar village, barley, wheat, tomato, fruit and vegetable are the main crops planted, with olive being the majority. In Kürüm village, the main crops planted are walnut, olive and clover. In Ozanlı village, Barley, peanut and olive are the main crops planted. Also, barley and olive are the main crops planted in Ufacık village.

Table 7-58: Agricultural Products

Agricultural Products in the Settlements	
Çörekli	
Barley	1
Fruit and Vegetable	1
Gülpınar	
Barley	4
Wheat	1
Tomatoes	1
Fruit and Vegetable	1
Olive	4
Kürüm	
Walnut	1
Olive	4
Clover	1
Ozanlı	
Barley	1
Peanut	1
Olive	1

Agricultural Products in the Settlements	
Ufacık	
Barley	1
Olive	2

The same people were asked whether there has been any change in agricultural production in the last 5 years. In Çörekli village, it was stated that there is no change. In Gülpınar village, 1 out of 11 participants stated that there is no change; 8 stated that agricultural production has decreased; 2 stated that agricultural production has increased. In Kürüm village, 5 out of 6 participants stated that there was no change in agricultural production, while 1 participant stated that there was an increase. In Ozanlı village, 1 participant stated that there was no change in agricultural production, 1 stated that there was an increase and 1 stated that there was a decrease. In Ufacık village, all participants stated that there was a decrease in agricultural production.

Table 7-59: Changes in agricultural production

Village	Decrease	Increase	Same	Total
Çörekli	0	0	1	1
Gülpınar	8	2	1	11
Kürüm	0	1	5	6
Ozanlı	1	1	1	3
Ufacık	3	0	0	3
Total	12	4	8	24

The participants who stated that there was an increase in agricultural production in Ozanlı and Gülpınar villages stated that the reason for this increase was the increase in the amount of precipitation. In Kürüm village, it was stated that the introduction of fertilizer and pesticide use led to an increase in agricultural production.

Some of the participants in Gülpınar, Ozanlı and Ufacık villages stated that agricultural production has decreased in the last 5 years. The reasons for this decline were asked to the participants. In all 3 villages, the participants stated that low prices caused a decrease in agricultural production. In addition to this, in Gülpınar village, it was stated that lack of labour force and drought also caused a decrease in agricultural production. In Ufacık village, it was stated that lack of labour force, drought and plant diseases in the fields caused a decrease in agricultural production.

57% of the participants stated that they were engaged in animal husbandry. Only none of the participants in Çörekli village are engaged in animal husbandry. In Gülpınar village, half of the 16 participants are engaged in animal husbandry. In Kürüm village, 4 of the 13 participants stated that they were engaged in animal husbandry, while 9 stated that they were not. In Ozanlı village, 3 out of 4 participants stated that they were engaged in animal husbandry, while in Ufacık village, 2 out of 3 participants stated that they were engaged in animal husbandry.

Table 7-60: Engagement with animal husbandry

Answer	Çörekli	Gülpınar	Kürüm	Ozanlı	Ufacık	Total
Yes	0	8	4	4	2	18
No	5	8	9	1	1	24
Total	5	16	13	5	3	42

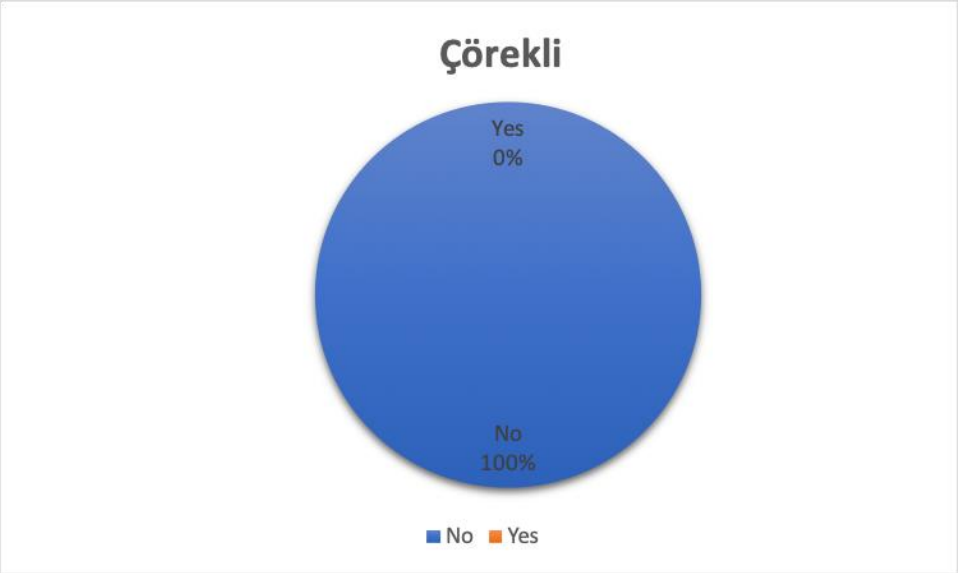

Figure 7-4: Animal Husbandry in Çörekli

Figure 7-5 Animal Husbandry in Gülpınar

Figure 7-6 Animal Husbandry in Kürüm

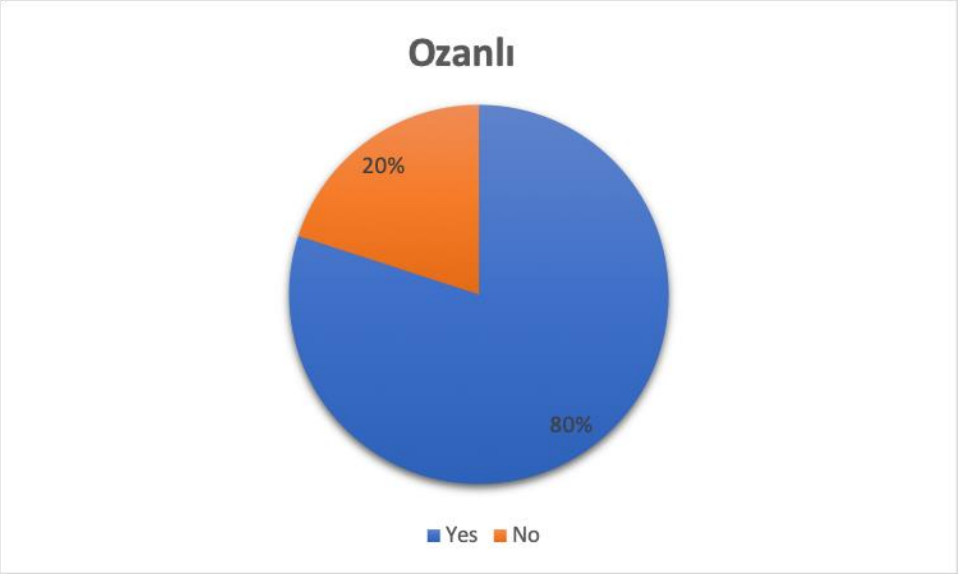

Figure 7-7 Animal Husbandry in Ozanlı

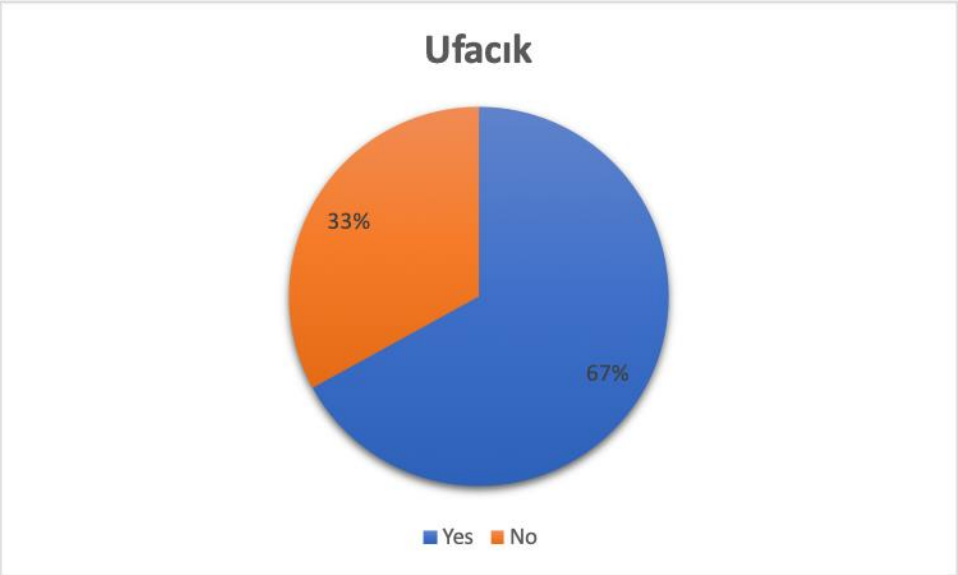

Figure 7-8 Animal Husbandry in Ufacık

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 security guard, 6 people as a driver, and 1 person as a cleaner in Gülpınar village. In Kürüm village, 1 person stated that he/she can work as an office worker, 1 person as a driver, and 2 people as cleaner. In Ozanlı village, 1 person stated that he/she could work as a cleaner and one person stated that he/she could work as a driver. In Ufacık village, 2 people stated that they could work as cleaners. In Çörekli village, none of the participants stated that they had usable skills.

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 interview was conducted in 1 out of 5 villages. The women focus group interview was conducted in the village of Ufacık. 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, field work and cattle husbandry. The women do not expect any negative impact from the project. They stated that if job opportunities arise during the project, women in the village can work in positions such as cleaners and cooks.

The participation rate of women in household interviews is 35.7%. According to the gender distribution of the participants, the number of women participants is considerably less than men. During the interviews, it was observed that men were more authorised than women in decision-making and expression of opinions. When women were asked questions, they generally stated that they would prefer their husbands to answer them. Therefore, the number of women who agreed to participate in the interviews in the field study is lower than the number of men.

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 prioritised. 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 prioritised 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, it was stated that there are no forests and rivers in any settlement within the project impact area.

The recreation area is located only in Çörekli and Ufacık villages.

During the household interviews, it was stated that there are areas with sentimental value in Çörekli, Gülpınar, Kürüm and Ufacık villages. 20% of the participants in Çörekli village, 50% of the participants in Gülpınar village, 23% of the participants in Kürüm village and 33% of the participants in Ufacık village stated that they use these areas. Most of the participants stated that the project will not affect these areas or that they have no information on this issue. Only 1 participant from Gülpınar village and 1 participant from Kürüm village stated that the project will affect these areas.

According to the household interviews, it was determined that all villages have spring water. 80% of the respondents in Çörekli village, 63% of the respondents in Gülpınar village, 77% of the respondents in Kürüm village, 60% of the respondents in Ozanlı village and 33% of the respondents in Ufacık village stated that they use this water. During the interviews, the participants were asked "do you expect this resource to be affected by the project". Only in Gülpınar village, 25% of the participants stated that they expected an impact. Participants in other villages stated that they did not expect an impact or did not have information on this issue.

It is stated that all of the villages have well water. While all of the participants in Ozanlı and Ufacık villages stated that they use this water, 80% of the participants in Çörekli village, 69% of the participants in Gülpınar village and 23% of the participants in Kürüm village stated that they use this water. Most of the participants do not think that the project will affect well water. Only 13% of the participants in Gülpınar village and 33 % of the participants in Ufacık 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 Çörekli, Gülpınar, Kürüm, Ozanlı and Ufacık villages all have pasture areas. 44% of the participants in Gülpınar village, 23% of the participants in Kürüm village, 80% of the participants in Ozanlı village, 67% of the participants in Ufacık village stated that they use pasture areas for grazing animals. In all villages, most of the respondents stated that pasture areas will be affected by the project. The expected impacts are the destruction of pasture areas and therefore the end of animal husbandry. Although some of the participants suggested that the project should be relocated or new pasture areas should be allocated, most of the participants did not make any suggestions.

During the household interviews, it was stated that hunting was carried out only in Gülpınar and Ozanlı villages. It was stated that partridge and rabbit were hunted in Gülpınar village and only partridge was hunted in Ozanlı village. It was stated that hunting activities were carried out in spring season in both villages.

Perceived Positive Impacts of The Project

During the field studies, participants were asked about their expectations of positive impacts related to the project. 20 out of 42 participants stated their positive expectations about the project. This rate corresponds to 48% of all participants. 40% of the participants in Çörekli village, 38% of the participants in Gülpınar village, 56% of the participants in Kürüm village, 40% of the participants in Ozanlı village and 67% of the participants in Ufacık village stated that they expect positive impact. When asked "What could be the positive impacts of the project?", the answers were employment creation, benefit to national income, free electricity distribution to villages. 18 out of 20 participants stated that there will be employment opportunities thanks to the project, 1 person stated that national income will increase, and 1 person stated that free electricity will be distributed.

Perceived Adverse Impacts of The Project

During the field studies, participants were asked about their expectations of negative impacts related to the project. 19 out of 42 participants stated that the project may have negative impacts.

18 of the 19 participants stated that the project would lead to the loss of pasture areas and the end of animal husbandry sector. In addition, the participants also stated that they expect negative impacts such as noise and dust during construction works.

20% of the participants in Çörekli village, 63% of the participants in Gülpınar village, 31% of the participants in Kürüm village, 40% of the participants in Ozanlı village and 33% of the participants in Ufacık village stated that the project would cause the loss of pasture areas and the end of animal husbandry.

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
- Permanent job opportunities
- Avoiding damage to power lines during construction work

Most of the participants expressed their concerns about the loss of pasture area and the end of animal husbandry. Although they did not have specific suggestions, they stated that this was the most significant negative impact and that a solution should be found for this.

On 6 February 2023, the villages were severely affected by the earthquakes. Some of the participants stated that their houses were destroyed or damaged and that they live in containers. Although not directly related to the project, they stated that they did not receive any aid after the earthquake and suggested that they should be assisted.

In addition, some of the participants stated that they could not give advice because they did not have enough information about the project. It is recommended that Kalyon Enerji should carry out information activities in the villages.

7.2.2 Population and Demography

According to the baseline information of the population component, the sensitivity of the villages was assessed as **Medium** 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 Çörekli is 30, Gülpınar is 600, Kürüm is 100, Ozanlı is 160, and Ufacık is determined as 150 and considering the proximity of the workers accommodation Kürüm 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

- **Increase of population**

Only 10 workers will be accommodated inside the Project site borders (see Figure 7-9). The rest (approximately 68 workers, skilled) will be accommodated in rental houses and hotels in in Şahinbey District and Gaziantep Province.

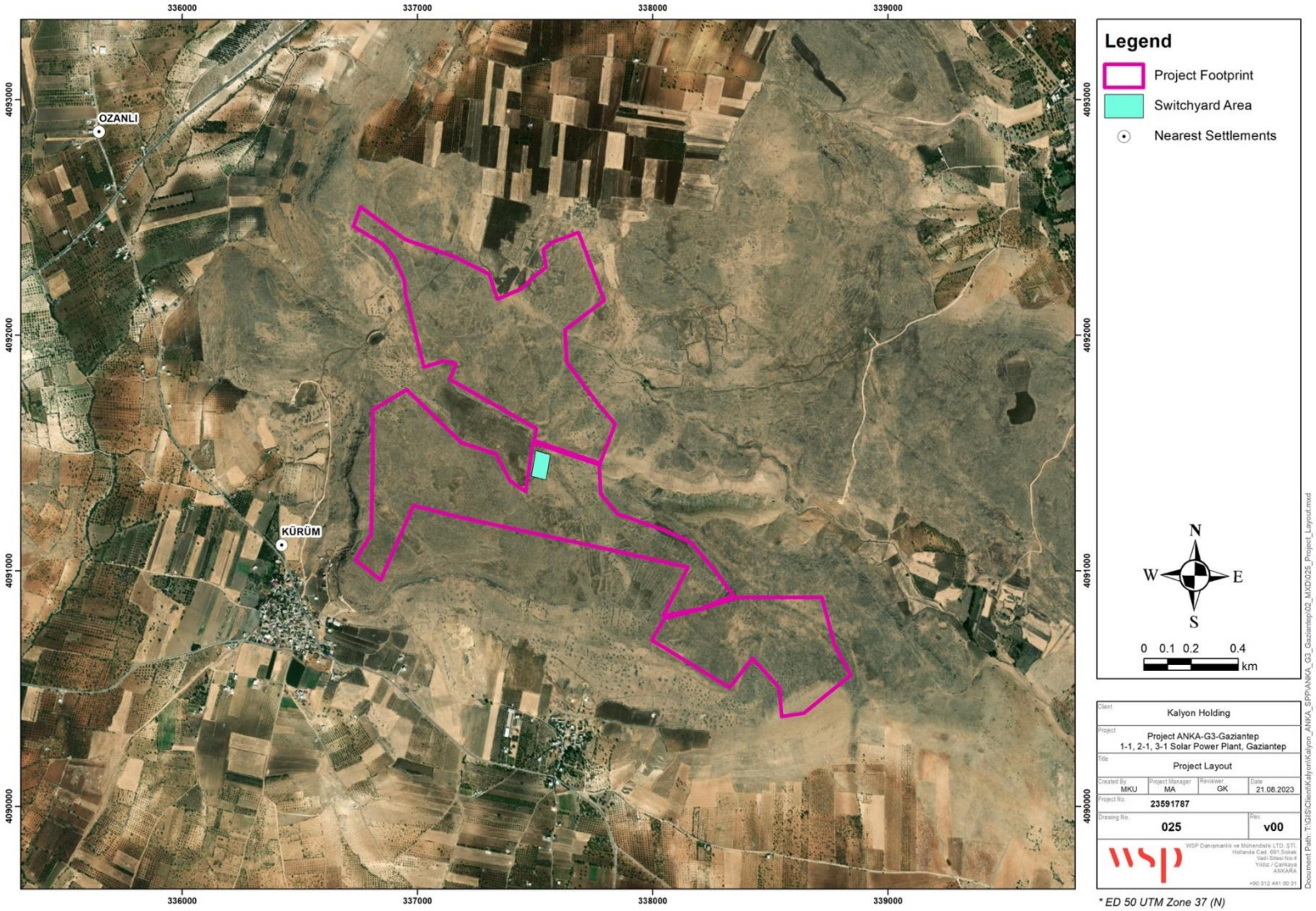

Figure 7-9: Project Layout

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 Kürüm Village the frequency of the impact is assessed as continuous. The geographical extent of the population influx impact will be limited to the closest residential areas proximity to Kürüm Village and the impact will be local. The impact will occur at the local level, and the intensity of the impact is assessed as high. The receptor sensitivity is assessed as medium. 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 negligible.

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 Influx	Duration: Short	Medium	Short-mid-term	**Medium**	Medium high	**Negligible**
	Frequency: Continuous					
	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 19 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. No lodging is planned during the operation phase. Employees will accommodate in houses in the vicinity of the Project area. 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 19 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 influx	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.

7.2.2.2.4 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 5 months and 172 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.

Gaziantep is one of the cities most affected by the 7.8 and 7.5 magnitude earthquakes that occurred in Turkey on 6 February 2023. The affected villages were also affected by the earthquake. Villages were also affected by the earthquake. The houses, barns and shops of the people in the villages were damaged due to the earthquake. These damages caused economic problems. The villagers, whose barns were destroyed, had to sell their animals. therefore, their need for work increased due to the economic problems they experienced. The fact that the project provides employment opportunities to the local people will strengthen them economically.

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 pasture area worries people. Loss of pasture 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, they said that 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 5 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**	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). When the Solar Power Plant is put into operation, it is planned to produce 50 MWe of electricity annually. 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 medium sensitivity. The impact is, very 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	Medium	Long term	**High**	Medium high	**Very High**
	Frequency:	Frequent					
	Geo. Extent:	National					
	Intensity:	Low					

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, 172 employees will work during the construction phase and 19 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 Çörekli,Gülpınar,Kürüm, Ozanlı and Ufacık villages then Şahinbey District, Gaziantep 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 Gaziantep 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)
- 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 medium to low 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:	Very long	Medium	Short-mid-term	**Medium**	Medium	**Low**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.2.5 Land Use (Livelihoods and Land Access Restrictions)

7.2.5.1 Construction Phase

7.2.5.1.1 Impact factors

G3-GAZİANTEP-1-1/2-1/3-1 Solar Power Plants Project with a total installed capacity of approximately 65 MWp/50 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 in Gaziantep Province, in the Şahinbey District, Kürüm neighbourhood in Türkiye.

The Project Area was announced as a Renewable Energy Resource Area (YEKA) by the Ministry of Energy and Natural Resources. Scope of the "Contest Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" published in the Official Gazette dated 03/07/2020 and numbered 31174; YEKA G3-GAZİANTEP-1-1/2-1/3-1 competitions were won by the Client. YEKA Right of Use Contract were signed on 01.07.2021 between the winner of the competition, Kalyon Enerji Yatırımları A.Ş and the

Ministry of Energy and Natural Resources. Pre-license was given by the Ministry of Industry and Technology, numbered ÖN/11080-30/05183 and 28.07.2022.

The Project will be established on a pastureland of 122.96 hectares. Preparation and Approval of 1/25000 and 1/5000 Master Development Plan and 1/1000 Implementation Development Plan Approval has been completed and cadastral controls are in progress.

According to the mukhtar interviews, in Çörekli village, 5 households, in Kürüm village 40 household, in Ozanlı village 30 household, and in Ufacık village 30 household 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.

After the earthquake, some of the people in the villages had to sell their animals and some of the animals were destroyed due to the earthquake. Therefore, changes can be observed in the number of households using pasture.

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.
- If compensation alone is not sufficient to restore livelihoods, implementation of livelihood restoration in accordance with IFC requirements.
- 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 continuous. 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 very high to medium 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:	Very long	Medium-high	Long term	**Very high**	Medium high	**Medium**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Very high					

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 increase,

- 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.

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.

- **Emissions**

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.

- **Increase of Population**

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 172 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 10 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 7.1.3 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 7.1 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 7.1.2. of the ESIA Report and Pollution Prevention Plan will be followed.
- Quality spare parts and lubrication products will be used.

Increase of Population

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:	Frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
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	Mid term	**High**	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:	Reccurent					
	Geo. Extent:	Local					
	Intensity:	Low					
Waste management	Duration:	Short	Medium	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Continuous					
	Geo. Extent:	Local					
	Intensity:	Medium					
Employment of Security Personnel	Duration:	Short	Medium low	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Reccurent					
	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

- 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 7-74: 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-low	Short-mid-term	**Low**	Medium high	**Negligible**
	Frequency:	Reccurent					
	Geo.Extent:	Local					
	Intensity:	Low					

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]:

[14] https://bangkok.ohchr.org/what-are-human-rights/
https://www.ohchr.org/en/human-rights/universal-declaration/

Human rights are rights inherent to all human beings, whatever our nationality, place of residence, sex, national or ethnic origin, colour, 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 maximise 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 recognised 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 recognised 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 Organisation's Declaration on Fundamental Principles and Rights at Work.

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 Turkey (TIHEK) (Law No. 6701, 2016)
- Labour Law (Law No. 4857, 2003) and related regulations
- Regulation on the Implementation of the Law Concerning Private Security Services
- Labor Act No. 1475, 1971
- Occupational Health and Safety Law No. 6331, 2012
- Social Insurance and Universal Health Insurance Law No. 5510, 2006
- Regulation on Overtime and Extra Hours No. 25425, 2004
- Regulation on the Principles and Procedures Governing the Employment of Children and Young Workers published in gazette No. 25425 (April 2004)
- Law on Trade Unions and Collective Bargaining Agreements No. 6356, 2012

International Requirements

The following international standards will be applicable to the Project:

- International Labour Organisation (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)
- 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

Cooperation with International Human Rights Mechanisms

Council of Europe

Türkiye is currently party to 121 of 225 conventions of the Council of Europe and signed another 31 conventions. Ahead of European Union countries, Türkiye ranks fifteen among all 47 Council of Europe member states.

Apart from the European Court of Human Rights, Türkiye maintains close cooperation with the monitoring and human rights bodies of the Council of Europe covering various areas such as fight against racism and discrimination, prevention of torture and ill-treatment, fight against corruption, money-laundering and terrorism as well as combatting violence against women. In this context, Türkiye maintains its cooperation with the European Committee for the Prevention of Torture (CPT), European Committee Against Racism and Intolerance (ECRI) as well as the Council of Europe Commissioner for Human Rights, while taking into consideration the recommendations and the reports published by these mechanisms.

Türkiye – European Court of Human Rights (ECtHR) Relations

In 1987, Türkiye accepted the right to individual application to the ECtHR for a review based on the European Convention on Human Rights (ECHR). Türkiye recognized the compulsory jurisdiction of the ECtHR in 1990.

According to Article 90 of Turkish Constitution, international agreements duly put into effect have the force of law and no objection of unconstitutionality shall be raised with regard to these agreements. Moreover, in the case of a conflict between international conventions concerning fundamental rights and freedoms and the laws, due to differences in provisions on the same matter, the provisions of international agreements shall prevail.

Furthermore, the Constitutional Court also stated in its judgment dated 7 February 2008, that the ECHR has become a part of the domestic law within the framework of Article 90 of the Constitution; that the provisions of the Convention have the force of law and that the judgments of the ECtHR are binding. Therefore, the ECHR and the ECtHR case-law have been acknowledged among the sources of the Turkish legal system.

Furthermore, under the constitutional amendment adopted by the public referendum in 2010, the right to individual application to the Constitutional Court has been introduced. Accordingly, since 23 September 2012, every person may lodge an application to the Constitutional Court on the grounds of allegation of violation by public authority of any of his/her fundamental rights and freedoms safeguarded in the Constitution within the scope of the ECHR.

In accordance with the “Cooperation Protocol” between the Ministry of Justice and the Ministry of Foreign Affairs, that came into force on 1 March 2012, applications arising from domestic law issues and execution of the judgments rendered on these applications are followed by the Ministry of Justice. Applications communicated to the Government prior to the effective date of the Protocol or applications and execution of judgments related to the foreign policy and international relations of Türkiye are followed by the Ministry of Foreign Affairs.

UN Human Rights Mechanisms

Türkiye is party to sixteen UN human rights conventions. Compliance with UN conventions by the State parties are reviewed by the relevant committees (treaty-based bodies).

The Human Dimension of the Organization for Security and Co-operation in Europe (OSCE)

In accordance with the OSCE's comprehensive approach to security, while **ODIHR** works on a wide range of areas such as democracy, the rule of law, human rights and fundamental freedoms, tolerance and non-discrimination, its most visible activity is election observation. ODIHR monitors national elections held in the OSCE participating States upon the invitations of these countries in line with their OSCE commitments. ODIHR deployed an Election Observation Mission to Türkiye to observe the Presidential and 27th Parliamentary Elections held on 24 June 2018.

The HCNM was established to identify ethnic tensions involving national minorities, make early warnings and find solutions to conflicts which could undermine stability, peace and friendly relations among states in the OSCE region.

The Representative on Freedom of the Media was established to observe media developments in the OSCE region as part of early warning function, ensure the formation of a free, independent, and pluralist media and cooperate on these matters.

Actively contributing to the human dimension activities of the OSCE, Türkiye particularly prioritizes the topics of xenophobia, Islamophobia, intolerance, and discrimination in the work of OSCE human dimension.

7.2.7.2 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 civilisation 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 defence in case of detention.

- **Safeguarding the physical and moral integrity and the private life of the individual:** Protecting the honour 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 liveable 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.

7.2.7.3 Methodology

In line with the Equator Principles 4 guidance methodology, the overall impact assessment on human rights for the Project is based on the following factors:

- **Scale:** How serious are the impacts for the victim?
- **Scope:** How many people could be affected by the harm?
- **Remediability:** Will a remedy restore the victim to the same or equivalent position before the harm; how easy or difficult would it be for the victim to get a remedy?
- **Likelihood:** What is the likelihood of the impact occurring?

The approach to managing such impacts is based on those most severe (based on scale, scope, and remediability) and with the greatest likelihood of occurring.

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**
  - Right to life
  - 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 to social security, including social insurance
- Labour standards in supply chain
- Grievance Mechanism

- **Economic, Social and Cultural rights**
  - Right to an adequate standard of living and housing
  - Right to health, food, water and sanitation
  - Right to take part in cultural life
- **Rights of Vulnerable Persons**
  - Migrant workers
  - Right of protection for the children
  - The rights of minorities
  - Women's rights
- **Community Health and Safety**
  - Environmental risks
  - Security risks

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.

Table 75: Human Rights Risk Classification

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**

7.2.7.4 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 civil and political rights, labour rights, social rights, vulnerability and community health and safety.

This study has been conducted to determine the levels of human rights risks and potential mitigation measures pertinent to the Project. The table below is formed to assess the Project-specific human rights context and determine the level of risk in terms of human rights.

Table 76: Human Rights Impact Assessment

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
Civil and Political Rights						
Right to life	As stated in EP4 Guidance Note, individuals have the right not to be deprived of life arbitrarily or unlawfully. This includes the right to have one's life protected, for example, from physical attacks or health and safety risks. The human rights risks in terms of right to life may occur under the categories of security, community and occupational health and safety. For example, security risks may occur as the lethal use of force by security forces to protect company resources, facilities, or personnel. As for the health and safety, operations that pose life-threatening safety risks to workers or neighboring communities through, for example, exposure to toxic chemicals. The likelihood of such risks is determined as low for the Project. Yet, to make sure the risks are minimized, certain mitigation measures need to be followed.	▪ Local communities ▪ Project workers	Scale: High Scope: Low Remediability: Low Likelihood: Low	**Medium**	The following plans are relevant and implemented for the mitigation measures in case of potential risks on right to life: ▪ Human Rights Management Plan ▪ Community Health and Safety Management Plan ▪ Security Management Plan ▪ Hazardous Material Management Plan ▪ Emergency Preparedness and Response Plan ▪ Traffic Management Plan Before the construction, local communities will be informed about the risks of the entering the construction sites. Security personnel will patrol the site area to prevent any unauthorized access onto the site. Conflict Management Training will be provided to 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.	**Low**
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, nor shall anyone be blamed or accused on account of his thoughts and opinions.	▪ Local communities ▪ Project workers	Scale: High Scope: Low Remediability: High Likelihood: Medium	**Medium**	Project-specific Stakeholder Engagement Plan and External Grievance Mechanism will be implemented to provide a space for the stakeholders to express their thoughts and the opinions on the Project.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
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 organisations, which qualify as public institutions. In accordance with Turkish Republic Ministry of Environment and Urbanisation Environmental Impact Assessment Regulation (Official Gazette Nov. 25, 2014; No: 29186), stakeholder meetings for information disclosure had been held.	▪ Local communities ▪ Project workers	Scale: High Scope: Low Remediability: High Likelihood: Medium	**High**	Project-specific Stakeholder Engagement Plan will be 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**
Labour Rights						
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. Within the scope of the Project, it is planned to employ 172 people during the construction phase of the Project and 19 people during the operation phase. It is projected that among 172 people to be worked during construction period, 42 of the employees will be from	▪ Project workers	Scale: High Scope: Low Remediability: Medium Likelihood: Medium	**Medium**	The Project will implement Human Resources Policy and Labor Management Plan 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 Rights Management Plan will also be prepared 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 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 prioritise settlements directly affected by the current activities of the Project. Equal tender process will be applied.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
	Kalyon Enerji, 70 of the employees will be mechanical personel and 30 of the employees will be electrical personel, 25 of the employees will be construction personel, while 5 of the employees will be HSE personel. National requirements, ILO Conventions ratified by Türkiye and IFC PS2 will be applied both direct and subcontractor workers. 60 workers are planned to be accommodated in the camp site.				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 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 and Offsite Accommodation Management Plan implemented within the scope of the Project in line with the IFC/EBRD's Guidance Note on Workers' Accommodation, 2009. Contractor Management Plan which monitors the compliance with the international labour and human rights standards (IFC PS2) of the subcontractors will be prepared and implemented.	
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 by the Law, the minimum limits of wages shall be determined every two years at the latest by the related Ministry. At the peak construction phase, the number of construction workforce, will be 172. It will be 19 during the operation phase.	▪ Project workers	Scale: Medium Scope: Low Remediability: Medium Likelihood: Low	**Medium**	Payroll records of the direct and indirect workers will be controlled by Kalyon Enerji 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. Human Resources Policy and Labor Management Plan will be implemented for these mitigation measures. Contractor Management Plan which monitors the compliance with the international labour and human rights standards (IFC PS2) of the subcontractors will be prepared and implemented.	**Low**
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, political opinion, philosophical belief, religion and sex 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	▪ Project workers	Scale: High Scope: Low Remediability: Medium Likelihood: Low	**Medium**	Human Rights Management Plan will be prepared and implemented for the mitigation measures. An employee code of conduct will be prepared and implemented ensuring non-discrimination. 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.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
	for work of equal value is not permissible.”					
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. However, unionisation is not a common practice in Türkiye.	▪ Project workers	Scale: Medium Scope: Low Remediability: High Likelihood: Medium	**Medium**	Human Resources Policy and Labour Management Plan will be implemented for relevant mitigation measures. In case of the absence of the unions, workers representatives should be elected, and periodical meetings will be held with the representatives. 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.	**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 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.	▪ Project workers	Scale: High Scope: Low Remediability: Medium Likelihood: Low	**Medium**	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 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. Human Resources Policy, Labor Management Plan and Human Rights Management Plan will be implemented. Contractor Management Plan which monitors the compliance with the international labour and human rights standards (IFC PS2) of the subcontractors will be prepared and implemented.	**Low**
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	Scale: Medium Scope: Low Remediability: High Likelihood: Low	**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. Human Resources Policy, Labor Management Plan and Human Rights Management Plan will be implemented for these mitigation measures.	**Low**
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,	▪ Project workers	Scale: High Scope: Low Remediability: High Likelihood: Low	**Medium**	Social insurance payments of all direct and indirect workers will be strictly controlled by Kalyon Enerji. Awareness meetings will be held with the Project workers if required. Human Resources Policy will be implemented. Contractor Management Plan and Labour Management Plan which monitors the compliance with the international labour and human rights	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
	short-term and long-term insurances. All direct and indirect workers will have right 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.				standards (IFC PS2) of the subcontractors will be prepared and implemented.	
Labour standards in Supply chain	Not all rights potentially impacted by a project are necessarily within the client's immediate control as in the case of supply chain. Project activities may unknowingly pose risks through the supply chains from the labour of workers who have been trafficked and are forced to work, for example, in factories. Women and children may be subject to particularly severe impacts in such situations. 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 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.	▪ Workers in production in the supply chain	Scale: High Scope: Medium Remediability: Medium Likelihood: Low	**Medium**	Kalyon Enerji 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. Human Rights Management Plan will be prepared and implemented. Kalyon Enerji will not meet Project's material needs from suppliers where forced and child labour is being used. Kalyon Enerji will ensure the suppliers' compliance with the codes of conduct for suppliers based on international labour standards. All suppliers and vendors will have the responsibility to ensure the Company's quality standards are achieved. This may include quality inspections by Kalyon Enerji, if deemed necessary.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
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 the principle of reciprocity, have the right to apply in writing to the competent authorities and to the Grand National Assembly of Türkiye regarding the requests and complaints concerning themselves or the public. The Presidency's Communication Centre (CIMER) has been providing a centralised 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.	▪ Local communities ▪ Project workers	Scale: Medium Scope: Medium Remediability: Medium Likelihood: Low	**Medium**	Project specific Grievance Mechanism both for the Project workers and the stakeholders were prepared and will be implemented to raise the grievances and the feedbacks of the stakeholders. Project-specific Human Resources Policy and Human Rights Management Plan will be implemented. 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.	**Low**
Economic, Social and Cultural Rights						
Right to an adequate standard of living and housing	According to the results of the desktop research, social field studies and background project information, there will be no resettlement and economic displacement in the Project. For the Project, 60 workers are planned to be accommodated in the camp site. Kürüm village located in the Area of Influence of the Project is affected negatively from the 6 February 2023 Türkiye-Syria Earthquake. For this reason, Kürüm is considered as vulnerable in terms of standard of living and housing.	▪ Local communities ▪ Project workers	Scale: High Scope: Medium Remediability: Medium Likelihood: Medium	**Medium**	Camp Site and Offsite Accommodation Management Plan will be implemented. Stakeholder Engagement Plan will be prepared and implemented. Grievance mechanism will be prepared and implemented. Also, Community Development Plan will be implemented.	**Low**
Right to health, food, water and sanitation	Potential risks to local communities identified in the ESIA include traffic increase in	▪ Local communities ▪ Project workers	Scale: High Scope: Medium	**High**	Community Health and Safety Management Plan, Traffic Management Plan, Security Management	**Medium**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
	construction, communicable diseases, construction related environmental impacts, increased need for resources, security aspects, etc. 60 workers are planned to be accommodated in the camp site.		Remediability: Medium Likelihood: Medium		Plan, and Community Development Plan will be prepared and implemented.	
Right to take part in cultural life	As indicated in EP4 Guidance Note, individuals have a right to take part in the cultural life of society and enjoy the benefits of scientific progress, especially disadvantaged groups. Potential risks may include activities involving resource extraction or new construction could impact this right by separating groups from areas of cultural importance and knowledge, or by damaging their cultural heritage. Since no such activities will be done within the scope of the Project, the likelihood of potential impact is assessed as low.	▪ Local communities ▪ Project workers	Scale: Medium Scope: Medium Remediability: Medium Likelihood: Low	**Medium**	Human Rights Management Plan, Stakeholder Management Plan, and Cultural Heritage Management Plan will be implemented.	**Low**
Rights of Vulnerable Groups						
Migrant workers	As indicated in the EP4 Guidance Note, the International Convention on the Protection of the Rights of All Migrant Workers and Members of their Families establishes how migrant workers, and their families should be protected. Since to employ migrant workers unregistered is prohibited for the Project, the potential risks are determined as low after the implementation of mitigation measures.	▪ Project workers	Scale: High Scope: Low Remediability: Medium Likelihood: Low	**Medium**	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. Human Resources Policy, Labor Management Plan and Human Rights Management Plan will be implemented for relevant mitigation measures.	**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 fifteen is prohibited. However, children who have reached the age of fourteen 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	▪ Children ▪ Project workers	Scale: High Scope: Low Remediability: Medium Likelihood: Low	**Medium**	The minimum working age will be 18 for all direct and indirect workers. Subcontractor monitoring system will be established by Kalyon Enerji to ensure that all subcontractors comply with work age limits. Human Resources Policy, Labor Management Plan and Human Rights Management Plan will be implemented for relevant mitigation measures.	**Low**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
	may only work jobs that will not prevent their school attendance.					
Rights of minorities	During the construction phase of the Project a workers' accommodation camp will be established and 60 workers are planned to be accommodated, which may create impact on the daily life of the village.	▪ Local communities ▪ Project workers	Scale: High Scope: Low Remediability: Medium Likelihood: Low	**Medium**	Cultural awareness training will be provided to the workers who will be accommodated in the camp site. Camp Site and Offsite Accommodation Management Plan and Security Management Plan will be prepared and implemented.	**Low**
Women's rights	As indicated in EP4 Guidance Note, The Convention on the Elimination of all Forms of Discrimination Against Women exists to promote women's rights and their protection. The potential risks to women's rights may include the following: ▪ Discrimination against women based on their marital status or reproductive status, ▪ Company's operations or products have had negative impacts on people's health in a way that discriminates against women (such as by failing to recognize the particular harm to their reproductive health), ▪ Project activities pollute or threaten existing water resources in a way that significantly interferes with local communities' ability to access clean drinking water. In such situations, there may be particular negative impacts on women and girls, who are responsible for water collection in many communities. Considering such examples, the likelihood of potential negative impacts on women's rights for the Project is assessed as medium. In terms of women's employment, there is a visible gender gap in female and male labour force participation in Türkiye. In 2021, the employment rate for women was 28% whereas it was 62.8% for men in Türkiye (TURKSTAT, 2023). In the construction	▪ Women of local communities ▪ Female Project workers	Scale: High Scope: Medium Remediability: Medium Likelihood: Medium	**High**	Equal pay for equal work especially considerate of women employees will be implemented. Positive discrimination will be applied to female candidates during the recruitment process. The safety and needs of female staff staying in the camp will be met at a high level. Human Resources Policy, Labor Management Plan and Human Rights Management Plan will be implemented for relevant mitigation measures.	**Medium**

Topic	Project Context	Stakeholders	Impact Factor Features	Pre-mitigation	Mitigation Measures	Risk Categorization
	sector, it is observed that female employees are generally employed as OHS or service personnel.					
Community Health and Safety						
Environmental risks	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. 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.	▪ Local communities ▪ Project workers	Scale: High Scope: Medium Remediability: High Likelihood: Low	**Medium**	Suitable and sufficient environmental management plans for waste, wastewater, noise and air quality will be established and implemented. The following management plans will be implemented for preventing and reducing environmental risks: ▪ Pollution Prevention Plan ▪ Hazardous Material Management Plan ▪ Soil Management Plan ▪ Waste Management Plan ▪ Biodiversity Management Plan ▪ Cultural Heritage Management Plan and Chance Find Procedure ▪ Camp Site and Offsite Accommodation Management Plan The construction site and the construction camp site are to be regularly monitored for environmental aspects. In case of a grievance, additional measurements will be held, and the results will be shared with the local communities.	**Low**
Security risks	During the construction phase of the Project, unarmed security will be needed on the site and especially during the access to the pastureland may create social tension between the security personnel and the local communities.	▪ Local communities ▪ Project workers	Scale: Medium Scope: Medium Remediability: Medium Likelihood: Low	**Medium**	Before the construction, local communities will be informed about the risks of the entering the construction sites. Security personnel will patrol the site area to prevent any unauthorized access onto the site. Security Management Plan and Community Health and Safety Management Plan will be established and implemented by the Contractor, outlining expectations around security. Conflict Management Training will be provided to 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.	**Low**

7.2.7.5 Human Rights Management Plan of the Project

Every human being should be treated with dignity and equality, according to international standards on human rights. The Human Rights Management Plan (HRMP) for the G3 Gaziantep-1-1, 2-1, 3-1 Solar Power Plant Project will be implemented. The HRMP will include the issues assessed in the Human Rights Assessment under the topics of civil and political rights, labour rights, social rights, rights of vulnerable groups and community health and safety, together with relevant mitigation measures for potential human rights risks. In accordance with the requirements of Good International Industry Practices (GIIP), Equator Principles IV (dated July 2020), internationally recognized Human Rights, and implementation of the United Nations (UN) Guiding Principles on Business and Human Rights (2011), Kalyon Enerji will develop and implement a management process that will ensure respect for Human Rights. All subcontractors will be informed about the Human Rights Management Plan of the Project and the HRMP will be put in the visible locations of the Project site. The requirements set out in this HRMP are applied to all activities throughout the lifecycle of the Project, including those carried out by contractors.

Human Rights will be managed according to the following principles:

- Strive for continuous improvement in upholding and respecting Human Rights through ongoing dialogue with internal and external stakeholders.
- Continue to avoid all forms of child labour, forced labour and modern slavery for all activities in which the Project are engaged and across the entire supply chain.
- Avoid discrimination against any individual based on race, colour, 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, 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 programs to advance the socio-economic empowerment of women in communities and eliminate barriers to the advancement and fair treatment of women in workplaces.
- Respect the collective and customary rights of local peoples near the Project construction and operation areas and ensure consultation with all relevant stakeholders.
- Establish confidential mechanisms to identify, receive and respond to Human Rights and ethical concerns from any stakeholder in an objective manner.
- Take action to terminate any contracts or arrangements with the EPC, subcontractors and suppliers should the Client become aware that their practices and performance conflict with the requirements of this Human Rights Policy.
- When working with public or private security forces, implement a security approach consistent with the Voluntary Principles on Security and Human Rights.

In further detail, the HRMP serves the following purposes:

- Incorporate respect for Human Rights into management, governance practices and programs as defined in the International Bill of Human Rights and the International Labor Organization's Declaration on Fundamental Principles and Rights at Work.
- Ensure that EPC, subcontractors, suppliers and business partners 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.
- Define the roles and responsibilities within Kalyon Enerji for the management of Human Rights related issues.
- Continually review and evaluate changing Human Rights conditions in the jurisdictions in which the Project operate.

7.2.7.6 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. The monitoring activities are defined in the table below. The indicators for monitoring will be followed through the Human Rights Management Plan to be prepared specifically for the Project. The detailed monitoring activities and key performance indicators regarding human rights are presented in the Human Rights Management Plan of the Project.

Table 77: Monitoring for Human Rights Risks

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	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	Biannual	■ Kalyon Enerji ■ Subcontractors

Activity	Steps	Areas For Further Attention and Considerations	Frequency	Responsibility
	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.	reasonable deadline for receiving comments on the HRIA report from the stakeholders.		
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. Kalyon Enerji 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.	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
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

Activity	Steps	Areas For Further Attention and Considerations	Frequency	Responsibility
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, the *Project-level community grievance mechanism can provide helpful information to inform the monitoring of impact management measures* and key performance indicators.

[15] https://www.humanrights.dk/tools/human-rights-indicators-business

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 7-78**.**

Table 7-78: 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.

- According to the official correspondence dated 19.04.2022 and numbered 2423592 from Gaziantep Cultural Heritage Preservation Regional Board Directorate of the Ministry of Culture and Tourism, General Directorate of Cultural Heritage and Museums, there is Çörekli Stone Quarry, which is registered as a 1st Degree Archaeological Site, approximately 200 meters south of the project area, and attention will be paid to this area during the 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;

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 7-79: 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. However, according to the official correspondence dated 19.04.2022 and numbered 2423592 from Gaziantep Cultural Heritage Preservation Regional Board Directorate of the Ministry of Culture and Tourism, General Directorate of Cultural Heritage and Museums, there is Çörekli Stone Quarry, which is registered as a 1st Degree Archaeological Site, approximately 200 meters south of the project area. In the scope of operational activities of the project, there will be no interaction with this 1st Degree Archaeological Site during 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. As stated in Section 7.1.7.1 before, there will be no interaction with the 1st Degree Archaeological Site (Çörekli Stone Quarry) during decommissioning and closure phase.

7.2.9 Visual Aesthetics

Based on the information collected for the definition of the baseline (see Ch 6.2.10), the physical component *Visual Aesthetics* was assigned a **Low-Medium** value of sensitivity. The AoI is considered to be sensitive for the following reasons:

- Presence of three 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 via Google Earth.
- The closest settlements to the Project components and some social facilities were taken into account in identification of the sensitive receptors.
- 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, social facility, 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 7-80.

Table 7-80: 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 mentioned mitigation measures above during the construction phase is presented in the following table (Table 7-81). 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 7-81: 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 7-82.

Table 7-82: 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*

[16] Anurag, Zhang, Gwamuri, Pearce, "General Design Procedures for Airport-Based Solar Photovoltaic Systems" , 2017

to 1.20–1.30, PV poses no (or presents tolerable/safe) hazards from 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 more light 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 behaviour 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 vapour 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 minimises 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 SiO2 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 7-83).

Table 7-83: 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/infrastructures	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 a balanced coexistence of Natural Habitats (52%) and Modified Habitats (48%). The Natural Habitats consist entirely of the EUNIS habitat “E1.3 - Mediterranean Xeric Grassland” and “H3.2-Basic and Ultra-Basic Inland Cliffs”, while the Modified Habitats are mostly comprised of mixed crops. The Project AoI is not located within the boundaries of any legally protected area nor of area recognized as internationally important for biodiversity.

Critical Habitats (CHs) identified within the AoI are triggered by different flora and fauna species listed below.

Table 7-84: Results of Critical Habitat assessment (IFC PS6, 2019)

Taxon	Species	Common name	IUCN Red List	National Red List	Endemic/RR	Lit./ Obs.	IFC criteria
Flora	*Symphytum aintabicum*	-	-	VU	Endemic/RR	O	Criterion 1a & 2a
	Alopecurus utriculatus subsp. *gaziantepicus*	-	-	CR	Endemic/RR	O	Criterion 1a & 2a
Mammals	*Mesocricetus auratus*	Golden Hamster	EN	-	Restricted Range	L	Criterion 1a

In addition, 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. This compilation also considered locally or regionally endemic species present or potentially present within the AoI. Here is a summary of the identified “species of conservation concern” (SCC):

- 1 flora species classified as Near Threatened and regional endemic (*Anthemis tricornis*);
- 1 reptile species, classified as Vulnerable (*Testudo graeca*);
- 8 bird species, including 2 species classified as Near Threatened (*Circus macrourus* and *Vanellus vanellus*), 3 species classified as Vulnerable (*Aquila heliaca, Falco vespertinus, Streptopelia turtur*), and 3 species classified as Endangered (*Aquila nipalensis, Falco cherrug* and *Vanellus gregarius*);
- 4 mammal species, including 2 species classified as Near Threatened (*Rhinolophus euryale, Miniopterus schreibersii*) and 2 species classified as Vulnerable (*Rhinolophus mehelyi, Vormela peregusna*).

The sensitivity of the various biodiversity components is defined as follows:

- the component, including Natural habitats and SCC, is considered having a **Medium** sensitivity;
- Critical Habitats (CHs) are considered having a **High** sensitivity.

In the present section, 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 in

Chapter 5.0 of the ESIA Methodology, 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 sections 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.

Specific impacts on Critical Habitats are discussed in depth in Section 7.3.1.4 and Section 7.3.2.4 for the construction and operation phases.

Avoidance, mitigation and rehabilitation are proposed in this section according to the mitigation hierarchy principle. Monitoring measures are also proposed.

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 7-12.

Table 7-85: Project Actions and Related Impact Factors During Construction Phase

Project actions	Impact factors
General engineering/construction works	Vegetation and topsoil 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.

Vegetation and topsoil disturbance

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.

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 (*Mesocricetus auratus, Vormela peregusna, Rhinolophus mehelyI, Miniopterus schreibersii,* and *Rhinolophus euryale*) - 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.

- **Emission of noise**

The emission of noise is expected to be of medium-high intensity during the construction phase. Construction activities such as vegetation clearance, 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[17]; Canaday & Rivadeneyra, 2001[18]). Anthropogenic noise is demonstrated to cause severe decreases in species richness and abundances also for insect and amphibian species (Penone *et al.*, 2012[19]; Clauzel *et al.*, 2013[20]). 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.*, 199517; Canaday and Rivadeneyra, 200118). 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[21]), this behavior 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.

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[17] 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.

[18] 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.

[19] 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.

[20] 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.

[21] 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.

- **Emission of particulate matter**

Construction activities such as vegetation clearance, 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[22]). 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. This leads to a 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.

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 auratus, Vormela peregusna, Rhinolophus mehelyi,* and *Rhinolophus euryale*). Animals could be attracted to roads for a variety of reasons, and traffic can have an important influence on wildlife species, their behavior responses, and their distribution, thus on the use of space by local populations (Jacobson *et al.*, 2016[23]). 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.

[22] 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/026974919 390179R)

[23] 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.

- **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[24]), and, if they penetrate into a habitat, they can potentially change its functionality and species composition, including priority biodiversity species (Chornesky & Randall, 2003[25]). 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 10th of May 2023. These species are *Symphytum aintabicum*, *Alopecurus utriculatus* subsp*. gaziantepicus*, and *Anthemis tricornis.*

  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 a minimum clearing of natural vegetation will be performed, it can be assumed that 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.

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 7-10 and their numerical estimation is presented in Table 7-86.

Vegetation and flora species, in particular the three flora species identified as species of conservation concern (*Symphytum aintabicum*, *Alopecurus utriculatus* subsp*. gaziantepicus* and *Anthemis tricornis*) will be affected at the same time by several of the above-described impact factors, first of all by vegetation and soil disturbance.

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 Golden Hamster (*Mesocricetus auratus*, EN-Restricted Range), the European Marbled Polecat *(Vormela peregusna*, VU), the Mediterranean Horseshoe Bat and the Schreiber's Bent-winged Bat (*Rhinolophus euryale*, *Miniopterus schreibersii* 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.

[24] Rejmanek M. & Richardson D. (2013). Plant Invasions and Invasibility of Plant Communities. Vegetation Ecology: Second Edition. 10.1002/9781118452592.ch13.

[25] 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.

Direct impacts from vegetation clearing and disturbance of terrestrial topsoil will impact 10% of the total AoI. The direct impacts will be concentrated on Mediterranean xeric grassland (E1.3 EUNIS habitat type). Direct impacts on natural habitats will be entirely concentrated on it and they will affect 20% of this habitat within the AoI (i.e., 122.89 ha).

Indirect impacts in the 100 m buffer deriving from construction, such as introduction of invasive alien species, could impact a total of 8% of the AoI. Indirect impacts from construction in the 100 m buffer will be mainly on Mediterranean xeric grassland (E1.3, 90.04 ha). Indirect impacts will affect also basic and ultra-basic inland cliffs (H3.2, 5.10 ha), mixed crops of market gardens and horticulture (I1.2, 8.86 ha), and marginally scattered residential buildings (J2.1, 0.13 ha).

Indirect impacts in the 300 m buffer deriving from construction, such as emission of noise, could impact a total of 24% of the AoI. Indirect impacts within the 300 m buffer will be mainly on Mediterranean Xeric Grassland (E1.3, 229.32 ha). Indirect impacts will affect also basic and ultra-basic inland cliffs (H3.2, 20.88 ha), mixed crops of market gardens and horticulture (I1.2, 41.50 ha), scattered residential buildings (J2.1, 5.38 ha), and marginally artificial standing waters (J5.1, 0.35 ha).

Table 7-86: 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 habitats							
E1.3 - Mediterranean Xeric Grassland	614.91	122.89	20	90.04	15	229.32	37
H3.2 - Basic and Ultra-Basic Inland Cliffs	24.75	-	0	5.10	21	20.88	84
Subtotal	*639.66*	*122.89*	*19*	*95.14*	*15*	*250.20*	*39*
Modified habitats							
I1.2 - Mixed Crops of Market Gardens and Horticulture	576.07	0.33	<0.1	8.86	2	41.50	7
J2.1 - Scattered Residential Buildings	20.44	-	0	0.13	1	5.38	26
J5.1 - Highly Artificial Non-Saline Standing Waters	0.35	-	0	-	0	0.35	100
Subtotal	*596.86*	*0.33*	*0*	*8.99*	*2*	*47.23*	*8*
Total	***1236.52***	***123.22***	***10***	***104.13***	***8***	***297.43***	***24***

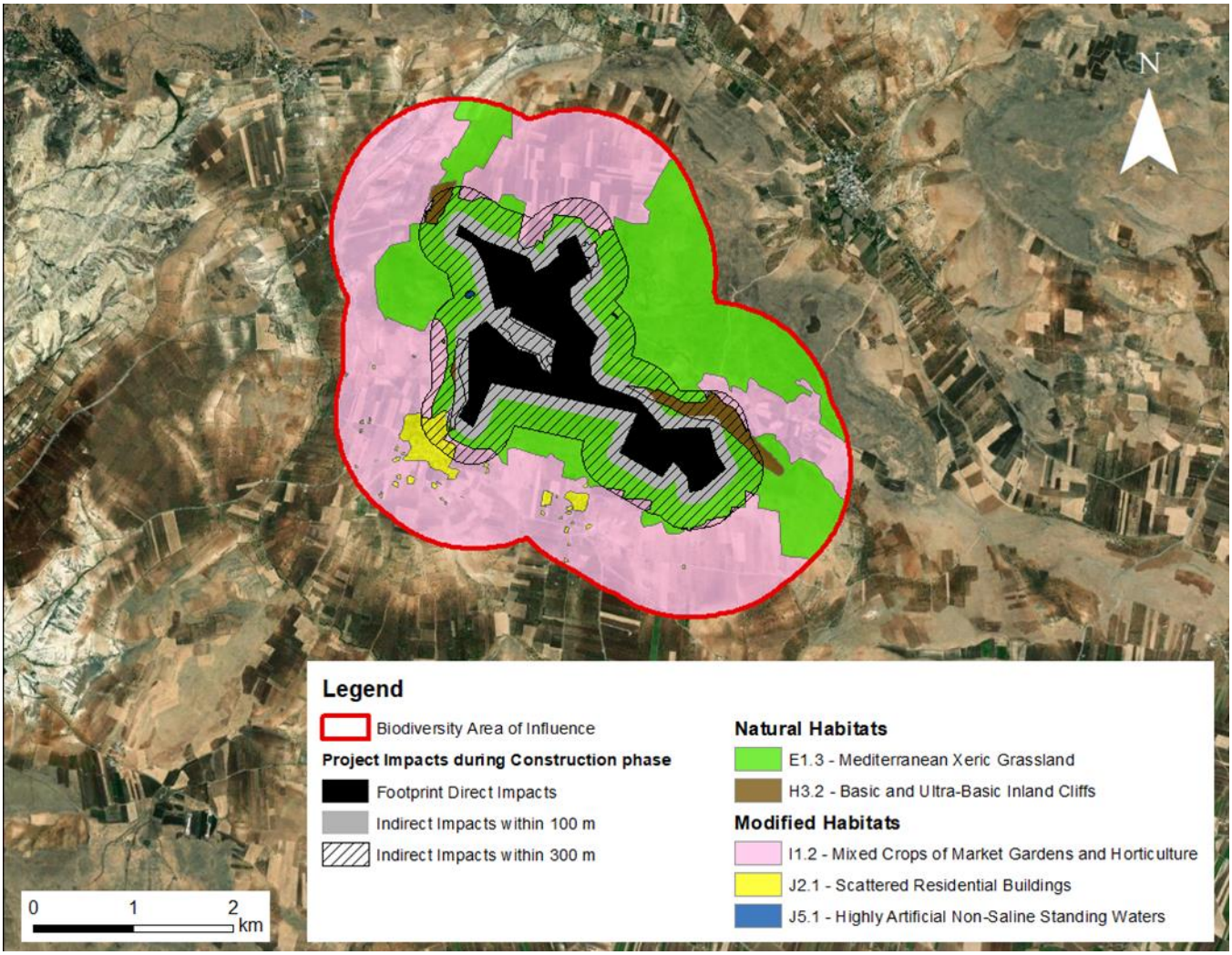

Figure 7-10: Map of the Construction Impacts on EUNIS Habitats within the AoI

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:

  - minimization 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 and topsoil disturbance:

  - limiting natural vegetation clearance 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 before vegetation clearance to identify and eventually relocate fauna species. Company's Biodiversity Assistant Specialist will perform pre-construction surveys in the areas to be cleared (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 t Company's Biodiversity Assistant Specialist 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 Golden Hamster (*Mesocricetus auratus*, EN- Restricted Range), 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 vegetation clearing, day 2 machinery and equipment bought to the working area, day 3 manual excavation, day 4 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, which 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 authorized personnel trained in reptile transport and/or Company’s Biodiversity Assistant Specialist for 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 maximize the success of the translocation operations (Abeli & Dixon, 2016[26]).

7.3.1.3 Residual Impacts

Considering the application of the above-mentioned mitigation measures, the impact on biodiversity components is presented in Table 7-87 and it is expected to be **Medium.**

- The main residual impact on natural habitats could derive from vegetation removal 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 7-87: Residual Impact Assessment Matrix for Biodiversity Component during Construction Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Vegetation and topsoil disturbance	Duration:	Medium-long	Medium	Long term	**Medium**	Medium	**Medium**
	Frequency:	Frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Emission of noise	Duration:	Medium	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Emission of dust	Duration:	Medium	Medium	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Increase in vehicular traffic	Duration:	Medium	Medium	Short-term	**Negligible**	Medium	**Negligible**
	Frequency:	Moderately frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					
Accidental introduction and dispersal of alien species	Duration:	Medium	Medium	Long term	**Medium**	Medium	**Low**
	Frequency:	Sporadic					
	Geo. Extent:	Local					
	Intensity:	Medium					

[26] Abeli T. & Dixon K. (2016). Translocation ecology: the role of ecological sciences in plant translocation. Plant Ecology. 217. 10.1007/s11258-016-0575-z.

7.3.1.4 Critical Habitat

7.3.1.4.1 Flora species

The potential impacts on flora species triggering CH are associated with the following impact factors:

1) Vegetation and topsoil disturbance
2) Emission of particulate matter
3) Accidental introduction and dispersal of alien species

The effects of impact factors and general mitigation measures for overall biodiversity were described in the previous sections, while the potential direct and indirect impacts that could occur on flora species triggering CH are summarized in the table below.

Additional studies and mitigation measures are discussed whenever necessary and residual impacts are also assessed below. Monitoring measures are presented in Section 7.3.1.4.

The no net loss/net gain assessment is discussed in Section 7.3.4 including potential offset measures to obtain Net Gain.

Table 7-88: Potential direct and indirect impacts during construction phase on flora species triggering CH and additional mitigation measures

Species	National Red List, End. / RR	Potential Direct and Indirect Impacts	Additional Measures
Symphytum aintabicum	VU, Local endemic/ RR	No direct impacts are based on current information of the species distribution. The only population of the species found in SP10 (6 individuals estimated) is located within 100 m from Project footprint, therefore indirect impacts could occur for this species.	Additional mitigation measures for populations directly and indirectly impacted by the Project: • Flora On-site Conservation (minimization): the conservation of CH determinant species shall be guaranteed to the extent possible. Species not directly impacted by the Project footprint with population located within 100 m from construction or operation areas will be actively protected from any indirect impact. Exclusion zones at these stations, where soil and vegetation will be preserved and access will not be allowed, will be clearly identified both on maps and in the field. • Flora Salvaging and Translocation (minimization/restoration): if unavoidable direct impact is anticipated, individuals belonging to flora species determining CH impacted by the Project footprint shall be identified and salvaged prior to construction and translocated to the appropriate sites. • Seed collection: seeds of flora species determining CH will be collected to be used during rehabilitation. Collection and conservation will be performed following the best practices indicated by the Millennium Seed Bank. Seeds collected will be separately stored for each sub-population using clearly identifiable codes. Part of the seeds will be donated to the Ankara Seed Bank where they could be stored for conservation or use for scientific research and, if needed, germinated and used to create new populations.
Alopecurus utriculatus subsp. *gaziantepicus*	CR, Local endemic/ RR	The population found in SP2 (300 individuals) is located within the Project Footprint, therefore direct impacts from vegetation and topsoil disturbance could occur. Population found in SP8 (250 individuals estimated) is located at more than 100 m from the Project footprint, therefore it is not expected to be directly or indirectly impacted by the Project.	

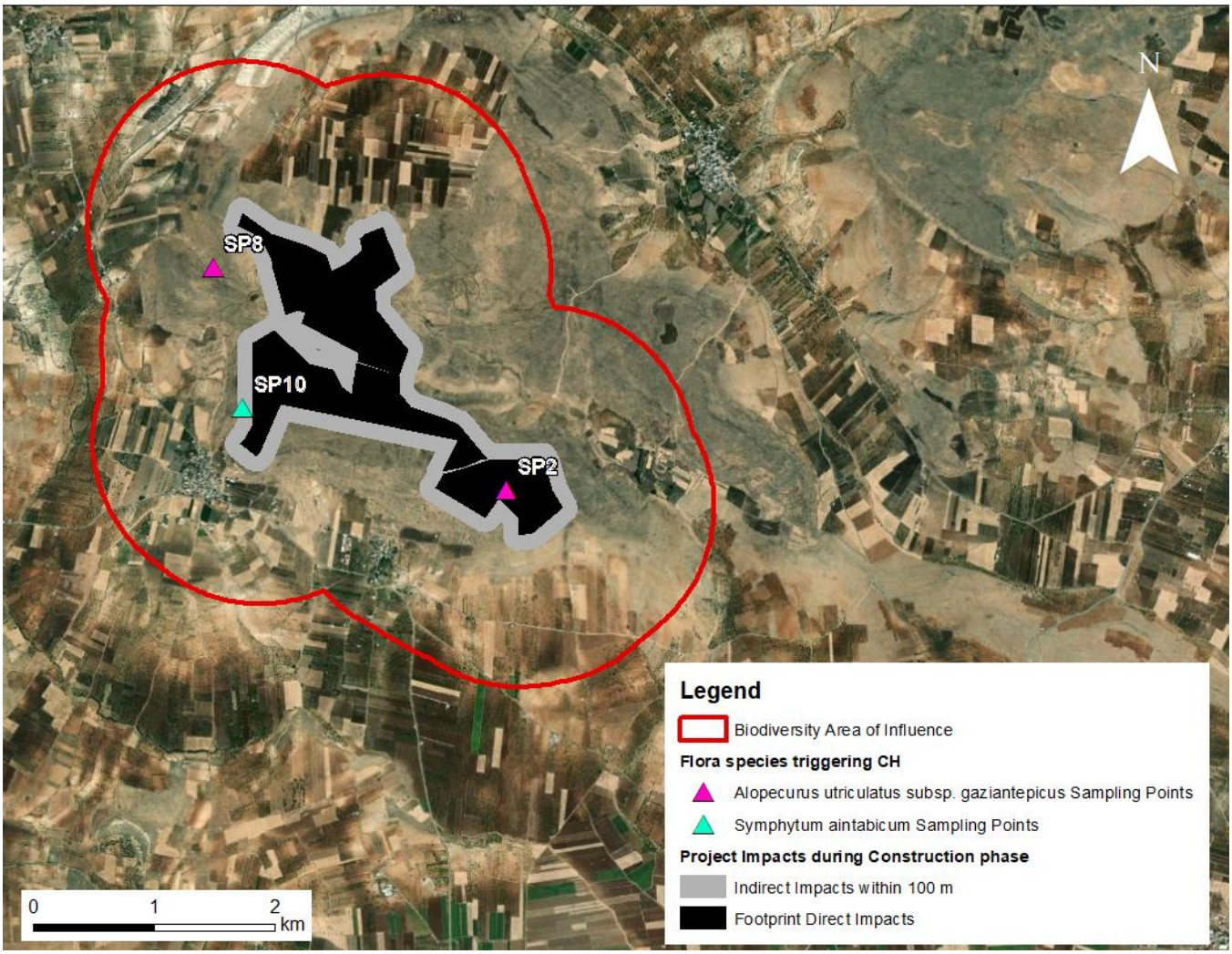

Figure 7-11: Locations of Flora species triggering CH and potential direct and indirect impact during construction phase

According to the baseline study performed, the general sensitivity is considered to be **High** for flora species triggering CHs.

Considering the application of the above-mentioned mitigation measures, the impact on biodiversity components is presented in the following tables and it is expected to be **Medium** for the flora species *Alopecurus utriculatus* subsp. *gaziantepicus*, directly impacted by the Project, and **Low** for flora species *Symphytum aintabicum*, only indirectly impacted.

Table 7-89: Residual impact assessment matrix for flora species triggering CH in the AoI during construction phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Vegetation and topsoil disturbance	Duration:	Medium-long	High	Long term	**High**	Medium-high	**Medium**
	Frequency:	Frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Emission of dust	Duration:	Medium	High	Short-term	**Low**	Medium-high	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Accidental introduction and dispersal of alien species	Duration:	Medium	High	Long term	**High**	Medium-high	**Low**
	Frequency:	Sporadic					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.3.1.4.2 Fauna species

The potential impacts on flora species triggering CH are associated with the following impact factors:

7) Vegetation and topsoil disturbance
8) Emission of noise
9) Increase of vehicular traffic

The effects of impact factors and general mitigation measures for overall biodiversity were described in the previous sections, while the potential direct and indirect impacts that could occur on fauna species triggering CH are summarized in the table below.

Additional studies and mitigation measures are discussed whenever necessary and residual impacts are also assessed below. Monitoring measures are presented in Section 7.3.1.4.

The no net loss/net gain assessment is discussed in Section 7.3.4 including potential offset measure Net Gain.

Table 7-90: Potential direct and indirect impacts during construction phase on fauna species triggering CH and additional mitigation measures

Species	Red List, End. / RR	Potential Direct and Indirect Impacts	Additional Measures
Golden Hamster *(Mesocricetus auratus)*	EN, Endemic/ RR	Direct impacts due to the Project Footprint could affect suitable habitats (E1.3 - Mediterranean Xeric Grassland), although the presence of the species has not been confirmed. Indirect impacts within 100 m and 300 m buffer could affect this species' habitat if not properly mitigated.	If the species is observed, additional avoidance/mitigation measures will be put in place to avoid any direct impact. Mitigation measures for planned biodiversity during the construction phase are considered sufficient to mitigate indirect impact.

Table 7-91: Residual impact assessment matrix for fauna species triggering CH in the AoI during construction phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Vegetation and topsoil disturbance	Duration:	Medium-long	High	Long term	**High**	Medium	**Medium**
	Frequency:	Frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Medium					
Emission of noise	Duration:	Medium	High	Short-term	**Low**	Medium	**Low**
	Frequency:	Highly frequent					
	Geo. Extent:	Local					
	Intensity:	High					
Increase in vehicular traffic	Duration:	Medium	High	Short-term	**Low**	Medium	**Negligible**
	Frequency:	Moderately frequent					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.3.1.5 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 Company's Biodiversity Assistant Specialist. If necessary, an external expert will be consulted. 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 auratus, Vormela peregusna, Rhinolophus mehelyi,* and *Rhinolophus euryale*), both within and around the AoI, shall be documented and recorded, accompanied by photographic evidence. Any such observations should be promptly reported to the Company's Biodiversity Assistant Specialist responsible on site.
- Accidents involving wildlife or the observation of live animal or carcasses along the access road or within the construction site will be recorded. If necessary, supplementary mitigation measures to deter wildlife from entering the site and to prevent roadkill will be implemented.

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 7-92.

Table 7-92: 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., photovoltaic arrays, 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. The habitat loss is calculated in Table 7-93. 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[27]).

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[28]; Graham *et al.*, 2021[29]; Hassanpour *et al.*, 2018[30]). 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[31]).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**

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[32]). 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.

[27] 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.

[28] 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.

[29] 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.

[30] 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.

[31] 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.

[32] 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.

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 could derive from the presence of external flashlights arranged in order to illuminate the areas surrounding some permanent facilities (e.g., administrative building, dining hall, warehouse, etc.).

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 behavior, biological clocks, predator-prey interactions, movement and dispersal patterns, community structure, and interactions among and within species (Longcore & Rich, 2004[33]).

Effects are likely species-specific, based on the role ambient light plays in physiology and behavior, 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[34]) highlighted a response of migratory bats towards light that was dependent on light color. Artificial lighting can also negatively affect nocturnal and migratory bird species (Rich & Longcore, 2006[35]). Nocturnal migratory species may be disorientated and attracted by the sky glow during the night. Fixed white lights attract more individuals than flashing or colored 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[31]).

Invasive alien species can potentially change functionality of ecosystems and composition of plant species community, including priority biodiversity species (Chornesky & Randall, 2003[25]).

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 10th of May 2023. These species are the following: *Symphytum aintabicum* and *Alopecurus utriculatus* subsp. *gaziantepicus*

[33] Longcore T. &Rich C. (2004). Ecological light pollution. Front. Ecol. Environ. 2004; 2[4]: 191– 198.

[34] 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.

[35] Rich C. & Longcore T. (2006). Ecological Consequences of Artificial Night Lighting. Island Press Washington, DC.

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 “Mediterranean Xeric Grassland” (EUNIS habitat E 1.3). The effect of grazing exclusion and PV panels on the three flora species identified as species of conservation concern (*Symphytum aintabicum* and *Alopecurus utriculatus* subsp. *gaziantepicus*) 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 Golden Hamster (*Mesocricetus auratus*, EN-Restricted Range), the European Marbled Polecat *(Vormela peregusna*, VU), 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 Table 7-92, and their numerical estimation is presented in Table 7-93.

Direct impacts deriving from the presence of permanent infrastructures (e.g., inverter stations, substation, administrative buildings, internal roads, etc.) will impact less than 1% of the total AoI and will be entirely on Mediterranean Xeric Grassland (E1.3 EUNIS habitat type, 8.17 ha). The direct impacts deriving from the presence of PV panels will impact 7% of the total AoI and will be entirely on Mediterranean Xeric Grassland (E1.3 EUNIS habitat type, 82.48 ha).

Indirect impacts in the 100 m buffer deriving from operation, such as introduction and spreading of alien species, could impact a total of 16% of the AoI. Indirect impacts from operation in the 100 m buffer will be mainly on Mediterranean Xeric Grassland (E1.3, 183.58 ha). Indirect impacts will affect also basic and ultra-basic inland cliffs (H3.2, 4.98 ha), mixed crops of market gardens and horticulture (I1.2, 9.11 ha), and marginally scattered residential buildings (J2.1, 0.01 ha).

Indirect impacts in the 300 m buffer deriving from operation, such as noise and emission of light, could impact a total of 33% of the AoI. Indirect impacts within the 300 m buffer will be mainly on Mediterranean xeric grassland (E1.3, 344.05 ha). Indirect impacts will affect also basic and ultra-basic inland cliffs (H3.2, 20.88 ha), mixed crops of market gardens and horticulture (I1.2, 40.58 ha), scattered residential buildings (J2.1, 4.02 ha), and marginally artificial standing waters (J5.1, 0.35 ha).

Table 7-93: Direct and Indirect Impacts on EUNIS Habitats calculated within the AoI for the Operation Phase

Habitat	Total AoI	PV Panels Area		Direct Impact (Permanent facilities)		Impact on 100 m buffer		Impact on 300 m buffer	
	ha	ha	%	ha	%	ha	%	ha	%
Natural habitats									
E1.3 - Mediterranean Xeric Grassland	614.91	82.48	13	8.17	1	183.58	30	344.05	56
H3.2 - Basic and Ultra-Basic Inland Cliffs	24.75	0.00	0	0.00	0	4.98	20	20.88	84
Subtotal	*639.66*	*82.48*	*13*	*8.17*	*1*	*188.56*	*29*	*364.93*	*57*
Modified habitats									
I1.2 - Mixed Crops of Market Gardens and Horticulture	576.07	0	0	0	<0.1	9.11	2	40.58	7
J2.1 - Scattered Residential Buildings	20.44	0	0	0	0	0.01	<0.1	4.02	20
J5.1 - Highly Artificial Non-Saline Standing Waters	0.35	0	0	0	0	0.00	0	0.35	100
Subtotal	*596.86*	*0.00*	*0*	*0*	*<0.1*	*9.12*	*2*	*44.95*	*8*
Total	***1236.52***	***82.48***	***7***	***8.17***	***<1***	***197.68***	***16***	***409.88***	***33***

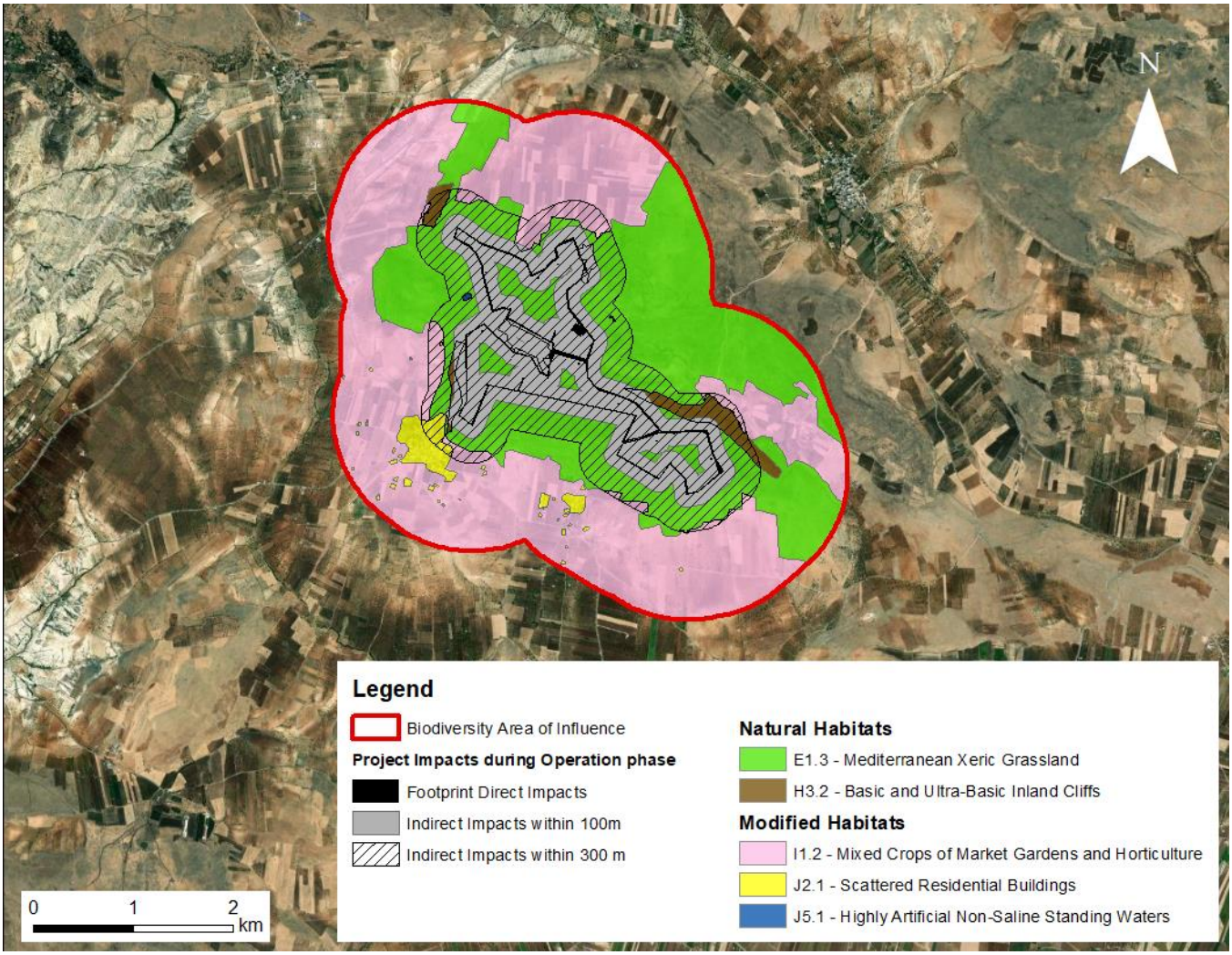

Figure 7-12: Map of the Operation Direct and Indirect Impacts from permanent facilities on EUNIS Habitats within the AoI

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:

  - minimization 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. Fencing will be modified so that a gap measuring 1 m in length and 10 cm in height from ground level is created every 100 m. This gap will allow animals to move in to and out of the project site, thus maintaining population transfer with populations located in areas outside of the project. All new fences will conform to this design..
- Non-polarizing white tape can be used around and across 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 Section 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): orange lamps seen along roadsides;
  - light emitting diodes (LEDs): light source of choice, emitted more directional, warmer color temperatures (~ 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 maximize the success of the translocation operations (Abeli & Dixon, 2016[26]).

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[36]; Graham *et al.*, 2021[37]; Hassanpour *et al.*, 2018[38]). 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[39]). 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 7-94 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.
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[36] 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.

[37] 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.

[38] 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.

[39] 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.

Table 7-94: Residual Impact Assessment Matrix for Biodiversity Component during Operation Phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features - Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Presence of permanent infrastructures	Duration:	Long	Medium	Mid term	**Medium**	Medium-high	**Low**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Low					
Emission of noise	Duration:	Long	Medium	Short-term	**Negligible**	Low	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Negligible					
Presence of artificial lights	Duration:	Long	Medium	Short-term	**Negligible**	Low	**Negligible**
	Frequency:	Highly frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Negligible					
Accidental introduction and dispersal of alien species	Duration:	Long	Medium	Long term	**Medium**	Medium-high	**Low**
	Frequency:	Sporadic					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.3.2.4 Critical Habitat

7.3.2.4.1 Flora species triggering CH

The potential impacts on flora species triggering CH are associated with the following impact factors:

1) Presence of new buildings/infrastructures
2) Accidental introduction and spreading of alien species.

The effects of impact factors and general mitigation measures for overall biodiversity were described in the previous sections, while the potential direct and indirect impact that could occur on flora species triggering CH are summarized in the table below.

Additional studies and mitigation measures are discussed whenever necessary and residual impacts are also assessed below. Monitoring measures are presented in Section 7.3.2.4.

The no net loss/net gain assessment is discussed in Section 7.3.4 including potential offset measure to obtain Net Gain.

Table 7-95: Potential direct and indirect impact during operational phase on flora species triggering CH and additional mitigation measure

Species	National Red List, End. / RR	Potential Direct and Indirect Impacts	Additional Measures
Symphytum aintabicum	VU, Local endemic/ RR	No direct impacts are expected based on current information of the species distribution. The only population of the species found in SP10 (6 individuals estimated) is located within 100 m from Project footprint, therefore indirect impacts could occur for this species.	Additional mitigation measures for populations directly and indirectly impacted by the Project: • Flora On-site Conservation (minimization): the conservation of CH determinant species shall be guaranteed to the extent possible. Species not directly impacted by the Project Footprint with population located within 100 m from construction or operation areas will be actively protected from any indirect impact. Exclusion zones at these stations, where soil and vegetation will be preserved and access will not be allowed, will be clearly identified both on maps and in the field. • Flora Salvaging and Translocation (minimization/restoration): if unavoidable direct impact is anticipated, individuals belonging to flora species determining CH impacted by the Project Footprint shall be identified and salvaged prior to construction and translocated to the appropriate sites. • Seed collection: seeds of flora species determining CH will be collected to be used during rehabilitation. Collection and conservation will be performed following the best practices indicated by the Millennium Seed Bank. Seeds collected will be separately stored for each sub-population using clearly identifiable codes. Part of the seeds will be donated to the Ankara Seed Bank where they could be stored for conservation or use for scientific research and, if needed, germinated and used to create new populations.
Alopecurus utriculatus subsp. *gaziantepicus*	CR, Local endemic/ RR	The population found in SP2 (300 individuals) is located within the Project Footprint, therefore direct impacts from the presence of PV panels could occur. Population in SP8 (250 individuals estimated) is located at more than 100 m from the Project footprint, therefore it is not expected to be directly or indirectly impacted by the Project.	

According to the baseline study performed, the general sensitivity is considered to be **High** for flora species triggering CH.

Considering the application of the above-mentioned mitigation measures, the impact on biodiversity components is presented in the following tables and it is expected to be **Medium** for the flora species *Alopecurus utriculatus* subsp. *gaziantepicus*, directly impacted by the Project, and **Low** for flora species *Symphytum aintabicum*, only indirectly impacted.

Table 7-96: Residual impact assessment matrix for flora species triggering CH in the AoI during the operation phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features - Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Presence of permanent infrastructures	Duration:	Long	High	Mid term	**High**	Medium-high	**Medium**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Low					
Accidental introduction and dispersal of alien species	Duration:	Long	High	Long term	**High**	High	**Low**
	Frequency:	Sporadic					
	Geo. Extent:	Local					
	Intensity:	Medium					

7.3.2.4.2 Fauna species triggering CH

The potential impacts on flora species triggering CH are associated with the following impact factors:

1) Presence of permanent infrastructures
2) Emission of noise
3) Emission of light

The effects of impact factors and general mitigation measures for overall biodiversity were described in the previous sections, while the potential direct and indirect impact that could occur on fauna species triggering CH are summarized in the table below.

Additional studies and mitigation measures are discussed whenever necessary and residual impacts are also assessed below. Monitoring measures are presented in Section 7.3.1.4.

The no net loss/net gain assessment is discussed in Section 7.3.4 including potential offset measure Net Gain.

Table 7-97: Potential direct and indirect impact on potential fauna species triggering CH

Species	National Red List, End. / RR	Potential Direct and Indirect Impacts	Additional Measures
Golden Hamster	EN, Endemic/ RR	Direct impacts due to the Project Footprint could affect suitable habitats (E1.3 - Mediterranean Xeric Grassland), although	Additional studies: field observations will be performed through a walkover survey by a third party biodiversity expert within the suitable habitats for

Species	National Red List, End. / RR	Potential Direct and Indirect Impacts	Additional Measures
(Mesocricetus auratus)		the presence of the species has not been confirmed. Indirect impacts within 100 m and 300 m buffer could affect this species' habitat if not properly mitigated.	the species (E1.3 - Mediterranean Xeric Grassland) in May/June. If the species is observed, additional avoidance/mitigation measures will be put in place to avoid any direct impact. Mitigation measures for planned biodiversity during the construction phase are considered sufficient to mitigate indirect impacts.

According to the baseline study performed, the general sensitivity is considered to be **High** for fauna species triggering CH.

Considering the application of the above-mentioned mitigation measures, the impact on biodiversity components is presented in the following tables and it is expected to be **Medium** for the species triggering CH in the AoI.

Table 98: Residual impact assessment matrix for fauna species triggering CH in the AoI during the operation phase

Impact Factor	Impact Factor Features		Component Sensitivity	Impact Features - Reversibility	Impact Value	Mitigation effectiveness	Residual impact value
Presence of permanent infrastructures	Duration:	Long	High	Mid term	**High**	Medium-high	**Medium**
	Frequency:	Continuous					
	Geo. Extent:	Project footprint					
	Intensity:	Low					
Emission of noise	Duration:	Long	High	Short-term	**Low**	Low	**Low**
	Frequency:	Highly frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Negligible					
Presence of artificial lights	Duration:	Long	High	Short-term	**Low**	Low	**Low**
	Frequency:	Highly frequent					
	Geo. Extent:	Project footprint					
	Intensity:	Negligible					

■

7.3.2.5 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 PV 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 (*Symphytum aintabicum* and *Alopecurus utriculatus* subsp. *gaziantepicus*). This monitoring will be conducted during the vegetative season by Company's Biodiversity Assistant Specialist construction andoperation phase.

- presence and spreading of invasive flora species in the areas under the PV panels will be monitored at least twice a year during the vegetative season by Company's Biodiversity Assistant Specialist. during the construction and operation phase. 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 auratus* and *Vormela peregusna*), will be performed at the end of construction in the areas located under the PV panels, in order to assess the possible beneficial effects offered by 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 during by Company's Biodiversity Assistant Specialist during the construction and operation phase.
- 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 detail 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 and Critical Habitats

The present net loss assessment identifies and discusses residual and unavoidable impacts on Natural Habitats and on Critical Habitats. Residual impacts are assessed considering the effect of the avoidance, mitigation and monitoring measures for construction and operation.

7.3.4.1 Natural Habitats

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 8.17 ha occupied by temporary facilities during construction will be restored with the aim of returning the areas to their former natural condition as "E1.3 - Mediterranean Xeric Grassland".

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 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 8.17 ha. This area is considered as an unavoidable residual impact and as a net loss of the natural habitat "E1.3 - Mediterranean Xeric Grassland".

In addition, PV panels occupy an area of about 82.48 ha that also fall within "E1.3 - Mediterranean Xeric Grassland" habitat. Within this area 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[40]), especially when a Project is accompanied by implementation of a long-term management and restoration plan.

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[41]), increase in plant species diversity, plant biomass and plant functional traits connected to reproductive

[40] 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.

[41] 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

fitness (Zhai et al., 2018[42]), increased aboveground biomass, soil moisture and vegetation cover (Hassanpour et al., 2018[43], Zhang et al., 2023[44]), floral and pollinator abundance (Graham et al., 2021[45]).

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[46]) 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 sections to maximize the potential positive effects on biodiversity and ecosystem services and mitigate the negative impacts.

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 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 Indicators 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.

7.3.4.2 Critical Habitats

7.3.4.2.1 Flora species

Two flora species potentially triggering CH were observed in the LSA (*Symphytum aintabicum, Alopecurus utriculatus* subsp. *gaziantepicus*).

For these species direct impacts are mainly associated with loss of populations present under the footprint of the Project and its associated facilities. Since little is known about the ecological requirements of these flora species, using a precautionary approach, it is considered that it will not be possible to restore the specific ecological niche

[42] 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

[43] 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.

[44] 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

[45] 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

[46] 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.

of the species triggering CH directly impacted by the Project. Moreover, considering that the translocation of natural species in the wild is not always successful and no information are available at the moment on the survival rate of these particular species, the potential positive effects of these actions were not considered at present.

The net loss is therefore calculated conservatively as the area affected by direct impacts at the end of the construction phase or in the worst-case scenario based on current knowledge of the species distribution.

Indirect impacts from the Project could occur in a 100 m buffer and are mainly associated with possible changes in habitat suitability and with competition due to introduction and spreading of alien species into disturbed habitats. Mitigation and monitoring measures presented for the construction and operation phase are considered sufficient for indirect impacts on populations of the species to be mitigated.

Table 99: Potential Net Loss of flora species determining CH

Species	National Red List, End. / RR	Net Loss
Symphytum aintabicum	VU, Local endemic/ RR	No net loss based on current information of the species distribution.
Alopecurus utriculatus subsp. *gaziantepicus*	CR, Local endemic/ RR	The population in SP2 (300 individuals) is located within the Project Footprint, therefore direct impacts form vegetation and topsoil disturbance could occur. A Flora On-site Conservation area will be created within the PV panel area and monitoring. If not possible Flora Salvaging and Translocation will be performed.

The feasibility and long-term success of "Flora On-site Conservation areas" and "Flora Salvaging and Translocation" measures need to be monitored to assess if the measure suggested within the ESIA is sufficient to ensure No Net Loss/Net Gain of flora species directly impacted by the Project.

In case the results of the monitoring will show that measures are not sufficient, additional offset measures will be implemented. These measures could include:

- protection of existing populations that could be otherwise threatened by impacts other than the Project (e.g., overgrazing, developments);
- reinforcement of existing populations and/or creation of new populations using seeds or other propagules sustainably collected in the wild, preferably passing through a stage of multiplication and growing in a controlled environment.

If necessary, these activities will be performed in collaboration with local research center and institutions (e.g., Ankara Seed Bank, University) to identify the multiplication and translocation protocols and ensure ongoing protection and monitoring of the populations.

7.3.4.2.2 Fauna species

Golden Hamster *(Mesocricetus auratus)* is precautionary considered as potentially present, although the presence of the species has not been confirmed. At the end of the construction phase a limited area of potentially suitable habitat will be occupied by permanent facilities. However, PV panel area could have a habitat suitability similar or

even higher than pre-construction conditions for Golden Hamster CHs, provided that appropriate rehabilitation and management actions are put in place.

Additional studies will be performed through a walkover survey within the suitable habitats for the species (E1.3 - Mediterranean Xeric Grassland) in May/June.

If the species is observed, additional avoidance, mitigation and offset measures will be put in place to ensure Net Gain for the species.

Table 100: Potential Net Loss of fauna species determining CH

Species	Red List, End. / RR	Net Loss
Golden Hamster *(Mesocricetus auratus)*	EN, Endemic/ RR	Net loss due to the Project Footprint could affect suitable habitats (E1.3 - Mediterranean Xeric Grassland), although the presence of the species has not been confirmed. Indirect impacts within 100 m and 300 m buffer could affect this species' habitat if not properly mitigated.

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11.0 CLIMATE CHANGE RISK ASSESSMENT

The "*Equator Principles 4 – Principle 2: Environmental and Social Assessment*" requires that a Climate Change Risk Assessment (CCRA) is required to be prepared:

- For all Category A and, as appropriate, Category B Projects and will include consideration of relevant physical risks as defined by the TCFD[1], and
- 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.

TCFD divided climate-related risks into two major categories In the Recommendations Report[2], which are:

- **Transition Risks:** Risks related to the transition to a lower-carbon economy, and
- **Physical Risks:** Risks related to the physical impacts of climate change.

Since the Project is proposed as "Category A" according to EP4, a Climate Change Risk Assessment (CCRA) has been prepared by WSP. The combined emissions of the Project are below 100,000 tons of CO_2 equivalent annually, therefore, only Physical Risks are included in the CCRA Report.

The results of the CCRA show the degree to which the project region is vulnerable to the physical risks (acute and chronic) of climate change and the potential consequences. The project area's temperatures are gradually rising, and the average total amount of precipitation is trending downward. According to future forecasts, this trend will continue and, if mitigation measures for climate change are insufficient, there may be even more drastic changes by the end of the century. The climate risk assessment for the project area draws attention to the potential risks.

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.

[1] Task Force on Climate-related Financial Disclosures (TCFD)

[2] TCFD. (2017). *Recommendations of the Task Force on Climate-related Financial Disclosures*. Task Force on Climate-Related Financial Disclosures, June.

DRAFT REPORT

Project ANKA - G3-Gaziantep-1-1, 2-1, 3-1 Solar Power Plant, Gaziantep

CLIMATE CHANGE RISK ASSESSMENT

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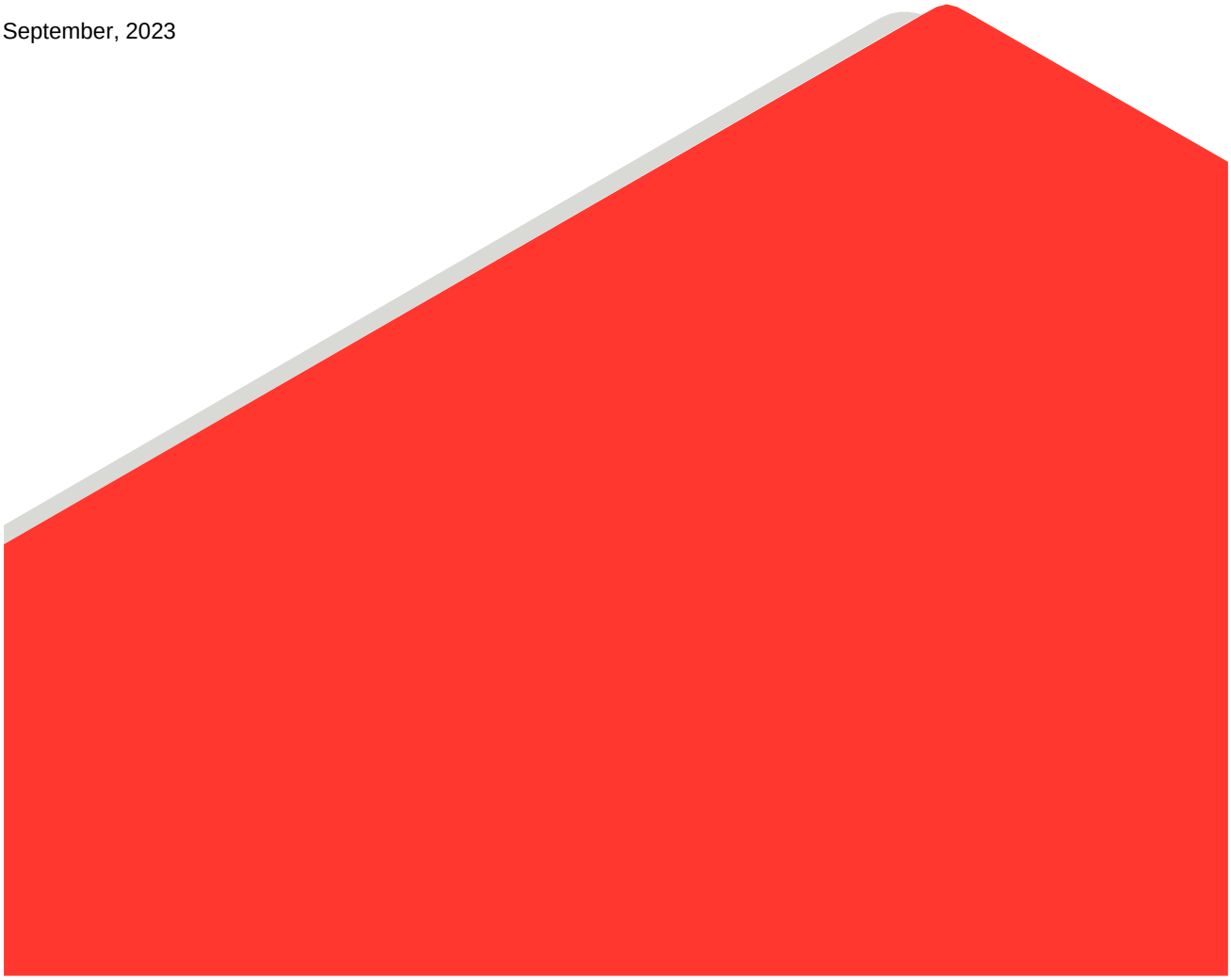

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1.0 INTRODUCTION

G3-GAZİANTEP-1-1/2-1/3-1 Solar Power Plants Project with a total installed capacity of approximately 65 MWp/50 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 in Gaziantep Province, in the Şahinbey District, Kürüm neighbourhood 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[3] (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)[4].
- 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”.

[3] The Equator Principles Association, 2020 (The Equator Principles_EP4_July2020 (equator-principles.com).

[4] 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.

2.0 PROJECT BACKGROUND

The Project Area was announced as a Renewable Energy Resource Area (YEKA) by the Ministry of Energy and Natural Resources. Scope of the "Contest Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" published in the Official Gazette dated 03/07/2020 and numbered 31174; YEKA G3-GAZİANTEP-1-1/2-1/3-1 competitions were won by the Client. YEKA Right of Use Contract were signed on 01.07.2021 between the winner of the competition, Kalyon Enerji Yatırımları A.Ş and the Ministry of Energy and Natural Resources. Pre-license was given by the Ministry of Industry and Technology, numbered ÖN/11080-30/05183 and 28.07.2022.

The Project consists of three sub-projects namely, G3-Gaziantep-1-1 Solar Power Plant Project, G3-Gaziantep 2-1 Solar Power Plant Project and G3-Gaziantep 3-1 Solar Power Plant Project. Individual Environmental Impact Assessment (EIA) reports have been prepared for these sub-projects per the requirements of national EIA Regulation and the “EIA Positive” decisions for each have been acquired.

The main components of the plant consist of solar panels, panel carrier systems, inverter stations (consist of 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 50 MWe of electricity annually, and the electricity produced will be connected to two separate 1272 MCM OHTLs namely Polateli ~100 m 154 kV OHTL and Abdülhamit Han ~100 m 154 kV OHTL. Details of the Project components are provided in Chapter 3 of the ESIA.

The Project construction activities has been started in July 2023. The construction period of the Project is estimated to be 6 months and the total operation period will be 30 years.

The Project will be established on a pastureland of 122.96 hectares. Preparation and Approval of 1/25000 and 1/5000 Master Development Plan and 1/1000 Implementation Development Plan Approval has been completed and cadastral controls are in progress.

According to the Official Letter dated 29.06.2022 and numbered E-88108382-754-105533 from Gaziantep Metropolitan Municipality, Gaziantep 2040 1/100.000 scaled Provincial Environmental Plan has been canceled with the judicial decision of Gaziantep (2nd) Administrative Court dated 13.03.2020 and numbered E:2018/3825-

K:2020/236. After the judicial decision, it was decided to replan with the decision of the Gaziantep Metropolitan Municipality Council dated 17.07.2020 and numbered 329, and it was unplanned in terms of the Environmental Plan. As per this official letter, Provincial Environmental Planning continues throughout the borders of Gaziantep Metropolitan Municipality.

3.0 METHODOLOGY

According to the ISO 14091 Standard "Adaptation to climate change – Guidelines on vulnerability, impacts and risk assessment[5]" 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)[6] and the World Bank Group[7] 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.
- 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.

[5] 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.

[6] The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body for assessing the science related to climate change.

[7] The World Bank Group (WBG) is a family of five international organizations that make leveraged loans to developing countries.

- 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.

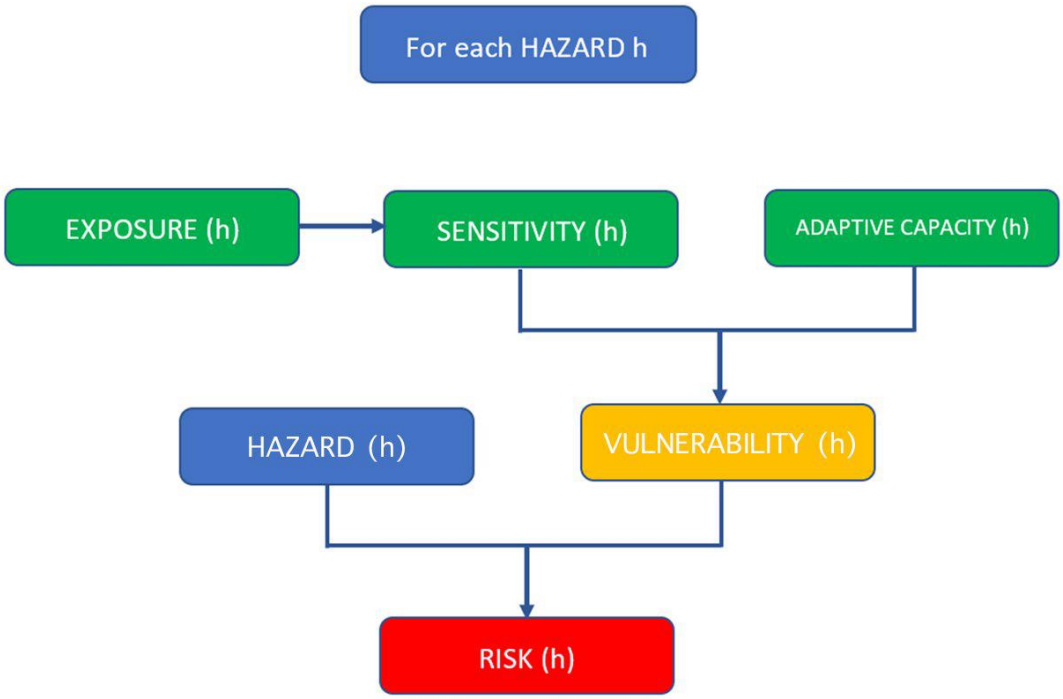


Figure 1: Workflow of the risk assessment for a specific hazard "h" the Project is exposed to, showing how different risk factors are combined across the analysis.

4.0 CLIMATE CHANGE RISK ASSESSMENT

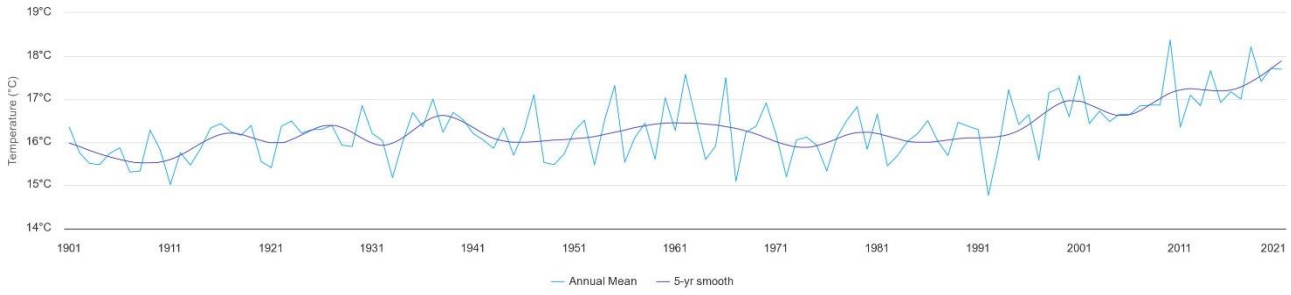
This section presents the of CCRA that takes into consideration all project facilities as described in ESIA Section 3 - Project Description.

4.1 Current Climate Overview

The Project is located in the city of Gaziantep, Türkiye. Information collected from the World Bank Group – Climate Change Knowledge Portal[8] 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 Gaziantep 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.

Gaziantep is located in the Southeastern Anatolia region of Türkiye.. The continental climate is prevailing in the Gaziantep province and winters are warm, and summers are hot and dry. According to the observation records of Gaziantep Meteorology Station between 1960 and 2021, the annual average temperature is 15.4°C. The highest temperature was recorded in July with 44°C, and the lowest temperature was measured in January with -16.8°C. Temperature observations show that Gaziantep has warmed significantly in recent decades. Between 1901 and 2021, the average annual temperature increased by about 1.3°C as can be seen from Figure 2 below.



[8] The Climate Change Knowledge Portal (CCKP) provides global data on historical and future climate, vulnerabilities, and impacts.

Figure 2: Observed Average Annual Mean-Temperature of Gaziantep for 1901-2021

Historical climate trends show that between the years 1901 and 2021 the average annual precipitation in Gaziantep increased about 112.1 mm as presented in Figure 3. According to the observation records of Gaziantep Meteorology Station between 1960 and 2021, the annual total precipitation is 573.3 mm. The maximum amount of precipitation per day was measured in December with 66.5 mm.

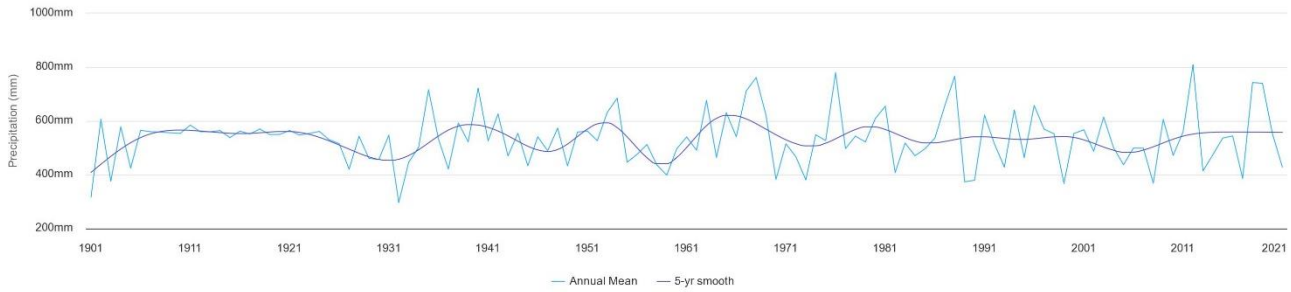


Figure 3: Observed Average Annual Precipitation of Gaziantep for 1901-2021

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.

The Project pre-construction activities has started in March 2023. Since the construction period of the Project is estimated to be 6 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 Gaziantep, under SSP5-8.5 by the end of the century as can be seen from Figure 4.

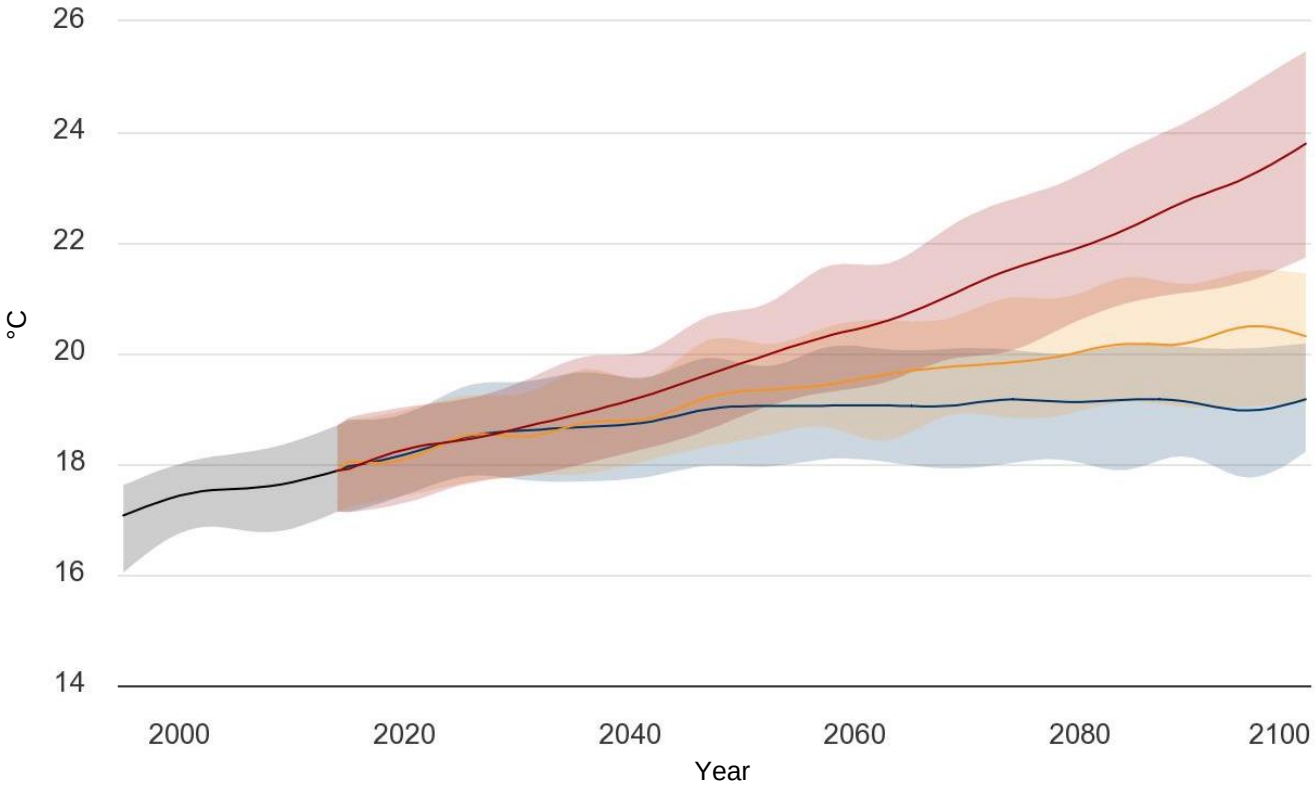


Figure 4: Projected Mean Temperature - Gaziantep (Ref. Period: 1995-2014), Multi-Model Ensemble

The projections for the mean temperatures according to the years under all scenarios are given in Table 1.

Table 1: Projected Mean-Temperature for Gaziantep

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	18.72°C	17.73 to 19.56°C	18.78°C	17.98 to 19.55°C	19.15°C	18.21 to 19.98°C
2060	19.06°C	18.09 to 20.14°C	19.52°C	18.52 to 20.58°C	20.43°C	19.37 to 21.61°C
2080	19.12°C	18.02 to 20.02°C	20.03°C	18.96 to 21.09°C	21.92°C	20.61 to 23.24°C
2100	19.17°C	18.22 to 20.18°C	20.31°C	19.11 to 21.44°C	23.79°C	21.73 to 25.46°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 Gaziantep, (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	0.82°C	0.97°C	1.05°C	1.40°C	1.41°C	1.30°C	1.29°C	1.44°C
February	0.95°C	0.95°C	1.05°C	1.08°C	1.45°C	1.39°C	1.50°C	1.32°C
March	0.66°C	0.98°C	0.87°C	1.17°C	1.04°C	1.06°C	1.19°C	1.46°C
April	0.88°C	0.76°C	0.94°C	1.18°C	1.43°C	1.26°C	1.52°C	1.09°C
May	1.22°C	1.12°C	1.38°C	1.67°C	1.62°C	1.57°C	1.84°C	1.47°C
June	1.03°C	1.17°C	1.59°C	1.67°C	1.61°C	1.83°C	1.62°C	1.37°C
July	1.02°C	1.40°C	1.57°C	1.78°C	1.70°C	1.79°C	1.72°C	1.78°C
August	1.2°C	1.38°C	1.80°C	1.93°C	1.78°C	1.66°C	1.98°C	2.05°C
September	1.05°C	1.19°C	1.88°C	1.74°C	1.92°C	2.04°C	1.82°C	1.55°C
October	0.91°C	1.49°C	1.60°C	1.58°C	1.52°C	1.45°C	1.60°C	1.04°C
November	1.01°C	1.03°C	1.12°C	1.23°C	1.37°C	1.25°C	1.10°C	1.24°C
December	0.92°C	1.05°C	1.14°C	1.32°C	1.33°C	1.55°C	1.23°C	0.86°C

Table 3: Projected Mean-Temperature Anomaly Gaziantep, (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	0.66°C	1.13°C	1.04°C	1.60°C	1.68°C	1.98°C	2.26°C	2.33°C
February	0.75°C	0.94°C	1.32°C	1.59°C	1.93°C	2.00°C	2.29°C	2.34°C
March	0.53°C	0.76°C	1.42°C	1.58°C	1.73°C	1.86°C	2.05°C	2.19°C
April	0.51°C	0.98°C	1.49°C	1.61°C	1.99°C	2.06°C	2.48°C	2.43°C
May	0.96°C	1.40°C	1.62°C	1.83°C	2.49°C	2.53°C	2.66°C	2.79°C
June	1.95°C	1.56°C	1.79°C	2.13°C	2.35°C	2.81°C	2.83°C	3.18°C
July	1.07°C	1.52°C	1.96°C	2.19°C	2.52°C	2.91°C	3.25°C	3.58°C
August	1.23°C	1.39°C	1.92°C	2.39°C	2.78°C	3.11°C	3.42°C	3.53°C
September	1.21°C	1.51°C	2.09°C	2.42°C	2.50°C	2.78°C	2.91°C	3.31°C
October	1.14°C	1.35°C	1.56°C	2.17°C	2.50°C	2.59°C	3.05°C	3.11°C
November	1.03°C	1.11°C	1.30°C	1.86°C	2.13°C	2.28°C	2.33°C	2.58°C
December	0.94°C	1.05°C	1.35°C	1.69°C	1.90°C	1.99°C	2.14°C	2.14°C

Table 4: Projected Mean-Temperature Anomaly Gaziantep, (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	0.57°C	1.07°C	1.40°C	1.98°C	2.78°C	2.81°C	3.76°C	4.35°C
February	0.74°C	0.79°C	1.40°C	2.02°C	2.50°C	3.14°C	3.65°C	4.23°C
March	0.58°C	0.95°C	1.51°C	2.06°C	2.43°C	3.28°C	3.73°C	4.67°C
April	0.69°C	1.04°C	1.90°C	2.32°C	2.60°C	3.63°C	4.15°C	4.85°C
May	1.00°C	1.56°C	1.94°C	2.75°C	3.27°C	4.23°C	5.38°C	5.86°C
June	1.30°C	1.55°C	2.31°C	2.90°C	3.59°C	4.41°C	5.26°C	6.23°C
July	1.08°C	1.61°C	2.47°C	3.12°C	3.73°C	4.88°C	5.43°C	6.53°C
August	1.12°C	1.77°C	2.51°C	3.23°C	3.96°C	5.14°C	5.97°C	6.78°C
September	1.15°C	1.75°C	2.54°C	3.33°C	3.96°C	4.68°C	5.77°C	6.59°C
October	1.13°C	1.59°C	2.22°C	3.01°C	3.94°C	4.58°C	5.32°C	6.49°C
November	0.82°C	1.22°C	1.84°C	2.44°C	2.92°C	3.49°C	4.60°C	5.33°C
December	0.68°C	1.24°C	1.63°C	2.10°C	2.59°C	2.92°C	3.82°C	4.67°C

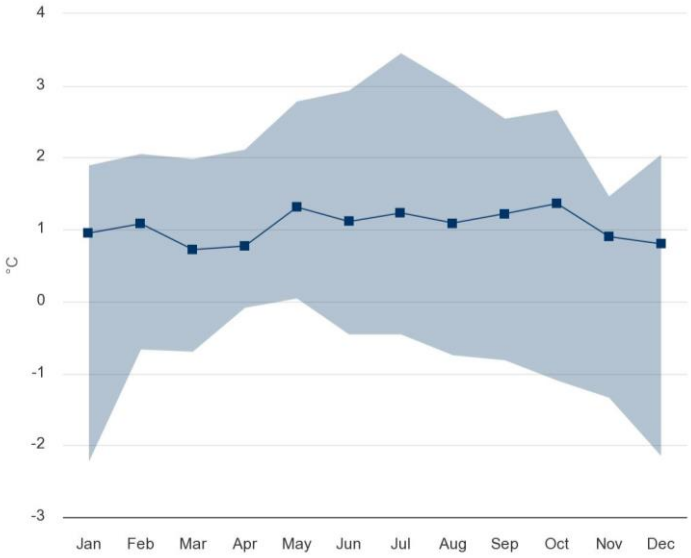
2020-2039

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.

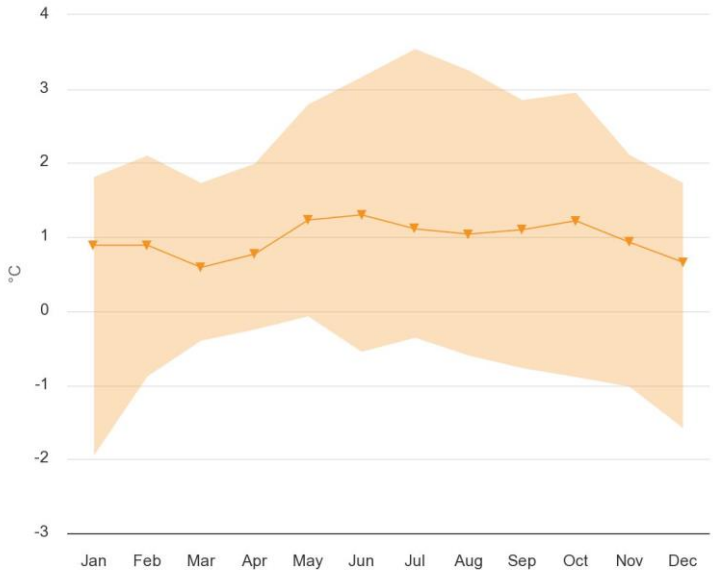
The graph represents monthly temperature anomalies (differences from the long-term average) from January to December for the years 2020 to 2039.

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.

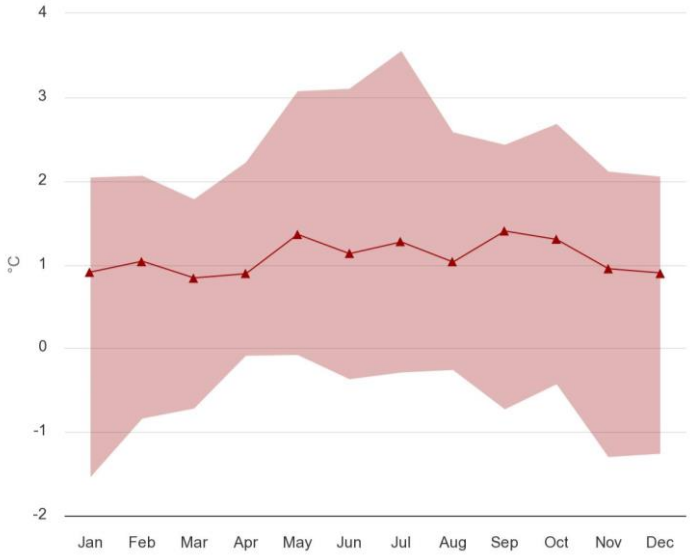
The highest deviation is expected as an increase of 3.55 ˚C in July under the SSP5-8.5 scenario and -2.23 ˚C as a decrease in January under the SSP1-2.6 scenario as can be seen from the Figure 5 (b) and (a), respectively.



SSP1-2.6 (a)



SSP2-4.5 (b)



SSP5-8.5 (c)

Figure 5: Projected Mean Temperature Anomaly for 2020-2039 - Gaziantep (Ref. Period: 1995-2014), Multi-Model Ensemble

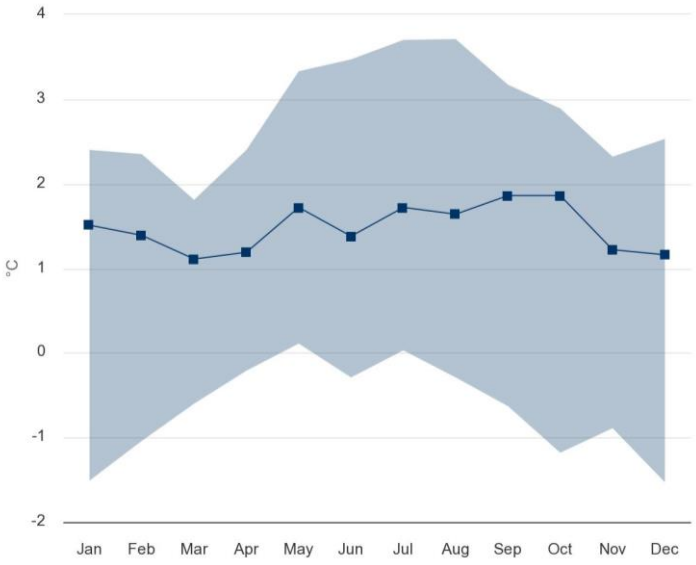
2040-2059

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.

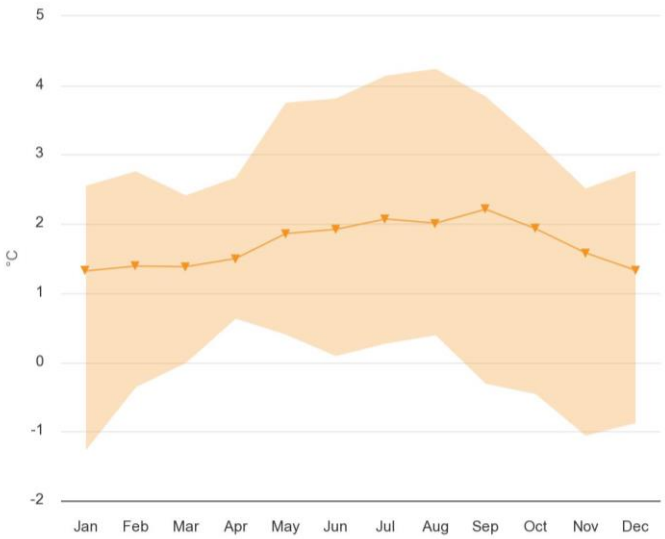
The graph represents monthly temperature anomalies (differences from the long-term average) from January to December for the years 2040 to 2059.

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 4.93 ˚C in July under the SSP5-8.5 scenario and -1.53 ˚C as a decrease in December under the SSP1-2.6 scenario as can be seen from the

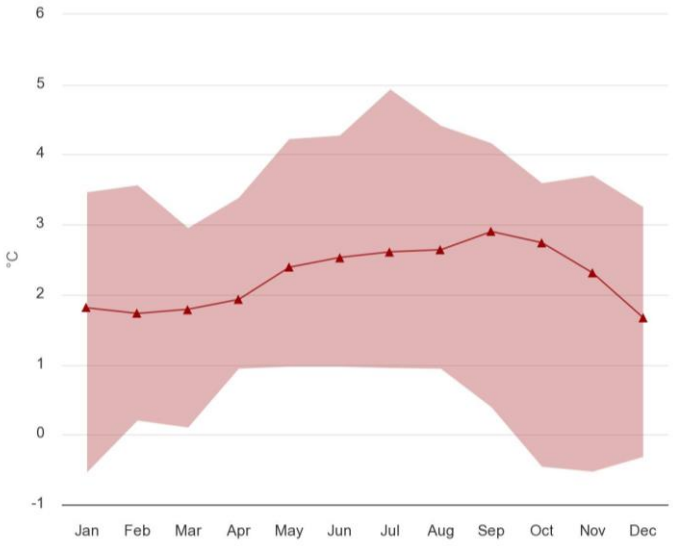
Figure 6 (c) and (b), respectively.



SSP1-2.6 (a)



SSP2-4.5 (b)



SSP5-8.5 (c)

Figure 6: Projected Mean Temperature Anomaly for 2040-2059 - Gaziantep (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 Gaziantep, under SSP5-8.5 by the end of the century as can be seen from Figure 7.

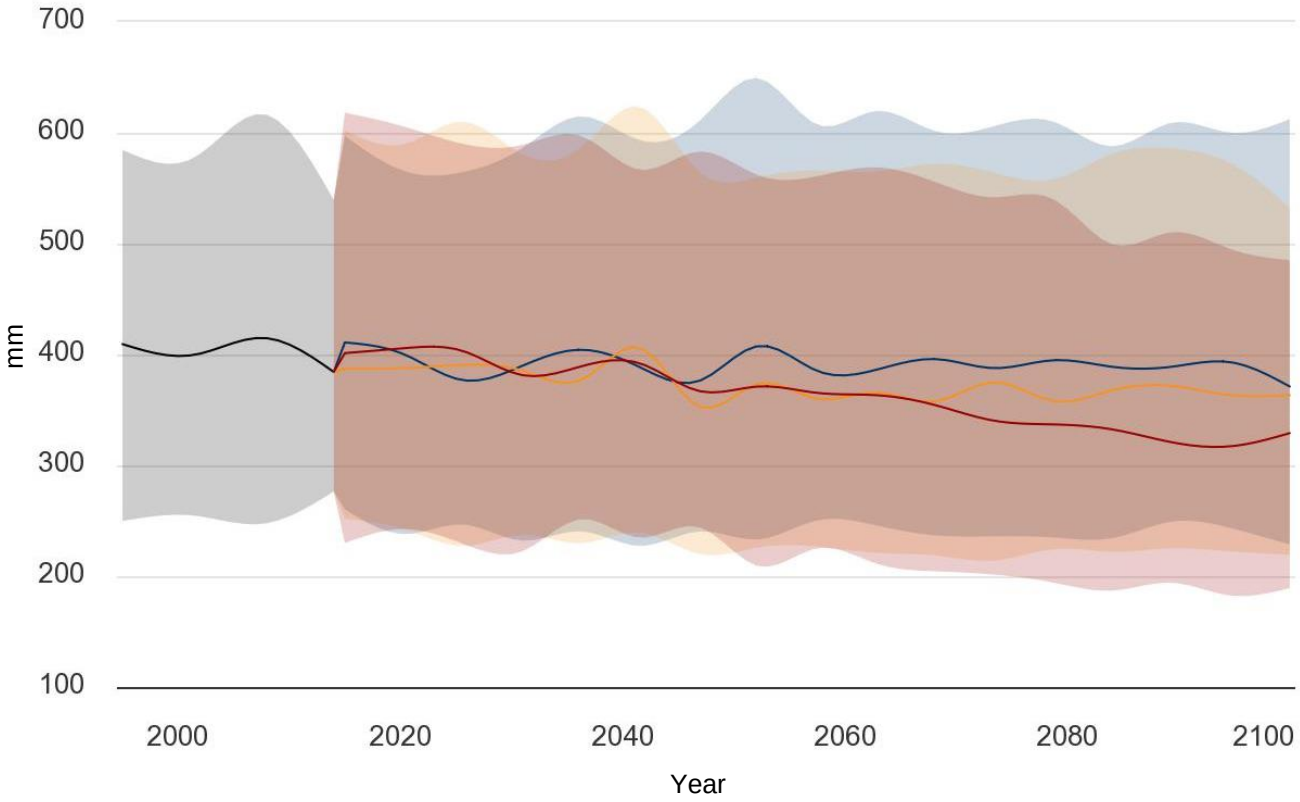


Figure 7: Project Precipitation - Gaziantep (Ref. Period: 1995-2014), Multi-Model Ensemble

The projections for the precipitation according to the years under all scenarios are given in Table 5.

Table 5: Projected Precipitation - Gaziantep

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	393.53 mm	229.91 to 600.02 mm	403.99 mm	238.26 to 620.75 mm	394.83 mm	238.91 to 572.82 mm
2060	381.16 mm	251.22 to 609.65 mm	361.57 mm	223.80 to 564.94 mm	364.01 mm	222.15 to 566.15 mm
2080	394.67 mm	233.89 to 604.48 mm	357.50 mm	224.78 to 562.09 mm	336.49 mm	191.57 to 531.26 mm
2100	371.13 mm	228.57 to 612.33 mm	363.28 mm	219.41 to 532.37 mm	329.06 mm	189.28 to 484.98 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 Gaziantep, (SSP1-2.6, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-2060	2061-2070	2071-2080	2081-2090	2091-2100
January	1.86 mm	-3.15 mm	-3.32 mm	0.91 mm	2.24 mm	0.15 mm	-3.57 mm	2.08 mm
February	-0.82 mm	-2.67 mm	-2.49 mm	-4.52 mm	0.40 mm	-1.68 mm	-2.92 mm	-4.72 mm
March	1.56 mm	-0.45 mm	0.98 mm	-1.03 mm	0.42 mm	1.23 mm	-2.25 mm	-1.68 mm
April	-0.32 mm	0.17 mm	0.09 mm	1.34 mm	2.34 mm	1.90 mm	0.92 mm	0.66 mm
May	-0.32 mm	-1.83 mm	1.34 mm	0.23 mm	-0.44 mm	-1.62 mm	-0.53 mm	2.48 mm
June	0.60 mm	0.27 mm	1.34 mm	-0.16 mm	-0.04 mm	-0.53 mm	0.77 mm	1.31 mm
July	-0.11 mm	-0.18 mm	-0.08 mm	-0.13 mm	-0.27 mm	-0.02 mm	-0.16 mm	-0.19 mm
August	-0.05 mm	-0.03 mm	-0.10 mm	-0.17 mm	-0.24 mm	-0.11 mm	-0.04 mm	-0.08 mm
September	-0.30 mm	-0.06 mm	-0.59 mm	-0.72 mm	-0.36 mm	-0.58 mm	-0.48 mm	-0.40 mm
October	0.43 mm	-1.89 mm	-0.52 mm	-0.26 mm	-2.97 mm	-0.81 mm	-3.21 mm	-2.68 mm
November	-2.25 mm	-3.79 mm	-5.66 mm	0.55 mm	-1.49 mm	-6.75 mm	2.01 mm	-2.63 mm
December	-7.73 mm	-3.69 mm	-1.63 mm	-3.62 mm	0.08 mm	-4.81 mm	-0.07 mm	-4.89 mm

Table 7: Projected Precipitation Anomaly Gaziantep, (SSP2-4.5, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-2060	2061-2070	2071-2080	2081-2090	2091-2100
January	3.22 mm	-8.29 mm	-6.62 mm	-2.01 mm	-5.30 mm	-0.88 mm	-6.18 mm	-2.85 mm
February	-3.83 mm	0.16 mm	-1.35 mm	-1.67 mm	-5.91 mm	-4.31 mm	-6.21 mm	-7.37 mm
March	-1.39 mm	-2.20 mm	-4.51 mm	-3.81 mm	-5.32 mm	-1.13 mm	-1.98 mm	-4.47 mm
April	-0.47 mm	0.26 mm	1.27 mm	-1.96 mm	-1.64 mm	-0.80 mm	-0.56 mm	-0.09 mm
May	-1.67 mm	-2.51 mm	0.01 mm	-1.98 mm	-4.42 mm	-2.24 mm	-0.60 mm	-2.14 mm
June	0.60 mm	-0.27 mm	-0.74 mm	0.18 mm	-0.66 mm	-0.46 mm	-0.39 mm	0.68 mm
July	-0.27 mm	-0.05 mm	-0.07 mm	-0.33 mm	-0.37 mm	-0.49 mm	-0.51 mm	-0.42 mm
August	-0.05 mm	-0.12 mm	-0.11 mm	-0.14 mm	-0.16 mm	-0.47 mm	-0.40 mm	-0.21 mm
September	-0.11 mm	-0.21 mm	-0.48 mm	-0.79 mm	-0.80 mm	-0.61 mm	-1.56 mm	-0.91 mm
October	-2.22 mm	0.26 mm	1.50 mm	-0.80 mm	-2.63 mm	-2.60 mm	-3.65 mm	-0.34 mm
November	-1.75 mm	-4.24 mm	-5.52 mm	-2.96 mm	-3.91 mm	-7.47 mm	-1.40 mm	-3.53 mm
December	-2.79 mm	-4.21 mm	-3.76 mm	-10.62 mm	-7.91mm	-3.61 mm	-5.98 mm	-10.51 mm

Table 8: Projected Precipitation Anomaly Gaziantep, (SSP5-8.5, Multi Model Assemble)

Years / Months	2021-2030	2031-2040	2041-2050	2051-2060	2061-2070	2071-2080	2081-2090	2091-2100
January	1.41 mm	-1.30 mm	-3.17 mm	-4.27 mm	-12.23 mm	-11.09 mm	-9.80 mm	-16.11 mm
February	0.94 mm	-1.26 mm	-2.58 mm	-9.73 mm	-6.81 mm	-11.34 mm	-9.90 mm	-10.40 mm
March	-2.07 mm	-3.12 mm	-4.82 mm	-3.99 mm	-4.51 mm	-8.02 mm	-7.83 mm	-9.89 mm
April	-2.59 mm	3.30 mm	-3.41 mm	-3.51 mm	-3.72 mm	-5.68 mm	-5.73 mm	-9.71 mm
May	-2.86 mm	-0.62 mm	-2.48 mm	-1.85 mm	-4.38 mm	-4.25 mm	-4.25 mm	-6.74 mm
June	-0.47 mm	-0.50 mm	0.15 mm	0.31 mm	-0.61 mm	-0.32 mm	-0.91 mm	-0.85 mm
July	-0.46 mm	0.08 mm	-0.32 mm	-0.47 mm	-0.50 mm	-0.58 mm	-0.34 mm	-0.55 mm
August	-0.06 mm	-0.02 mm	-0.13 mm	-0.18 mm	-0.15 mm	-0.40 mm	-0.45 mm	-0.43 mm
September	-0.36 mm	-0.43 mm	-0.71 mm	-0.63 mm	-0.73 mm	-1.55 mm	-1.83 mm	-1.31 mm
October	1.04 mm	-2.08 mm	-0.37 mm	-3.40 mm	-2.08 mm	-1.65 mm	-4.37 mm	-6.78 mm

Years / Months	2021-2030	2031-2040	2041-2050	2051-2060	2061-2070	2071-2080	2081-2090	2091-2100
November	-2.54 mm	-1.27 mm	-4.95 mm	-8.47 mm	-3.83 mm	-6.71 mm	-10.43 mm	-8.65 mm
December	-8.33 mm	-4.84 mm	-8.32 mm	-14.43 mm	-16.97 mm	-18.38 mm	-20.73 mm	-19.83 mm

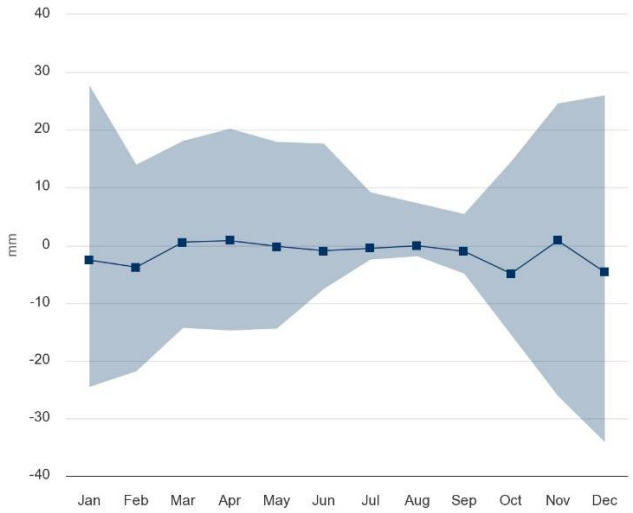
2020-2039

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.

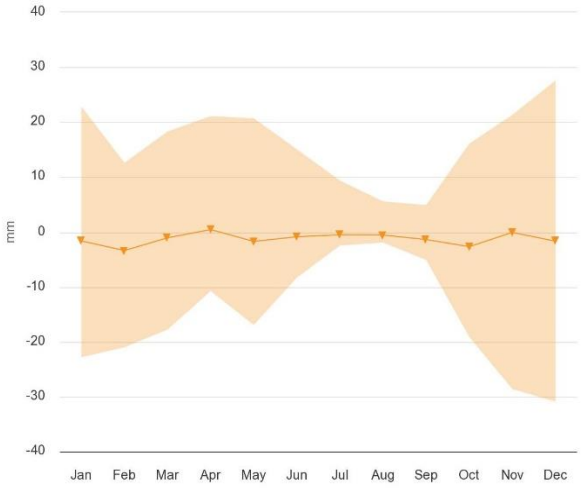
The graph represents projected precipitation anomalies (differences from the long-term average) from January to December for the years 2020 to 2039.

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.

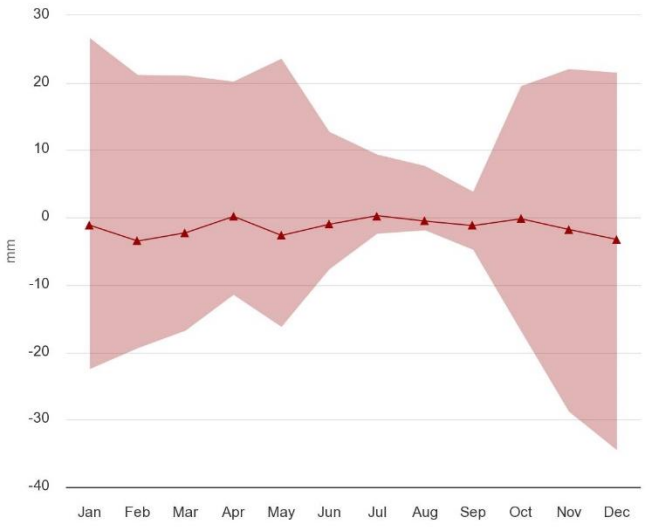
The highest deviation from the baseline values is expected as an increase of 27.66 mm in January under the SSP1-2.6 scenario and -34.54 mm as a decrease in December under the SSP5-8.5 scenario as can be seen from the Figure 8 (b) and (c), respectively.



SSP1-2.6 (a)



SSP2-4.5 (b)



SSP5-8.5 (c)

Figure 8: Projected Precipitation Anomaly for 2020-2039 - Gaziantep (Ref. Period: 1995-2014), Multi-Model Ensemble

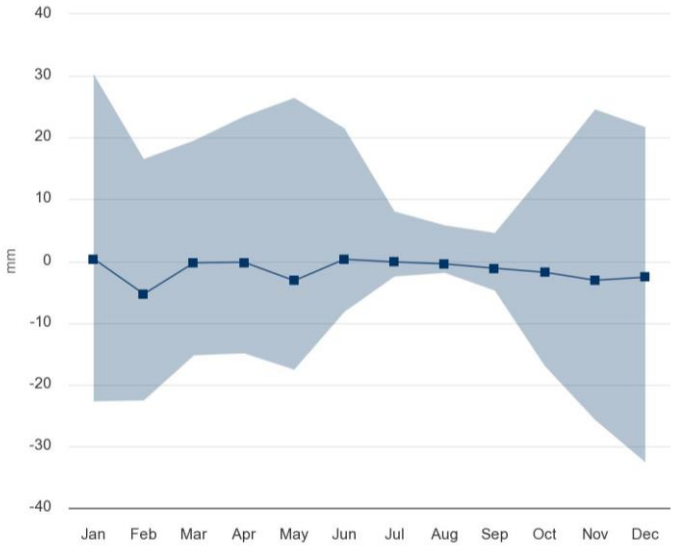
2040-2059

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.

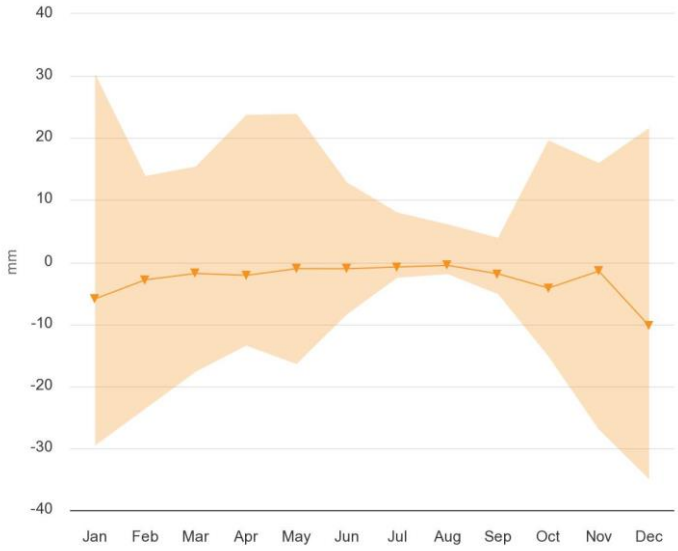
The graph represents projected precipitation anomalies (differences from the long-term average) from January to December for the years 2020 to 2039.

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.

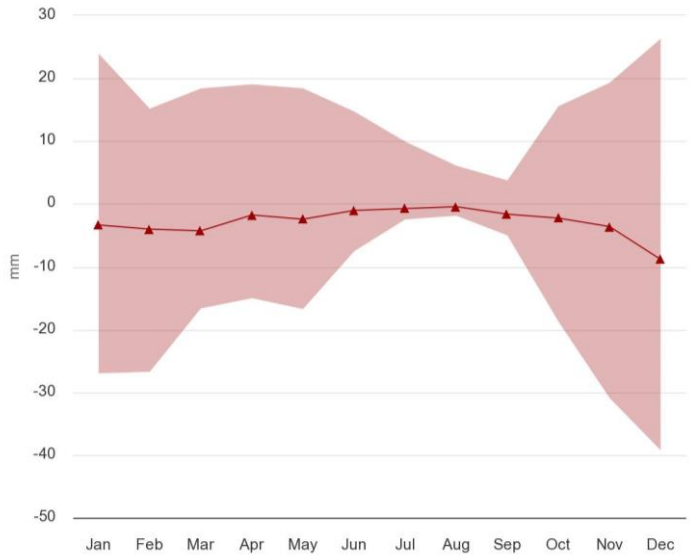
The highest deviation from the baseline values is expected as an increase of 30.27 mm in January under the SSP1-2.6 scenario and -39.24 mm as a decrease in December under the SSP5-8.5 scenario as can be seen from the Figure 9 (a) and (c), respectively.



SSP1-2.6 (a)



SP2-4.5 (b)



SSP5-8.5 (c)

Figure 9: Projected Precipitation Anomaly for 2040-2059 - Gaziantep (Ref. Period: 1995-2014), Multi-Model Ensemble

4.3 Assessment of Hazards

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 Gaziantep.

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**

The flood risk in Gaziantep is influenced by its geographic location in 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.

Flooding is generally not considered to be a significant climate-related hazard for Gaziantep. The city is located in south-eastern Turkey and its climate is characterised by hot, dry summers and mild, wet winters. This climate pattern is more prone to drought and water scarcity than to flooding. Although Gaziantep is not traditionally prone to flooding, climate change may lead to unexpected shifts in rainfall patterns and extreme rainfall events that could increase the risk of localised flooding in the future.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “LOW”.

- **Extreme Heat Hazard**

The mean annual temperature in Gaziantep has increased by 1.3°C temperature since last century. Temperatures are projected to keep rising according to all scenarios. 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 Gaziantep Province, in January, which is typically the coldest month of the year, average minimum temperatures moved from -0.51°C for the period 1901-1930 to -0.41° 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. Gaziantep Province has a desertification risk of medium level. It is situated at an elevation of about 850 m above sea level.

As studies indicate, Gaziantep province is among the provinces that may be affected by drought due to its geographical location and its proximity to the Mediterranean region.[9] 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)[10], severe storms including heavy rain, large hail, damaging lightning is a recurring hazard in Gaziantep.

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “MEDIUM”.

- **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 Gaziantep 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, Gaziantep lost 1.21 kha overall from all loss factors between 2001 and 2022, including the loss of 57 ha of tree cover due to fires. In this time frame, the year 2019 had the greatest amount of tree cover loss due to fires, with 12 ha lost to fires accounting for 4.4% of all tree cover loss for that year. Fires were responsible for 4.5% of tree cover loss in Gaziantep 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 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.

[9] https://dergipark.org.tr/tr/download/article-file/1535088

[10] https://eswd.eu/

Therefore, this hazard has been scoped in for the climate change risks assessment and assessed as “HIGH”.

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.

4.4 Assessment of Sensitivity, Adaptive Capacity and Vulnerability

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 130 m3 according 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.
- 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 GASKİ via water trucks.

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.

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.
- Gaziantep Directorate conducts energy-efficiency studies on municipal facilities and buildings and implements efficiency-enhancing projects in collaboration with energy managers and survey experts. Gaziantep municipality signed the Covenant of Mayors in 2017 and thereby committed to reducing CO_2 emissions by at least 80% by 2050.[11]

[11]https://oecdcogito.blog/2023/08/10/gaziantep-a-recovery-leaving-no-one-behind/#:~:text=Gaziantep%2C%20T%C3%BCrkiye's%20first%20municipality%20to,management%20in%20the%20public%20sector

- Gaziantep, Türkiye's first municipality to prepare a Climate Change Action Plan in 2011, completed the Sustainable Energy and Climate Action Plan in 2018 and is currently working on the "Gaziantep Climate Change Adaptation Action Plan" for renewable energy and energy management in the public sector.
- Gaziantep municipality is preparing national commitments and roadmaps for zero-carbon building policies, as well as local strategies and actions for net-zero carbon building implementation. Gaziantep was chosen as a pilot province in the Zero-Carbon Buildings Project.
- 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".

- A reinforced concrete structure was added under the fences which were established to ensure the security of the project site, hence the site was protected from potential flood and surface water.
- The inverter station foundation was raised 60 cm from the ground level against the risk of rising water.
- In case of water intrusion scenario into the inverter station foundation, a water collection reservoir has been designed in the station foundation. There is infrastructure to collect water in the reservoir and discharge it out with the help of a pump.
- The manhole lid at the entrance of the inverter station foundation is selected as impermeable.
- The foundation concrete was waterproofed with insulation materials to prevent water leakage into the 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.

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

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	LOW	LOW
EXTREME HEAT	MEDIUM	HIGH	HIGH
EXTREME COLD	MEDIUM	LOW	LOW
DROUGHT	MEDIUM	HIGH	HIGH
SEVERE STORMS	HIGH	MEDIUM	HIGH
EXTREME PRECIPITATIONS	MEDIUM	MEDIUM	MEDIUM
WILDFIRES	HIGH	HIGH	HIGH

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 Gaziantep and Gaziantep 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 Gaziantep.
- Verify the adequacy of the maintenance program of all prevention and fire emergency systems.

Signature Page

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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.

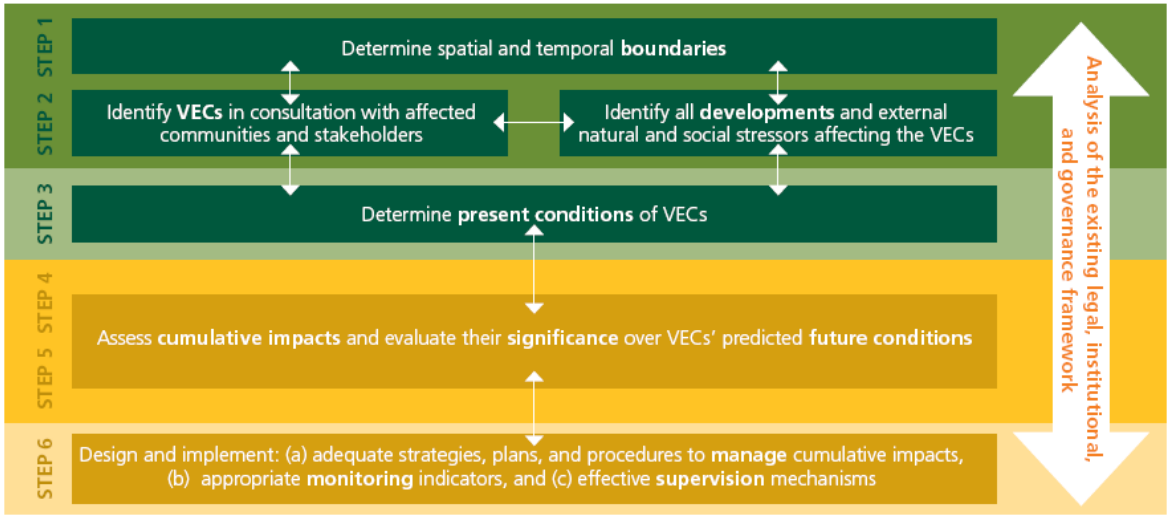

Figure 9-1: Cumulative Impact Assessment Methodology

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:

Construction

- 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	154 kV Polateli 380 ETL (West)	0 m	154 kV	Under construction
2	154 kV Polateli 380 ETL (East)	0 m	154 kV	Under construction
3	Ant Marble Quarry	1650 m	19,500 m^3/year	Under operation
4	Çörekli Rock Quarry	200 m	Unknown	Under operation

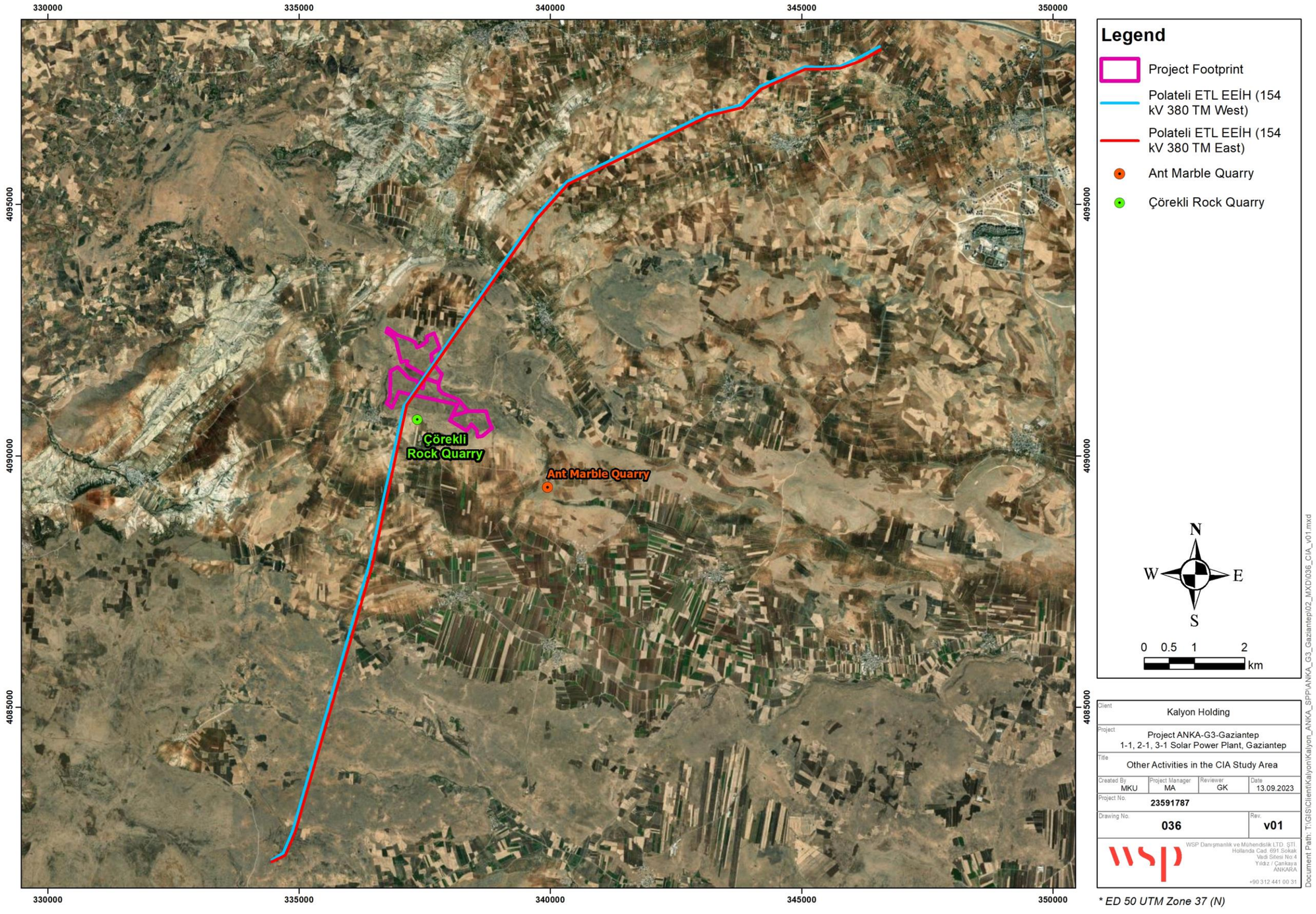

Figure 9-2: Other Activities in the CIA Study Area

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
154 kV Polateli 380 ETL (West)	√	√	√	√	√	√	√	√	√
154 kV Polateli 380 ETL (East)	√	√	√	√	√	√	√	√	√
Ant Doğaltaş Madencilik Marble Quarry	√	√	√	√	√	√	√	√	√
Çörekli Rock Quarry	√	√	√	√	√	√	√	√	√

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, Polateli electrical transmission line (ETL) projects in 154 kV capacity, which will serve Gaziantep SPP projects, traverse inside of the Project area. Since these ETLs are under construction, baseline noise measurements already cover the noise emissions generated from their construction. However, the project schedule, construction technologies, number of machinery and equipment list are unknown. 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.

Moreover, there is a marble quarry project under operation where is in the south-eastern of the Project Area with 1.65 km. Baseline noise measurements conducted in the scope of this ESIA study cover the operational noise aspects of this facility.

There is also a rock quarry project under operation which is in the southern of the Project Area with a 200 m distance which is near the archaeological site. Baseline noise measurements conducted in the scope of this ESIA study also cover the operational noise aspects of this facility.

To display the cumulative impacts of the construction of the Project, a noise modelling study is conducted. The noise levels of the 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-1, N-2, N-4, N-5, N-6, N-7, N-8, N-9, N-10 and N-11;
- Turkish evening-time noise regulatory limit value is exceeded at locations N-5 and N-11.

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 0.873 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, Polateli electrical transmission line (ETL) projects in 154 kV capacity, which will serve Gaziantep SPP projects, traverse inside of the Project area. Since these ETLs are under construction, baseline air quality measurements already cover the air emissions generated from the construction of these ETLs. However, the project schedule, construction technologies, number of machinery and equipment list are unknown. 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 emissions and dust generation.

Moreover, there is a rock quarry and a marble quarry under operation which is in southern of the Project Area. Baseline air quality measurements conducted in the scope of this ESIA study also cover the operational air emission aspects of this facility. In light of this information, the expected cumulative impact of these separate projects 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 and the expected cumulative impact of these separate projects will be **Low**.

9.5.3 Terrestrial Biodiversity

A total of three Solar Power Plant (SPP) Projects, respectively named “G3 GAZİANTEP-1-1 SPP”, “G3 GAZİANTEP-2-1 SPP”, and “G3 GAZİANTEP-3-1 SPP”, in addition to two Transmission Lines and one Çörekli Rock Quarry and Ant Marble Quarry already under operation, will be located within Mediterranean xeric grasslands in Şanlıurfa Province, in Gaziantep District, in south-eastern Türkiye.

During construction and operation phases, potential impacts on biological components from the Project will mainly be associated with the following impact factors: vegetation and topsoil disturbance, introduction of buildings/infrastructures, emission of noise, emission of particulate matter, emission of light, increase of vehicular traffic, potential introduction and dispersal of alien species.

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.), which will cause a loss of available natural habitat during the entire operation phase. In addition, Rock and Marble quarries already under operation have determined a loss of available natural habitat, through vegetation and topsoil removal. This loss will directly and indirectly affect habitats, flora, and fauna species. If indirect impacts are not properly mitigated, habitat fragmentation and degradation could also occur.

However, flora and vegetation are expected to recover in Solar Power Plants at least partially during the operation phase, due to the rehabilitation of the temporary facilities, but also in the areas under the PV panels. Literature shows that the construction of Solar Power Plants in desertic and dry grassland areas could determine overall positive effects on biodiversity, in terms of increased plant diversity and increased plant biomass (Bai et al., 2022; Graham et al., 2021; Hassanpour et al., 2018) provided that appropriate long-term management and restoration activates are implemented.

Based on these considerations and assuming that appropriate mitigation, monitoring and offsetting measures will be applied in all SPPs, associated powerlines Rock and Marble Quarries, 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, less than 0.1% 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 projects, there will be an unknown temporary increase in the existing traffic load, which will not adversely affect the traffic in the region. In addition, according to the PIF of the Ant Marble Quarry Project, which is under operation, 3 trucks and one water truck are being used for the operational activities. There will be an increase of less than 0.1% in the existing traffic load due to these additional vehicles which is negligible.

Although the traffic load from the Rock Quarry under operation is unknown, with the consideration of existing traffic density in O-54 Ring Road, this increase in traffic may be considered negligible.

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.

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

The Project will be established on a pastureland of 122.96 hectares. The Project Area was announced as a Renewable Energy Resource Area (YEKA) by the Ministry of Energy and Natural Resources. Scope of the "Contest Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" published in the Official Gazette dated 03/07/2020 and numbered 31174; YEKA G3-GAZİANTEP-1-1/2-1/3-1 competitions were won by the Client. YEKA Right of Use Contract was signed on 01.07.2021 between the winner of the competition, Kalyon Enerji Yatırımları A.Ş and the Ministry of Energy and Natural Resources. Pre-license was given by the Ministry of Industry and Technology, numbered ÖN/11080-30/05183 and 28.07.2022.

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 other projects are presented below.

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.

Ant Marble Quarry: The project area is located on pasturelands and agricultural lands with a 24.5 ha area. According to the PIF of the project, necessary permits will be obtained for the use of these areas within the framework of the Soil Conservation and Land Use Law No. 5403 and During operation, Gaziantep Provincial Environmental Plan Notes will be followed.

Çörekli Rock Quarry: The project area is located on pasturelands and agricultural lands that are near the archaeological site 200 m from the Gaziantep SPP site. Çörekli Rock Quarry is under operation and the total area of the project that covers the land is unknown.

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 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. According to EIA/PIF reports, the employment requirements for each project are provided below.

ETLs: 120 personnel will work during the construction and operation phases of the project in total.

Rock Quarry: 20 personnel will be employed during the operation phase.

9.5.9 Local Procurement

The Project and other three projects including the rock quarry and two 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 OTHL Construction

The project area has two points where OTHL and SPP panels overlap. As per the project specifications, the panels will not be constructed under these two points as per engineering and design studies conducted. For this issue, "High Current Facilities Regulation" will be strictly followed during the construction and even commissioning phases of the project. (*Ref. www.mevzuat.gov.tr*)

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 G3-Gaziantep-1-1, 2-1, 3-1 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

The Project with a total installed capacity of approximately 65 MWp/50 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 in Gaziantep Province, in the Şahinbey District, Kürüm neighbourhood in Türkiye. Once the Solar Power Plant is put into operation, it is planned to produce 135808 MWe of electricity annually, and the electricity produced will be connected to two separate 1272 MCM OHTLs namely Polateli ~100 m 154 kV OHTL and Abdülhamit Han ~100 m 154 kV OHTL.

The project layout is presented in Figure 10-2.

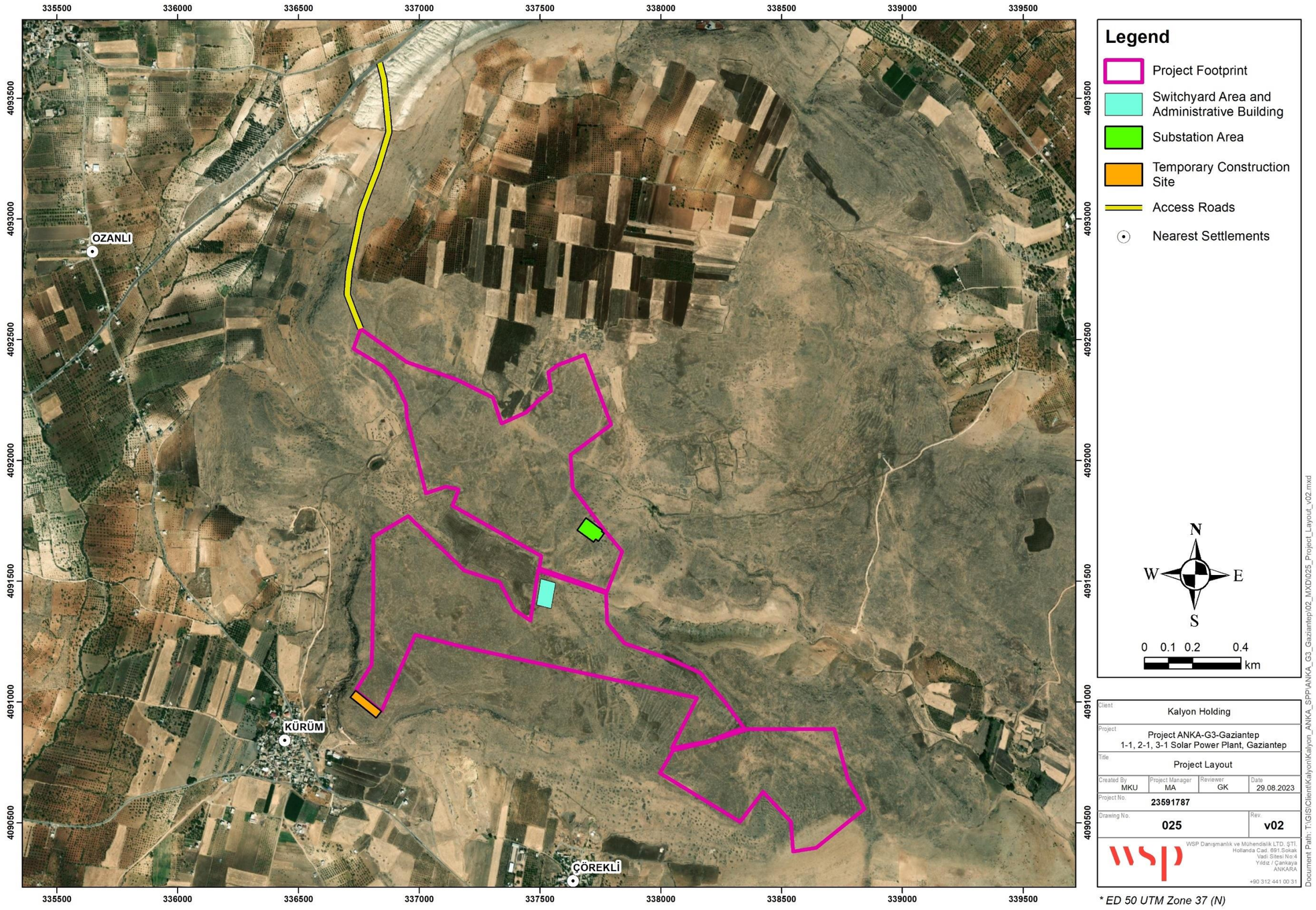


Figure 10-2: Project Layout

The Project Area was announced as a Renewable Energy Resource Area (YEKA) by the Ministry of Energy and Natural Resources. Scope of the "Contest Announcement on the Allocation of Renewable Energy Resource Areas and Connection Capacities Based on Solar Energy" published in the Official Gazette dated 03/07/2020 and numbered 31174; YEKA G3-GAZİANTEP-1-1/2-1/3-1 competitions were won by the Client. YEKA Right of Use Contract were signed on 01.07.2021 between the winner of the competition, Kalyon Enerji Yatırımları A.Ş and the Ministry of Energy and Natural Resources.

The Project will be established on a pastureland of 122.96 hectares. Preparation and Approval of 1/25000 and 1/5000 Master Development Plan and 1/1000 Implementation Development Plan Approval has been completed and cadastral controls are in progress.

The closest settlements to the SPP site are Kürüm Village at 0.33 km, Çörekli Village at 0.57 km, Ozanlı Village at 1.15 km, Gülpınar Village at 2.22 km and Ufacık Village at 2.42 km. The nearest settlements to the Project site are shown in Figure 10-3.

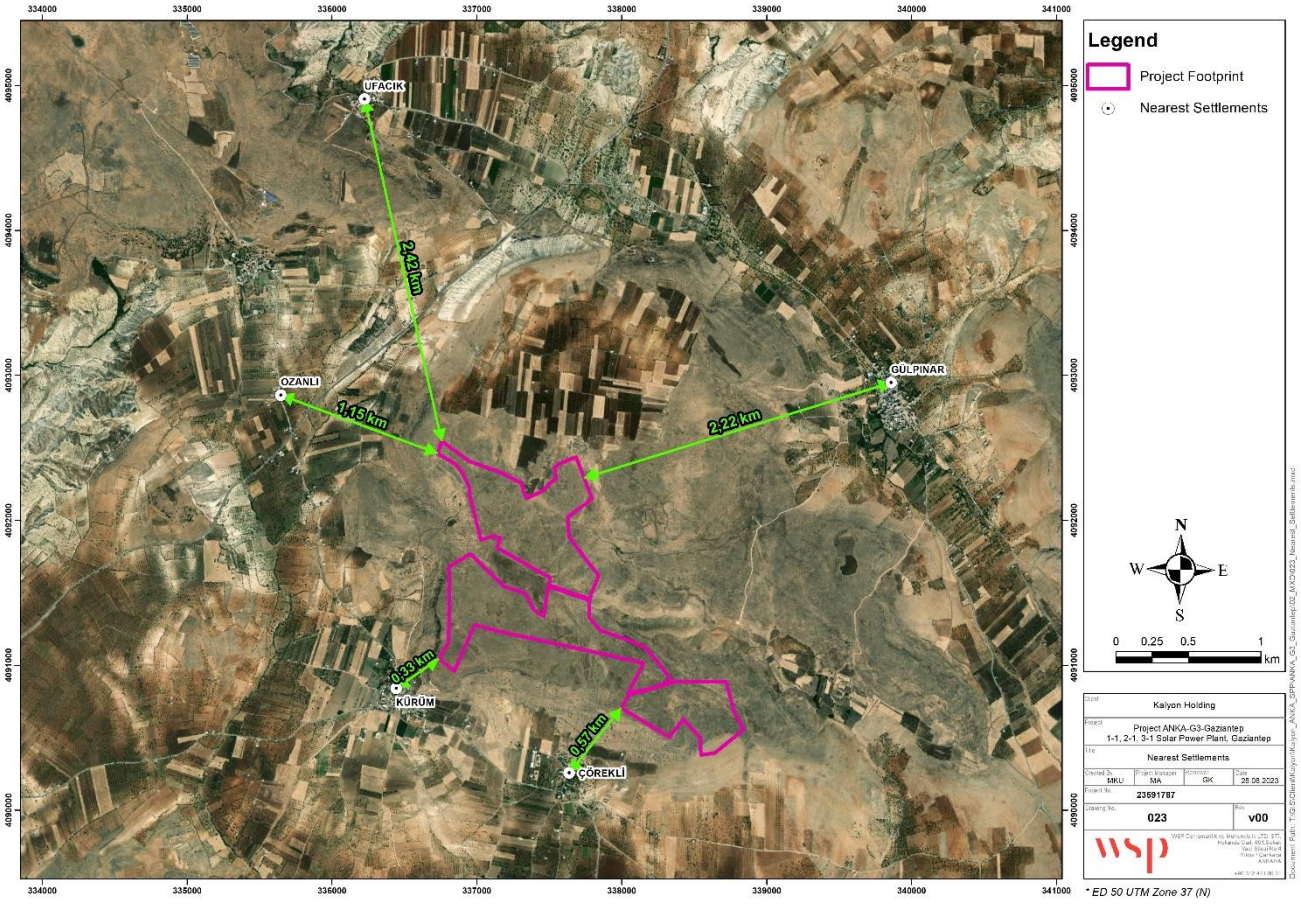


Figure 10-3 Map Showing Nearest Settlements to the Project Site

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.

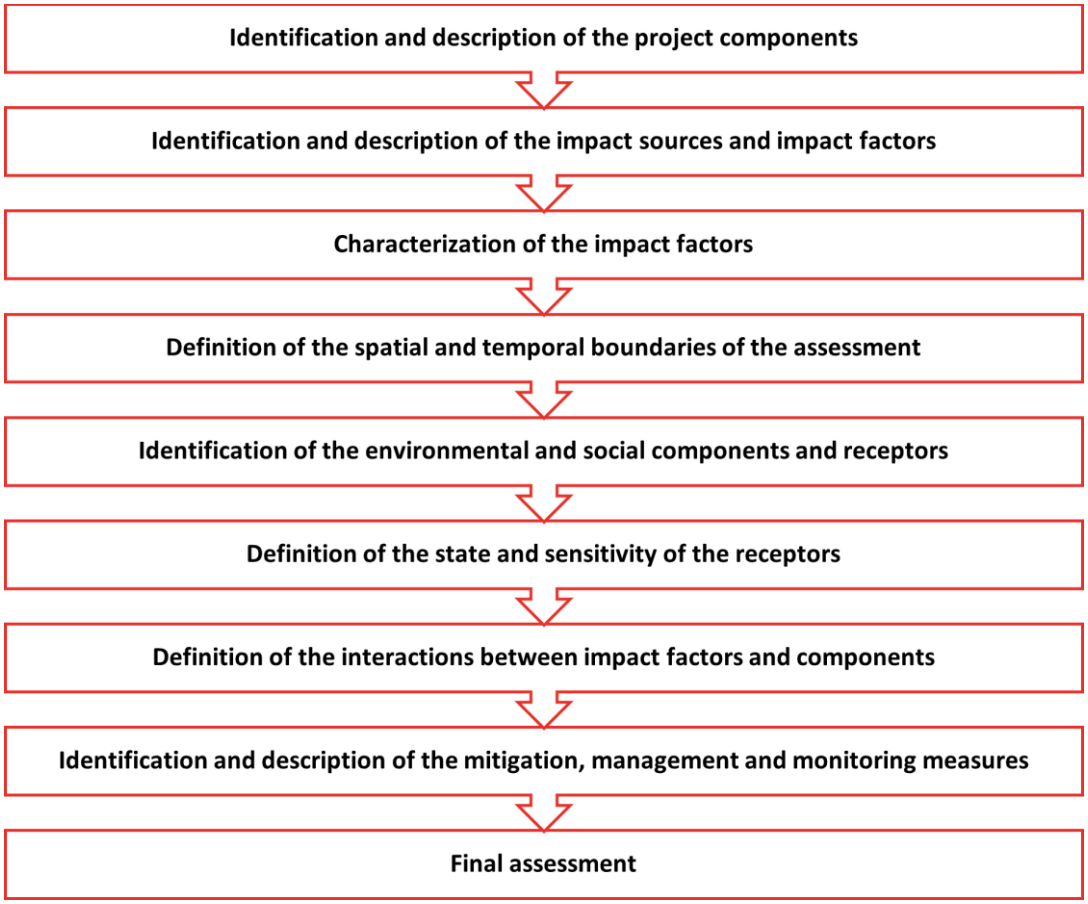


Figure 10-4: Impact Assessment Approach

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 ■ Labor 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.)

Relevant IFC PS	Plans / Procedures
	■ 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.

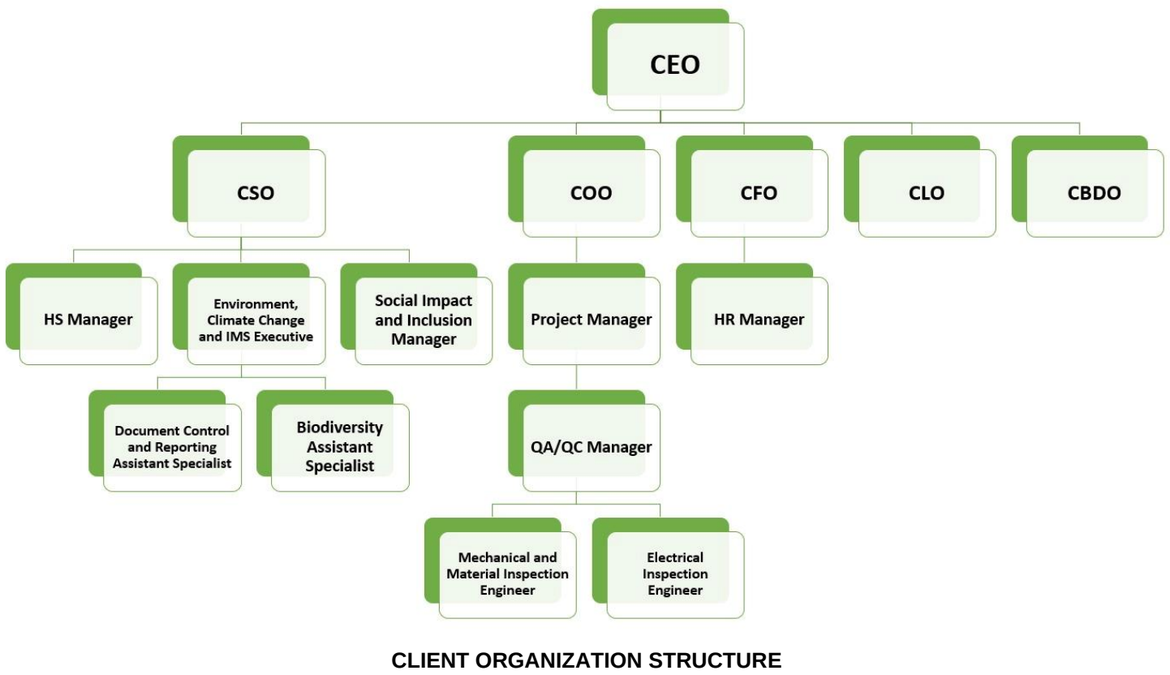
Each management plan has a similar structure, but the level of detail and complexity is appropriate to the expected impacts and risks of the Project identified in the ESIA. The mitigation measures identified in the relevant sections of the ESIA are included in each management plan, which will be disclosed 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.

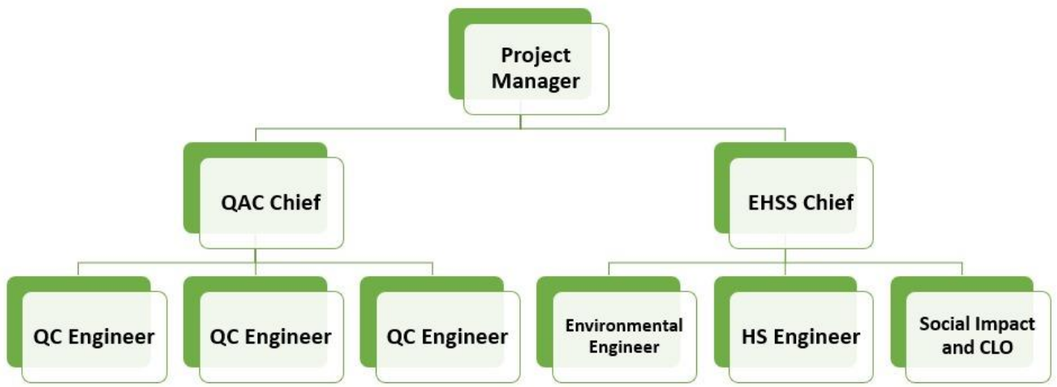
10.6 Organisational Structure and Competency

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 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 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 Gaziantep 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 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 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.	

Component	Phase	Project action	Mitigation measures	Monitoring measures

	Operation	Plant/infrastructure operation	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.
				■ 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

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 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; ■ 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; ■ Engine covers will be kept closed when the equipment is in operation to minimize noise;	■ 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
			■ 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 ■	
	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 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	■ 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
			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 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.	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			▪ 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); ■ 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;	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ 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.	

	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.
			  ■ 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.
				■ 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
			▪ 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;	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ 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 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.
				■ Incident/accident reports
				■ Monitoring report results
				■ Visual Site inspection

Component	Phase	Project action	Mitigation measures	Monitoring measures
			▪ 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. ■ 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. ■ 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	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			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. ■ 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.	■ Groundwater monitoring results ■ Incident/accident reports ■ Monitoring report results ■ Visual Site inspection

Component	Phase	Project action	Mitigation measures	Monitoring measures
			▪ 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.	
	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
				▪ 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
			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.	

	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
				■ 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.	
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
Biological	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 and utilization of the existing modified habitat for placement of temporary facilities was prioritized as much as possible. ■ Natural vegetation clearance will be limited 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 before vegetation clearance to identify and eventually relocate fauna species. Company's Biodiversity Assistant Specialist will perform pre-construction surveys in the areas to be cleared (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 t Company's Biodiversity Assistant Specialist 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	■ Monitoring the presence and spreading of invasive flora species within and around the construction site at least twice a year during the vegetative season by an Company's Biodiversity Assistant Specialist and an extirpation campaign by an external expert in order to avoid the spreading of the invasive species, if necessary. ■ Observation, documenting and reporting the 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 auratus, Vormela peregusna, Rhinolophus mehelyi,* and *Rhinolophus euryale*), both within and around the AoI by photographic evidence by Company's Biodiversity Assistant Specialist responsible. ■ Accidents involving wildlife or the observation of live animal or carcasses along the access road or within the construction site will be recorded. If necessary, supplementary mitigation measures to deter wildlife from entering the site and to prevent roadkill will be implemented.

Component	Phase	Project action	Mitigation measures	Monitoring measures
			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 Golden Hamster (*Mesocricetus auratus*, EN-Restricted Range), 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 vegetation clearing, day 2 machinery and equipment bought to the working area, day 3 manual excavation, day 4 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. ■ Night works will be avoided (from 8 pm to 6 am) to reduce impacts on nocturnal fauna species; ■ The number and the speed of vehicle movements will be limited along the existing access roads. ■ 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”. ■ Speed limits and animal crossing signs will be installed on the access roads. ■ It will be avoided to accumulate stagnant water and organic waste within the construction site and on the roads, which 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 authorized personnel trained in reptile transport and/or Company’s Biodiversity Assistant Specialist for 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.	

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ 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.	

	Operation	Plant/infrastructure operation	■ The footprint of individual facilities will be minimised.
			■ Utilization of the existing modified habitat for placement of temporary facilities will be prioritized as much as possible.
			■ The areas occupied by the new permanent infrastructures will be fenced. Fencing will be modified so that a gap measuring 1 m in length and 10 cm in height from ground level is created every 100 m. This gap will allow animals to move in to and out of the project site, thus maintaining population transfer with populations located in areas outside of the project. All new fences will conform to this design..
			■ Non-polarizing white tape can be used around and across 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.
			■ 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.
			■ 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): orange lamps seen along roadsides;
			  ■ light emitting diodes (LEDs): light source of choice, emitted more directional, warmer color temperatures (~ 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
			■ 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.
				■ A floristic and vegetational monitoring including the presence and abundance of the flora species identified as species of conservation concern (*Symphytum aintabicum* and *Alopecurus utriculatus* subsp. *Gaziantepicus)* during the vegetative season by Company's Biodiversity Assistant Specialist
				■ Monitoring the presence and spreading of invasive flora species within and around the construction site at least twice a year during the vegetative season by an Company's Biodiversity Assistant Specialist and an extirpation campaign by an external expert in order to avoid the spreading of the invasive species, if necessary.
				■ 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 auratus and Vormela peregusna) by Company's Biodiversity Assistant Specialist.
				■ Recording the accidents involving wildlife or the observation of live animal or carcasses along the permanent access roads or in the areas occupied by permanent infrastructures

Component	Phase	Project action	Mitigation measures	Monitoring measures
			■ 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 maximize the success of the translocation operations	

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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. During the operation phase of the Project, in case the measurements are above the limit values, an annual measurement will be carried out to stay on the safe side.

Air Quality 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.

Removal of topsoil/soil, minor leakage of contaminants into soil, occupation of land and discharge of wastewater are potential impact factors to the soil and subsoil components. For mitigating these impact factors, detailed

measures have been developed as presented in Section 7.1.3. These residual impacts of *Soil and Subsoil components were* assessed as negligible and low during construction and operation phases.

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** with the proposed mitigation measures. Unlike other Project components, the *Economy and Employment* are expected to have **high and very positive** impact on both the construction and operation periods, respectively. Components on *Labor and Working Conditions were* assessed as **high** 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.

Regarding *Land Use components,* 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 continuous. In order to properly compensate the PAPs through the implementation of Community Development Plan, the impact on occupation of pasturelands is anticipated to decrease from **very high** to **medium** level.

The overall residual impacts for *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.

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/m^3)	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/m^3)	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/m^3)	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 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		

* 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	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

Activity	Start Date	Finish Date
Permitting		
Ministry Approval of Design	15-Jan-23	17-Feb-23
Construction Permit	19-Aug-23	21-Aug-23
Final Delivery Acceptance Certificate Application & Issuance	07-Oct-23	11-Oct-23
The signing of the YEKA Contract	01-Jul-21	-
Master Plan Approval	14-Apr-22	01-Jul-23
EMRA (EPDK) Pre-License Approval	01-Jul-22	21-Jul-22
Base Plan Approval of the Site	01-Apr-22	25-May-22
Environmental Impact Assessment Approval	01-Mar-22	25-Nov-22
Signing TEİAŞ Connection Agreement	16-Nov-22	19-Apr-23
Transfer of Land Ownership	18-Nov-22	18-Aug-23
Land Allocation Approval	21-Jul-23	20-Sep-23
Electricity Generation License Approval	19-Aug-23	28-Aug-23
Baseline Studies (Physical Measurements & Biodiversity Monitoring)	01-May-23	30-Jun-23
Engineering	**06-Sep-22**	**26-Aug-23**
SPP Engineering	28-Sep-22	24-Jun-23
Substation Contracting & Engineering	06-Sep-22	01-Jul-23
OHTL Contracting, Engineering	04-Oct-22	31-Mar-23
CCTV & Lighting Engineering	24-Jul-23	26-Aug-23
Procurement	**09-May-23**	**24-Nov-23**
Early Works	**24-Jul-23**	**03-Sep-23**
Earthworks on Site Surface	24-Jul-23	15-Aug-23
Reptile & Mammal Burrow Monitoring Prior to Earthworks	24-Jul-23	20-Aug-23
Mobilization Works	05-Aug-23	03-Sep-23
Construction	**27-Jul-23**	**05-Feb-24**
Solar System	27-Jul-23	05-Feb-24
Substation	01-Aug-23	08-Dec-23
OHTL	09-Nov-23	08-Dec-23
Test & Commissioning & Provisional Acceptance	**11-Sep-23**	**17-Feb-24**
Final Acceptance & Commercial Operation of SPP	-	17-Feb-24
Solar System	11-Sep-23	17-Feb-24
Substation	09-Dec-23	23-Dec-23
OHTL	19-Dec-23	23-Dec-23

APPENDIX D

List of Species

Flora Species

Family	Species	Global IUCN Status	Local IUCN Status	End./ RR	Lit./ Obs.
Amaryllidaceae	*Ixiolirion tataricun subsp. montanum*	-	-	-	Obs.
Anacardiaceae	*Pistacia khinjuk*	-	-	-	Lit.
Anacardiaceae	*Pistacia vera*	-	-	-	Lit.
Apiaceae	*Prangos meliocarpoides*	-	-	-	Lit.
Apiaceae	*Scandix iberica*	-	-	-	Lit.
Apiaceae	*Eryngium campestre*	-	-	-	Obs.
Apiaceae	*Eryngium creticum*	-	-	-	Obs.
Apiaceae	*Lagoecia cuminoides*	-	-	-	Obs.
Apiaceae	*Tordylium trachycarpum*	-	-	-	Obs.
Apiaceae	*Torilis tenella*	-	-	-	Obs.
Asteraceae	*Anthemis tricornis*	-	NT	End.	Obs.
Asteraceae	*Carduus pycnocephalus*	-	-	-	Obs.
Asteraceae	*Echinops viscosus*	-	-	-	Obs.
Asteraceae	*Gundelia tournefortii*	-	-	-	Obs.
Asteraceae	*Tragopogon longirostris*	-	-	-	Obs.
Asteraceae	*Centaurea solstitialis*	-	-	-	Lit.
Asteraceae	*Lactuca serriola*	-	-	-	Lit.
Asteraceae	*Picris kotschyi*	-	-	-	Lit.
Asteraceae	*Ptilostemon diacantha*	-	-	-	Lit.
Asteraceae	*Serratula cerinthifolia*	-	-	-	Lit.
Boraginaceae	*Anchusa aucheri*	-	-	-	Lit.
Boraginaceae	*Echium italicum*	-	-	-	Lit.
Boraginaceae	*Onosma sericea*	-	-	-	Lit.
Boraginaceae	*Alkanna hirsutissima*	-	-	-	Obs.
Boraginaceae	*Symphytum aintabicum*	-	VU	End./ RR	Obs.
Brassicaceae	*Erysimum smyrnaeum*	-	-	-	Obs.
Cistaceae	*Helianthemum salcifolium*	-	-	-	Obs.
Fabaceae	*Trifolium campestre*	-	-	-	Obs.
Fabaceae	*Trifolium pilulare*	-	-	-	Obs.
Fabaceae	*Trifolium stellatum*	-	-	-	Obs.
Lamiaceae	*Phlomis bruguieri*	-	-	-	Obs.
Lamiaceae	*Phlomis linearis*	-	LC		Obs.
Lamiaceae	*Sideritis libanotica subsp. microchlamys*	-	-	-	Obs.
Lamiaceae	*Teucrium multicaule*	-	-	-	Obs.
Lamiaceae	*Ziziphora capitata*	-	-	-	Obs.
Plumbaginaceae	*Acantholimon acerosum*	-	-	-	Lit.
Poaceae	*Aegilops biuncialis*	-	-	-	Obs.
Poaceae	*Alopecurus utriculatus subsp. gaziantepicus*	-	CR	End./ RR	Obs.
Poaceae	*Avena sterilis*	-	-	-	Obs.
Poaceae	*Bromus japonicus*	-	-	-	Obs.

Family	Species	Global IUCN Status	Local IUCN Status	End./ RR	Lit./ Obs.
Poaceae	*Cornucopiae cucullatum*	-	-	-	Obs.
Poaceae	*Dactylis glomerata*	-	-	-	Obs.
Poaceae	*Echinaria capitata*	-	-	-	Obs.
Poaceae	*Festuca valesiaca*	-	-	-	Obs.
Poaceae	*Hordeum bulbosum*	-	-	-	Obs.
Poaceae	*Poa bulbosa*	-	-	-	Obs.
Poaceae	*Taeniatherum caput-medusae*	-	-	-	Obs.
Poaceae	*Aegilops speltoides*	-	-	-	Lit.
Poaceae	*Avena wiestii*	-	-	-	Lit.
Poaceae	*Bromus tomentellus*	-	-	-	Lit.
Poaceae	*Chrysopogon gryllus*	-	-	-	Lit.
Rhamnaceae	*Paliurus spina-christi*	-	-	-	Lit.
Rosaceae	*Rosa canina*	-	-	-	Obs.
Rosaceae	*Rosa pulverulenta*	-	-	-	Lit.
Rosaceae	*Crataegus monogyna*	-	-	-	Lit.
Rosaceae	*Crataegus aronia*	-	-	-	Lit.
Rubiaceae	*Salix triandra*	-	-	-	Lit.
Scrophulariaceae	*Veronica scardica*	-	-	-	Lit.
Scrophulariaceae	*Parentucellia latifolia subsp. flaviflora*	-	-	-	Obs.
Solanaceae	*Solanum alatum*	-	-	-	Lit.
Valerianaceae	*Valerianella vesicaria*	-	-	-	Obs.

Amphibian species

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.
Bufonidae	*Bufotes viridis sitibundus*	DD	-	Obs
Ranidae	*Pelophylax ridibundus*	LC	-	Obs

Reptile species

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.
Lacertidae	Apathya cappadocica	LC	-	Obs
Lacertidae	*Ophisops elegans*	LC	-	Obs
Colubridae	*Platyceps najadum*	LC	-	Obs
Scincidae	*Heremites auratus*	LC	-	Obs
Testudinidae	*Testudo graeca*	VU	-	Obs
Agamidae	*Laudakia stellio*	LC	-	Obs
Colubridae	*Eirenis eiselti*	LC	-	Obs
Viperidae	*Macrovipera lebetinus*	LC	-	Obs
Colubridae	*Natrix tessellata*	LC	-	Obs
Gekkonidae	*Mediodactylus orientalis*	LC	-	Obs

Bird Species

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.
Ciconiidae	Ciconia ciconia	LC	-	Obs.
Accipitridae	*Pernis apivorus*	LC	-	Obs.
Accipitridae	*Milvus migrans*	LC	-	Obs.
Accipitridae	*Circaetus gallicus*	LC	-	Obs.
Accipitridae	*Accipiter nisus*	LC	-	Obs.
Accipitridae	*Buteo rufinus*	LC	-	Obs.
Falconidae	*Falco tinnunculus*	LC	-	Obs.
Columbidae	*Columba livia*	LC	-	Obs.
Columbidae	*Streptopelia decaocto*	LC	-	Obs.
Columbidae	*Streptopelia turtur*	VU	-	Obs.
Cuculidae	*Cuculus canorus*	LC	-	Obs.
Strigidae	*Athene noctua*	LC	-	Obs.
Caprimulgidae	*Caprimulgus europaeus*	LC	-	Obs.
Apodidae	*Apus apus*	LC	-	Obs.
Apodidae	*Tachymarptis melba*	LC	-	Obs.
Meropidae	*Merops apiaster*	LC	-	Obs.
Coraciidae	*Coracias garrulus*	LC	-	Obs.
Upupidae	*Upupa epops*	LC	-	Obs.
Alaudidae	*Calandrella brachydactyla*	LC	-	Obs.
Alaudidae	*Galerida cristata*	LC	-	Obs.
Hirundinidae	*Hirundo rupestris*	LC	-	Obs.
Hirundinidae	*Hirundo rustica*	LC	-	Obs.
Hirundinidae	*Hirundo daurica*	LC	-	Obs.
Turdidae	*Saxicola rubetra*	LC	-	Obs.
Turdidae	*Oenanthe isabellina*	LC	-	Obs.
Turdidae	*Oenanthe oenanthe*	LC	-	Obs.
Turdidae	*Oenanthe hispanica*	LC	-	Obs.
Turdidae	*Turdus merula*	LC	-	Obs.
Sylviidae	*Hippolais pallida*	LC	-	Obs.
Sylviidae	*Sylvia communis*	LC	-	Obs.
Muscicapidae	*Muscicapa striata*	LC	-	Obs.
Sittidae	*Sitta neumayer*	LC	-	Obs.
Laniidae	Lanius collurio	LC	-	Obs.
Laniidae	Lanius senator	LC	-	Obs.
Corvidae	*Pica pica*	LC	-	Obs.
Corvidae	*Corvus monedula*	LC	-	Obs.
Corvidae	*Corvus frugilegus*	LC	-	Obs.
Corvidae	*Corvus corone*	LC	-	Obs.
Sturnidae	*Sturnus vulgaris*	LC	-	Obs.
Passeridae	*Passer domesticus*	LC	-	Obs.
Passeridae	*Petronia petronia*	LC	-	Obs.

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.
Fringillidae	*Carduelis carduelis*	LC	-	Obs.
Fringillidae	*Carduelis cannabina*	LC	-	Obs.
Emberizidae	*Emberiza hortulana*	LC	-	Obs.
Emberizidae	*Emberiza melanocephala*	LC	-	Obs.
Emberizidae	*Miliaria calandra*	LC	-	Obs.

Mammal species

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.	Lit./ Obs.
Rhinolophidae	*Rhinolophus mehelyi*	VU	Mehely Nalburunlu Yarasası	H	VU
Cricetidae	*Mesocricetus auratus*	VU	Suriye Hamsteri	H	VU
Mustelidae	*Vormela peregusna*	VU	Alaca Sansar	H	VU
Erinaceidae	*Erinaceus concolor*	LC	Kirpi	O	LC
Erinaceidae	*Hemiechinus auritus*	LC	Uzunkulaklı Kirpi	H	LC
Soricidae	*Crocidura suaveolens*	LC	Küçük Beyazdişli Böcekçil	H	LC
Soricidae	*Crocidura leucodon*	LC	Çiftrenkli Böcekçil	H	LC
Rhinolophidae	*Rhinolophus ferrumequinum*	LC	Büyük Nalburunlu Yarasa	H	LC
Rhinolophidae	*Rhinolophus hipposideros*	LC	Küçük Nalburunlu Yarasa	H	LC
Rhinolophidae	*Rhinolophus euryale*	NT	Akdeniz Nalburunlu Yarasası	H	NT
Vespertilionidae	*Myotis myotis*	LC	Farekulaklı Büyük Yarasa	H	LC
Vespertilionidae	*Myotis blythii*	LC	Farekulaklı Küçük Yarasa	H	LC
Vespertilionidae	*Pipistrellus pipistrellus*	LC	Adi Yarasa	H	LC
Vespertilionidae	*Pipistrellus kuhlii*	LC	Beyazşeritli Yarasa	H	LC
Vespertilionidae	*Eptesicus bottae*	LC	Akdeniz Genişkanatlı Yarasası	H	LC
Vespertilionidae	*Plecotus macrobullaris*	LC	Uzunkulaklı Kafkas Yarasası	H	LC
Miniopteridae	*Miniopterus schreibersii*	NT	Uzunkanatlı Yarasa	H	NT
Molossidae	*Tadarida teniotis*	LC	Kuyruklu Yarasa	H	LC
Leporidae	*Lepus europaeus*	LC	Yaban Tavşanı	O	LC
Cricetidae	*Microtus guentheri*	LC	Gunther Faresi	O	LC
Cricetidae	*Microtus elbeyli*	DD	Elbeyli Tarlafaresi	O	DD
Cricetidae	*Gerbillus dasyurus*	LC	Kayalık Gerbili	H	LC
Cricetidae	*Meriones tristrami*	LC	Türkiye Çöl Sıçanı	O	LC

Family	Species	Global IUCN Status	End./ RR	Lit./ Obs.	Lit./ Obs.
Spalacidae	*Nannospalax ehrenbergi*	DD	Sarıdişli Körfare	O	DD
Muridae	*Apodemus mystacinus*	LC	Kaya Faresi	H	LC
Muridae	*Apodemus flavicollis*	LC	Sarı Boyunlu Ormanfaresi	O	LC
Muridae	*Rattus rattus*	LC	Ev Sıçanı	H	LC
Muridae	*Rattus norvegicus*	LC	Göçmen Sıçan	H	LC
Muridae	*Mus macedonicus*	LC	Sarı Evfaresi	H	LC
Muridae	*Mus musculus*	LC	Ev Faresi	H	LC
Hystricidae	*Hystrix indica*	LC	Oklu Kirpi	A	LC
Canidae	*Canis aureus*	LC	Çakal	A	LC
Canidae	*Vulpes vulpes*	LC	Kızıl Tilki	O	LC
Mustelidae	*Mustela nivalis*	LC	Gelincik	H	LC
Mustelidae	*Martes foina*	LC	Kaya Sansarı	O	LC
Suidae	*Sus scrofa*	LC	Yaban Domuzu	A	LC

Signature Page

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